IQEC/LAT 2002 home page

Mark your calendar for

IQEC 2002
International Quantum Electronics Conference
collocated with

LAT 2002
Conference on Lasers, Applications and Technologies

Moscow, Russia
22-28 June, 2002

PSAS 2002
Satellite conference on Precision Physics of Simple Atomic Systems
St. Petersburg, Russia
June 30 - July 4, 2002

Address of the conference site: Presidium Building of the Russian Academy of Sciences, Leninsky ave. 32a ("Leninsky Prospekt" metro stop, across Gagarin Square). Registration area is located in the foyer of the Conference Hall (Bol'shoi Kinokontsertny Zal, BKZ).
Registration Hours: June 21 -- 14:00-18:00, June 22-26 -- 8:00-18:00, June 27 -- 8:00-16:00

IQEC/LAT 2002 is sponsored by

American Physical Society

Optical Society of America

IEEE/Lasers and Electro-Optics Society

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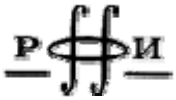

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Objectives and scope

The International Quantum Electronics Conference (IQEC 2002) and the Conference on Lasers, Applications, and Technologies (LAT 2002) will be held concurrently, June 22–28, 2002 at the Presidium Building of the Russian Academy of Sciences (RAS), Moscow, Russia.

The International Quantum Electronics Conference (IQEC) is the largest international conference featuring the fundamentals of quantum electronics, basic research in lasers, nonlinear and quantum optics, quantum information, and fundamental laser spectroscopy of atoms and condensed matter. IQEC 2002 is organized by the Russian Academy of Sciences and M. V. Lomonosov Moscow State University under the aegis of the International Council on Quantum Electronics (ICQE).

The Conference on Lasers, Applications, and Technologies (LAT) provides a forum for an update and review of a wide range of laser technologies and applications including laser device development, processing of advanced materials, optical information technologies, biomedicine and ecology applications. The meeting serves to stimulate the use of more mature optical technologies in different fields. LAT 2002 is organized by the Russian Academy of Sciences, Ministry of Industry, Science and Technology of the Russian Federation, and SPIE/Russia.

The IQEC/LAT 2002 exhibit will provide attendees with the opportunity to explore innovative solutions to the technical challenges faced by research and applied scientists, engineers, and managers from industry, academia, and government.

Within the frame of IQEC/LAT 2002 will also be organized the Conference for Young Scientists and Engineers (IQEC/LAT-YS 2002), which topics will coincide with those of IQEC/LAT 2002. The conference format will include sessions of poster presentations delivered by young participants-students and scientists up to 28 years-either entering the field or already actively working there. The participants of the conference will also have an advantage to participate in the scientific program of the IQEC/LAT 2002. The best papers will be presented with best conference paper awards. A limited number of travel grants will be available.

IQEC 2002 Organizing Committee

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Program Committee

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3. High-resolution spectroscopy and high-precision measurements

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5. Quantum information and quantum computing

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6. Cold atoms and atomic optics

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V. Yakovlev, *Moscow Inst. of Physics and Engineering*, Russia
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7. Ultrafast phenomena

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W. Zinth, *Univ. of Munich*, Germany

8. Superstrong laser fields and their interaction with matter

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S. Watanabe, *Univ. of Tokyo*, Japan

9. Physics and optical diagnostics of nanostructures

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C. C. Davis, *Univ. of Maryland*, USA
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R. Wehrspohn, *Max-Plank-Ist. for Microstructure Physics*, Germany
N. I. Zheludev, *Univ. of Southampton*, UK

10. Laser biomedicine and chemistry

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IQEC-2002 Symposium on "Entangled States: Fundamentals and Applications"
L. Lugiato, *Universita del 'Insubria*, Italy, ***Co-Chair***
A. V. Sergienko, *Boston University*, USA, ***Co-Chair***
V. N. Zadkov, *Moscow State University*, Russia, ***Co-Chair***

IQEC-2002 Symposium on "Light-Induced Phase Transitions and Optical Switching"
N. I. Zheludev, *University of Southamption*, UK, ***Chair***

IQEC-2002 Symposium on "Photonic Crystals"
Philip St. J. Russell, *University of Bath*, UK, ***Co-Chair***
Costas M. Soukoulis, *Iowa State University*, USA, ***Co-Chair***
Aleksei M. Zheltikov, *Moscow State University*, Russia, ***Co-Chair***

Program highlights

IQEC/LAT PLENARY SPEAKERS

Quantum dots heterostructure lasers: state-of-the-art and future trends, Zhores Alferov, Ioffe Physical-Technical Inst., Russia

Overview of super-strong-laser-field problems, Toshi Tajima, Stanford Linear Accelerator Center, Stanford Univ., USA

Quantum Interference of Macromolecules, Anton Zeilinger, Univ. of Vienna, Austria

TUTORIAL SPEAKERS

Spectroscopy approaches to atom-dielectric nanostructures interactions, Martial Ducloy, Univ. Paris-Nord, France

Control and synchronization of homoclinic chaos and its implication for neurodynamics, F. Tito Arecchi, Univ. of Firenze, Italy

Precision measurements in gravitational physics, Vladimir B. Braginski, Moscow State Univ., Russia

Nonlinear optics with matter waves, Pierre Meystre, Univ. of Arizona, USA

Atom and nanoparticles, Vladilen Letokhov, Inst. of Spectroscopy, Russia

Adaptive femtosecond quantum control--principles and applications, Gustav Gerber, Univ. Wuerzburg, Germany

Generation and metrology of XUV attosecond pulses, Pierre Agostini, Centre d'Etudes de Saclay, France

Ultrasound-Mediated Biophotonic Imaging, Lihong Wang, Texas A&M Univ., USA

Laser processing of dielectrics and polymers by a high repetition-rate, ultrashort-pulse, tunable mid-infrared laser, R.F.Haglund, Vanderbilt Univ., USA

IQEC INVITED SPEAKERS

Physics of Advanced and Novel Lasers

Laser Action in Space: FeII in the Gas Condensations in Vicinity of Eta Carinae, S.Johansson and V.S. Letokhov, Lund University, Sweden, and Inst. of Spectroscopy, Russia

Ultrahigh power laser program in Japan, Yasukazu Izawa, Osaka Univ., Japan

Optical parametric chirped pulse amplification-a new way to high peak power, Ian Ross, Rutherford Appelton Lab, UK

Discharge pumped rare gas excimer lasers in the vacuum ultraviolet spectral region, Wataru Sasaki, Univ. of Miyazaki, Japan

Polymer-filled nanoporous glass composite-a new class of materials for laser optics, Modest Koldunov, R&D Enterprise "Optronika", Russia, Dennis Pacheco, Physical Sciences Inc., USA

Quantum dot lasers and VCSELs for telecom applications, Victor Ustinov, Ioffe Physico-Technical Inst., Russia

Ultrahigh power lasers developments in Russia: State of the art and prospects, Alexander Sergeev, Inst. of Applied Physics, Russia

Novel results on table-top X-lasers, Juerg Balmer, Univ. of Berne, Switzerland

Pulse-periodic non-chain deuterium fluoride lasers, Sergey Velikanov, Russian Federal Nuclear Center, Russia

Study of ultra-short-pulse high-power laser driven x-ray sources at SIOM, Ruxin Li, Shanghai Inst. of Fine Mechanis, China

Diode pumped solid-state lasers in near infared and visible spectral region, Huber Gunter, Univ. of Hamburg, Germany

Nonlinear Optical Phenomena

Femtosecond coherent Raman spectroscopy, Wolfgang Kiefer, Univ. Wurzburg, Germany

Four-wave mixing and time-domain high-resolution spectroscopy in gas-phase Raman media, Vyacheslav B. Morozov, Moscow State Univ., Russia

Dynamic nonlinear effects in photonic band gap structures, Joseph W. Haus, The Univ. of Dayton, USA

Developments in synchronously pumped parametric oscillators, David C. Hanna, Univ. of Southampton, UK

Control and measurement of electric fields on the femtosecond time scale, Jie Shan, Columbia Univ., USA

Attosecond pulse physics, Nenad Milosevic, Vienna Univ. of Technology, Austria

Effects of self-frequency conversion in nonlinear-laser chi^(2)+chi^(3) and chi^(3) crystals: new results and applied aspects, Alexander A. Kaminskii, Inst. of Crystallography, Russia

Cavity solitons as pixels in semiconductor, Massimo Giudici, Inst. Nonlineaire de Nice, France

High-Resolution Spectroscopy and High-Precision Measurements

Optical time pieces using a single, laser-cooled Hg ion, James Bergquist, NIST, USA

Cold atom space clocks and applications, Christophe Salomon, Ecole Normale Superieure, France

High-resolution spectroscopy of solid hydrogen: Towards the new perspectives in optical physics, Kohzo Hakuta, Univ. of Electro-Communications, Japan

Light interference from single atoms and their mirror images, Rainer Blatt, Univ. Insbruck, Austria

Precision Measurement of the n=2 triplet P fine structure in helium: A determination of the fine-structure constant, Eric Hessels, York Univ., Canada

High resolution spectroscopy of a single In^+ ion - towards an optical frequency standard, Joachim von Zanthier, Max-Planck Inst. of Quantum Optics, Germany

High-resolution spectroscopy of strontium atoms in optical lattices, Hidetoshi Katori, Univ. of Tokyo, Japan

Tapping and confinement of cold Yb and Cs atoms for the precise measurement of atomic EDM, Tsutomu Yabuzaki, Kyoto Univ., Japan

Fundamental tests using laser cooled Rb and Cs clocks, Andre Clairon, LPTF, France

An octupole frequency standard in a single ytterbium ion, Stephen Webster, National Physical Lab, UK

Multiple wavelength interferometry for absolute distance measurements, Rene Dandliker, Univ. of Neuchatel, Switzerland

Optical frequency synthesizer and clock, Jun Ye, JILA/NIST, USA

Stabilization of milelocked lasers for metrology, Steven Cundiff, JILA/NIST, USA

Femtosecond optical clock by using frequency comb, V. S. Pivtsov, Inst. of Laser Physics, Russia

Quantum Optics

Generation of polarization squeezed and entangled light beams, Elisabeth Giacobino, Univ. Pierre et Marie Curie, France

Interference of biphoton light: Spectroscopy and communication applications, Sergei P. Kulik, Moscow State Univ., Russia

Quantum optics and quantum information, Mikhail Lukin, Harvard-Smithsonian Center for Astrophysics, USA

Photon echo phenomenon and light storage, Igor Yevseyev, Moscow State Engineering Physics Inst. Russia

Quantum catastrophes, Ulf Leonhardt, Univ. of Saint Andrews, Scotland

Superradiance revisited or what does Nature do with 2^N dimensions?, Howard Carmichael, Oregon Univ., USA

Quantum communication with entangled states of atoms and light, Eugene Polzik, Aarhus University, Denmark

Single photons and entangled photons from a quantum dot microcavity, Y. Yamamoto, Stanford Univ., USA

Hyperentangled-photon cryptography, Alexander Sergienko, Boston Univ., USA

Quantum Information and Quantum Computing

Non-holonomic quantum computations with ions, Luming Duan, Univ. of Innsbruck, Austria

Quantum-state manipulation and detection of trapped atomic ions, David Wineland, NIST, USA

Information in quantum world: An insight into fundamental problems of physics, Boris A. Grishanin, Moscow State Univ., Russia

Ultra-long range free-space quantum cryptography: technologies and trials, John Rarity, Lasers and Photonics, QinetiQ, UK

Cold Atoms and Atom Optics

All optical formation of an atomic Bose-Einstein condensate, M. Chapman, Georgia Inst. of Technology, USA

Bose-Einstein condensation in a magnetic micro trap, Claus Zimmermann, Univ. Tubingen, Germany

Single atom manipulation in a dipole trap, Victor Gomer, Univ. Bonn, Germany

Coherent matter in optical Lattices: First observation of a superfluid-Mott insulator transition, Immanuel Bloch, Max-Planck-Inst. of Quantum Optics, Germany

The problems of nonlinear dynamics of an atom laser, Anatoly N. Oraevski, P.N.Lebedev Physical Inst., Russia

Quantum phase transition from a superfluid to a Mott insulator in a gas of ultracold atoms, Markus Greiner, Univ. of Munich, Germany

Decelerating and trapping and neutral dipolar molecules, Gerard Meijer, FOM-Institute for Univ. of Nijmegen, the Netherlands

Ultrafast Phenomena

Coulomb explosion of clusters induced with intense femtosecond lasers, Shuji Sakabe, Osaka Univ., Japan

Ultrafast carrier dynamics in correlated materials and high-temperature superconductors, R. A. Kaindl, Lawrence Berkeley National Lab, USA

Generation of intense sub-4 fs pulses in the visible using molecular modulation, Georg Korn, Max-Born-Inst., Germany

The control of the carrier-envelope phase shift in few-cycle pulses, Alexander Apolonski, Technische Univ. Wien, Austria

Polariton spectroscopy in semiconductor microcavity, Eugene Vinogradov, Inst. of Spectroscopy, Russia

Superstrong Laser fields and their Interaction with Matter

Physics and applications of relativistic plasmas driven by ultra-intense lasers, Donald Umstadter, Univ. of Michigan, USA

Laser induced nuclear physics at intensities up to 10^{23} W cm^{-2}, Kenneth W. D. Ledingham, Univ. of Glasgow, UK

Lasers in astrophysics, Hideake Takabe, Osaka Univ., Japan

Atoms and molecules in strong laser fields, Hartmut Schroder, Max-Planck Inst. of Quantum Optics, Germany

Low-energy nuclear processes using femtosecond laser plasma, Andrei Savel'ev, Moscow State Univ., Russia

Guiding of superstrong femtosecond laser pulses through the gas filled dielectric capillary tubes, Andrei Stepanov, Inst. of Applied Physics, Russia

Relativistic mehanisms of high harmonic generation, Sergey Bulanov, General Physics Inst., Moscow

Strong field non-sequential multiple ionization: At and far below the threshold for impact ionization, Horst Rottke, Max-Born-Inst., Germany

Multichrged molecular ions probed by femtosecond laser-induced Coulomb explosion, Christian Cornaggia, CEA Saclay, France

Multi-TW Laser "Progress-P": upgrade and laser-plasma interaction, Alexander Charukchev, Research Inst. for Complex Testing of Optoelectronic Devices and Systems, Russia

Absolute-phase effects of few-cycle laser pulses, Gerhard Paulus, Max-Planck-Inst. for Quantum Optics, Germany

New advances in laser pulse propagation and filamentation, See L. Chin, Laval Univ., Canada

Table-top femtosecond laser kHz sources of hard x-rays and energetic particles, Martin Richardson, CREOL, Univ. of Central Florida, USA

Physics and Optical Diagnostincs of Nanostructures

Fiber optics using photonic crystal materials, Jonathan C. Knight, Univ. of Bath, UK

Plasmonic nanomaterials for photonics, Vladimir Shalaev, New Mexico State Univ., USA

Femtosecond interactions in strongly-confined quantum dots, Victor Klimov, LANL, USA

2D photonic crystals of LATEX and their near-field response, Tadashi, Itoh, Osaka Univ., Japan

New optical phenomena for exciton system in quantum wells, Yuri E. Lozovik, Inst. of Spectroscopy, Russia

Engineering of photonic crystal heterostructures from opaline films, Clivia M. Sotomayor Torres, Univ. of Wuppertal, Germany

Photon correlation spectroscopy of single quantum dots, Atac Imamoglu, Univ. of California, USA

Concepts of Photonic Structure Generation by Atomic Nanofabrication, Dieter Meschede, Univ. of Bonn, Germany

Photonic band gaps in systems without periodic order, photonic quasicrystals, amorphous photonic band gap materials, and photonic fractals, Che Ting Chan, Hong Kong Univ. of Science and Technology, Hong Kong

Defect-deformational nanostructuring of solid surface under laser action, Vladimir I. Emel'yanov, Moscow State Univ., Russia

Lasing in disordered nanostructures, Hui Cao, Nothwestern Univ., USA

Laser Biomedicine and Chemistry

Intravascular imaging with OCT, Brett E. Bouma, Harvard Medical School, USA

New laser applications for reshaping and medical treatment of cartilages, Emil Sobol, Inst. on Laser and Information Technologies, Russia

Quantification of tissue properties using two-photon microscopy: An information Science, Peter T. C. So, M.I.T., USA

Extending the imaging capabilities of confocal microscopes, Tony Wilson, Oxford Univ., UK

Light scattering spectroscopy for diagnostics, Lev T. Perelman, Harvard Medical School, USA

Phase resolved functional optical coherence tomography: Technology and applications, Zhongping Chen, Beckman Laser Inst., USA

Biological Sensors and Enzymes on the Femtosecond Time Scale, Jean-Louis Martin, Ecole Polytechnique-ENSTA, France

Optics of blood and laser diagnostics of cardiovascular and oncological diseases, Alexander Priezzhev, Moscow State Univ., Russia

To the problem of biological activity of laser light: importance of spatial gradients, A.N. Rubinov, A.A. Afanas'ev, Institute of Physics, Belarus

IQEC SPECIAL SYMPOSIA

Special Symposium on Entangled States: Fundamentals and Applications

Organizers: Luigi Lugiato, Univ. del 'Insubria, Italy; Alexander V. Sergienko, Boston Univ., USA; Victor N. Zadkov, Moscow State Univ., Russia

Quantum tomography, Malvin C. Teich, Boston Univ., USA

Spatial squeezing and entanglement in quantum information, Ivan V. Sokolov, St. Petersburg State Univ., Russia

Is entanglement a resource for quantum metrology? Paolo Tombesi, Univ. degli Studi di Camerino, Italy

Quantum holography, Bahaa E. A. Saleh, Boston Univ., USA

Decoherence and deentanglement of optical fields, Sergey Ya. Kilin, Stepanov Inst. of Physics, Belarus

Entanglement and non-locality, Gunnar Bjork, Lab. of Quantum Electronics and Quantum Optics, Sweden

Spin squeezing, Anders Sorensen, Aarhus Univ., Denmark

Quantum Properties of Non-linear Interferometers, Gerd Leuchs, Univ. Erlangen-Nurnberg, Germany

Efficient linear optical quantum computation, Andrew White, The Univ. of Queensland, Australia

Quantum Images: spatial entanglement of quantum fluctuations in light, and its applications, Claude Fabre, University Pierre et Marie Curie, France

Entanglement entropy and spatial patterns of spontaneous single photons, Chi-Kwong Law, Chinese Univ. of Hong Kong, Hong Kong

Quantum searching--with and without entanglement, Suhail M. Zubairy, Texas A&M Univ., USA

Special Symposium on Light-Induced Phase Transitions and Optical Switching

Organizer: Nikolai I. Zheludev, Univ. of Southamption, UK

Femtosecond dynamics of photo-induced phenomena in low dimensional systems, Tohru Suemoto, Univ. of Tokyo, Japan

Photo-induced cooperative phenomena in inorganic and organic semiconductors, Shin-ya Koshihara, Tokyo Inst. of Technology, Japan

Microscopic analysis of laser induced phase transitions in carbon and silicon, Harald Jeschke, Free Univ. of Berlin, Germany

Photo-induced phase-transition in quantum paraelectric oxides, Koichiro Tanaka, Kyoto Univ., Japan

Structural dynamics of photo-induced phase transitions as measured with femtosecond x-rays, Andrea Cavalleri, Lawrence Berkeley Nat. Lab., USA

Light-induced transient band gap collapse in semiconductors for all-optical switching, Junichiro Kono, Rice Univ., USA

Photoresistivity in a charge-density-wave material, Kenjiro Miyano, Univ. of Tokyo, Japan

Photonics of structural transformations in Ga nanoparticles, Kevin MacDonald, Univ. of Southampton, UK

Dynamics of Electron-hole liquid formation in direct- and indirect-gapsemiconductors, Makoto Kuwata-Gonokami, Univ. Tokyo, Japan

Ultrafast x-ray spectroscopy: new possibilities to study dynamics in laser-excited materials, Klauss Sokolowski-Tinten, Univ. of Essen, Germany

Laser-induced phase transformations on a nanoscale, Vladislav Yakovlev, Univ. of Wisconsin, USA

The destruction of magnetism in FeBO3 by ultrafast laser excitation, Roman Pisarev, Ioffe Physical Technical Inst., Russia

Photo-induced effect of quantum paraelectric system in perovskite oxides, Masaki Takesada, Hokkaido Univ., Japan

Special Symposium on Photonic Crystals

Organizers: Philip St. J. Russell, Univ. of Bath, UK; Costas M. Soukoulis, Iowa State Univ., USA; Aleksei M. Zheltikov, Moscow State Univ., Russia

Harmonic generation in 1-D photonic band structures: effective medium approach, Charles M. Bowden, U. S. Army Aviation & Missile Research, Development, & Engineering Center, USA

Supercontinuum generation in photonic crystal fibers using stimulated Raman scattering and four wave mixing, John Harvey, Univ. of Auckland, New Zealand

Toward photonic crystals through nanostructuring of semiconductors, Pavel K. Kashkarov, Moscow State Univ., Russia

2D planar photonic crystals as nonlinear resonant cavities, Jeff Young, Univ. of British Columbia, Canada

Nonlinear photonic crystals, Yuri S. Kivshar, Australian National Univ., Australia

Photon density of states effects on spontaneous Raman scattering in mesoscopic structures, Sergey V. Gaponenko, Inst. of Molecular and Atomic Physics, Belarus

Photonic crystals, microstructures and nanostructures, Richard M. De La Rue, Univ. of Glasgow, UK

Properties and applications of photonic crystal fibers, William J. Wadsworth, Univ. of Bath, Bath, UK

LAT INVITED SPEAKERS

Advanced Lasers and Systems

Ultrashort pulses, high average power, U. Keller, Swiss Federal Inst. of Technology, Zurich, Switzerland

Recent progress for efficient ceramic lasers, K.-I. Ueda, Univ. of Electrocommunications, Japan

Optical fiber amplifiers, Y.-M. Delavaux, Key Optical Systems, Inc., France

CW fiber lasers in near IR range, E. M. Dianov, General Physics Inst., Russia

Cr^{2+} lasers, S. Kueck, Univ. of Hamburg, Germany

Excimer laser systems for refractive surgery, S. K. Vartapetov, Center of Physical Devices, Russia

Compensation of thermal lenses in high-power solid state lasers, T. Graf Univ. of Bern, Switzerland

High power planar wave guide lasers and amplifiers, D. R. Hall, H. Y. Baker, Heriot-Watt Univ., UK

DPSS laser systems for color TV projection, U. Krause, Jenoptik, Germany

High-power slab-shaped RF pumped industrial CO_2 lasers, A. Dutov, Inst. for Laser Physics, St.-Petersburg, Russia

Laser Systems for Precision Measurements

Accurate absolute frequency measurements across the optical spectrum using a single ion reference, Alan Madej, Inst. for National Measurement Standards, Canada

Narrow-linewidth lasers for frequency standards and metrology, P. Gill, National Physics Lab, UK

Frequency metrology and precision spectroscopy in the infrared, Paolo De Natale, National Inst. of Optics, Italy

Optical frequency standard based on a trapped Yb-171 ion, Ch. Tamm, PTB Braunschweig, Germany

Development of Borehole laser Strainmeter, Shoji Sakata, Nat. Research Inst. for Earth Science and Disaster Prevention, Japan

Applications of high stable lasers for precision measurements, L. F. Vitushkin, BIPM, France

Spectroscopy of cold Mg atom beam, A. N. Goncharov, Inst. of Laser Physics, Russia

Nd: YAG/I2 optical frequency standard and spectroscopy of I_2 near 532 nm, M.N.Skvortsov, Inst. of Laser Physics, Russia

Atom interferometry with ultra-cold Ca atoms, Uwe Sterr, PTB Braunschweig, Germany

Laser Applications in Medicine

LIF after excitation with ultrafast laser irradiation, the response of a single cell and the effect of its scattering environment, Theodore G. Papazoglou, European Commission, Research Directorate-General, Belgium

Photon-mediated nitric oxide biology, Juan Rodriguez, Centenary College and LSU Health Sciences Center, USA

Speckle-correlation diagnostics of non-stationary mass transfer and structural transitions in tissues, Dmitry Zimnykov, Saratov State Univ., Russia

High-resolution optical tomographic imaging of biological tissues: Problems and solutions, Ruikang K Wang, Keele Univ., UK

Long-distance biomodeling for cranio facial surgery and neurosurgery, Alexander Evseev, Inst. on Laser and Information Technologies, Russia

Transmiocardial laser revascularisation, Il'ya Berishvili, Bakulev Cardio-Surgery Ctr., Russia

Near-infrared lasers in treatment of deep, metastatic tumors using dye-enhanced selective photothermal interaction, Wei R. Chen, Univ. of Central Oklahoma, USA

Development of novel digital x-ray imaging techniques, Hong Liu, Univ. of Oklahoma, USA

New approaches in spectrum correlation tomography, Yu. T. Mazurenko, Res. Scientific Ctr. Vavilov Optical State Inst., Russia

Diffusion optical tomography, J. C. Schotland, Washington Univ., USA

Low-intensity laser therapy of cells, Tina Karu, Inst. of Laser and Information Technologies, Russia

Optical Information, Data Processing and Storage, and Laser Communication Technologies

Ultrafast nonlinear optical processing using femtosecond laser pulses, S. Fainman, Univ. of California, USA

Laser cryptography: quantum cryptography and cryptography based on optical chaos, J.-P. Goedgebuer, Univ. de Franche-Comte, France

Multiwave holography based on the nonlinear - optical transformations, D. Staselko, Res. Scientific Ctr. Vavilov Optical State Inst., Russia

Fiber optics signal processing, P. Bayvel, Univ. College London, UK

Magnetically programmable solitons for monolithically integrated circuits, A. D. Boardman, Univ. of Salford, UK

Optical multiplexors/demultiplexors on the base of Bragg gratings, V. Sokolov Inst. on Laser and Information Technologies, Russia

Laser Technologies for Environmental Monitoring and Ecological Applications

Remote sensing of wind, C. Werner, DLR-Oberpfaffenhofen, Germany

Femtosecond lidar technology in atmospheric study, L. Woeste, Freie Univ. Berlin, Germany

Laser monitoring of aerosol pollution of the atmosphere over industrial centers, Yu. S. Balin, Inst. of Atmospheric Optics, Russia

Synoptic studies of the Antarctic Ross Sea with the ENEA lidar fluorosensor, A. Palucci, Scientific Ctr. in Frascati, Italy

Advance in laser sensing of the middle atmosphere, V. Zuev, Inst. of Atmospheric Optics, Russia

Multiwavelength lidar sounding of atmospheric aerosol, A. Ivanov, Stepanov Inst. of Physics, Belarus

Laser Processing of Advanced Materials and Laser Microtechnologies

Theory of femtosecond laser ablation, S. Anisimov, Inst. of Theoretical Physics, Russia

Laser welding of polymers, F. Bachmann, Rofin-Sinar GmbH, Mainz, Germany

Basic processes in deep penetration laser material interaction, R. Fabbro, CLFA, France

Laser applications for biotechnical components, A. Gillner, Fraunhofer Inst. Lasertechnik, Germany

Laser processing of aluminum alloys, H. Hugel, Univ. of Stuttgart, Germany

Fs laser stereolithography for bio-MEMS (micro-TAS) fabrication, K. Ikuta, Univ. of Nagoya, Japan

Laser nano-optomechanics, P. Leiderer, Univ. of Konstanz, Germany

Near field and optical resonance effects in laser cleaning, B. Lukyanchuk, Data Storage Inst., Singapore

Controlled synthesis of nanoclusters and nanostructured oxide films by nano and femtosecond pulsed laser ablation, W. Marine, Univ. of Marseille, France

Laser deposition of thin films of doped chalcogenite glass for electrooptical applications, M. Martino, Univ. of Lecce, Italy

Photochemical laser technology for integrated-optical components of polymer basis, S. Metev, Univ. of Bremen, Germany

Industrial applications of high power CW CO_2 lasers, V. Naumov, TRINITI, Russia

Laser surface microstructuring to improve tribiological systems, V. Romano, H. Weber, Univ. of Bern, Switzerland

Laser phototyping by sintering technique, D. Schuoker, Technical Univ. Wien, Austria

Formation of nanoparticles in liquid phase via laser ablation, G. Shafeev, General Physics Inst., Russia

Laser assisted and hybrid deposition process for nanocomposite material synthesis, A. Voevodin, Air Force Research Laboratory, USA

Laser Technologies for Isotope Separation and Selective Photochemistry

Laser isotope separation of rare earth metals by AVLIS, D. Stern, Livermore Laurence National Lab, USA

The physical basis of isotope separation of U by method of selective multiphoton dissociation, D. O'Judd, Los Alamos National Laboratory, USA

Laser methods of isotope separation, D. Malyuta, Russian Research Ctr. Kurchatov Inst., Russia

Progress in laser separation of rare isotopes in RENC-VNIIEF and GPI, S. Yakovlenko, General Physics Inst., Russia

LAT SPECIAL SYMPOSIUM

Special Symposium on Adaptive Optics for High-Power Lasers

Organizers: Alexis Kudryashov, Inst. on Laser and Information Technologies, Russia; Peter Nickles, Max-Born-Inst., Germany

Multi-stage TiS laser with closed-loop adaptive optical system-modification of intensity profile and correction of wavefront distortions, H. Baumhacker et al., Max-Planck Inst. of Quantum Optics, Germany

Novel diode pumped laser cavities with intracavity beam shaping, J. P. Huignard et al., Thomson CSF, France

Wavefront correction for diffraction-limited focal spot on 80 J/1 ns laser facility, Julien Fuchs, LULI/Ecole Polytechnique, France

IQEC/LAT-YS KEYNOTES

High-resolution experiments with spin-polarized atoms, A. Weis, Univ. Fribourg, Switzerland

Powder lasers, F. Auzel, CNRS/GOTR, France

Quantum imaging, L. Lugiato, Univ. dell'Insubria, Italy

Femtosecond holography, Yu. Tolmachev, St. Petersburg State Univ., Russia

Femtosecond laser produced high temperature plasmas: x-ray generation and nuclear processes, V. Gordienko, Moscow State Univ., Russia

Nonlinear optics of photonic crystals, A. Zheltikov, Moscow State Univ., Russia

Tissue optics, V. Tuchin, Saratov State Univ., Russia

Laser welding, V. Golubev, Inst. on Laser and Information Technologies, Russia

Physics and prospect of nanostructure lasers and photonic crystal, Yasuhiko Arakawa, Inst. of Industrial Science, Japan

Nonclassical light: generation and properties, Anatoly S. Chirkin, Moscow State Univ., Russia

New opportunities of investigating phase transformations and lattice dynamics using femtosecond X-ray pulses, D. von der Linde, Institut fuer Laser- und Plasmaphysik, Universitaet Essen, Germany

AGENDA OF SESSIONS

SATURDAY, JUNE 22, 2002

Conference Hall	Hall 1	Hall 2	Hall 3	Hall 4
13:00–15:30 **JSaA · Opening. Plenary Lectures I**				
15:30–16:00 COFFEE BREAK				
16:00–17:30 **YSaA · Opening. Keynote Lectures I**	**16:00–18:30** **JSaB · Ultrahigh Power Lasers**	**16:00–18:30** **QSaA · Optical Parametric Processes—40 Years of OPOs**	**16:00–18:30** **QSaB · Squeezed States and Biphotons**	**16:00–18:30** **JSaC · Optical Coherence Tomography**
19:00–21:00 WELCOME RECEPTION				

Hall 5	Hall 6	Room 1		
15:30–16:00 COFFEE BREAK				
16:00–18:30 **QSaC · Strong-Field Phenomena in Plasma**	**16:00–18:15** **QSaD · Atom Cooling and Trapping**			
19:00–21:00 WELCOME RECEPTION				

AGENDA OF SESSIONS

SUNDAY, JUNE 23, 2002

Conference Hall	Hall 1	Hall 2	Hall 3	Hall 4
8:30–10:30 JSuA · IQEC/LAT Tutorials I	8:30–10:30 QSuA · X-Ray and VUV Lasers and Light Sources	8:30–10:30 QSuB · Four-Wave Mixing	8:30–10:30 QSuC · Quantum Correlations and Entangled States I	8:30–10:30 LSuA · Laser Processing of Advanced Materials and Laser Microtechnologies I
10:30–11:00 COFFEE BREAK				
11:00–12:00 JSuC · IQEC/LAT Tutorials II	11:00–12:30 JSuB · Ultrashort Laser Pulses: Generation and Amplification	11:00–12:30 QSuF · Quadratic Solitons	11:00–12:30 QSuG · Quantum Correlations and Entangled States II	11:00–11:45 LSuB · Laser Processing of Advanced Materials and Laser Microtechnologies II
12:30–14:00 LUNCH (on your own)				
14:00–16:00 YSuA · IQEC/LAT-YS Keynote Lectures II	14:00–16:00 LSuC · Solid-State Lasers I	14:00–16:00 QSuJ · Ultrafast Nonlinear Optics	14:00–16:00 QSuK · QED and Superradiance	14:00–16:00 JSuD · Optical Tomography of Biological Tissues
16:00–16:30 COFFEE BREAK				
16:30–17:30 YSuB · IQEC/LAT-YS Keynote Lectures III	16:30–18:30 LSuD · Fiber and Waveguide Lasers	16:30–18:30 QSuN · Nonlinear Optical Materials	16:30–18:30 QSuO · Electromagnetically Indiuced Transparency	16:30–18:45 JSuE · Microscopy and X-Ray Imaging
18:30–20:00 IQEC/LAT POSTER SESSIONS I				

SUNDAY, JUNE 23, 2002

Hall 5	Hall 6	Room 1		
8:30–10:30 **QSuD · Pulse Propagation**	**8:30–10:30** **QSuE · Atom Optics**			
10:30–11:00 COFFEE BREAK				
11:00–12:30 **QSuH · Molecules in Strong Laser Field**	**11:00–12:30** **QSuI · Quantum Gases I**			
12:30–14:00 LUNCH (on your own)				
14:00–16:00 **QSuL · Laser-Induced Nuclear Physics**	**14:00–16:00** **QSuM · Quantum Gases II**			
16:00–16:30 COFFEE BREAK				
16:30–18:30 **QSuP · X-Rays and Fast Particles Generation**	**16:30–18:00** **QSuQ · Matter Waves**			
18:30–20:00 IQEC/LAT POSTER SESSIONS I				

AGENDA OF SESSIONS

MONDAY, JUNE 24, 2002

Conference Hall	Hall 1	Hall 2	Hall 3	Hall 4
8:30–9:00 **JMA · EPS Awards Ceremony**				
9:00–10:00 **JMB · Plenary Lectures II**				
10:00–10:30 COFFEE BREAK				
10:30–12:30 EXHIBIT ONLY TIME				
12:30–14:00 LUNCH (on your own)				
14:00–16:00 **YMA · Keynote Lectures IV**	**14:00–16:15** **QMA · Solid-State Lasers**	**14:00–15:45** **QMB · Coherent Phenomena and Phase Control**	**14:00–16:00** **QMC · Single Photon Optics, Entanglement, and Statistics I**	**14:00–16:00** **LMA · Laser Processing of Advanced Materials and Laser Microtechnologies III**
16:00–16:30 COFFEE BREAK				
16:30–17:30 **YMB · Keynote Lectures V**	**16:30–18:45** **QMF · Solid-State and Gas Lasers**	**16:30–18:30** **QMG · Nonlinear Optical Techniques**	**16:30–18:30** **QMH · Single Photon Optics, Entanglement, and Statistics II**	**16:30–18:30** **LMC · Laser Processing of Advanced Materials and Laser Microtechnologies IV**
18:30–20:00 IQEC/LAT POSTER SESSIONS II				

MONDAY, JUNE 24, 2002

Hall 5	Hall 6	Room 1		
10:00–10:30 COFFEE BREAK				
10:30–12:30 EXHIBIT ONLY TIME				
12:30–14:00 LUNCH (on your own)				
14:00–16:00 **QMD · Absolute Phase of Laser Pulses**	**14:00–16:00** **QME · Symposium on Entangled States: Fundamentals and Applications**			
16:00–16:30 COFFEE BREAK				
16:30–18:30 **QMI · Laser-Plasma and Laser-Atom Experiments and Theory**	**16:30–18:30** **QMJ · Symposium on Entangled States: Fundamentals and Applications**			
18:30–20:00 IQEC/LAT POSTER SESSIONS II				

AGENDA OF SESSIONS

TUESDAY, JUNE 25, 2002

Conference Hall	Hall 1	Hall 2	Hall 3	Hall 4
8:30–10:20 JTuA · Prokhorov and Basov Memorial Session				
10:00–10:30 COFFEE BREAK				
10:30–12:30 JTuD · IQEC/LAT Tutorials III	10:30–12:15 LTuA · Solid-State Lasers II	10:30–12:30 QTuA · Photonic Crystals	10:30–12:30 JTuB · Postdeadline Papers I	10:30–13:00 JTuC · New Diagnostics Techniques
12:30–14:00 LUNCH (on your own)				
14:00–16:00 YTuA · IQEC/LAT-YS Keynote Lectures VI	14:00–16:00 QTuD · Semiconductor Lasers	14:00–16:00 QTuE · Nonlinear Beam Dynamics	14:00–16:00 QTuF · Femtosecond Synthesizers and High-Resolution Spectroscopy	14:00–16:15 JTuE · Spectroscopic Techniques
16:00–16:30 COFFEE BREAK				
16:30–17:30 YTuB · IQEC/LAT-YS Keynote Lectures VII	16:30–18:45 QTuJ · Excimer and Semiconductor Lasers	16:30–18:30 QTuK · Nonlinear Effects in Lasers	16:30–18:30 QTuL · High-Resolution Spectroscopy	16:30–18:30 JTuF · Ultrafast Chemistry and Biology
18:30–20:00 IQEC/LAT POSTER SESSIONS III				

TUESDAY, JUNE 25, 2002

Hall 5	Hall 6	Room 1		
10:00–10:30 COFFEE BREAK				
10:30–12:30 **QTuB · Laser-Electron Scattering, X-Ray and Fast Particles Generation**	**10:30–13:00** **QTuC · Symposium on Entangled states: Fundamentals and Applications**	**10:30–12:30** **LTuB · Symposium on Adaptive Optics for High-Power Lasers I**		
12:30–14:00 LUNCH (on your own)				
14:00–15:45 **QTuG · Lasing and Optical Transitions in Nanostructures**	**14:00–16:15** **QTuH · Symposium on Quantum Nucleonics I**	**14:00–16:30** **LTuC · Symposium on Adaptive Optics for High-Power Lasers II**		
16:00–16:30 COFFEE BREAK				
16:30–18:30 **QTuM · Optics of Nanostructures I**	**16:30–18:45** **QTuN · Symposium on Quantum Nucleonics II**			
18:30–20:00 IQEC/LAT POSTER SESSIONS III				

AGENDA OF SESSIONS

WEDNESDAY, JUNE 26, 2002

Conference Hall	Hall 1	Hall 2	Hall 3	Hall 4
8:30–10:30 JWA · IQEC/LAT Tutorials IV	8:30–10:30 LWA · Phase Conjugation and Beam Propagation	8:30–10:30 QWA · Soliton Optics and Beam Dynamics	8:30–10:30 QWB · Fundamental Tests and Spectroscopy in an Extremely Thin Cell	8:30–10:30 LWB · Laser Processing of Advanced Materials and Laser Microtechnologies V
10:30–11:00 COFFEE BREAK				
11:00–12:00 JWC · IQEC/LAT Tutorials IV	11:00–12:30 LWD · Semiconductor Lasers	11:00–12:30 QWE · Nonlinear Pattern Formation and Nonlinear Nanooptics	11:00–12:30 JWB · Single Ion Optical Frequency Standards I	11:00–12:30 LWE · Laser Processing of Advanced Materials and Laser Microtechnologies VI
12:30–14:00 LUNCH (on your own)				
14:00–16:00 YWA · IQEC/LAT-YS Keynote Lectures VIII	14:00–16:00 LWG · Gas Lasers and Ultrashort Pulse Lasers I	14:00–16:00 QWH · Nonlinear Optics of Guided Waves	14:00–16:00 JWD · Single Ion Optical Frequency Standards II	14:00–16:00 JWE · Laser-Cell Interaction
16:00–16:30 COFFEE BREAK				
	16:30–18:30 LWI · Gas Lasers and Ultrashort Pulse Lasers II	16:30–18:15 QWK · Few-Cycles Optical Pulses	16:30–18:45 JWF · Optical Standards and Precision Measurements	16:30–18:30 LWJ · PDT and Other Oncological Applications
19:00–22:00 CONFERENCE RECEPTION				

WEDNESDAY, JUNE 26, 2002

Hall 5	Hall 6	Room 1		
8:30–10:45 QWC · Optics of Nanostructures II	8:30–10:30 LWC · Communication Systems and Elements	8:30–10:30 QWD · Symposium on Light-Induced Phase Transitions and Optical Switching		
10:30–11:00 COFFEE BREAK				
11:00–12:30 QWF · Phase Transitions and Nanostructuring	11:00–12:30 LWF · Magnetooptical and Liquid Crystal Schemes	11:00–12:30 QWG · Symposium on Light-Induced Phase Transitions and Optical Switching		
12:30–14:00 LUNCH (on your own)				
14:00–16:15 QWI · Nanoengineering	14:00–16:00 LWH · Holography Methods	14:00–16:00 QWJ · Symposium on Light-Induced Phase Transitions and Optical Switching		
16:00–16:30 COFFEE BREAK				
16:30–18:45 QWL · Nanoparticles and Quantum dots	16:30–18:30 LWK · Fiber Solitons and Ultrafast Processing	16:30–17:30 QWM · Symposium on Light-Induced Phase Transitions and Optical Switching		
19:00–22:00 CONFERENCE RECEPTION				

AGENDA OF SESSIONS

THURSDAY, JUNE 27, 2002

Conference Hall	Hall 1	Hall 2	Hall 3	Hall 4
8:30–9:30 JThB · IQEC/LAT Tutorials VI	8:30–10:30 LThA · Laser and Atmospheric Spectroscopy	8:30–10:30 QThA · Laser Control of Ultrafast Phenomena I	8:30–10:15 LThB · Laser Systems for Precision Measurements I	8:30–10:30 JThA · Laser-Tissue Interaction I
10:30–11:00 COFFEE BREAK				
	11:00–12:30 LThC · Water and Vegetation	11:00–12:30 QThD · Ultrafast Dynamics in Condensed Matter	11:00–12:30 LThD · Laser Systems for Precision Measurements II	11:00–12:30 LThE · Laser-Tissue Interaction II
12:30–14:00 LUNCH (on your own)				
	14:00–16:00 LThF · Aerosols	14:00–16:00 QThF · Nonlinear Optics of Ultrafast Pulses	14:00–16:00 QThO · Quantum Information and Quantum Computing I	14:00–16:00 LThG · Laser Processing of Advanced Materials and Laser Microtechnologies VII
16:00–16:30 COFFEE BREAK				
	16:30–18:30 LThI · Atmosphere	16:30–18:45 QThI · Laser Control of Ultrafast Phenomena II	16:30–18:30 QThJ · Quantum Information and Quantum Computing II	16:30–18:30 LThJ · Laser Processing of Advanced Materials and Laser Microtechnologies VIII
18:30–20:00 IQEC/LAT POSTER SESSIONS IV				

THURSDAY, JUNE 27, 2002

Hall 5	Hall 6	Room 1		
8:30–10:30 **QThB · Special Symposium on Photonic Crystals I**	**8:30–10:30** **QThC · Gas Lasers**			
10:30–11:00 COFFEE BREAK				
11:00–12:30 **QThE · Special Symposium on Photonic Crystals II**	**11:00–12:30** **JThC · Postdeadline Papers II**			
12:30–14:00 LUNCH (on your own)				
14:00–16:00 **QThH · Special Symposium on Photonic Crystals III**	**14:00–16:00** **LThH · Laser Technologies for Isotope Separation and Selective Photochemistry I**			
16:00–16:30 COFFEE BREAK				
16:30–18:30 **QThK · Special Symposium on Photonic Crystals IV**	**16:30–18:30** **LThK · Laser Technologies for Isotope Separation and Selective Photochemistry II**			
18:30–20:00 IQEC/LAT POSTER SESSIONS IV				

Conference Hall JOINT				

13:00–15:30
JSaA · Opening.
Plenary Lectures I
S.N.Bagayev, *Inst. of Laser Physics, Russia, Presider*

JSaA1 · 13:00
Opening Ceremony

JSaA2 · 13:30 · PLENARY LECTURE
Quantum dots heterostructure lasers: State-of-the-art and future trends, Zh. Alferov, *Ioffe Physical-Technical Inst., Russia*

JSaA3 · 14:30 · PLENARY LECTURE
Overview of super-strong laser field problems, T.Tajima, *Stanford Univ., USA.* The development of large energy lasers on the order of mega joule combined with the pulse compression techniques and pulse control methods will allow us to access an unprecedented intensity of lasers in the next decade. The power may reach and exceed exawatt. At such power, the laser-matter interaction is ultra-relativistic, i.e. electron motion becomes ultrarelativistic. In this regime, the inter-action between light and charged particles becomes increasingly more coherent, yielding more effective extreme high energy phenomena. These intensities are relevant to the physics of high energy (TeV and beyond), high temperatures (beyond GeV), high pressure (beyond Gbar), and violent acceleration (or equivalent gravity near a black hole). Unique windows into studies of fundamental science will be discussed in this application.

15:30–16:00 COFFEE BREAK

15:30–16:00 COFFEE BREAK

Conference Hall IQEC/LAT-YS	Hall 1 JOINT	Hall 2 IQEC	Hall 3 IQEC	Hall 4 JOINT
16:00–17:30 **YSaA · Opening. Keynote Lectures I** V.B.Smirnov, *St. Petersburg State Univ., Russia, Presider*	**16:00–18:30** **JSaB · Ultrahigh Power Lasers** A.A.Manenkov, *General Physics Inst., Russia, Presider*	**16:00–18:30** **QSaA · Optical Parametric Processes—40 Years of OPOs** A. Piskarskas, *Vilnius Univ., Lithuania*, D. Hanna, *Univ. of Southampton, UK, Presiders*	**16:00–18:30** **QSaB · Squeezed States and Biphotons** A.N.Oraevsky, *Lebedev Physical Inst., Russia, Presider*	**16:00–18:30** **JSaC · Optical Coherence Tomography** J. Fujimoto, *M.I.T., USA*, A.M.Sergeev, *Inst. Appl. Physics, Russia, Presiders*
YSaA1 · 16:00–16:30 ***Opening Ceremony***	**JSaB1 • 16:00 • INVITED** ***Ultrahigh power laser program in Japan,*** Y. Izawa, *Osaka Univ., Japan.* Ultrahigh power laser program for developments of Nd: glass and Ti: sapphire lasers with 100 TW – 1 PW output and their applications to fast-ignitor laser fusion and high field physics such as field ionization, particle acceleration and photochemistry will be presented.	**QSaA1 • 16:00 • INVITED** ***Developments in synchronously-pumped optical parametric oscillators,*** D. C. Hanna, *Univ. of Southampton, UK.* Synchronous-pumping of quasi-phase-matched nonlinear crystals allows very high parametric gains. This is exploited in various ways, including fibre-laser-pumped operation, use of a fibre in the signal feedback arm, operation at very long idler wavelengths and use of a diffraction-grating to provide feedback.	**QSaB1 · 16:00 · INVITED** ***Quantum catastrophe of slow light*, U.Leonhardt, *Univ. of St Andrews, UK.*** In quantum catastrophes such as the black hole the quantum nature of light resolves wave singularities and creates characteristic quantum effects related to Hawking radiation. The lecture explains a proposal to generate a slow-light catastrophe.	**JSaC1 · 16:00 · INVITED** **High resolution optical imaging of biological tissues: problems and solutions,** R.K.Wang, *Cranfield Univ., UK. We discuss the current problems associated with the high-resolution optical imaging techniques, and present a promising technique to enhance light penetration depth for optical imaging applications.*
YSaA2 • 16:30 • KEYNOTE ***Powder lasers: Amplified spontaneous emission versus super-radiance,*** F.Auzel, *CNRS/GOTR, France.* In this lecture, we present a review of the results from literature and from our own work on amplification of spontaneous emission by stimulated one and on super-radiance (superfluorescence) processes obtained on rare-earth-doped powdered materials.	**JSaB2 • 16:30 • INVITED** ***The current status and future prospects for optical parametric chirped pulse amplification,*** I. N. Ross, P. Matousek, J. L. Collier, *CLRC Rutherford Appleton Lab., UK.* The technique of optical parametric chirped pulse amplification (OPCPA) is becoming accepted as an important new laser technique. The present status and potential applications for the generation of ultrashort pulse, ultrahigh power and high average power will be reviewed.	**QSaA2 • 16:30** ***Few-cycle pulses in an optical parametric oscillator,*** P. Kinsler, G. H. C. New, *Imperial College, UK.* We present both a comprehensive framework for treating the nonlinear interaction of few-cycle pulses and a range of simulation results. These demonstrate how the effect of the nonlinearity differs between the many-cycle and few-cycle cases.	**QSaB2 · 16:30** ***Quantum auto- and cross-correlations in the emission of the one mode vertical-cavity surface-emitting lasers*, J.-P. Hermier, I.Maurin, E.Giacobino, *Univ. Pierre et Marie Curie, France*, M.I.Kolobov, *Univ. des Sci. et Tech. de Lille, France*, Yu.M.Golubev, T.Zernova, *St. Petersburg State Univ., Russia*.** The VCSEL theory is developed on the basis of the well-known spin-flip model in the adiabatical approximation when both the optical polarization and the population of the lower laser level are eliminated.	**JSaC2 · 16:30 · INVITED** ***Phase resolved functional optical coherence tomography: Technology and applications,*** Zhongping Chen, *Univ. of California, USA.*

Hall 5 IQEC	Hall 6 IQEC			

16:00–18:30
QSaC · Strong-Field Phenomena in Plasma
G.Mourou, *Univ. of Michigan, USA, Presider*

QSaC1 • 16:00 • INVITED
Nonlinear Thomson and Compton scattering in relativistic plasmas, D.Umstadter, S.Banerjee, F.He, Y.Y.Lau, R.Shah, A.Valenzuela, *Univ. of Michigan, USA.* We discuss the first experimental observation of high-order harmonic generation and Compton scattering from free electrons in underdense plasmas. New scaling laws governing these processes are derived theoretically.

QSaC2 • 16:30 • INVITED
Relativistic mechanisms of the high harmonic generation in laser plasmas, S.V.Bulanov, *General Phys. Inst., Russia.* An overview of theoretical studies and of the PIC simulations of the high harmonic generation (HHG) mechanisms by the relativistically intense laser radiation, when the electron quiver energy is well above the rest mass energy, is presented. The HHG by the single particle in the field of super intense electromagnetic wave, the HHG by "the oscillating mirror" formed by the laser pulse at the overdense plasma–vacuum interface, and inside a narrow fiber are discussed.

16:00–18:15
QSaD · Atom Cooling and Trapping
V.I.Balykin, *Inst. of Spectroscopy, Russia, Presider*

QSaD1 • 16:00 • INVITED
Single atom manipulation in a dipole trap, V.Gomer, S.Kuhr, W.Alt, D.Schrader, Y.Miroshnychenko, I.Dotsenko, D.Meschede, *Univ. of Bonn, Germany.* A standing wave dipole trap loaded with a single or any desired number of cold neutral atoms transports them with submicron precision over macroscopic distances and can deliver a prescribed number of atoms on demand.

QSaD2 • 16:30 • INVITED
Stochastic gauge simulations of Bose gases, P.D.Drummond, P.Deuar, K.Kheruntsyan, *Univ. of Queensland, Australia.* We show that grand canonical ensembles of bosons can be simulated with stochastic equations based on a gauge representation method. Results on 1D Bose gasses give good agreement with known exact results.

Conference Hall IQEC/LAT-YS	Hall 1 JOINT	Hall 2 IQEC	Hall 3 IQEC	Hall 4 JOINT
16:00–17:30 **YSaA · Opening. Keynote Lectures I —Continued**	**16:00–18:30** **JSaB · Ultrahigh Power Lasers—Continued**	**16:00–18:30** **QSaA · Optical Parametric Processes—40 Years of OPOs—Continued**	**16:00–18:30** **QSaB · Squeezed States and Biphotons—Continued**	**16:00–18:30** **JSaC · Optical Coherence Tomography—Continued**
		QSaA3 • 16:45 ***Characterisation of a 66%-total-conversion-efficiency pulsed PPLN OPO,*** O. Balachninaite, V. Sirutkaitis, R. Grigonis, *Vilnius Univ., Lithuania,* R. C. Eckardt, *Cleveland Crystals, Inc., USA.* Beam analysis and spectral characterisation of a pulsed optical parametric oscillator based on periodically poled lithium niobate (PPLN) are reported. Measurements were performed pumping with 13 ns, 1064 nm pulses at total energy conversion exceeding 66%.	**QSaB3 • 16:45** ***Light interacting with atomic systems: polarization squeezing and EPR type correlations,*** V.Josse, L.Vernac, M.Pinard, A.Bramati, E.Giacobino, *Univ. Pierre et Marie Curie, France.* Polarization squeezing and EPR type correlations are observed via the interaction of a nearly resonant linearly polarized laser beam with a cloud of cold cesium atoms in an optical cavity.	
	JSaB3 • 17:00 • INVITED ***Ultra-high power laser development in Russia: State-of-the-art and prospects,*** A.M.Sergeev, *Inst. of Appl. Phys., Russia.* Development of terawatt and multi-terawatt laser facilities in several scientific centers is discussed together with recent experimental results on laser-plasma interaction, obtained using these facilities. Progress in developing petawatt optical parametric generation is reviwed.	**QSaA4 • 17:00** ***Amplification of polychromatic pulses in a resonant optically dense medium under coherent pumping,*** S.N.Bagayev, *ILP, Russia,* V.S.Egorov, I.B.Mekhov, P.V.Moroshkin, I.A.Chekhonin, *St.Petersburg Univ., Russia,* E.M.Davliatchine, E.Kindel, *Inst. of Low-Temp. Plasma Phys., Germany.* Experimental and theoretical investigation of different regimes of probe field attenuation and amplification in the presence of strong pumping field is presented for the case of multimode dye laser radiation and extended optically dense medium. In the model, collective phenomena are taken into account.	**QSaB4 • 17:00** ***Generation of squeezed vacuum using nonlinear polarization interferometer and spatial light modulator,*** J.Higuchi, N.Nishizawa, T.Goto, *Nagoya Univ., Japan,* M.Mori, *Aichi Inst. of Technology, Japan,* R.Goto, K.Yamane, *Fujitsu Ltd., Japan.* Squeezed vacuum is generated using nonlinear polarization interferometer and spectral manipulation using spatial light modulator. Noise reduction of –1.8 dB is observed only by passing through the optimized pulse along a cascade connected fiber.	**JSaC3 · 17:00** ***Optical coherence microscopy,*** A.D.Aguirre, P.Hsiung, T.H.Ko, I.Hartl, J.G.Fujimoto, *Massachusetts Inst. of Technology, USA.* Optical coherence microscopy combines OCT with confocal microscopy and generates en face images with high transverse resolution and improved image penetration depths. Real-time, cellular imaging with 3 µm transverse resolution is achieved using a handheld probe.
		QSaA5 • 17:15 ***Powerful optical parametric amplifiers and generators of ulthort pulses,*** R.Danielius, A.P.Piskarskas, *Vilnius Univ., Lithuania.* We present the new results on OPG/OPA bandwidth control (both broadening and narrowing as well as profile shaping) by appropriate pump modulation in space- and time-domain. A new technique scaling-up an output power of chirped pulse OPA will be demonstrated.	**QSaB5 • 17:15** ***Dispersive spreading of biphotons,*** M.V.Chekhova, *Moscow State Univ., Russia,* A.Valencia, Y.H.Shih, *Univ. of Maryland, USA,* A.S.Trifonov, *Ioffe Phys. Tech. Inst., Russia.* We show that a biphoton propagating through a dispersive medium behaves like a short pulse: its second-order correlation function spreads and in the far-field zone, acquires the shape of the spectrum.	**JSaC4 · 17:15** ***Investigations of biotissue depolarization properties using crosspolarization OCT,*** R.V.Kuranov, V.M.Gelikonov, A.V. Shakhov, A.B.Terentyeva, I.V.Turchin, V.A.Kamensky, *Inst. of Appl. Phys., Russia.* First results for increasing the specificity of optical coherence tomography (OCT) using depolarizing properties of biological tissues are present. Comparisons between tomograms obtained in orthogonal polarizations have been made.

Hall 5 IQEC	Hall 6 IQEC			

16:00–18:30
QSaC · Strong-Field Phenomena in Plasma—Continued

16:00–18:15
QSaD · Atom Cooling and Trapping—Continued

QSaC3 • 17:00
Plasma hot electrons characterization by electronic, ionic and x-ray diagnostics, P.M.Mikheev, V.M.Gordienko, I.M.Lachko, A.B.Savelev, R.V.Volkov, *Moscow State Univ., Russia.* Methods of laser plasma electronic component diagnostics based on x-ray yield and ionic time-of-flight measurements as well as direct electronic spectroscopy at moderate laser intensities up to 10^{16} W/cm^2 were described.

QSaD3 • 17:00
Magnetically levitated atoms in a crossed-beam CO_2-laser trap: towards BEC of cesium, T.Weber, J.Herbig, M.Mark, H.-C.Naegerl, R.Grimm, *Innsbruck Univ., Austria.* In order to produce a BEC of Cs with tunable interactions we experimentally explore a novel crossed-beam optical trap based on powerful CO_2 lasers in combination with a spin-selective magnetic levitation field.

QSaC4 • 17:15
Electron-ion collision induced harmonics generation in a plasma with anisotropic bi-Maxwellian distribution, G.Ferrante, M.Zarcone, *INFM and Dip. di Fisica e Techn. Relative, Italy,* S.A.Uryupin, *Lebedev Phys. Inst., Russia.* A treatment is given of harmonics generation due to inverse bremsstrahlung in plasma with an anisotropic bi-Maxwellian electron velocity distribution. Analytically and numerically is established how the efficiency of the odd harmonics generation and the polarization depend on the degree of temperature anisotropy and on the angle between the pump wave field and the symmetry axis of the electron distribution.

QSaD4 • 17:15
Coherent atomic beam splitters using scattering in a modulated standing waves, S.V.Borisenok, Yu.V.Rozhdestvensky, G.Udov, *Inst. for Laser Physics, Russia.* Easy-constructed coherent atomic beam splitter for multi-level atomic systems had been improved using the scattering the wave packet in standing waves with different types of the modulation. The scattering pictures do not depend on the pulse modulation shape that allows us to choose efficiency the modulation parametrs.

Conference Hall	Hall 1 JOINT	Hall 2 IQEC	Hall 3 IQEC	Hall 4 JOINT
	16:00–18:30 **JSaB · Ultrahigh Power Lasers—Continued**	**16:00–18:30** **QSaA · Optical Parametric Processes—40 Years of OPOs—Continued**	**16:00–18:30** **QSaB · Squeezed States and Biphotons—Continued**	**16:00–18:30** **JSaC · Optical Coherence Tomography—Continued**
	JSaB4 • 17:30 • INVITED ***Narrow-band continuously tunable (188 to 1400 nm) solid-state radiation sources based on frequency conversion of Ti:Sapphire laser radiation,*** V.A.Orlovich, P.A.Apanasevich, V.V.Ermolenkov, A.S.Grabtchikov, *Stepanov Inst. of Phys., Belarus,* A.A.Buj, A.V.Kachinsky, V.D.Kopachevsky, *JV "Solar-TII", Belarus,* W.Kiefer, *Univ. of Wuerzburg, Germany.* The results of obtaining narrow-band (? 30 pm) pulsed (4–8 ns) continuously tunable in the range of 188–1400 nm radiation in solid-state laser system are presented. Specially created powerful (up to 100 mJ) Ti:Sapphire laser have been used. The radiation of this laser was converted to UV and DUV regions with using the harmonic generation and to IR region with using Raman conversion in barium nitrate crystals.	**QSaA6 • 17:30** ***230 THz bandwidth of optical parametric amplification in the near UV-VIS: A route towards tunable sub-10 fs UV pulses?,*** P.Tzankov, T.Fiebig, *Technische Univ. München, Germany,* I.Buchvarov, *Sofia Univ., Bulgaria.* A broad bandwidth noncollinear optical parametric amplification scheme in a BBO crystal pumped by the third harmonic of a femtosecond Ti: Sapphire laser has been investigated experimentally. A small signal gain in the order of several thousands times and a bandwidth of 230 THz FWHM between 335 and 450 nm was observed.	**QSaB6 • 17:30** ***Multi-purpose nonclassical light source,*** Ruixiang Guo, Xiaojun Jia, Changde Xie, Kunchi Peng, *Shanxi Univ., China.* A compact multi-purpose nonclassical light source has been built. The bright two-mode quadrature amplitude squeezed light and the EPR beam with amplitude anticorrelation and phase correlation are produced in these devices for the first time to our knowledge.	**JSaC5 · 17:30** ***Study of OCT potentialities in clinical practice,*** V.Gelikonov, V.Kamensky, N. Shakhova, *Inst. of Appl. Phys., Russia*, N.Gladkova, G.Petrova, A.Shakhov, A.Terentieva, E.Zagaynova, *Medical Academy, Russia,* I.Kuznetsova, O.Streltsova, *Regional Hospital, Russia.* Optical Coherence Tomography potentialities in biopsy guiding, objective search of tumor borders, ntraoperative control of tissue removal, evaluation of recovery processes and monitoring of different kinds of therapy are discussed.
		QSaA7 • 17:45 ***Two-color laser in a periodically poled waveguide,*** I.V.Melnikov, I.D.Melnikova, D.Mayorga-Cruz, *General Phys. Inst., Russia.* This report presents a novel lasing medium, which consists of diode-pumped rare-earth ion-doped quasi-phase-matched waveguide structure and relies on the utilization of saturated amplification and absorption in the pumped and unpumped section of the device, correspondingly. Different operation regimes are presented for the case of a 950 nm pump producing an output both at 1550 and 775 nm.	**QSaB7 • 17:45** ***Experimental characterisation of continuous variable polarisation squeezed states,*** R.Schnabel, W.P.Bowen, H.A.Bachor, P.K.Lam, *Australian Natl Univ., Australia,* T.C.Ralph, *Univ. of Queensland, Australia.* We report the generation and characterization of continuous wave polarization squeezed light beams. Stokes parameter variances of different polarization squeezed states are visualized on the Poincaré sphere. Application in the field of quantum information is discussed.	**JSaC6 · 17:45** ***Optical clearing of blood by dextrans,*** X.Xu, L.Wu, *Cranfield Univ., UK,* R.K. Wang, J.B.Elder, *Keele Univ., UK,* V.V.Tuchin, *Saratov Univ., Russia.* Effect of dextrans on optical property of blood in stasis and in flow was investigated. Optical clearing of blood was achieved by refractive index matching and aggregation of erythrocytes induced by dextrans.
	JSaB5 • 18:00 • INVITED ***High power free electron laser for Siberian center of photochemical research and technology: status and perspective,*** G.N.Kulipanov, A.K.Petrov, A.N. Skrinsky, N.A.Vinokurov, *Budker Inst. of Nuclear Phys., Russia.* A high power free electron laser is under construction in Novosibirsk. The first stage will be commissioned this year. Its design average power is up to 10 kW at 100–200 micron wavelength range. The second Stage will provide up to 100 kW average power at 2–20 micron wavelength range. Some potential applications are discussed.	**QSaA8 • 18:00** ***Stochastic theory of parametric amplification in crystals with an irregular domain structure,*** E.Yu.Morozov, *Moscow State Univ., Russia.* The stochastic model of the crystal with an irregular domain structure is proposed and applied to quasi-phase-matched optical parametric amplification. Dependencies of amplified waves intensities on crystal's length, phase mismatch and structure quality is examined.	**QSaB8 • 18:00** ***Squeezed light generation by self-frequency conversions,*** A.A.Novikov, G.D.Laptev, A.S.Chirkin, *Moscow State Univ., Russia.* Quadrature-squeezed light generation by quasi-phase-matched self-frequency conversion in periodically poled active-nonlinear Nd:Mg: $LiNbO_3$ crystal located in the cavity is studied in this paper. The conventional and consecutive three-frequency wave interactions are considered.	**JSaC7 · 18:00** ***Reconstruction of biotissue scattering parameters from OCT images using theoretical models of light propagation in turbid medium,*** I.V.Turchin, L.S.Dolin, E.A.Sergeeva, V.A.Kamensky, *Inst. of Appl. Phys., Russia.* An algorithm based on theoretical models of OCT signal in stratified turbid medium has been developed to reconstruct biotissue scattering characteristics from clinical OCT images. The analysis of a statistical sample of human mucosa tomograms is presented.

Hall 5 IQEC	Hall 6 IQEC			

16:00–18:30
QSaC · Strong-Field Phenomena in Plasma—Continued

QSaC5 • 17:30
On the theory of relativistic electromagnetic solitons in a hot multi-component plasma, M.Passoni, *Politechnico di Milano, Italy,* M.Lontano, *Istituto di Fisica del Plasma "P.Caldirola", Italy,* S.Bulanov, *General Phys. Inst., Russia.* The theory of relativistic electromagnetic solitons in a hot plasma is developed. Two approaches are followed which are valid in two distinct plasma regimes: an adiabatic, purely hydrodynamical model, and an isothermal model which relies on a given particle distribution function which is an exact solution of the relativistic Vlasov equations.

QSaC6 • 17:45
Plasma mirror distortions and instabilities induced by high intensity femtosecond pulses, A.Tarasevitch, C.Dietrich, D.von der Linde, *Univ. Essen, Germany.* The 120 fs laser pulses at the intensity of 10^{18} W/cm^2 are interacting with variable-scale-length solid-density plasma. Divergence of the reflected radiation, efficiency of high order harmonic generation and onset of plasma instabilities are studied.

QSaC7 • 18:00
Inverse bremsstrahlung in a plasma with electron temperature anisotropy, G.Ferrante, M.Zarcone, *INFM and Dip. di Fisica e Techn. Relative, Italy,* S.A.Uryupin, *Lebedev Physical Inst., Russia.* Inverse bremsstrahlung absorption of laser radiation in plasma with two-temperature bi-Maxwellian electron distribution is investigated. When the longitudinal temperature considerably exceeds the temperature in transverse direction a strong anisotropy in the weak field absorption is found. The degree of absorption anisotropy decreases with intensity increase and becomes logarithmically weak in the strong field.

16:00–18:15
QSaD · Atom Cooling and Trapping—Continued

QSaD5 • 17:30
Laser-cooled metastable helium: electron collision studies, L.J.Uhlmann, R.G.Dall, M.Colla, R.J.Gulley, M.D.Hoogerland, K.G.H.Baldwin, S.J.Buckman, *Australian Natl Univ., Australia.* We laser cool trapped metastable helium atoms as a target for electron scattering experiments, and measure the increase in trap loss due to electron impact to determine absolute scattering cross sections for the first time.

QSaD6 • 17:45
An intense source of cold Rb atoms, Yu.B.Ovchinnikov, J.Schoser, A.Bataer, R.Loew, V.Schweikhard, A.Grabowski, T.Pfau, *Univ. of Stuttgart, Germany.* A pure 2D-MOT continuous source of cold Rb atoms, loaded from thermal vapours, with total flux up to 60 billions atoms per second at mean velocity 50 m/s is set up and investigated. The dependence of the flux of cold atoms on different parameters of the 2D-MOT has been studied.

QSaD7 • 18:00
Stability of the dipole atom trap with superimposed laser cooling, V.G.Minogin, *Inst. of Spectroscopy, Russia.* We present an analysis of an atom dipole trap composed of a focused, far-of-resonance, red-detuned trapping laser beam, and a pair of red-detuned, counterpropagating cooling laser beams (CFORT). We show that separation of the trapping and cooling processes allows one to achieve a stable operation of the CFORT at a minimum temperature close to the recoil temperature.

Conference Hall	Hall 1 JOINT	Hall 2 IQEC	Hall 3 IQEC	Hall 4 JOINT
	16:00–18:30 **JSaB · Ultrahigh Power Lasers—Continued**	**16:00–18:30** **QSaA · Optical Parametric Processes—40 Years of OPOs—Continued** **QSaA9 • 18:15** ***Resonantly enhanced interaction of light and microwaves via whispering gallery modes,*** A.B.Matsko, V.S.Ilchenko, A.A.Savchenkov, L.Maleki, *California Inst. of Technology, USA.* We propose a scheme of a resonant cw microwave-optical parametric oscillator based on high-Q whispering gallery modes excited in a nonlinear dielectric cavity. Such an oscillator has an extremely low threshold and stable operation, and may be used in spectroscopy and metrology.	**16:00–18:30** **QSaB · Squeezed States and Biphotons—Continued** **QSaB9 • 18:15** ***The subpoissonian generation with effective suppression,*** Ja.A.Fofanov, *Inst. for Analytical Instr. Russia,* I.V.Sokolov, *St.-Petersburg State Univ., Russia.* The low noise generation in semiconductor laser with external optical feedback is considered. The regimes of subpoissonian generation with effective suppression of set of sub-threshold modes were experimentally observed and theoretically investigated.	**16:00–18:30** **JSaC · Optical Coherence Tomography—Continued** **JSaC8 · 18:15** ***OCT features of pathological processes in different mucosae,*** E.Zagaynova, N. Gladkova, O.Streltsova, *Nizhny Novgorod Medical Academy, Russia,* G.Gelikonov, F.Feldchtein, V.Kamensky, *Inst. of Appl. Phys., Russia,* G. Zuccaro, J.Richter, *The Cleveland Clinic Foundation Gastroenterology Dept, USA,* U.Seitz, N.Soehendra, *Univ. Eppendorf Interdisciplinary Endoscopy, Germany.*

19:00–21:00 WELCOME RECEPTION

Hall 5 IQEC				

16:00–18:30
QSaC · Strong-Field Phenomena in Plasma—Continued

QSaC8 • 18:15
Asymptotic theory of nonlinear self-modulation of relativistically intense laser pulses in plasmas in the Compton limit, A.L.Galkin, O.B.Shiryaev, V.V.Korobkin, *General Phys. Inst., Russia.* Asymptotic theory of nonlinear self-modulation of relativistically intense laser pulses in plasmas and weakfield excitation is presented for the case where the laser radiation frequency is much greater than the plasma frequency (Compton limit).

19:00–21:00 WELCOME RECEPTION

Conference Hall — JOINT

8:30–10:30
JSuA · IQEC/LAT Tutorials I
A.K.Dmitriyev, *Inst. of Laser Physics, Russia, Presider*

JSuA1 · 8:30 · TUTORIAL LECTURE
Nonlinear optics with matter waves, P.Meystre, *Univ. of Arizona, USA.* Nonlinear atom optics is the matter-waves analog of nonlinear optics. The tutorial will introduce the basic ideas underlying this new field, present a number of examples, and conclude by a discussion of possible applications.

Hall 1 — IQEC

8:30–10:30
QSuA · X-Ray and VUV Lasers and Light Sources
Y. Izawa, *Osaka Univ., Japan, Presider*

QSuA1 · 8:30 · INVITED
Characteristics of nickel-like soft-x-ray lasers, J.E.Balmer, M.Braud, C.Siegel, *Univ. of Berne, Switzerland,* J.Nilsen, *Lawrence Livermore Natl Lab., USA.* We report on the experimental characterization of collisonally-pumped nickel-like x-ray lasers in the 14-nm region with respect to output energy, pulse duration, near- and far-field intensity distributions, gain-length product required for saturation, and coherence properties. The x-ray laser emission is produced by irradiating flat targets of Pd and Sn with 100-ps pulses from a Nd:glass laser system at energies up to 30 J.

QSuA2 · 9:00 · INVITED
Study of ultra-short-pulse high-intensity laser driven X-ray sources at SIOM, Ruxin Li, Zhizhan Xu, *Shanghai Inst. of Optics and Fine Mechanics (SIOM), China.* Reported is the recent progress in the study of ultra-short-pulse high-intensity laser based on CPA and OPCPA schemes and the laser induced coherent soft-x-ray sources based on high-order harmonic generation from solid targets and atoms.

Hall 2 — IQEC

8:30–10:30
QSuB · Four-Wave Mixing
R.B.Miles, *Princeton Univ., USA, Presider*

QSuB1 · 8:30 · INVITED
Femtosecond coherent Raman spectroscopy, W.Kiefer, M.Schmitt, T.Siebert, M.Heid, *Univ. Würzburg, Germany,* A.Materny, *Intern. Univ. Bremen, Germany,* S.Grabtchikov, V.Orlovich, *Stepanov Inst. of Phys., Belarus.* Femtosecond time-resolved coherent Raman techniques such as coherent anti-Stokes Raman scattering (CARS) are used to study the dynamics of vibrational motions in the ground and/or excited electronic states of gaseous, liquid or solid systems.

QSuB2 · 9:00 · INVITED
Four-wave mixing and time-domain high-resolution spectroscopy in gas-phase Raman media, V.B.Morozov, A.N. Olenin, V.G.Tunkin, D.V.Yakovlev, *Moscow State Univ., Russia.* Four-wave mixing and dephasing kinetics of narrow molecular Raman resonances in gases is studied by picosecond time-domain measurements. In the case of rotational resonances of molecular hydrogen, experimental pulse responses demonstrate considerable departure from theoretical models based on statistical independence of collisional distortions of translational and rotational motions.

Hall 3 — IQEC

8:30–10:30
QSuC · Quantum Correlations and Entangled States I
A.V.Masalov, *Lebedev Physical Inst., Russia,* and M.G.Raymer, *Univ. of Oregon, USA, Presiders*

QSuC1 · 8:30 · INVITED
Interference of biphoton fields: spectroscopy and communication applications, S.Kulik, *Moscow State Univ., Russia.* We are considering three basic factors to act upon spatial-frequency distribution of biphoton states of light by means of interference. Combination of these factors allows to use biphoton fields for spectroscopy and communication applications.

QSuC2 · 9:00
Parametric instability and radiation of neutral molecules moving above a grating, A.Belyanin, Vit.Kocharovsky, V.Kocharovsky, *Inst. of Appl. Phys., Russia,* F.Capasso, *Bell Labs, Lucent Technologies, USA.* We predict and study the effect of parametric self-induced excitation of a molecule moving above the dielectric or conducting medium with periodic grating. Parametrically excited molecular bunches can produce an easily detectable IR and microwave coherent radiation flux.

Hall 4 — LAT

8:30–10:30
LSuA · Laser Processing of Advanced Materials and Laser Microtechnologies I
F.Dausinger, *Univ. of Stuttgart, Germany, Presider*

LSuA1 · 8:30 · INVITED
Theory of femtosecond laser ablation, S.I. Anisimov, *Landau Inst. for Theoretical Phys., Russia.*

LSuA2 · 9:00
Precise drilling of steel with ultrashort pulsed solid-state lasers, Ch.Foehl, D.Breitling, F.Dausinger, *Univ. of Stuttgart, Germany.* Aiming at the investigation of the potential advantages of ultra-short pulses for ablation and drilling, a German national project called PRIMUS was established. This contribution will present recent results of this project and will show the influence of processing technology and different process parameters on quality and efficiency.

Hall 5 IQEC

8:30–10:30
QSuD · Pulse Propagation
P. Agostini, *Commissariat l'Energie Atomique, France, Presider*

QSuD1 · 8:30 · INVITED
Creation and detection of ions in intense laser fields, H.Schroeder, C.J.G.J. Uiterwaal, C.R.Gebhardt, K.-L.Kompa, *Max-Planck-Inst. fuer Quantenoptik, Germany.* We discuss a modified MPI model, which includes the structure of the photo absorption cross-sction in the ionization continuum. Thus, different ionization features among atoms and molecules, with respect to ionization thresholds and ATI spectra become readily understandable. An analytical approximation for ionization yields and direct ATI spectra is derived which is supported by the existing experimental evidence.

QSuD2 · 9:00 · INVITED
New advances in laser pulse propagation and filamentation, S.L.Chin, A.Iwasaki, W.Liu, *Laval Univ., Canada,* N.Akozbek, C.M.Bowden, *US Army Aviation and Misslie Command, USA,* O.G.Kosareva, V.P.Kandidov, *Moscow State Univ.,* A.Becker, *Bielefeld Univ., Germany*. Femtosecond laser pulse filamentation in optical media leads to interference of multiple filaments, in-phase co-propagation of the fundamental and the 3rd harmonic fashioning a pair of solitary-like-pulses and intensity clamping.

Hall 6 IQEC

8:30–10:30
QSuE · Atom Optics
M.Leduc, *Ecole Normale Supearieure, France, Presider*

QSuE1 · 8:30
Quantum reflection and its applications, F.Shimizu, *Univ. Electro-Communs, Japan,* J.Fujita, *NEC Inst. for Fundamental Res., Japan.* Characteristics of quantum reflection of cold atoms from a solid surface and its applications to atom optics will be presented.

QSuE2 · 8:45
Observation of a matter-wave soliton, L.Khaykovich, F.Schreck, T.Bourdel, J.Cubizolles, G.Ferrari, C.Salomon, *Ecole Normale Superieure, France.* We report the first realization of a matter-wave soliton. The soliton is produced from ^{7}Li Bose-Einstein Condensate, launched in a one-dimentional optical guide. We obtaine propagation without dispertion which is a dramatic evidence of a soliton.

QSuE3 · 9:00
Optical mask for laser cooled atoms, A.Turlapov, A.Tonyushkin, T.Sleator, *New York Univ., USA.* We have demonstrated an "optical mask" for Rb atoms from a MOT. The mask consists of a pulse of an optical standing wave (λ) resonant to an open atomic transition. The interaction pumps all atoms except those near the nodes into another hyperfine ground state, leaving a grating of "spikes" in atomic density in the initial ground state. We have used the mask to create density gratings of period $\lambda/2n$ (n=1–4) as well as to image these gratings in real time.

Conference Hall JOINT	Hall 1 IQEC	Hall 2 IQEC	Hall 3 IQEC	Hall 4 LAT
8:30–10:30 **JSuA · IQEC/LAT Tutorials I—Continued**	**8:30–10:30** **QSuA · X-Ray and VUV Lasers and Light Sources—Continued**	**8:30–10:30** **QSuB · Four-Wave Mixing—Continued**	**8:30–10:30** **QSuC · Quantum Correlations and Entangled States I—Continued** **QSuC3 · 9:15** ***Entanglement and quanta statistics in two-mode systems,*** S.V.Kuznetsov, A.V. Kusev, *Moscow State Univ., Russia,* O.V. Manko, *Lebedev Physical Inst., Russia.* In two-mode system with gaussian Wigner function for an entangled state we calculate tomogram of the state and the quanta statisics. The tomogram of total system and one-mode subsystem are shown to be gaussian ones. The quanta statistics of one-mode is described by Hermite polynomials depending on degree of entanglement.	**8:30–10:30** **LSuA · Laser Processing of Advanced Materials and Laser Microtechnologies I—Continued** **LSuA3 · 9:15** ***Femtosecond laser ablation and nanostructuring,*** F.Korte, J.Serbin, C.Fallnich, B.N.Chichkov, *Laser Zentrum Hannover e.V., Germany,* S.Nolte, *Friedrich-Schiller-Univ. Jena, Germany.* We report on our recent progress in femtosecond laser material processing, nanostructuring, fabrication of waveguides, and photonic devices.
JSuA2 · 9:30 · TUTORIAL LECTURE ***Spectroscopy approaches to atom-dielectric nanostructures interactions,*** M.Ducloy, *Univ. Paris 13, France*. One reviews the recent progress in nanophysics of excited atoms in interaction with dielectric (metallic) surfaces or nanostructures. Special attention is paid to spectroscopic approaches to this field, including high-resolution laser spectroscopy (selective reflection, transmission spectra of sub-micron gas cells), and momentum spectroscopy of atom beams diffracting onto micro/nanogratings.	**QSuA3 · 9:30** ***Investigations of a laboratory Ne-like germanium x-ray laser in RFNC-VNIIEF,*** F.M.Abzaev, R.E.Aleksandrovich, V.I.Annenkov, A.V.Bessarab, V.A.Gaidash, P.D. Gasparyan, V.S.Drozhzhin, S.V.Kalipanov, G.A.Kirillov, S.I.Petrov, I.V.Pikulin, V.V. Romaev, A.V.Ryadov, F.A.Starikov, N.A. Suslov, V.A.Tokarev, N.V.Zhidkov, *Russian Federal Nuclear Center, Russia.* The first demonstration of x-ray laser under the laboratory conditions in Russia is reported. Quasi-steady-state lasing is reached at a 3p–3s transition of Ne-like germanium (λ=196.06Å) in the laser plasma created by ISKRA-5 facility.	**QSuB3 · 9:30** ***Separating surface and bulk contributions to third-harmonic generation in silicon,*** P.N.Saeta, N.A.Miller, *Harvey Mudd College, USA.* Surface and bulk contributions to third-harmonic generation in silicon are distinguished by measuring the dependence of third-harmonic generation on silicon thickness. The results show negligible surface contribution to third-harmonic generation.	**QSuC4 · 9:30** ***Quantum imaging and experiments with spatial quantum correlations,*** H.-A.Bachor, N.Treps, U.Anderson, B.Buchler, P.K.Lam, *Australian Natl Univ., Australia,* A.Maitre, C.Fabre, *Univ. Pierre et Marie Curie, France.* We are exploring a new class of applications for optical correlations. We report the first spatial application of squeezed light for the 1 dim measurement of the beam position, and in 2 dimensions with higher order modes.	**LSuA4 · 9:30 · INVITED** ***Effect of nonlinear scattering of radiation in air on material ablation by femtosecond laser pulses,*** S.M.Klimentov, T.V.Kononenko, P.A.Pivovarov, S.V.Garnov, V.I.Konov, *General Phys. Inst., Russia,* D.Breitling, F.Dausinger, *Inst. für Strahlwerkzeuge, Germany.* Ablative action of ultra-short laser pulses was shown to be strongly influenced by nonlinear forward scattering of the incident beam in ambient air followed by spectral conversion of radiation and significant transformation of its spatial profile.
	QSuA4 · 9:45 ***Developments in point light sources for EUV lithography,*** M.Richardson, C.Keyser, Chiew-seng Koay, *Univ. of Central Florida, USA.* EUV lithography is now considered the leading candidate technology to succeed current excimer-based lithographic fabrication of computer chips. We discuss the EUV light source requirements and the technologies that are likely to satisfy them.	**QSuB4 · 9:45** ***Using four-wave mixing method for diagnostics of turbulent parameters of active medium of fast-axial flow CO_2 laser,*** S.A.Buyarov, M.G.Galuskin, V.S. Golubev, R.V.Grishayev, V.D.Dubrov, Yu.N.Zavalov, V.Ya.Panchenko, *ILIT, Russia.* Intracavity four-wave mixing by non-linearity of gain of active medium of cw FAF CO_2 laser was realized. The spectrum of pulsations of intensity of phase-conjugation beam has the information about lateral turbulent pulsations of gas flow.	**QSuC5 · 9:45** ***Nonlocal pulse shaping with entangled photon pairs,*** M.Bellini, S.Viciani, *Istituto Nazionale di Ottica Appl. and INFM, Italy,* F.T.Arecchi, F.Marin, A.Zavatta, *Univ. di Firenze and INFM, Italy.* We provide evidence of time-like "ghost" interference between entangled fields of light. By spectrally or temporally modulating one light pulse, we observe nonlocal shaping effects on the other pulse of the entangled pair.	

Hall 5 IQEC	Hall 6 IQEC			
8:30–10:30 **QSuD · Pulse Propagation—Continued**	**8:30–10:30** **QSuE · Atom Optics—Continued**			
	QSuE4 · 9:15 ***Application of permanent magnetic microstructures in integrated atom optics,*** A.I.Sidorov, F.Scharnberg, D.S.Gough, R.J.McLean, P.Hannaford, *Swinburne Univ. of Technology, Australia,* T.J.Davis, *CSIRO Manufacturing Sci. and Techn., Australia,* G.I.Opat, *The Univ. of Melbourne, Australia.* We show that permanent magnetic films can be used for the construction of micron-scale traps and waveguides that can accumulate, transport, split and recombine atom de Broglie waves.			
QSuD3 · 9:30 ***Formation of filaments and transverse ring structures in high-power femtosecond laser pulses in air,*** O.G.Kosareva, V.P.Kandidov, K.Yu.Andrianov, *Moscow State Univ., Russia,* S.L.Chin, S.Petit, W.Liu, A.Iwasaki, M.-C.Nadeau, *Univ. Laval, Canada.* We observed subsequent formation of multiple filaments and registered the interference of transverse rings produced by the two filaments at different stages of their development in the propagation of 14 mJ, 45 fs infrared laser pulse in air.	**QSuE5 · 9:30** ***Brillouin propagation modes and stochastic resonance in an optical lattice,*** M.Schiavoni, F.-R.Carminati, L.Sanchez-Palencia, F.Renzoni, G.Grynberg, *Lab. Kastler-Brossel, France.* We have studied the transport of atoms in a dissipative optical lattice. The Brillouin propagation modes have been excited and detected by imagery. We have observed the phenomenon of stochastic resonance on the mode amplitude.			
QSuD4 · 9:45 ***Coupled ionization and laser pulse propagation dynamics, probed with ultrafast pulse measurement techniques,*** F.A.Weihe, C.Valentin, S.Kazamias, R.Haroutounian, S.Sebban, G.Grillon, F.Auge, G.Cheriaux, A.Rousse, D.Hulin, Ph.Balcou, *ENSTA, Ecole Polytechnique, France.* We report measurements of the changes in the temporal intensity, temporal phase, and spectrum, of an intense, ultrashort laser pulse, after it has passed through a gas target, using ultrafast pulse measurement techniques.	**QSuE6 · 9:45** ***Loading optical surface traps through elastic collisions,*** D.Rychtarik, M.Hammes, H.-C.Naegerl, R.Grimm, *Innsbruck Univ., Austria.* We investigate loading of conservative optical trapping potentials at a surface through elastic collisions from a reservoir of cold atoms. A local increase of density and phase-space density by a factor of ten is observed.			

Conference Hall JOINT	Hall 1 IQEC	Hall 2 IQEC	Hall 3 IQEC	Hall 4 LAT
8:30–10:30 **JSuA · IQEC/LAT Tutorials I—Continued**	**8:30–10:30** **QSuA · X-Ray and VUV Lasers and Light Sources—Continued**	**8:30–10:30** **QSuB · Four-Wave Mixing—Continued**	**8:30–10:30** **QSuC · Quantum Correlations and Entangled States I—Continued**	**8:30–10:30** **LSuA · Laser Processing of Advanced Materials and Laser Microtechnologies I—Continued**
	QSuA5 · 10:00 ***High power gas discharge produced plasma extreme ultra-violet radiation sources,*** V.M.Borisov, A.S.Ivanov, S.V.Mironov, V.A.Mishchenko, O.B.Khristoforov, Y.B.Kiryukhin, A.V.Prokofiev, A.Y.Vinokhodov, *TRINITI, Russia,* U.Stamm, I.Ahmad, S.Götze, J.Kleinschmidt, V.Korobotchko, J.Ringling, G.Schriever, *XTREME Technologies GmbH, Germany.* Recent results in the development of gas discharge produced plasma EUV sources for EUV lithography are presented.	**QSuB5 · 10:00** ***Four-wave mixing and optical bistability in resonant medium,*** O.G.Romanov, A.S. Rubanov, A.L.Tolstik, A.V.Chaley, *Belarussian State Univ., Belarus.* The results of theoretical modeling for intracavity and off-cavity four-wave mixing have been considered with regard to the transients in resonant media and diffraction mechanism of transverse feedback. The formation peculiarities of the spatio-temporal structures of light fields upon the effects of a symmetry breaking bifurcation for counter-propagating pump waves have been described.	**QSuC6 · 10:00** ***Quantum interference with photon number resolving detectors,*** A.J.Miller, S.Nam, J.M.Martinis, *NIST, USA,* G.Di Guiseppe, M.Atature, A.V.Sergienko, B.E. Saleh, M.C.Teich, *Boston Univ., USA.* We describe the development of a novel photon counting detector that is capable of photon number discrimination. We present results showing quantum interference in coincident and two-photon rates from a polarization version of the Hong-Ou-Mandel interferometer.	**LSuA5 · 10:00** ***Analytical and fundamental aspects of femtosecond laser microablation,*** A.F.Semerok, *CEA Saclay, DPC/SCPA /LALES, France.* Femtosecond laser microablation of metals and transparent dielectrics was under experimental and theoretical studies with respect to surface elemental microanalysis. Particular features of the fs laser ablation and laser microplasma are presented and discussed.
	QSuA6 · 10:15 ***Efficient UV and VUV light sources on R_2 and RX molecules,*** V.F.Tarasenko, M.V.Erofeev, M.I.Lomaev, D.V.Shitz, V.S.Skakun, E.A.Sosnin, High Current Electronics Inst., Russia. Efficient radiation of Ar_2*, Kr_2*, Xe_2*, KrBr*, KrCl*, XeI*, Cl_2, Br_2*, I_2*, XeBr*, XeCl* molecules and I atoms was obtained. New types of UV and VUV excilamps with different discharge geometry excited by capacitive discharge, barrier discharge, glow discharge and high-pressure volume discharge are presented.	**QSuB6 · 10:45** ***Surface electromagnetic waves enhanced femtosecond multiphoton interactions,*** P.Masselin, *Univ. du Littoral, France,* M.M.Nazarov, A.P.Shkurinov, *Moscow State Univ., Russia,* Y.E.Lozovic, S.P.Merculova, *Inst. of Spectroscopy, Russia.* Three and four-wave mixing on metal surface is studied with two noncollinear laser beams. Observed high efficiency of frequency conversion is concerned with simultaneous excitation of surface electromagnetic waves on frequencies of all interacting waves.	**QSuC7 · 10:15** ***Quantum ellipsometry with polarization-entangled photon pairs,*** K.C.Toussaint, Jr., A.F.Abouraddy, M.Corbo, A.V. Sergienko, B.E.A.Saleh, M.C.Teich, *Boston Univ., USA.* We present a novel interferometric method for performing ellipsometric measurements using polarization-entangled photon pairs in conjunction with a coincidence-detection scheme. Such measurements are absolute; they require neither source nor detector calibration.	**LSuA6 · 10:15** ***Action of ultra-short laser pulses on surface in the near field,*** M.Libenson, G.Martsinovsky, *Vavilov State Optical Inst., Russia,* V.Men'shov, O.Belous, *Inst. of Fine Mechanics and Optics, Russia.* A simple theory for pulsed laser local near-field photoexcitation in metals and semiconductors by a single ultra short pulse is considered, and isolated heating of free electrons in the metal is analyzed. It allowed estimation of emission current density in the area of the neaf-field interaction.

10:30–11:00 COFFEE BREAK

Hall 5 IQEC	Hall 6 IQEC			

8:30–10:30
QSuD · Pulse Propagation—Continued

QSuD5 · 10:00
Delay-dependent amplification of short light pulses due to stimulated Rayleigh process, M.V.Fedorov, *General Phys. Inst., Russia,* S.V.Popruzhenko, *Moscow State Engin. Phys. Inst., Russia,* D.F.Zaretsky, *RRC "Kurchatov Inst.", Russia,* W.Becker, *Max-Born Inst., Germany.* We consider the stimulated Rayleigh scattering of two short light pulses of close carrier frequencies propagating in gaseous media. We show that time delay between maxima of pulses may provide significant energy transfer between them.

QSuD6 · 10:15
Multifilamentation of high-power femtosecond laser pulses in the turbulent atmosphere, S.A.Shlenov, V.P.Kandidov, O.G.Kosareva, *Moscow State Univ., Russia.* Multifilamentation of powerful femtosecond laser pulse propagating in the turbulent atmosphere is studied by Monte Carlo technique. Phase screen method is used to simulate air refractive index fluctuations. Statistical characteristics of filament-center displacements and average number of filaments are obtained at various parameters of turbulence.

8:30–10:30
QSuE · Atom Optics—Continued

QSuE7 · 10:00
Cold atom gyroscope for precision measurement, A.Landragin, A.Clairon, N.Dimarcq, J.Fils, D.Holleville, F.Yver, *Observatoire de Paris, France,* P.Bouyer, *Univ. d'Orsay, France,* Ch.J.Borde, *Univ. Paris-Nord, France.* An atomic gyroscope is under construction for applications in fundamental physics, geophysics or inertial navigation. We use cold atoms and a compact design to reach the long term stability required for these applications.

QSuE8 · 10:15
2D and 3D laser cooling in near resonant multifrequency field, A.V.Taichenachev, A.M.Tumaikin, V.I.Yudin, *Novosibirsk State Univ., Russia.* We propose a new variant of 2D (3D) laser cooling, when each of near resonant monochromatic fields propagating on different orthogonal (or independent) directions have different frequencies. Our method combines in itself both the phase independent potential and sub-Doppler cooling in near resonant field.

10:30–11:00 COFFEE BREAK

Conference Hall — JOINT

11:00–12:00
JSuC · IQEC/LAT Tutorials II
A.S.Akhmanov, *Ins. of Laser and Inf. Technologies, Russia, Presider*

JSuC1 · 11:00 · TUTORIAL LECTURE
Ultrasound-mediated biophotonic imaging, L.V.Wang, *Texas A&M Univ., USA.* We explored novel ultrasound-mediated medical imaging for early-cancer detection, a grand challenge in cancer research, using non-ionizing electromagnetic and ultrasonic waves. The hybrid modalities yield electromagnetic-contrast information at ultrasonic resolution in relatively thick biological tissue.

Hall 1 — JOINT

11:00–12:30
JSuB · Ultrashort Laser Pulses: Generation and Amplification
Y.Senatsky, *Lebedev Physical Inst., Russia, Presider*

JSuB1 · 11:00 · INVITED
Ultrashort pulses with high average power, R.Paschotta, F.Brunner, E.Innerhofer, T.Südmeyer, U.Keller, *Swiss Federal Inst. of Technology, Switzerland.* We discuss passively mode-locked lasers with high average output power, based on thin disk laser heads and semiconductor saturable absorber mirrors (SESAMs). New power records are 22 W in 240-fs pulses and 60 W in 6-ps pulses.

JSuB2 · 11:30
4-fs pulses at megahertz repetition rate: approaching the single-cycle regime, V.Yakovlev, A.Apolonski, G.Tempea, F.Krausz, *Vienna Univ. of Technology, Austria.* Generation of 4-fs pulses by compressing the spectrally broadened output of a Ti:sapphire oscillator is described. An approach to characterize these extremely short pulses is discussed.

Hall 2 — IQEC

11:00–12:30
QSuF · Quadratic Solitons
G.Assanto, *Univ. of Rome, Italy, Presider*

QSuF1 · 11:00
Nonlinear beam dynamics in $c^{(2)}$ waveguides, G.Stegeman, R.Malendevich, R.Schiek, R.Iwanow, L.Jankovic, H.Fang, *Univ. of Central Florida, USA,* G.Schreiber, W.Sohler, *Univ. Paderborn, Germany,* L.Torner, *Univ. Politecnica de Catalunya, Spain.* Beam focusing, single soliton generation, multi-soliton generation and the onset of modulational instability were all observed with increasing input power in QPM and birefringence phase-matched $LiNbO_3$ slab waveguides.

QSuF2 · 11:15
Optical vortices of parametrically coupled waves, A.P.Sukhorukov, A.A.Kalinovich, *Moscow State Univ., Russia,* G.Molina-Terriza, L.Torner, *Polytechnic Univ. of Catalonia, Spain.* We consider the interaction of two coupled beams that contain screw phase dislocations, and obtain the conditions for generation of one or three vortices. We also determine the vortex trajectories under the conditions of three-wave parametric interaction.

QSuF3 · 11:30
Parametric amplification of Gaussian beam in the field of optical vortex, A.Matijošius, A.Piskarskas, V.Smilgevicius, G.Tamošauskas, *Vilnius Univ., Lithuania.* We demonstrate the first to our knowledge parametric amplification of Gaussian beam in the field of optical vortex. Frequency and topological charge conversion of optical vortex have been observed.

Hall 3 — IQEC

11:00–12:30
QSuG · Quantum Correlations and Entangled States II
A.S.Chirkin, *Moscow State Univ., Russia*, and S.Harris, *Stanford Univ., USA, Presiders*

QSuG1 · 11:00 · INVITED
Hyperentangled-photon cryptography, A.V.Sergienko, G.Di Giuseppe, G.S.Jaeger, M.Atature, M.D.Shaw, B.E.A.Saleh, M.C.Teich, *Boston Univ., USA.* The role of hyperentanglement in the quantum interference of light generated via type-II spontaneous parametric down-conversion is explored. We have demonstrated in regimes of both ultrafast and continuous-wave pumping that the observed quantum-interference pattern in one feature, such as polarization, can be modified at will by controlling the dependence of the state on the other parameters, such as frequency and transverse wavevector. These findings improve our capacity to engineer the polarization-entangled quantum states for secure open-air communications.

QSuG2 · 11:30
Experimental transformation between quadrature phase and polarisation entanglement, W.P.Bowen, R.Schnabel, H.-A.Bachor, P.K.Lam, *Australian Natl Univ., Australia,* T.C.Ralph, *Univ. of Queensland, Australia.* We produce quadrature phase entanglement from a pair of amplitude squeezed beams. The entanglement is interrogated with two well-accepted but subtly different measures. We demonstrate a scheme converting this entanglement to continuous variable polarisation entanglement.

Hall 4 — LAT

11:00–11:45
LSuB · Laser Processing of Advanced Materials and Laser Microtechnologies II
V.Konov, *General Phys. Inst., Russia, Presider*

LSuB1 · 11:00 · INVITED
Mechanisms of laser cleaning, P.Leiderer, M.Mosbacher, J.Graf, F.Lang, M.Olapinski, Ch.Bartels, J.Boneberg, *Univ. of Konstanz, Germany.* We report about laser cleaning of extremely smooth surfaces like silicon. The mechanisms for removing submicroscopic dust particles by "Dry Laser Cleaning" and "Steam Laser Cleaning" (applying an additional liquid film to the surface) are investigated.

LSuB2 · 11:30
Laser technology of SNOM-tips fabrication: process diagnostics, processing and testing, V.P.Veiko, N.B.Voznesensky, S.A.Volkov, A.N.Kalachev, *Inst. of Fine Mechanics and Optics, Russia,* L.N.Kaporsky, *Vavilov State Optical Inst., Russia.* Diagnostic of laser–assisted drawing–out of SNOM–tips has been investigated by high–speed movie camera and byhromatic pyrometry. Testing of the SNOM–tips apertures has been made by reconstruction of SNOM–tip aperture from far–field experimental distribution by developed theoretical algorithm.

Hall 5 IQEC	Hall 6 IQEC			

11:00–12:30
QSuH · Molecules in Strong Laser Field
H.Takuma, *Osaka Univ., Japan, Presider*

QSuH1 · 11:00 · INVITED
Multicharged molecular ions probed by laser-induced Coulomb explosion, L.Quaglia, V.Brenner, Ph.Millie, C.Cornaggia, *CEA Saclay, France.* Multicharged molecules are investigated using fluorescence studies and kinetic energy measurements of atomic fragments resulting from Coulomb explosion. Experimental results are discussed in the frame of ab initio calculations of the corresponding molecular electronic states.

QSuH2 · 11:30
Vibrational-rotational dynamics of a molecular system in a laser field, A.M.Popov, O.V.Tikhonova, E.A.Volkova, *Moscow State Univ., Russia.* Laser-field dynamics of a 2D model of H_2^+ molecular ion is investigated numerically, with both rotational and vibrational degrees of freedom being taken into account. The interrelation between molecular dissociation and orientation is studied, and the effect of the molecular alignment on the possible stabilization against dissociation is analyzed.

11:00–12:30
QSuI · Quantum Gases I
F.Shimizu, *Univ. Electro-Communs, Japan, Presider*

QSuI1 · 11:00 · INVITED
Bose-Einstein condensates in magnetic micro traps, C.Zimmermann, *Univ. Tübingen, Germany.* A magnetic micro trap is loaded with Rubidium atoms from a standard magnetooptical trap by continuously changing the shape of the trapping potential. The micro trap is formed by a set of microfabricated current conductors with widths ranging from 3µ. to 30µm. Efficient cooling by forced evaporation allows to generate Bose-Einstein condensates inside the micro trap with up to 500 000 condensed atoms. Lifetime, interaction with the substrate, superfluid flow, and quasi one-dimensional behavior of the condensate will be discussed.

QSuI2 · 11:30 · INVITED
Dynamics of rotating Bose-Einstein condensate, F.Chevy, V.Bretin, P.Rosenbusch, K.W.Madison, J. Dalibard, *Ecole Normale Supérieure, France.* In this paper will be presented a few aspects of the physics of rotating Bose-Einstein condensate, in particular the nucleation of quantized vortices and their influence on the collective modes of the cloud.

Conference Hall JOINT	Hall 1 JOINT	Hall 2 IQEC	Hall 3 IQEC	
11:00–12:00 **JSuC · IQEC/LAT Tutorials II — Continued**	**11:00–12:30** **JSuB · Ultrashort Laser Pulses: Generation and Amplification — Continued**	**11:00–12:30** **QSuF · Quadratic Solitons— Continued**	**11:00–12:30** **QSuG · Quantum Correlations and Entangled States II— Continued**	
	JSuB3 · 11:45 ***Generation of femtosecond laser pulse with phase singularity,*** Y.Miyamoto, A.Wada, T.Ohtani, N.Nishihara, M.Takeda, *Univ. of Electro-Communs, Japan,* N.R.Heckenberg, H.Rubinsztein-Dunlop, *Univ. of Queensland, Australia.* Femtosecond laser pulses with phase singularity were generated using a pair of holograms. The angular dispersion introduced by the first hologram is compensated by the second hologram.	**QSuF4 · 11:45** ***Multiple quadratic soliton generation and its control by weak beams in non-critically phase-matched crystals,*** S.Polyakov, G.Stegeman, *Univ. Central Florida, USA.* We demonstrate numerically that multiple quadratic solitons are generated due to anisotropic diffraction in non-critically phase-matched geometries and bifurcation-like switching between one and two soliton generation can be controlled with a weak harmonic seed beam.	**QSuG3 · 11:45** ***Counter-propagating entangled photons in a waveguide with periodic nonlinearity,*** M.C.Booth, M.Atature, G.Di Giuseppe, B.E.A.Saleh, A.V.Sergienko, M.C.Teich, *Boston Univ., USA.* The conditions required for spontaneous parametric down-conversion in a waveguide with periodic nonlinearity in the presence of an unguided pump field are established. We find that counter-propagating beams exhibit narrow bandwidth permitting the generation of quantum states that possess discrete-frequency entanglement.	
	JSuB4 · 12:00 · INVITED ***Predicting temperature dependent solid state laser performance,*** M.Bass, *Univ. of Central Florida, USA,* L.Weichman, *Sandia Natl Labs, USA.* We analyze the temperature dependence of both actively and passively Q-switched Nd:YAG and Cr,Nd:GSGG lasers in the range -60 to +60ºC. The theory and experimental results are presented. Coincidentally, we identify the properties of an ideal saturable absorber.	**QSuF5 · 12:00** ***Quadratic soliton deviation due to asymmetric perturbations,*** D.A.Chuprakov, A.P.Sukhorukov, *Moscow State Univ., Russia.* Quadratic soliton steering by asymmetric amplitude and phase perturbations was investigated. Such distortions can appear due to beam separation and crossing. We found localized asymmetric modes and developed effective particle theory to found soliton propagation direction.	**QSuG4 · 12:00** ***Superresolution microscopy with squeezed light,*** M.I.Kolobov, *Univ. of Lille-1, France,* C.Fabre, *Univ. Pierre et Marie Curie, France,* P.Scotto, P.Colet, M.San Miguel, *Univ. de les Illes Balears, Spain.* Classical superresolution can be achieved in scanning microscopy by means of a special optical mask placed in the image plane. We demonstrate that further improvement of superresolution is possible by illuminating an object with multimode squeezed light.	
		QSuF6 · 12:15 ***Quadratic solitons in non-critically phase-matched crystals,*** G.Stegeman, R.Malendevich, L.Jankovic, S.Polyakov, *Univ. of Central Florida, USA,* C.Bosshard, P.Gunter, *Inst. of Quantum Electronics, ETH Honggerberg, Switzerland.* Quadratic spatial solitons at non-critical phase-matching for SHG in the biaxial crystal $KNbO_3$ exhibited a very large angular bandwidth for the soliton threshold, the soliton composition and its variation with input intensity.	**QSuG5 · 12:15** ***High-order photon statistics of single-mode laser diodes and microchip solid-state lasers,*** Tsong-Shin Lim, Jyh-Long Chern, *Natl Cheng Kung Univ., Taiwan,* Kenju Otsuka, *Tokai Univ., Japan.* Significant differences in the high-order photon statistics of laser diodes and microchip solid-state lasers were found. Employing the Fokker-Planck equation approach, we found that the ratio of the carrier to the photon lifetime is crucial.	

12:30–14:00 LUNCH (on your own)

Hall 5 IQEC	Hall 6 IQEC			

11:00–12:30
QSuH · Molecules in Strong Laser Field—Continued

QSuH3 · 11:45
Electron ionization asymmetries with ultrashort intense laser pulses, A.D.Bandrauk, S.Chelkowski, J.Levesque, *Univ. de Sherbrooke, Canada.* Exact numerical solutions of the time-dependent Schroedinger equation for the H atom and the H^{2+} molecular ion are used to illustrate ionization asymmetries in the tunnelling region.It is shown that Coulomb refocusing effects are essential to describe the effect.

QSuH4 · 12:00
Revival structures in picosecond laser-induced alignment, F.Rosca-Pruna, M.J.J. Vrakking, *FOM Inst. for Atomic and Molec. Phys., The Netherlands.* We report the experimental observation of revival structures in the alignment of a ground state rotational wavepacket following non-resonant excitation of I2 molecules by an intense picosecond laser pulse.

QSuH5 · 12:15
Interference stabilization of molecules with respect to photodissociation by a strong laser field, M.E.Sukharev, *Univ. de Paris-Sud, France,* M.V.Fedorov, *General Phys. Inst., Russia.* The ideas of interference stabilization of Rydberg atoms are adapted to photodissociation and stabilization of molecules by a strong laser field. Multiple strong-field-induced Raman-type transitions between vibrational levels of the ground electronic state are taken into account.

11:00–12:30
QSuI · Quantum Gases I—Continued

QSuI3 · 12:00
Measurement of the excitation spectrum of a Bose condensate, and direct observation of the phonon energy, R.Ozeri, J.Steinhauer, N.Katz, N.Davidson, *Weizmann Inst. of Sci., Israel.* We report on the measurement of the Bose-Einstein condensate excitation spectrum. Comparison is made to the Bogoliubov spectrum. The momentum and energy of phonons are also measured directly from computerized tomography of time-of-flight images.

QSuI4 · 12:15
Dynamical tunnelling of a Bose-Einstein condensate in an optical lattice: experiment and theory, H.Häffner, A.Browaeys, K.Helmerson, P.S.Julienne, C. McKenzie, W.D.Phillips, S.L.Rolston, W.K.Hensinger, B.Upcroft, *NIST, USA,* N.R.Heckenberg, H.Rubinsztein-Dunlop, G.J.Milburn, *The Univ. of Queensland, Australia.* We report experiments showing dynamical tunnelling of a Bose-Einstein condensate. In dynamical tunnelling a constant of motion other than energy forbids the process classically. We also present a detailed theoretical analysis of the experiments.

12:30–14:00 LUNCH (on your own)

Conference Hall — IQEC/LAT-YS

14:00–16:00
YSuA · IQEC/LAT-YS Keynote Lectures II
C.Sibilia, *Univ. di Roma "LaSapienza", Italy, Presider*

YSuA1 · 14:00 · KEYNOTE LECTURE
High-resolution experiments with spin-polarized atoms, A.Weis, *Univ. de Fribourg, Switzerland.* Spin-polarized atoms are a sensitive probe for a number of high-resolution investigations. We discuss the basic principles and applications such as low-field magnetometry, structure studies of quantum crystals and the measurement of forbidden polarizabilities.

Hall 1 — LAT

14:00–16:00
LSuC · Solid-State Lasers I
I.A.Shcherbakov, *General Phys. Inst., Russia, Presider*

LSuC1 · 14:00 · INVITED
Recent progress of ceramic lasers, Kenichi Ueda, *Univ. of Electro-Commun., Japan.* Novel solid state laser materials, Nd^{3+}:YAG, Nd^{3+}:Y_2O_3, Cr^{4+}:YAG ceramics, were developed. High optical-to-optical efficiency of 60% and kilowatt class output were demonstrated by Nd^{3+}:YAG ceramics. Possible application for industrial lasers and fusion driver will be discussed. The ceramic lasers have a great advantage in the new type of applications because of their scalability and flexibility.

LSuC2 · 14:30
Large aperture laser optical elements from KDP, KD*P crystals, V.I.Bespalov, V.I.Bredikhin, V.P.Ershov, V.V.Zilberberg, V.I.Katsman, *Inst. of Appl. Phys. RAS, Russia.* Optical elements made of KDP, DKDP crystals are up to now among the most expensive and significant ones in high-power laser systems. High-effective wasteless technology based on rapid technology of profiled growth of crystal products and the technology of optical diamond micromilling are developed now at the Inst. of Appl. Phys. RAS. The cycle duration of the crystal product growth reduces tens times.

Hall 2 — IQEC

14:00–16:00
QSuJ · Ultrafast Nonlinear Optics
D.von der Linde, *Univ. of Essen, Germany, Presider*

QSuJ1 · 14:00 · INVITED
Attosecond pulse physics, N.Milosevic, M.Kitzler, A.Scrinzi, T.Brabec, *Technische Univ. Wien, Austria.* In this talk an overview of the state of the art of attosecond physics will be given. Generation, characterization, and possible applications of attosecond pulses will be considered, theoretically as well as experimentally.

QSuJ2 · 14:30 · INVITED
Probing charge transport by terahertz time-domain spectroscopy, J.Shan, F.Wang, T.F.Heinz, *Columbia Univ., USA,* E.Knoesel, *Rowan Univ., USA,* M.Bonn, *Leiden Inst. of Chemistry, The Netherlands.* Terahertz time-domain spectroscopy (THz TDS) in conjunction with pulsed optical excitation is applied to investigate carrier dynamics and charge transport properties in normally insulating materials, such as non-polar liquids and wide band-gap solids.

Hall 3 — IQEC

14:00–16:00
QSuK · QED and Superradiance
A.N.Goncharov, *Inst. of Laser Physics, Russia*, and L.Orozco, *SUNY at Stony Brook, USA, Presiders*

QSuK1 · 14:00 · INVITED
Superradiance revisited or what does nature do with 2^N dimensions, H.J.Carmichael, J.P.Clemens, *Univ. of Oregon, USA,* Hyunchul Nha, *Seoul National Univ., Korea*, L.Horvath, *Macquarie Univ., Australia.* The stochastic initiation of superradiance is discussed from a quantum trajectory point of view. Approximations that yield a treatment accessible to numerical implimentation are compared with the exact formulation in a space of 2^N dimensions.

QSuK2 · 14:30
Selective interactions in trapped ions: motional state reconstruction and quantum logic, E.Solano, *Max-Planck-Inst. for Quantum Optics, Germany.* We propose a method for generating nonclassical states, reconstructing the motional Wigner function and implementing quantum logic in trapped ions using a suitable Raman laser scheme that selects resonantly Hilbert subspaces, leaving all others dispersive.

Hall 4 — JOINT

14:00–16:00
JSuD · Optical Tomography of Biological Tissues
T.Milner, *Texas Univ., USA*, and V.Tuchin, *Saratov State Univ., Russia*, *Presiders*

JSuD1 · 14:00 · INVITED
Coherent thermal wave tomography for tissue diagnostics, T.Milner, S.A.Telenkov, *Univ. of Texas at Austin, USA.* Thermal wave imaging of discrete chromophores in biological materials is demonstrated using tissue phantoms and in vivo models. Theoretical analysis and computer simulations are presented to solve the coherent thermal wave tomography inverse problem.

JSuD2 · 14:30 · INVITED
Diffusion tomography in the paraxial geometry, J.C.Schotland, *Washington Univ., USA.* We consider the inverse scattering problem for diffuse light in the paraxial geometry. We present a solution to this problem in the form of a fast algorithm.

Hall 5
IQEC

14:00–16:00
QSuL · Laser-Induced Nuclear Physics
S.P.Goreslavski, *Moscow Eng. Phys. Inst., Russia, Presider*

QSuL1 · 14:00 · INVITED
Laser induced nuclear physics and applications, K.W.D.Ledingham, *Univ. of Glasgow, UK.* This talk will include sufficient photo-nuclear physics theory to explain the experimental results which have been accumulated over the last four years when ultra-intense lasers interact with solid targets.

QSuL2 · 14:30 · INVITED
Low-energy nuclear processes using hot femtosecond laser plasma, A.B.Savel'ev, A.V.Andreev, V.M.Gordienko, *Moscow State Univ., Russia.* We discuss origins of various nuclear processes that take place at irradiation of solids with moderate intensity femtosecond laser pulses: low energy nuclear excitation, thermonuclear reactions, etc. Possible applications of these phenomena are also presented.

Hall 6
IQEC

14:00–16:00
QSuM · Quantum Gases II
C.Zimmermann, *Univ. of Tuebingen, Germany, Presider*

QSuM1 · 14:00 · INVITED
Quantum phase transition from a superfluid to a Mott insulator in an ultracold gas of atoms, M.Greiner, O.Mandel, T.Esslinger, T.W.Haensch, I.Bloch, *LMU & Max-Planck -Inst. for Quantum Optics, Germany.* A quantum phase transition from a superfluid to a Mott insulator is achieved in a Bose-Einstein condensate, stored in a three-dimensional optical lattice potential.

QSuM2 · 14:30
Suppression of identical particle collisions in a Bose condensate, N.Katz, J.Steinhauer, R.Ozeri, N.Davidson, *Weizmann Inst. of Sci., Israel.* Suppression of the collision cross section for identical particles within a Bose condensate is measured. We perform hydrodynamic simulations of excitations traveling through the condensate, and compare the number of observed collisions with experiment.

Conference Hall IQEC/LAT-YS	Hall 1 LAT	Hall 2 IQEC	Hall 3 IQEC	Hall 4 JOINT
14:00–16:00 **YSuA · IQEC/LAT-YS Keynote Lectures II—Continued**	**14:00–16:00** **LSuC · Solid-State Lasers I—Continued**	**14:00–16:00** **QSuJ · Ultrafast Nonlinear Optics—Continued**	**14:00–16:00** **QSuK · QED and Superradiance—Continued**	**14:00–16:00** **JSuD · Optical Tomography of Biological Tissues—Continued**
	LSuC3 · 14:45 ***Acentric oxide crystals for self-frequency doubling solid state lasers,*** B.I.Kidyarov, *Inst. of Semicond. Phys., Russia,* E.V.Pestryakov, *Inst. of Laser Phys., Russia.* Principles of search and list of new predicted self- frequency doubling laser crystals have been developed. It's shown that the oxide bond lengths and the size of laser ions are obligatory criterions for this goal.		**QSuK3 · 14:45** ***Time asymmetry and the breakdown of detailed balance in cavity QED,*** A.Devisov, H.J.Carmichael, *Univ. of Oregon, USA.* Temporal fluctuations in cavity QED are studied through the cross-correlation of output fields. Whereas microscopic reversibility guarantees time symmetry in thermal equilibrium, where detailed balance holds, time asymmetries arise in cavity QED due to the breakdown of detailed balance.	
YSuA2 · 15:00 · KEYNOTE LECTURE ***Nonclassical light: Generation and properties,*** A.S.Chirkin, *Moscow State Univ., Russia.* In the lecture the main attention will be pained to relatively new nonlinear optical methods of generating the squeezed light and analysis of its nonclassical polarization characteristics.	**LSuC4 · 15:00** ***New passive Q-switches for 2.8 μm Er:YSGG laser,*** V.G.Shcherbitsky, V.E. Kisel, N.V.Kuleshov, *Inter Laser Center, Belarus,* V.I.Levchenko, V.N.Yakimovich, *Inst. of Solid-State and Semicond. Phys., Belarus.* Passive Q-switching of flash-lamp pumped 2.79 μm Er:YSGG laser was demonstrated with Fe:ZnSe, Co:ZnSe and Co:ZnS saturable absorbers. The output pulses with energy up to 60 mJ and pulse width as short as 170 ns were obtained.	**QSuJ3 · 15:00** ***Nonlinear propagation of IR femtosecond laser pulses and optical damage in fused silica,*** L.Sudrie, B.Lamouroux, M.Franco, B.Prade, S.Tzortzakis, A.Mysyrowicz, A.Couairon, *Ecole Polytechnique, France.* Long-range filamentation of IR laser pulses and filamentary damage tracks are observed in fused silica. Experimental results are well reproduced by numerical simulations.	**QSuK4 · 15:00** ***Single-ion cavity-QED,*** M.Keller, G.Guthöhrlein, B.Lange, W.Lange, H.Walther, *Max-Planck-Inst. für Quantenoptik, Germany,* K.Hayasaka, *Kansai Adv. Res. Center, CRL, Japan.* The position of a single $^{40}Ca^{+}$-ion in an optical cavity is controlled with sub-wavelength resolution. Thus, continuous and well-defined interaction of the ion with a single field mode is achieved, permitting deterministic quantum state processing.	**JSuD3 · 15:00** ***Diffusion optical tomography as a technique of fast diagnostics of large multi-scattering objects,*** E.V.Tret'akov, I.V.Shutov, V.V.Shuvalov, *Moscow State Univ., Russia.* Algorithm of real-time visualization of large multiple-scattering objects' internal structure by diffusion optical tomography will be described. Experimental and computer-simulation (3D Monte-Carlo technique) data, obtained for such objects with some highly-absorbing and/or highly-scattering inclusions, will be presented.
	LSuC5 · 15:15 ***Scalable pulsed mid-infrared laser,*** C.R.Jones, R.N.Campbell, *Appl. Res. Associates, Inc., USA,* C.Kletecka, W.Rudolph, *Univ. of New Mexico, USA.* Combining advantages of solid-state and gas-laser technology, an Nd:YAG laser pumps a cell of HBr gas. The 1.34-micron excitation of a third-overtone transition resulted in energetic, cascade-lasing near 4 microns. Experiments and modeling are described.	**QSuJ4 · 15:15** ***Femtosecond laser direct-writing and poling of embedded grating structures,*** J.D.Mills, C.Corbari, P.G.Kazansky, J.J.Baumberg, *Univ. of Southampton, UK.* Embedded gratings have been written into fibers and silica plates with a femtosecond laser. Subsequent thermal poling reveals enhancement of the second harmonic production in the irradiated regions, offering possibilities of efficient quasi-phase-matching in fibers.	**QSuK5 · 15:15** ***Driven Jaynes-Cummings systems: squeezing, forced superradiance, exponential superradiance,*** A.Ya.Kazakov, *St.-Petersburg State Univ. of AeroSpace Instr., Russia.* Driven Jaynes-Cummings systems in the case of "open resonance" are under consideration. It is shown, that such systems can be a source of the squeezed radiation in the quantized mode. If N identical atoms interact with external field, the population of the quantized mode depends on N quadratically (for one-photon JCS) or exponentially (for two-photon JCS).	**JSuD4 · 15:15** ***3-D reconstruction of localized fluorescent masses,*** V.Chernomordik, D.Hattery, A.Russo, P.Smith, A.Eidsath, A.Gandjbakhche, *Natl Inst. of Health, USA.* Positions of fluorophores were reconstructed from the surfaces images, obtained by our near infrared imaging system. Accuracy of our algorithm, based on the random walk, is better than ~10% for intralipid phantoms and ex-vivo tissue.

Hall 5 IQEC	Hall 6 IQEC			

14:00–16:00
QSuL · Laser-Induced Nuclear Physics—Continued

14:00–16:00
QSuM · Quantum Gases II—Continued

QSuM3 · 14:45
Bose Einstein condensation and studies of cold collisions in a gas of metastable helium atoms, M.Leduc, F.Pereira dos Santos, J.Léonard, E.Jahier, S.Schwartz, C.Cohen Tannoudji, *l'Ecole Normale Supérieure, France.*

QSuL3 · 15:00
Interference effects in ionization of molecules in intense laser fields, A.Becker, J.Muth-Böhm, F.H.M.Faisal, *Univ. Bielefeld, Germany,* F.Grasbon, G.G.Paulus, H.Walther, *Max-Planck-Inst. für Quantenoptik, Germany,* S.L.Chin, *Univ. Laval, Canada.* Laser induced ionization probabilities are found to be reduced for molecules with valence orbitals having anti-bonding symmetry due to a destructive interference effect, but not for molecules with valence orbitals of bonding symmetry.

QSuM4 · 15:00
Creation of a molecular Bose-Einstein condensate by using a Mott insulator transition, D.Jaksch, P.Zoller, *Univ. of Innsbruck, Austria,* C.E.Williams, *NIST, USA,* J.I.Cirac, *Max-Planck-Inst. für Quantenoptik, Germany.* We propose creating a molecular Bose-Einstein condensate by photoassociating atoms in the Mott insulator state of an optical lattice. The superfluid molecular component arises dynamically from quantum fluctuations while decreasing the lattice depth.

QSuL4 · 15:15
Orientation of neutral molecules by combined electrostatic and laser fields, S.Minemoto, H.Nanjo, H.Tanji, T.Suzuki, H.Sakai, *Univ. of Tokyo, Japan.* We demonstrate orientation of polar molecules by combined electrostatic and induced dipole forces. The degree of orientation is controlled by the laser intensity, the magnitude of an electrostatic field, or the rotational temperature of molecules.

QSuM5 · 15:15
Ultracold bosonic dipolar gases, L.Santos, K.Goral, £.Dobrek, G.V.Shlyapnikov, M.Lewenstein, *Inst. für Theoretische Physik, Germany*, K.Rzazewski, *Center for Theor. Phys., Poland,* P.Zoller, *Inst. für Theor. Physik, Austria.* The physics of ultracold dipolar bosonic gases is discussed. We analyze the ground-state and excitations of dipolar Bose-Einstein condensates, which qualitatively differ from the case of short-range interactions. Additionally, we discuss the physics of dipolar Bose gases in periodic potentials.

Conference Hall IQEC/LAT-YS	Hall 1 LAT	Hall 2 IQEC	Hall 3 IQEC	Hall 4 JOINT
14:00–16:00 **YSuA · IQEC/LAT-YS Keynote Lectures II—Continued**	**14:00–16:00** **LSuC · Solid-State Lasers I—Continued**	**14:00–16:00** **QSuJ · Ultrafast Nonlinear Optics—Continued**	**14:00–16:00** **QSuK · QED and Superradiance—Continued**	**14:00–16:00** **JSuD · Optical Tomography of Biological Tissues—Continued**
	LSuC6 · 15:30 ***Highly efficient Nd:Y_2O_3 ceramic laser,*** J.Lu, J.Lu, T.Murai, K.Takaichi, T.Uematsu, K.Ueda, *Univ. of Electro-Commun., Japan,* H.Yagi, T.Yanagitani, *Konoshima Chemical Co., Ltd, Japan,* A.A.Kaminskii, *Inst. of Crystallography, Russia.* Large size, highly transparent Nd:Y_2O_3 ceramics were fabricated successfully. CW lasing was demonstrated with an 1.5% Nd:Y_2O_3 ceramic plate. Output power of 160 mW was obtained with a slope efficiency of 32%.	**QSuJ5 · 15:30** ***Harmonic generation from femtosecond laser produced plasma,*** A.Ishizawa, T.Kanai, H.Kuroda, *Univ. of Tokyo, Japan,* R.A.Ganeev, *NPO Akadempribor, Uzbekistan,* T.Ozaki, *NTT Corporation, Japan.* We present the studies of blueshift of up to 1.6 nm in the second harmonic and 5.1 nm in the fifth harmonic generated by the irradiation of a solid target with 500 fs laser pulses for p-polarization, an incident angle of 45°, and laser intensities up to $3 \cdot 10^{17}$ Wcm^{-2} (λ=1.06 μm). Polarization characteristics of harmonic generation were also studied.	**QSuK6 · 15:30 · INVITED** ***Photon echo phenomenon and light storage,*** I.V.Yevseyev, *Moscow State Engin. Phys. Inst., Russia.* Theoretical and experimental works devoted to the application of the photon echo phenomenon to recording, storage, and reproduction of information are reviewed. Conditions for the temporal shape reproduction of one of the exciting pulses by the photon echo signals are discussed. Various mechanisms of an increase of the information storage time are considered.	**JSuD5 · 15:30** ***Medical applications of terahertz imaging,*** J.M.Chamberlain, N.N.Zinov'ev, A.Foulds, R.E.Miles, E.Berry, A.J.Fitzgerald, M.A.Smith, G.C.Walker, *Univ. of Leeds, UK.* Terahertz imaging is a new technique that utilises the interaction of ultra fast near infrared pulses and appropriate transducers to generate, and coherently detect, broadband Terahertz pulses. Terahertz images of a number of human tissues will be shown, and their significance discussed.
	LSuC7 · 15:45 ***Aperiodically poled $LiNbO_3$:Nd^{3+} as a prototype for active frequency converter for continuos-wave tunable lasers,*** V.Bermúdez, D.Callejo, E.Diéguez, *Univ. Autónoma de Madrid, Spain,* J.Capmany, *Univ. Miguel Hernandez, Spain.* We present a prototype of an active frequency converter for cw Ti:Sapphire tunable laser producing tunable radiation between 440–475 nm and 485–505 nm, based on self-sum-frequency mixing of the tunable emission of a Ti:Sapphire laser injected in the cavity of a diode-pumped aperiodically poled Nd^{3+}:$LiNbO_3$ laser oscillating in cw.	**QSuJ6 · 15:45** ***Self-focusing of few-cycle light pulses,*** A.N.Berkovsky, P.A.Petroshenko, S.A.Kozlov, Yu.A.Shpolyanskiy, *St.Petersburg State Inst. of Fine Mech. and Optics, Russia.* The tendencies of the time-space dynamics of the electrical field of extremely short light pulses have been investigated. It is demonstrated that electromagnetic formations like light "dumbbells" or "bubbles" may evolve during self-focusing. Significantly blue-shifted spectral supercontinuum is shown to be generated at the breakdown of a shockwave of the pulse time envelope.		**JSuD6 · 15:45** ***Laser polarization visualization and selection of two-dimensional birefringence images,*** O.V.Angelsky, A.G.Ushenko, D.N.Burkovets, Yu.A.Ushenko, *Chernovitski Univ., Ukraine,* O.V.Pishak, V.P. Pishak, *Bukovinian State Medical Academy, Ukraine.* This paper is devoted to the analysis and experimental testing of the concept of laser polarization biotissue probing. The methods of increasing the signal-to-noise ratio in coherent images of the optically anisotropic architectonics of the morphological biotissue structure are considered.

16:00–16:30 COFFEE BREAK

Hall 5 IQEC	Hall 6 IQEC			

14:00–16:00
QSuL · Laser-Induced Nuclear Physics—Continued

QSuL5 · 15:30
Laser-induced ionization and fragmentation of diatomic molecules, A.M.Popov, O.V.Tikhonova, E.A.Volkova, *Moscow State Univ., Russia.* The behavior of a model two-electron diatomic molecule in a strong laser field is studied by the method of the direct numerical integration of the non-stationary Schroedinger equation. The detailed analysis of single- and double-electron ionization is performed. It is found that the dynamics of double-electron ionization is dramatically different for low and high laser frequencies.

QSuL6 · 15:45
Light scattering by products of hydrogen molecular ion dissociation, E.Nahvifard, V.Bykov, *General Phys. Inst., Russia.* Hydrogen molecular ion is in antisymmetric electron state after dissociation under influence of intense laser pulse. Light scattering by ion in such state is considered and shown that intensity of light scattered by this ion is much smaller than intensity of light scattered by equivalent number of hydrogen atoms.

14:00–16:00
QSuM · Quantum Gases II—Continued

QSuM6 · 15:30
Solitonic states of atomic Bose-Einstein condensates, N.N.Rosanov, Yu.V.Rozhdestvenskii, V.A.Smirnov, *Inst. for Laser Phys., Russia,* A.G.Vladimirov, *St. Petersburg State Univ., Russia,* D.V.Skryabin, *Univ. of Bath, UK,* W.J.Firth, *Univ. of Strathclyde, UK.* The stable solitonic states of BEC condensate are considered. Two different mechanisms of the soliton stabilization for low and high concentration are examined. Excitation of BEC soliton internal modes by optical Raman scattering is explored.

16:00–16:30 COFFEE BREAK

Conference Hall IQEC/LAT-YS	Hall 1 LAT	Hall 2 IQEC	Hall 3 IQEC	Hall 4 JOINT
16:30–17:30 **YSuB · IQEC/LAT-YS Keynote Lectures III** A.Weis, *Univ. Fribourg, Switzerland, Presider*	**16:30–18:30** **LSuD · Fiber and Waveguide Lasers** G.Huber, *Univ. Hamburg, Germany, Presider*	**16:30–18:30** **QSuN · Nonlinear Optical Materials** V.A.Makarov, *Moscow State Univ., Russia, Presider*	**16:30–18:30** **QSuO · Electromagnetically Indiuced Transparency** I.V.Sokolov, *St. Petersburg State Univ., Russia*, and R.Tanas, *Adam Mickiewicz Univ., Poland, Presiders*	**16:30–18:45** **JSuE · Microscopy and X-Ray Imaging** T.Wilson, *Univ. of Oxford, UK,* and L.Hong, *Univ. of Okhlahoma, USA*, *Presiders*
YSuB1 · 16:30 · KEYNOTE LECTURE ***Tissue optics,*** V.Tuchin, *Saratov State Univ., Russia.* Optical models of biological tissues with single and multiple scattering are presented. Continuous wave, time- and spatially-modulated laser beams propagation within tissues are described. Principles of tissue spectroscopy and tomography are discussed.	**LSuD1 · 16:30 · INVITED** ***High power planar wave guide lasers and amplifiers,*** D.R.Hall, H.J.Baker, *Heriot-Watt Univ., UK.*	**QSuN1 · 16:30 · INVITED** ***Effects of self-frequency conversion in nonlinear-laser $c^{(2)}+c^{(3)}$ and $c^{(3)}$ crystals: new results and applied aspects,*** A.A.Kaminskii, *Inst. of Crystallography, Russia.* We discuss the recent results on the self-frequency conversion effects in lasing undoped and doped insulated inorganic and organic crystals. New Raman active materials, including modern nanocrystalline ceramics $Y_3Al_5O_{12}$ and Y_2O_5 will present too.	**QSuO1 · 16:30 · INVITED** ***Towards quantum control of light in atomic ensembles,*** A.Andre, C.van der Wal, A.S.Zibrov, M.D.Lukin, *Harvard Univ., USA.* We discuss recent ideas and experiments involving coherent manipulation of light propagation in atomic ensembles as well as potential applications of these phenomena for manipulating quantum information.	**JSuE1 · 16:30 · INVITED** ***Two-photon microscopy with extended depth of focus,*** T.Wilson, M.A.A.Neil, F.Massoumian, *Univ. of Oxford, UK.* We describe a method, which uses a diffractive optical element to increase significantly the depth of focus, but with dramatically increased light efficiency. Applications to two photon imaging will be described.
	LSuD2 · 17:00 · INVITED ***CW fiber lasers in the near IR range,*** E.M.Dianov, *Fiber Optics Research Center at the GPI RAS, Russia.* Recent results on medium-power cw fiber lasers pumped by laser diodes are reviewed. Most attention is given to Raman lasers based on phosphosilicate fibers, the latter providing a number of advantages as compared to commonly used germanosilicate fibers.	**QSuN2 · 17:00** ***Nonlinear-optical properties of pseudoisocyanine,*** R.V.Markov, A.I.Plekhanov, Z.M.Ivanova, V.V.Shelkovnikov, *Inst. of Automation and Electrometry, Russia, Novosibirsk Inst. of Organic Chemistry, Russia.* Thin solid films (~100 nm) of J-aggregates in various polymeric matrixes are obtained. The optimum ratio dye/polymer at which the aggregates are most effectively formed and high optical properties of films are achieved is found. The dispersion of the nonlinear susceptibility $\mathrm{Im}\chi^{(3)}(\lambda)$ of the obtained films was measured by pump-probe method.	**QSuO2 · 17:00** ***Electromagnetically induced transparency in cold Rubidium atoms,*** C.Talbot, M.E.J.Friese, Z.Ficek, N.R.Heckenberg, H.Rubinsztein-Dunlop, *The Univ. of Queensland, Australia*. We perform pump/probe spectroscopy on a sample of cold ^{85}Rb atoms, pumping the 5S1/2 F=2 → 5P3/2 F=3 transition and probing the 5S1/2 F=3 → 5P3/2 F=3 transition. We observe Autler-Townes peaks about the 5S1/2 F=3 → 5P3/2 F=3 transition, and a transparency of the 5P1/2 F=3 level which we attribute to quantum interference between the pump and probe transitions.	**JSuE2 · 17:00 · INVITED** ***Recent advances in multi-photon microscopy,*** P.T.C.So, L.Laiho, Ki H.Kim, T.Ragan, C.Hendricks, M.Stitts, B.P.Engelward, *Massachusetts Inst. of Technology, USA,* C.Buehler, *Paul Scherrer Inst., Switzerland,* T.M.Hancewicz, P.D.Kaplan, *Unilever Res. US Inc., Edgewater Lab., USA.* Multiphoton microscopy has an increasingly board range of applications in biomedicine. This presentation will discuss key advances including: video rate imaging, image cytometry, spectrally resolved analysis, and tissue imaging based on second harmonic generation.

Hall 5 IQEC	Hall 6 IQEC			

16:30–18:30
QSuP · X-Rays and Fast Particles Generation
J.-C.Kieffer, *Lawrence Berkley National Lab, USA, Presider*

QSuP1 · 16:30 · INVITED
Table-top femtosecond laser kHz sources of hard x-rays and energetic particles, A.Thoss, G.Korn, N.Zhavoronkov, T.Elsaesser, *Max-Born-Inst. für Nichtlineare Optik und Kurzzeitspektroskopie, Germany,* M.Richardson, *Univ. Central Florida, USA,* M.Faubel, *Max-Planck-Inst. für Strömungsforschung, Germany.* We demonstrate that the conversion of high-intensity femtosecond laser light into high-energy electrons, x-rays and energetic ions can be transposed to the high-repetition rate, small-laboratory regime, where many new and intriguing applications become possible.

QSuP2 · 17:00 · INVITED
Guiding of superstrong femtosecond laser pulses through the gas-filled dielectric capillary tubes, N.Andreev, *Inst. for High Temperatures, Russia,* A.Babin, D.Kartashov, A.Kiselev, V.Lozhkarev, A.Sergeev, A.Stepanov, *Inst. of Appl. Phys., Russia,* A.Couairon, *CEA, France,* C.Courtois, B.Cros, J.Matthieussent, *LPGP, CNRS UMR 8578, Universite Paris XI, France,* L.Gorbunov, *Lebedev Physical Inst., Russia,* J.R.Marques, *LULI, UMR 7605, CNRS-CEA-Ecole Polytechnique-Universite Paris VI, France.* Intensive numerical and experimental investigation

16:30–18:00
QSuQ · Matter Waves
V.Minogin, *Inst. of Spectroscopy, Russia, Presider*

QSuQ1 · 16:30
Interferometry with large molecules, B.Brezger, L.Hackermueller, S.Uttenthaler, J.Petschinka, M.Arndt, A.Zeilinger, *Univ. Wien, Austria.* We have observed quantum interference of C_{70} fullerene molecules in a near-field interferometer of the Talbot-Lau type. It shows suitable scaling properties for interfering objects of even higher mass.

QSuQ2 · 16:45
Collinear and oblique optical guiding of a cold atomic beam, D.P.Rhodes, J.G.Livesey, G.P.T.Lancaster, J.Arlt, D.McGloin, K.Dholakia, *Univ. of St. Andrews, UK.* We demonstrate all optical guiding and splitting of a cold atomic beam. A non-adiabatic kick is observed using a red-detuned guide. A novel technique is shown for increased coupling into an oblique blue-detuned guide.

QSuQ3 · 17:00
Loss mechanism of electrostatically trapped molecules, M.Kajita, *Commun. Res. Lab., Japan,* H.Odashima, Y.Moriwaki, *Toyama Univ., Japan,* M.Tachikawa, *Meiji Univ., Japan.* We analyze the dynamics of linear polar molecules confined in the quadrupole electric fields. We calculate the storage lifetime taking the Majorana effect and inelastic collision into account.

Conference Hall IQEC/LAT-YS	Hall 1 LAT	Hall 2 IQEC	Hall 3 IQEC	Hall 4 JOINT
16:30–17:00 **YSuA · IQEC/LAT-YS Keynote Lectures III—Continued**	**16:30–18:30** **LSuD · Fiber and Waveguide Lasers—Continued**	**16:30–18:30** **QSuN · Nonlinear Optical Materials—Continued**	**16:30–18:30** **QSuK · Electromagnetically Induced Transparency—Continued**	**16:30–18:45** **JSuE · Microscopy and X-Ray Imaging—Continued**
		QSuN3 · 17:15 ***Drastic enhancement of two-photon absorption in porphyrins by optimizing resonance conditions in three-level system,*** M.Drobizhev, A.Karotki, A.Rebane, *Montana State Univ., USA,* M.Kruk, *Inst. of Mol. and Atomic Phys., Belarus,* N.Zh.Mamardashvili, *Inst. of Solution Chemistry, Russia.* We obtain a drastic enhancement of simultaneous two-photon absorption of porphyrins by tuning laser closer to the Q(0-0), g→u transition, increasing oscillator strength of the latter, and optimizing resonance conditions for the next, u→g transition.	**QSuO3 · 17:15** ***Coherence Induced Doppler-free resonances in non-Doppler-free geometry,*** A.S.Zibrov, Harvard Univ., USA, *Lebedev Physical Inst., Russia,* C.Y.Ye, Y.V.Rostovtsev, A.B.Matsko, *Texas A&M Univ., USA.* We observe Doppler-free resonances in an intrinsically non-Doppler-free geometry in hot rubidium atomic vapor. The narrow transparency dip on the background of high contrast subnatural absorption resonance can be explained as three-photon electromagnetically induced transparency.	
	LSuD3 · 17:30 · INVITED ***Optical fiber amplifiers,*** J.-M.Delavaux, *Keopsys Inc, USA.* We will review the design of high power fiber lasers and amplifiers and their applications to optical transmission. In particular, we will contrast the merits, limitations and trade-offs of various configurations based on doped Er^{3+} and Er^{3}–Yb^{3+} core and double clad fibers for C and L band devices.	**QSuN4 · 17:30** ***Optical nonlinearity of fullerene-sensitized photorefractive compositions caused by production of anion-radicals,*** O.L. Antipov, I.V.Yuova, *Inst. of Appl. Phys., Russia,* G.A.Domrachev, *Inst. of Metalloorganic Chem., Russia.* The origin of optical nonlinearity of polymeric compositions based on fullerene C_{70} and C_{60} and poly(9-vinylcarbazole) was investigated by two-beam coupling and self-action of a cw He-Ne laser beam at 633 nm, and spectroscopically. The strong local nonlinearity of the composite is due to the difference in polarizability of fullerene and its light-induced anion-radicals.	**QSuO4 · 17:30** ***Long-term dynamics in double-dark-state system,*** A.V.Taichenachev, A.M.Tumaikin, V.I.Yudin, *Novosibirsk State Univ., Russia.* We study the long-term dynamics of J→J–1 closed atomic transition in resonant elliptically polarized light field in the presence of a weak magnetic field. Tunneling, collapse of oscillations, and long-lived dynamical modes are found in this system.	**JSuE3 · 17:30** ***Near-infrared lasers in treatment of deep, metastatic tumors using dye-enhanced selective photothermal interaction,*** Wei R.Chen, *Univ. of Central Oklahoma USA.* An 805-nm diode laser has been used in the cancer treatment with in situ indocyanine green to provide non-invasive selective photothermal tumor destruction. In addition, a novel immunoadjuvant has been used to provide targeted immunological stimulation in the host. Long-term anti-tumor immunity was induced by the treatment in rats with metastatic breast tumors. The selective photothermal effect of the laser-dye combination and the effect the immunoadjuvants in treating deep, metastatic tumors are investigated.
		QSuN5 · 17:45 ***Picosecond submillimeter pulses in $ZnGeP_2$ crystal,*** V.V.Apollonov, Yu.A.Shakir, *General Phys. Inst., Russia,* A.I.Gribenyukov, *Inst. for Optical Monitoring, Russia.* For the first time three-wave interaction of picosecond pulses was investigated as difference frequency generation in $ZnGeP_2$ crystal. Spectral characteristics and pulse power versus crystal length are represented for difference frequency wavelengths of submillimeter range.	**QSuO5 · 17:45** ***Electromagnetically induced transparency and absorption in a standing wave,*** C.Affolderbach, R.Wynands, *Bonn Univ., Germany,* S.Knappe, *NIST, USA,* A.V.Taichenachev, V.I.Yudin, *Novosibirsk State Univ., Russia.* In an optical standing-wave configuration EIT in a thermal vapor alternates with EIA (slow with "fast" light) depending on spatial position. A complete understanding requires inclusion of Doppler effects.	

Hall 5 IQEC	Hall 6 IQEC			

16:30–18:30
QSuP · X-Rays and Fast Particles Generation—Continued

of superstrong femtosecond laser pulses propagation through the gas filled dielectric capillary tubes were performed. The results on transmission efficiency, spatial and temporal distribution and spectrum transformation of the intensive femtosecond pulses are presented.

QSuP3 · 17:30
Features of absorption and emission of molecules in high-power light fields, T.N.Kopylova, R.T.Kuznetsova, I.N.Lapin, L.G.Samsonova, V.A.Svetlichnyi, E.N.Tel'minov, D.N.Filinov, *Tomsk State Univ., Russia.* The radiation of concentrated solutions of organic dyes at excitation by the focused radiation of 2 harmonic Nd-YAG laser (532 nm) and XeCl laser (308 nm) was investigated. Four types of luminescence were revealed; their spectral, power and spatial characteristics were investigated. Features of observable radiations were discussed.

QSuP4 · 17:45
A molecule without electrons: bonding bare nuclei with bare laser fields, O.V.Smirnova, *Moscow State Univ., Russia,* M.Yu.Ivanov, *NRC Canada, Canada.* We show that a combination of intense linearly and circularly polarized laser fields can bond two same-sign charges, completely suppressing their Coulomb repulsion in all three dimensions and turning it into an effective attractive potential.

16:30–18:00
QSuQ · Matter Waves—Continued

QSuQ4 · 17:15
External fields-free trap for cold ions and electrons, S.K.Sekatskii, G.Dietler, *Univ. de Lausanne, Switzerland.* Cold paramagnetic ions and free electrons exhibit reflection from a periodically magnetized ferroelectric film and electrostatic attraction to it. MilliKelvin-depth traps capable to store ions and electrons simultaneously can be constructed using this principle.

QSuQ5 · 17:30 · INVITED
Decelerating and trapping and neutral dipolar molecules, Gerard Meijer, *Univ. of Nijmegen, The Netherlands.* A polar molecule experiences a force in an inhomogeneous electric field. Using this force neutral molecules can be decelerated and trapped. The experimental method will be described and results on trapping of ammonia are shown.

Conference Hall	Hall 1 LAT	Hall 2 IQEC	Hall 3 IQEC	Hall 4 JOINT
	16:30–18:30 **LSuD · Fiber and Waveguide Lasers—Continued**	**16:30–18:30** **QSuN · Nonlinear Optical Materials—Continued**	**16:30–18:30** **QSuK · Electromagnetically Indiuced Transparency—Continued**	**16:30–18:45** **JSuE · Microscopy and X-Ray Imaging—Continued**
	LSuD4 · 18:00 ***Multimode fiber lasers based on the Bragg gratings and Yb-doped double-clad fibers,*** A.S.Kurkov, O.I.Medvedkov, S.A.Vasiliev, V.M.Paramonov, D.A.Gruh, E.M.Dianov, *General Phys. Inst., Russia,* A.N.Guryanov, A.A.Umnikov, *Inst. of Chemistry of High Purity Substances, Russia.* We suggest a new configuration of the high power fiber laser. It is based on the application of multimode Bragg gratings and multimode active fibers. Efficient operations f lasers at 0.98 and 1.03 mm are demonstrated.	**QSuN6 · 18:00** ***A new technique to measure transient gain in polymer films,*** V.A.Sautenkov, S.A.van den Berg, E.R.Eliel, G.W. 't Hooft, *Leiden Univ., The Netherlands.* We have developed a simple approach to transient-gain measurements in neat polymer films. The technique is based on two-pulse amplified spontaneous emission in a pencil-shaped optically excited region.	**QSuO6 · 18:00** ***Study of the temporal build-up of electromagnetically induced transparency and absorption coherence resonances,*** P.Valente, H.Failache, A.Lezama, *Instituto de Fisica, Uruguay.* The dependence of electromagnetically induced transparency (EIT) and absorption (EIA) resonances on interaction time was studied for the closed transitions of the ^{85}Rb D-line using an atomic beam. Good agreement with theory is observed.	**JSuE4 · 18:00** ***X-ray microscopy of labeled live biological organisms with a nanosecond laser-plasma source,*** M.R.Al-Ani, J.Biggerstaff, M.Trujillo, M.Richardson, *Univ. Central Florida, USA.* Protein-specific, labeled imaging of live biological microorganisms with both confocal fluorescence microscopy and nanosecond laser-plasma x-ray microscopy is demonstrated for the first time with single-shot images of melanoma cells and human lymphocyte cells.
	LSuD5 · 18:15 ***Raman fiber laser-pumped 2μm fiber laser,*** A.Taniguchi, T.Kuwayama, A.Shirakawa, M.Musha, Ken-ichi Ueda, *Univ. of Electro-Commun., Japan.* We have demonstrated a 1212 nm Raman fiber laser-pumped Tm-Ho-codoped silica fiber laser. To our knowledge, the maximum output power of 300 mW is the highest for Tm-Ho-codoped silica fiber laser.	**QSuN7 · 18:15** ***Competitive optical nonlinearities of new cyanine dye derivatives,*** V.Gayvoronsky, A.Galas, M.Brodyn, *Inst. of Phys., Ukraine,* D.Grinko, *Inst. of Semicond. Phys., Ukraine,* A.Kachkovsky, M.Kudinova, A.Tolmachev, Yu.Slominsky, *Inst. of Organic Chemistry, Ukraine.* NLO properties of merocyanine and base thin films have been studied with picosecond Z-scan technique. Photoinduced absorption and self-focusing (SF) at 532 nm occur due to the transient absorption (saturation at 8 MW/cm^2).	**QSuO7 · 18:15** ***Λ-resonance in the presence of velocity changing collisions,*** A.V.Akimov, N.N. Kolachevsky, V.N.Sorokin, S.I.Kanorsky, *Lebedev Physical Inst., Russia.* We represent the results of experimental and theoretical investigations of the influence of velocity changing collisions on the shape of the Λ-resonance in samarium vapor.	**JSuE5 · 18:15 · INVITED** ***Development of a high resolution imaging system to facilitate cardiac optical mapping,*** H.Liu, *Univ. of Okhlahoma, USA.*

18:30–20:00 IQEC/LAT POSTER SESSIONS I

Hall 5 IQEC				

16:30–18:30
QSuP · X-Rays and Fast Particles Generation—Continued

QSuP5 · 18:00
Strong-field molecular alignment as a tool for quantum, E.A.Shapiro, I.Khavkine, M.Yu.Ivanov, *Natl Res. Council of Canada, Canada.* We show how strong-field molecular alignment can be used to build binary and blockwise logic gates acting on ro-vibrational states of a diatomic molecule. The resulting operations can be combined in algorithms to enable control of ro-vibrational wavepackets.

QSuP6 · 18:15
The influence of squeezed vibrational states on the optical properties of molecular systems in the field of intensive laser radiation, E.P.Sineavsky, E.Yu.Kanarovsky, *Inst. of Appl. Phys., Moldova.* The influence of squeezed vibrational states on the processes of luminescence, on the nonradiative decay and stabilization of exited electron-vibrational states, and on generation of higher optical harmonic in the intensive electromagnetic field is investigated.

18:30–20:00 IQEC/LAT POSTER SESSIONS I

QSuR · Physics of Advanced and Novel Lasers

QSuR1
Glass for high average power diode-pumped Yb-Er lasers, B.Denker, B.Galagan, V.Osiko, S.Sverchkov, *General Phys. Inst., Russia.* A new Yb-Er glass for high average power 1540 nm diode-pumped lasers is developed and investigated. Its thermal damage threshold and stability to air moisture are several times increased in comparison to existing glasses.

QSuR2
Decontamination of optical elements of multi-terawatt CPA lasers, V.Karpov, E.Gubbini, U.Eichmann, H.Schoennagel, M.P.Kalachnikov, *Max-Born-Inst., Germany,* F.Eggenstein, G.Reichardt, *BESSY GmbH, Germany.* Diffraction gratings used for pulse compression in multi-terawatt CPA lasers are subjected to carbon contamination. Decontamination of the gratings is performed by a radio frequency plasma discharge in oxygen-argon mixture directly in the compressor chamber.

QSuR3
New high efficiency solid-state laser elements based on nanoporous glass-polymer composite lasing in red spectral range 600-660 nm, S.M.Dolotov, E.P.Ponomarenko, A.V.Reznichenko, *R&D Enterprise "Alfa-Akonis", Russia,* M.F.Kolbunov, V.B.Lugovoi, *R&D Enterprise "Optronica", Russia,* Ya.V.Kravchenko, A.A.Manenkov, *General Phys. Inst., Russia,* V.A.Petukhov, *Lebedev Physical Inst., Russia.* Results of spectral and laser properties studies are presented for phenolemine dye series Ph510, Ph512, and Ph640 impregnated into polymer-filled nanoporous glass composite (PFNPG). High conversion efficiency (up to 45%) of the second harmonic Nd:YAG laser radiation to the red wavelength range, 600-660 nm, was observed for the first time. A service life of the 3 mm thick laser elements was as high as 105 shots. A comparison of laser characteristics of phenolemine 640 and pyrromethene 650 dyes in PFNPG showed an advantage of the first.

QSuR4
Cr^{4+}:LiGaSiO$_4$ as new promising active medium for NIR-lasesr, K.A.Subbotin, V.A.Smirnov, E.V.Zharikov, I.A.Shcherbakov, *General Phys. Inst., Russia.* New promising laser crystal Cr^{4+}:LiGaSiO$_4$ have been grown and investigated for the first time.

QSuR5
Automodulation mode of operation of diode-pumped solid-sate laser with passive Q-switch, S.I.Derzhavin, V.V.Kuzminov, D.A.Mashkovsky, *General Phys. Inst., Russia,* S.G.Grechin, V.V.Koshechkina, E.A.Sharandin, *Bauman MSTU, Russia.* At the first time theoretically and experimentally was investigated an automodu-lation mode of operation for diode-pumped solid-state laser with passive Q-switch with repetition rate of laser pulses up to several MHz.

QSuR6
Vibronic coupling in rare earth doped tellurite glass: an experimental and theoretical study, F.Pellé, *UMR 7574-CNRS, France,* K.K.Pukhov, *General Phys. Inst., Russia.* We propose an experimental and theoretical study of vibronic sidebands in a Rare Earth doped tellurite glass of potential interest as laser material. Relative contributions of both processes (M and Δ) are evaluated.

QSuR7
Population of high excited levels in erbium doped double chloride crystal, A.Tkachuk, *Vavilov State Optical Inst., Russia,* S.Ivanova, *St.Petersburg State Univ., Russia,* L.Isaenko, A.Yelisseyev, *Design and Techn. Inst. for Monocrystals, Russia,* S.Payne, *LLNL, USA,* M.F.Joubert, Y.Guyot, *LPCML, UMR 5620 du CNRS, Universite Lyon 1, France.* Population of high excited levels in erbium doped double chloride crystal Er^{3+}:KPb_2Cl_5 as potential material for UV and VIS lasers.

QSuR8
Multifunctional Nd:BaWO$_4$ and Nd:SrWO$_4$ crystals for Raman laser applications, P.G.Zverev, L.I.Ivleva, T.T. Basiev, V.V.Osiko, *General Phys. Inst., Russia.* Raman, spectroscopic and laser investigations of new multifunctional Nd^{3+}:$BaWO_4$ and Nd^{3+}:$SrWO_4$ laser active and Raman crystals are presented. Efficient intracavity Raman self-conversion in Nd^{3+}:$SrWO_4$ laser was obtained.

QSuR9
Spectroscopic properties of heavily-doped Cr:Mg$_2$SiO$_4$ crystals, V.F.Lebedev, S.Yu.Tenyakov, A.E.Levchenko, A.V. Gaister, E.V. Zharikov, *General Phys. Inst., Russia.* Important for laser performance the essential saturation of Cr^{4+} absorption coefficient and reabsorption of Cr^{3+} and Cr^{4+} fluorescence by Cr^{4+} absorption bands in heavily-doped Cr:Mg2SiO$_4$ crystals are discovered.

QSuR10
Features of compensation of thermally induced depolarization in polycrystalline Nd:YAG ceramics, E.Khazanov, M.Kagan, *Inst. of Appl. Phys., Russia.* It is shown that the depolarization of radiation in polycrystalline Nd:YAG ceramics results in the beam modulation with a characteristic size less than ceramic grain size. Conditions for birefringence compensation in ceramic laser rod by all known techniques are obtained.

QSuR11
Polymeric solid-state dye lasers for blue-green and red region spectra, L.G.Samsonova, T.N.Kopylova, V.A.Svetlichnyi, A.A.Shaposhnikov, *Siberian Phys.-Techn. Inst., Russia,* V.B.Sukhanov, *Inst. of Atmospheric Optics, Russia,* V.A.Reznichenko, S.M.Dolotov, *Alpha-Aconis, LTD, Russia.* Lasing properties and photostability of organic compounds in polymethylmethacrylate matrix radiating in blue-green and red region of the spectrum pumped by a XeCl laser (308 nm) and Cu laser (510,6 nm) are studied.

QSuR12
Gain anisotropy of diode pumped Nd:YAG lasers, G.Bouwmans, B.Ségard, P.Glorieux, *Univ. de Lille 1, France,* N.Milovsky, P.Khandokhin, E.Shirokov, *Inst. of Appl. Phys. , Russia.* The polarization dynamics of a bipolarized microchip Nd:YAG laser with linearly polarized diode laser pump has been studied experimentally and theoretically. The pump-induced gain anisotropy was observed and well described in a developed model.

QSuR13
Enhancement of Nd:GdCOB self-frequency-doubling efficiency, V.Lupei, *Inst. of Atomic Phys., Romania,* G.Aka, D.Vivien, *ENSCP, URA-CNRS 1466, France.* Enhancement of fundamental and self-frequency-doubled laser emission in Nd-doped $GdCa_4O(BO_3)_3$ by pumping directly into the emitting level (887 nm) is demonstrated: green output power for 620-mW absorbed power increases 2.6 times compared to traditional 811-nm pumping.

QSuR14
High resolution spectroscopy study of pair effects in Nd^{3+}:Y_2O_3 ceramic, A.Lupei, V.Lupei, *Inst. of Atomic Phys., Romania,* Y.Sato, T.Taira, *Inst. of Molec. Sci., Japan,* A.Ikesue, *Japan Fine Ceramics Center, Japan.* High-resolution spectroscopy of Nd^{3+}:Y_2O_3 transparent ceramics revealed the similarity to single crystals and the random placement of Nd^{3+} ions. The emission quantum efficiency estimated from emission decays delineates the range of useful Nd^{3+} concentrations.

QSuR15
Binary and ternary aluminate and gallate crystals as promising SHG-crystals and SFD-laser media, B.I.Kidyarov, *Inst. of Semicond. Phys., Russia,* E.V.Pestryakov, *Inst. of Laser Phys., Russia.* The system analysis of collected list of acentric ternary aluminate and gallate crystals is carried out for possible creation of optical SHG- and SFD-laser materials on the basis bond-length model of acentric oxide laser crystals.

QSuR16
Mid IR fluorescence in laser crystals doped with rare-earth ions, I.N.Vorob'ev, O.K.Alimov, B.I.Galagan, L.N.Dmitruk, V.N.Skvortsov, T.T.Basiev, Yu.V.Orlovskii, V.V.Osiko, *General Phys. Inst., Russia,* V.V.Badikov, *Kuban State Univ., Russia.* The fluorescence spectra of LaF_3, CaF_2, CdF_2, SrF_2, PbF_2, BaF_2, $CaGa_2S_4$, $PbCl_2$, KPb_2Cl_5, and $CsCdBr_3$ laser crystals doped with Pr, Nd, Tb, Dy, and Er trivalent ions were investigated in mid IR 26 micron spectral range.

QSuR17
Spectroscopy and population dynamics of monoclinic crystals KY(WO$_4$)$_2$:1...15% Tm pumped by a free-running Nd:YAG laser, S.N.Bagayev, S.M.Vatnik, A.P.Majorov, *Inst. of Laser Phys., Russia,* A.A.Pavlujk, *Inst. of Inorganic Chem., Russia.* Spectroscopy, population dynamics and laser operation of $KY(WO_4)_2$:1..15%Tm have been studied under free-running Nd:YAG laser pumping. Under longitudinal pump of 1064 nm the unstable laser operation has been demonstrated over spectral range 1850 to 1950 nm. The blue emission corresponding to transitions $^1G_4$ to $^3H_6$ has been observed for all Tm concentrations.

QSuR18
Spectroscopic investigation of rare earth doped Na, (Y, Lu) -fluorite crystals as promising UV and VUV laser materials, A.A.Apollonov, D.N.Karimov, T.V. Ouvarova, *General Phys. Inst., Russia,* A.A.Blistanov, *Moscow Inst. of Steel and Alloys, Russia,* S.P.Chernov, *Moscow State Univ., Russia.* Spectroscopic properties of rare earth doped Na,(Y,Lu)-fluorite crystals are studied in short wavelength region. Perspectives of solid-state UV and VUV lasers creation are discussed.

QSuR19
Spectroscopic and laser study of the tunable efficient continuous-wave Tm^{3+}:GdVO$_4$ laser, E.Sorokin, I.T.Sorokina, *TU Wien, Austria,* A.N.Alpatiev, A.I.Zagumennyi, Y.D.Zavartsev, I.A. Shcherbakov, *General Phys. Inst., Russia.* We present the results of spectroscopic investigation at 77 and 300 K of the Tm:$GdVO_4$ crystal, providing information on the emission and absorption cross-sections as well as lifetime. This material exhibits excellent laser performance, i.e. threshold as low as 75 mW, 55 % efficiency and 140 nm tunabilty around 1.9 μm at 230 mW output power.

QSuR20
Lasing conditions in thin film organic electroluminescent nanostructures, A.V. Kukhta, E.E.Kolesnik, V.V.Galkin, *Inst. of Molec. and Atomic Phys., Belarus.* The theoretical analysis of possibility and conditions of lasing in thin film organic electroluminescent nanostructures on the basis of developed model of molecule excitation by hot electrons ejected from the cathode is made.

QSuR21
Growth and spectroscopic properties of Yb:NaGd(WO$_4$)$_2$ crystal, D.A.Lis, K.A.Subbotin, E.V.Zharikov, Yu.K.Voron'ko, A.A.Sobol', S.N.Ushakov, V.E.Shukshin, *General Phys. Inst., Russia.* Yb:$NaGd(WO_4)_2$ single crystals - promising active medium of 1 μm laser, were grown and investigated. Up to the concentration of Yb^{3+} $1.6 \cdot 10^{21}$ cm^{-3} crystals do not demonstrate concentration quenching and measured fluorescence lifetime is 370 ns.

QSuR22
Solid-state Raman laser with the unstable telescopic resonator, V.A.Orlovich, A.S.Grabtchikov, V.V.Ermolenkov, V.A.Lisinetskii, R.V.Chulkov, *Stepanov Inst. of Phys., Belarus.* Energy and spatial characteristics for the barium nitrate Raman laser with the unstable telescopic resonator were studied and compared with results of Raman conversion in single-pass SRS and Raman lasers with plane and stable resonators.

QSuR23
Laser operation of a sub-millimeter end-pumped 1.1%Nd:YAG rod, S.M.Vatnik, *Inst. of Laser Phys., Russia.* Laser operation of a fiber-like 1.1%Nd:YAG rod with a diameter of 0.34 mm and a length of 4.7 mm has been demonstrated. The fiber was end-pumped with 0.5 W of CW radiation from a laser diode emitting at

808 nm. The measured laser thresholds are in a reasonable agreement with theoretical estimations. As it follows from a plane-strain approximation, the fiber can be pumped up to a power of 40 to 50 W without fracture caused by thermal stress.

QSuR24
Population dynamics of the $^7F_5$ level of Tb^{3+} ions doped in the KPb_2Cl_5 crystal, A.G.Okhrimchuk, L.N.Butvina, E.M.Dianov, *General Phys. Inst., Russia,* N.V. Lichkova, V.N.Zavgorodnev, *Inst. of Microelectronics Technology, Russia,* E.Sorokin, I.Sorokina, *Tech. Univ. Wien, Austria.* It is determined, that up-conversion prevents creation of population inversion in the Tb:KPb_2Cl_5 crystal. Up-conversion coefficient is estimated to be in the range (1-5)·10^{-16} cm^3/s for 1 weight % Tb concentration.

QSuR25
Study of the thermo-lensing effect in a diode-side-pumped Nd:YVO_4 laser, J.C.Bermudez, V.J.Pinto-Robledo, A.V.Kir'yanov, *Centro de Investigaciones en Optica, México,* M.J.Damzen, *Imperial College of Sci., Technology and Medicine, UK.* The thermal lensing effect induced by high power diode pumping in the grazing incidence side-pumped Nd:YVO_4 laser geometry is numerically modeled and analyzed. The 3D temperature distributions and the correspondent thermally induced lens in Nd:YVO_4 crystal are calculated for the straight and zigzag paths of the laser beam.

QSuR26
Multiphoton relaxation of mid IR transitions of rare-earth ions in laser crystals, Yu.V.Orlovskii, T.T.Basiev, V.V.Osiko, *General Phys. Inst., Russia,* N.P.Barnes, *NASA Langley Res. Center, USA,* S.B.Mirov, *Univ. of Alabama at Birmingham, USA.* Multiphonon relaxation rates of mid IR transitions in rare- earth ions doped laser crystals were studied as a function of temperature, strength of electronic transitions, including those of inter- manifold Stark-level - to- Stark-level transitions, the type of crystal lattice, and crystal lattice parameters.

QSuR27
Nonreciprocal optical effects by a traveling ultrasonic wave and its applications, O.E.Nanii, V.G.Voronin, D.D. Scherbatkin, N.V.Nanii, *Moscow State Univ., Russia.* Different techniques for enforcing the unidirectional operation of a CW and Q-switch ring lasers using isotropic and anisotropic acousto-optical effect are investigated experimentally and theoretically. Monolithic, planar, diode-pumped, single-frequency ring laser with AO Q-switch is presented.

QSuR28
Direct nanosecond Nd- Ce nonradiative energy transfer in the cerium trifluoride laser crystals, Yu.V.Orlovskii, T.T.Basiev, E.O.Orlovskaya, Yu.S.Privis, *General Phys. Inst., Russia,* V.V.Fedorov, S.B.Mirov, *Univ. of Alabama at Birmingham, USA.* Direct nanosecond Nd-Ce nonradiative energy transfer in the cerium trifluoride laser crystals were investigated as a function of neodimium concentration and temperature. The net growth of the measured Nd-Ce energy transfer rate in the temperature range from 20 to 55 K is found to be almost 4 orders of magnitude.

QSuR29
Generation parameters of high power acousto-optically Q-switched Nd:YAG laser, I.G.Harutyunyan, H.R.Petrosyan, G.G.Harutyunyan, *LT-PYRKAL CJSC, Armenia.* The dynamics of generation, temporal and energy parameters of high power multi-mode laser system, which is controlled by wide active aperture acousto-optic Q-switch, are investigated. This report presents preliminary results, obtained during the investigations.

QSuR30
Optical spectrum of a solid-state laser with longitudinally nonuniform pump, E.Yu.Shirokov, I.V.Koryukin, *Inst. of Appl. Phys., Russia.* The effect of longitudinal pump nonuniformity on the optical spectrum of a multi-longitudinal mode Fabry-Perot laser is investigated theoretically for two configurations: an end-pumped laser and a laser with partially filled cavity with an arbitrary size and position of the active crystal.

QSuR31
Stimulated radiation and absorption spectra of excited aluminium yttrium garnet single crystals doped with neodymium, V.V.Valyavko, A.A.Mozgo, *Stepanov Inst. of Phys., Belarus.* It is the first experimental revelation of long-lived kinetic instabilities in the absorption spectrum of optically excited laser aluminium yttrium garnet crystals doped with neodymium. For example, at wavelengths 200-275, 350-370 and 700-800 nm the amplitude of the peaks of instabilities reaches 20-25% of the value of the main absorption and depends on the level of pumping of the crystal. The influence of the effects revealed on the laser generation characteristics of garnet single crystals is discussed.

QSuR32
One-micron laser emission in concentrated Nd:YVO_4 and Nd:$GdVO_4$ crystals, V.Lupei, N.Pavel, *Inst. of Atomic Phys., Romania,* Y.Sato, T.Taira, *Inst. of Molec. Sci., Japan.* Highly efficient one-micron laser emission and heating reduction is demonstrated in concentrated Nd:YVO_4 (up to 3.0-at.% Nd) and Nd:$GdVO_4$ (up to 5.0-at.% Nd) crystals under direct pumping into the $^4F_{3/2}$ metastable level.

QSuR33
Estimation of saturation energy density in YSGG:Gr^{3+}:Yb^{3+}:Ho^{3+} crystal at self-limited transition $^5I_6$?$^5I_7$ (λ=2.92 mm), N.N.Il'ichev, L.A.Kulevsky, V.N.Tranev, *General Phys. Inst., Russia.* Results of investigation of active Q-switched YSGG:Gr^{3+}:Yb^{3+}:Ho^{3+} -laser operating at wavelength 2.92 μm are presented. Saturation energy density 9.6 J/cm^2 of self-limited $^5I_6$–$^5I_7$ transition at wavelength 2.92 μm at room temperature was estimated.

QSuR34
Spectroscopic bases for efficiency enhancement and power scaling of Nd:YAG lasers, V. Lupei, *Inst. of Atomic Phys., Romania.* The analysis of the effect of spectroscopic and emission decay characteristics in Nd:YAG on the laser parameters and generation of heat recommends the direct pumping into the emitting level of concentrated Nd materials as a means for enhancement of laser parameters and for power scaling.

QSuR35
Superlow and fast light-induced optical switching of the counterrunning waves intensities, frequencies and transverse modes in cw solid-state ring lasers, A.N. Shelaev, *Moscow State Univ., Russia.* The effects of super-low and fast (fs_{min} < 10^{-2} Hz, fs_{max} > 10^6 Hz), spontaneous and forced switching of the counterrunning waves intensities, frequencies and transverse modes (without changing the ring cavity geometry and without spiking transient process) have been found experimentally and theoretically in CW solid-state ring lasers.

QSuR36
Nano-crystalline femtosecond laser medium, V.I.Baryshnikov, T.A. Kolesnikova, *Irkutsk State Univ., Russia.* Ultrashort laser pulses (<100 fs) was formed at regime of regenerative amplification in LiF crystal on 5 μm-layer with F_2 color center nanolattice at pumping by nanosecond flashes of powerful Xe-lamp.

QSuR37
Development prospects and stability limits of mid-IR Kerr-lens mode-locked lasers, V.L.Kalashnikov, E.Sorokin, IT.Sorokina, *TU Wien, Austria.* The Kerr-lens mode locking stability and the ultrashort pulse characteristics are analyzed numerically for the Cr-doped ZnTe, ZnSe, ZnS active media. The advantages of these materials for the femtosecond lasing in the 2–3 μm spectral range are demonstrated.

QSuR38
A possibility to compensate second and third order dispersion of Cr:Forsterite in femtosecond laser, V.A.Dy'akov, S.S.Grechin, A.A.Podshivalov, V.I.Pryalkin, *Moscow State Univ., Russia,* A.A. Ivanov, *Center of Photochem., Russia.* We suggested a new scheme for dispersion compensation of Cr:Forsterite crystal based on using birefringent crystals. Positive group delay dispersion and third order dispersion may be compensated in element consists of two crystals (LBO and SBO for example).

QSuR39
A novel sub-nanosecond laser system for harmonic generation, I.Velchev, D.Neshev, F.Brandi, W.Hogervorst, W.Ubachs, *Vrije Univ. Amsterdam, The Netherlands.* We present a novel laser source producing high-energy, nearly Fourier-transform limited 300 ps pulses at wavelengths tunable around 780 nm. Preliminary results on the characterization of high-order harmonics generated in a gas jet are also reported.

QSuR40
Sub-100ps jitter between a Q-switched and mode-locked lasers, E.Khazanov, E.Katin, O.Palashov, *Inst. of Appl. Phys., Russia.* We suggested two-step scheme of synchronization of a pulsed Q-switched laser and a CW laser with passive mode-locking. A Nd:YLF laser with output pulse duration of 1.7 ns was synchronized with a femtosecond Cr:forsterite laser with jitter less than 100 ps.

QSuR41
Mode locking in a self-starting laser with cavity completed by fast population grating, A.P.Zinoviev, O.L.Antipov, G.E.Yudakin, *Inst. of Appl. Phys., Russia.* Mode locking in a self-starting laser with cavity completed by nonlinear mirror was investigated. Population grating induced in a saturated dye-doped polymer layer by generating beams themselves plays a role of the broadband holographic mirror. The generation of picosecond pulse train was achieved in cavity with a double-phase conjugated mirror.

QSuR42
1450 nm edge-emitting laser structures studied by electro-modulated reflectance and spontaneous emission spectroscopy, S.B.Constant, T.J.C.Hosea, D.Lock, S.J.Sweeney, T.E.Sale, *Univ. of Surrey, UK.* Edge-emitting lasers operating near 1450 nm are important pump sources for Raman and erbium-doped fibre amplifiers. Here, spectroscopic studies of such structures yield e.g. e_1hh_1, e_1lh_2 and e_1hh_2 InGaAsP quantum-well, and InGaAsP barrier, transition energies.

QSuR43
Angle-dependent surface photovoltage spectroscopy characterization of a 1.3 mm InGaAlAs/InP vertical-cavity surface-emitting laser structure, Y.S.Huang, J.S.Liang, S.D.Wang, *Natl Taiwan Univ. of Science and Techn., Taiwan,* L.Malikova, F.H.Pollak, *City Univ. of New York, USA,* J.P.Debray, R.Hoffman, A.Amtout, R.A. Stall, *EMCORE Corp., USA.* We have demonstrated the potential of using angle-dependent surface photovoltage spectroscopy for for nondestructive characterization of a of a 1.3 μm InGaAlAs/InP vertical-cavity surface-emitting laser structure.

QSuR44
Lasing modes in quasi-stadium laser diodes under a concentric resonator condition, T.Fukushima, *Okayama Prefectural Univ., Japan,* T.Harayama, P.Davis, P.O.Vaccaro, T.Nishimura, T.Aida, *ATR Adaptive Commun. Res. Labs, Japan.* Lasing modes in a two-dimensional quasi-stadium resonator were experimentally investigated under a concentric resonator condition. Modes corresponding to beam propagations on the cavity axis and on a ring-shape trajectory were observed.

QSuR45
Influence of Al and In content on defect formation in (Al,In) GaAs quantum dot laser diodes, T.V.Bezyazychnaya, V.M. Zelenkovskii, *Inst. of Physical Organic Chem., Belarus,* G.I.Ryabtsev, *Stepanov Inst. of Phys., Belarus,* M.M.Sobolev, *Ioffe Phys.-Tech. Inst., Russia.* Nonempirical quantum-mechanical calculations of two configurations of the EL2 defect in (Al,In)GaAs have been performed. Activation energy for the process of the defect

transformation was evaluated depending on aluminium or indium content and applied to an analysis of the quantum dot laser diode degradation.

QSuR46
Self-cooling scheme of a solid-state laser, S.V.Petrushkin, V.V.Samartsev, *Zavoisky Kazan Phys.-Tech. Inst., Russia.* The laser cooling method of a solid-state laser by means of its own radiation is suggested. The ier KY_3F_{10}:Nd^{3+} doped with Yb^{3+} ions, which represent a cooling subsystem in the laser medium, is considered theoretically.

QSuR47
Bistable operation of circular grating-coupled surface-emitting lasers, T.Kossek, P.Szczepanski, *Natl Inst. of Telecommun., Poland,* R.Paszkiewicz, *Warsaw Univ. of Technology, Poland.* The theoretical analysis of bistable operation of CGSEL DBR lasers with saturable absorber is presented. The semi-classical approach based on energy theorem, threshold field approximation and vector-wave self-consistent coupled-mode equations is used.

QSuR48
Analytical and numerical studies of VCSEL array optical modes, N.N.Elkin, A.A.Koutcheryavenkov, A.P.Napartovich, D.V.Vysotsky, *TRINITI, Russia.* Up to 10x10 antiguided VCSEL arrays were simulated by 3D bidirectional beam propagation method. Modal characteristics of VSEL and VCSEL arrays were obtained analytically. Good agreement between numerical and analytical results was found.

QSuR49
Stochastic polarisation switching dynamics in VCSELs, J.Danckaert, C.Miso, M.San Miguel, *IMEDEA, Spain.* We present analytical and numerical results on the stochastic switching time of current-induced polarisation switching in VCSELs. The switching times and their stochastic distribution are compared for different mechanisms causing the switching (thermal and non-thermal).

QSuR50
Effect of carrier transport on stability of QW lasers subject to a phase-conjugate feedback with frequency detuning, S.V.Voitikov, *Stepanov Inst. of Phys., Belarus.* The stability region of a QW laser subject to a phase-conjugate feedback with frequency detuning is narrowed and the values of critical reflectivity are decreased sufficiently because of unremovable in QW-laser structures carrier transport effects.

QSuR51
Influence of As mole fraction on the threshold characteristics of mid-IR lasers based on InGaAsSb/GaSb, O.V. Mashoshina, V.V.Lysak, I.A.Sukhoivanov, *Kharkov Natl Univ. of Radioelect., Ukraine.* We have studied theoretically threshold current as a function of temperature in strained InGaAsSb/GaSb multiple-quantum-well laser. The dependence of Auger recombination (AR) coefficients versus As mole fraction indicating a value of As which leads to the minimum AR was shown.

QSuR52
Kinks and degradation of laser diodes, M.E.Polyakov, *Stepanov Inst. of Phys., Belarus.* For any amplitude of force from the general principles and without simplifications the two-dimensional equation of kink motion has been derived and solved in analytical form. Kink motion analysis is presented.

QSuR53
Output-port selectable coherent addition of fiber lasers, A.Shirakawa,T.Saitou, K.Ueda, *Univ. of Electro-Communs, Japan.* Coherent addition of two fiber lasers is achieved with an all-fiber configuration. Almost single output is obtained from either of two fiber ports, which can be switched simply by port-loss control.

QSuR54
Polarization in Yb-doped double-clad fiber laser, L.Stepien, I.Razdobreev, P.Suret, S.Randoux, J.Zemmouri, *Univ. des Sciences et Techn. de Lille, France,* A.Kurkov, *General Phys. Inst., Russia.* We have investigated the polarization characteristics of the Yb-fiber laser. A difference in the temporal evolution of the total intensity and of the two polarization eigenstates was detected.

QSuR55
The origin of self-mode-locking in a ring class-B fiber laser, V.V.Kocharovsky, *Texas A&M Univ., USA,* Vl.V.Kocharovsky, K.A.Martianov, *Inst. of Appl. Phys. Russia.* We show that experimentally observed phenomenon of self-mode-locking in ring fiber laser can be attributed to self-consistent parametric resonance and beat-frequency-locking of paired natural modes. Formation of pulses is analyzed within spacio-temporal and spectral approaches.

QSuR56
"Whispering gallery" waves in quartz rods and optical fibers, V.A.Sychugov, B.A.Usievich, *General Phys. Inst., Russia.* V.P.Torchigin, *Inst. of the Informatics Problems, Russia.* Analysis of experimental data of "whispering gallery" waves excitation in thin quartz rods having different cone angles has been performed. It has been shown that opical-geometrical approach for "whispering gallery" waves propagation remains valid for the rods of rather small diameter (20 mkm). Measurements of mode size, excited in the cylindrical fibers have been made. Mode size for the system of coupled circular cavities has been estimated.

QSuR57
Prospects of superradiant lasing in magnetized heterostructures, A.A.Belyanin, V.V. Kocharovsky, Vl.V. Kocharovsky, D.S. Pestov, *Inst. of Appl. Phys., Russia.* Fundamentals, advantages, various regimes, and perspectives of experimental realization of superradiant lasing in magnetized quantum-well heterostructures are analyzed in detail. It is shown that this laser can generate femtosecond 1W pulses under cw pumping at room temperature.

QSuR58
A novel method of gas exchange and acoustic abatement useful in scaling rapid-pulsed, compact, molecular gas lasers up to very high average power, A.E.Hill, *Texas A&M Univ., USA.* A compact, efficient means of exchanging the cavity gas volume is being developed for high-power, high-repetition, CO_2 lasers. Apparatus used to move the gas alternately function to absorb the shock/acoustic disturbance created by the discharge.

QSuR59
Amplification of femtosecond pulses in the active medium of photolytical XeF(C-A) laser, V.I.Tcheremiskine, M.L. Sentis, *FRE 2165 CNRS – Universite Aix-Marseille II, France,* L.D.Mikheev, T.Yu. Moskalev, *Lebedev Physical Inst., Russia.* Amplification of femtosecond pulses is observed for the first time in the gas medium of photolytical XeF(C-A)- laser. The results obtained show the feasibility of achievement of multi-TW output pulses as a result of direct amplification in the designed compact amplifier.

QSuR60
Self -contained laser - amplifier based on an auto-wave photon – branched chain reaction with megajoule output energy in a pulse, V.I.Igoshin, R.R.Letfullin, *Lebedev Phys. Inst., Russia.* In the present paper we offer a new physical conception for the creation of super-high-power self-contained pulsed chemical HF laser based on a photon – branched chain reaction. We have determined the performances of the main laser units for the creation of self-contained pulsed chemical HF laser with Mega-Joule output energy in a pulse.

QSuR61
Beam characteristics of a rf-excited CO_2 laser equipped with an U-shape optical resonator containing a pentaprism, I.Yildiz, R.S.Kurucu, G.Aygun, A.Esendemir, *Middle East Tech. Univ., Turkey,* I.Gutu, *Natl Inst. for Lasers, Romania,* A.Alacakir, O.Pervan, O.Kusdemir, H.Goktas, *Ankara Nucl. Res. and Training Center, Turkey.* A simple and cheap design for rf-excited CO_2 laser is presented. RF-electrical discharge is obtained between the inner wall of an aluminium water pipe and a narrow rf electrode cooled by diffusion to the wall pipe. The gain profile asymmetry (that is presented in this design) is compansated by using an U-shape stable optical resonator, which contains an optical element with properties similar to the pentaprism. The laser beam was analysed in the near field as well as in the far field.

QSuR62
Molecular addmixtures positive effect on output parameters of e-beam pumped laser on Xe atomic transitions, A.V.Fedenev, V.S.Skakun, V.F.Tarasenko, *High Current Electr. Inst., Russia.* It is presented that at short (tens of nanoseconds) pulse duration of the e-beam pumped laser on atomic Xe transitions, the radiation energy and efficiency may be increased in several times due to small additions of molecular gases, such as N_2, CO_2, et al.

QSuR63
Influence of excitation pulse form on barrier discharge excilamps efficiency, M.I.Lomaev, D.V.Shiitz, V.S.Skakun, V.F. Tarasenko, *Inst. of High Current Electr., Russia.* Excilamps excited by a barrier discharge are the simplest and perspective as well sources of UV and VUV radiation. The present work is devoted to study of influence of specific power, excitation pulse form and other excitation parameters on efficiency of a barrier discharge KrCl-excilamp.

QSuR64
Study of KrCl- and XeBr- excilamps lifetime, M.V.Erofeev, E.A.Sosnin, V.F.Tarasenko, *High Current Electr. Inst., Russia.* The lifetime of KrCl (222 nm) and XeBr (283 nm) capacitive discharge excilamps have been investigated under different input power densities. Operating time up to 1500 h was achieved. It is shown that capacitive discharge excilamps are promising in long-live UV-assisted applications.

QSuR65
Physical processes and pulse repetition rates of metal halide vapor lasers, G.Evtushenko, D.Shiyanov, D.Shestakov, V.Sukhanov, V.Fedorov, *Inst. of Atmospheric Optics, Russia,* G.Peth, *Lebedev Phys. Inst., Russia.* To obtain efficient lasing in the visible region of spectrum experimental study of the physical processes and laser output of CuBr and PbBr-vapor lasers with high pulse repetition frequencies are presented in the paper.

QSuR66
Four-wave interaction in XeCl active plasma, Yu.K.Verevkin, E.Ya.Daume, V.N.Petrjakov, *Inst. of Appl. Phys., Russia.* The problem of four-wave interaction in a three-level medium has been solved. Computations are made taking into account the longitudinal change in pumping waves. This leads to a considerable decrease in the reflection coefficient for phase conjugate wave. The reflection coefficient has been measured in experiment.

QSuR67
E-beam and discharge pumped radiation of a xenon dimers, S.I.Yakovlenko, A.M.Boichenko, A.N.Tkachev, *General Phys. Inst., Russia,* M.I.Lomaev, D.V.Shitz, V.S.Skakun, V.F.Tarasenko, *High Current Electr. Inst., Russia.* E-beam and barrier discharge pumped xenon of pressure 100-200 Torr investigated theoretically and experimentally. Optimal values of gas density and specific excitation power for high efficiency radiation at $\lambda \sim 172$ nm have been defined.

QSuR68
Influence of positive-ion processes on quasysteady-state properties of discharges in power excimer lasers, S.Anufrik, A.Volodenkov, K.Znosko, *State Univ. of Grodno, Belarus.* High initial concentration of preionization electrons may contribute to fast formation of cathode layer with very strong electrical field strength, which is able to produce an explosion field emission. The distortion of uniform interelectrode electrical field due to the positive ions was investigated. The influence of coefficients of potential

electron emission due to ions and metastable atoms on discharge quality is discussed.

QSuR69
Transformation of plasma radiation of the transverse volumetric discharge on the mixture of helium and krypton with elegas molecules, A.K.Shuaibov, L.L.Shimon, A.I.Minya, *Uzhgorod Natl Univ., Ukraine.* The results of spectroscopic investigation of degeneration of radiation ($\Delta\lambda$=200-600 nm) active media of electrodischarge excimer lamps (λ=249 nm KrF), working on He/Kr/SF_6 (P=10-200 kPa) mixture, are presented. It is shown, that at quantity of digit pulses exceeding 104 effective enough formation of the excited molecules of sulphur which break up with radiation in spectral area 260-550 nm that may be used for development of a broadband lamp on system of band KrF (B-X; D-X), S_2 (B-X) and S_2 (f-a) is observed.

QSuR70
Investigations on charge-exchange XUV-laser schemes, V.V.Vorontsov, M.Born, L.Koch, B.N.Chichkov, B.Wellegehausen, *Univ. Hannover, Germany,* I.F.Shaikhislamov, *Inst. of Laser Phys., Russia.* Investigatons on charge exchange pumping of OVI ions with neutrals will be reported. Fs-laser to produce ions and pulsed valve to inject neutrals will be used for the first time.

QSuR71
Lasing spectra in cholesteric liquid crystals as a 1-D photonic band-gap materials, I.P.Ilchishin, *Inst. of Phys., Ukraine.* We perfomed experimental study of the lasing spectra in three types of cholesteric liquid crystals with different birefrigence. The obtained data are discussed in the framework of the theory of the DFB-lasers and modern conceptions concerning lasing at the edge of the photonic stop band.

QSuR72
Polarization characteristics of the dyes active media with XeCl laser excitation, A.Shaposhnikov, D.Filinov, *Tomsk State Univ., Russia,* R.Kuznetsova, T.Kopylova, *Tomsk State Univ., Russia.* The polarization degrees of the laser radiation for ethanol solution and polymeric samples with organic compounds, emitting in UV and visible region under XeCl laser excitation were determined. The dye lasers polarization characteristics dependency on intensity, polarization degree and geometry of the excitation, size and shape of excited volume was established.

QSuR73
Effect of intensityand polarization degree of excitation on dye laser active media photostability, R.Kuznetsova, V. Svetlichnyi, D.Filinov, E.Telminov, *Tomsk State Univ., Russia.* The molecular and lasing photostability of dye active media for UV region under XeCl laser excitation with different intensity and polarization degree was studied. The increasing of photostability of active media on the base of organic compounds in lasing conditions compare with sponteneous and under polarized pumping compare with nonpolarized were established.

QSuR74
Statistical properties of light generated by circular grating DBR laser with saturable absorber, R.Paszkiewicz, A.Tyszka-Zawadzka, T.Kossek, *Warsaw Univ. of Technology, Poland,* P.Szczepanski, *Natl Inst. of Telecommun., Poland.* The analytical analysis of the statistical properties of light generated by CG-DBR lasers with saturable absorber is presented. The semiclassical approach, based on the set of Langevine equation and corresponding Fokker-Planck equation is used.

QSuR75
Nonlinear operation of planar circular grating DFB/DBR laser with phase shift, A.Mossakowska-Wyszynska, *Warsaw Univ. of Technology, Poland,* T.Kossek, P.Szczepanski, *Natl Inst. of Telecommun., Poland.* We analyze nonlinear operation of planar circular grating DFB/DBR laser with phase shift. It is found that proper value and position of additional phase shift reduce gain of laser structure and improve its mode selectivity.

QSuR76
Drift region requirements for a free-electron laser without inversion, A.I. Artemyev, M.V.Fedorov, *General Phys. Inst., Russia,* G.Kurizki, *Weizmann Inst. of Sci., Israel,* K.Kapale, Yu.V.Rostovtsev, S.Trendafilov, M.O.Scully, *Texas A&M Univ. USA.* The proposed "phased" submillimeter domain optical klystron has a positive small-signal gain profile. It is achieved via the drift region phase delay and electron velocity deflection sensitive to the electron velocity and transverse position.

QSuR77
Free-electron laser without inversion via drift region-induced electron deflection, N.Yu.Shubin, M.V.Fedorov, *General Phys. Inst., Russia,* A.I.Artemyev, G.Kurizki, *Weizmann Inst. of Sci., Israel,* K.Kapale, Yu.V.Rostovtsev, S.Trendafilov, M.O.Scully, *Texas A&M Univ., USA.* We explore the gain profile and optimize the hot-beam small-signal gain of a two-stage optical klystron operating with the negative dispersion of the drift region.

QSuR78
Probabilistic model of random laser, V.Perinova, A.Lukš, *Palacky Univ., Czech Republic.* A model of random laser considering many modes and an amplifying medium described by rate equations is analyzed whose photon statistics are the more super-Poissonian, the greater is the number of modes above threshold.

QSuR79
A correlation of laser properties of dyes with their spectral characteristics, M.F. Koldunov, I.L.Pokotilo, *R&D Enterprise "Optronica", Russia,* Ya.V.Kravchenko, A.A.Manenkov, *General Phys. Inst., Russia.* A correlation of radiation conversion efficiency and spectral characteristics of different class dyes at a laser pump is investigated. Important parameters determining the conversion efficiency and service life of laser elements are shown to be a relative Stokes shift and absorption ratio at pump and luminescence wavelengths. The correlation has been proved by experimental data on the conversion efficiency and service life of laser elements doped with pyrromethene and phenolemine series dyes.

QSuR80
Dramatic spectral narrowing and broadband tuning from a non-resonantly injection-seeded diode laser, E.U.Rafailov, M.B.Flynn, W.Sibbett, *Univ. of St. Andrews, UK,* E.A.Avrutin, *Univ. of York, UK.* We demonstrate spectral narrowing with broadband tuning from a picosecond non-resonantly injection-seeded diode laser. A refined spectral output was tunable over a range of 44 nm from 1538 nm to 1582 nm.

QSuS · Nonlinear Optical Phenomena I

QSuS1
Widely ranged spectrum generation in hydrogen at coherent Raman excitation, A.V.Andreev, A.A.Valeev, V.B.Morozov, A.N.Olenin, V.G.Tunkin, *Moscow State Univ., Russia.* In gaseous hydrogen, coherently excited by pulsed biharmonic pumping in resonance with Raman rotational transition, collinearly generated frequency-modulated radiation was investigated by scattering of probe picosecond pulses. Almost complete transformation of probe pulses in a radiation with multi-component spectrum was achieved. A general solution of Raman equations was obtained in spectral and time representations.

QSuS2
Second harmonic generation by Bessel beams with a submicron spatial structure in the direction of the phase-matching cone of unaxial crystals, N.A.Khilo, E.S.Petrova, *Div. for Optical Problems in Inform. Technologies, Belarus,* V.N.Belyi, E.G.Katranji, A.A.Ryzhevich, *Stepanov Inst. of Phys., Belarus,* P.A.Khilo, *Technical Univ., Belarus.* A new scheme of three-wave interactions of Bessel light beams has been proposed and investigated. It is discovered that the choice of the vector beams involves new components of nonlinear susceptibilities increasing the efficiency of frequency conversion.

QSuS3
Novel correlated phenomena at parametric interactions of Bessel light beams, V.N.Belyi, N.S. Kazak, *Stepanov Inst. of Phys., Belarus,* N.A.Khilo, *Div. for Optical Problems in Inform. Technologies, Belarus.* The establishment of correlation between plane-wave components of Bessel light beams at signal and idler frequencies in three- and four-wave parametric interactions has been investigated. It is shown that at the such interaction the coupling coefficient reaches its maximum.

QSuS4
Frequency doubling with hollow light beams, N.S.Kazak, E.G.Katranji, A.A.Ryzhevich, *Stepanov Inst. of Phys., Belarus.* Multi-ring and first-order Bessel light beams interactions with different nonlinear crystals are investigated. Second harmonic field is studied in dependence on the input beam parameters. Hollow beams are useful in nonlinear processes when the intensity of the fundamental frequency beam is close to the threshold of the nonlinear medium optical damage.

QSuS5
Frequency conversion and orientational interaction of femtosecond laser pulses with nematic and smectic liquid crystal cells, V.A.Enikeeva, V.A.Makarov, I.A. Ozheredov, A.P.Shkurinov, *Moscow State Univ., Russia,* V.F.Kitaeva, A.S.Zolot'ko, *Lebedev Physical Inst., Russia.* Interaction of continuous waves and femtosecond laser pulses with pure and doped with dye nematic liquid crystal cells was studied. Enhancement of nonlinear frequency conversion efficiency into oriented liquid crystal cell is shown.

QSuS6
Nonlinear absorption in AgBr nanocrystals: multiphoton absorption assisted by free electrons, E.Yu.Perlin, D.I.Stasel'ko, A.V.Ivanov, *Vavilov State Optical Inst., Russia.* The reverse Herschel effect was detected in AgBr nanocrystals. The effect is interpreted in terms of multiphoton indirect interband absorption assisted by free photo-generated electrons. The calculated results agree with the experimental data.

QSuS7
Effect of low-frequency electric field on the sign-inversion orientational optical nonlinearity of nematic liquid crystals, M.I.Barnik, *Inst. of Crystallography, Russia,* S.A.Kharchenko, V.F.Kitaeva, A.S.Zolot'ko, *Lebedev Phys. Inst., Russia.* An interaction of nematic liquid crystals, exhibiting the sign-inversion orientational nonlinearity, with the simultaneously applied light and low-frequency electric fields has been investigated. The character of the variation of the orientational nonlinearity at changing the low-frequency field was established for the homeotropically and planarly aligned crystals.

QSuS8
Spectral and energy characteristics of transient stimulated Raman scattering in compressed gases: experiment and theory, A.G.Shvedko, S.G.Kruglik, P.A. Apanasevich, V.A.Orlovich, *Stepanov Inst. of Phys., Belarus.* Transient stimulated Raman scattering in compressed hydrogen and methane excited by the second harmonic of picosecond Ti:Sapphire laser was investigated both experimentally and theoretically. Energy, temporal, and spectral characteristics of this process are discussed.

QSuS9
Anomalous tuning behaviour of a synchronously pumped optical parametric oscillator, P.Loza-Alvarez, M.B.Flynn, W.Sibbett, *Univ. of St. Andrews, UK,* P.Kinsler, G.H.C.New, *Imperial College, UK.* We present a characterisation of a PPLN-based femtosecond OPO that reveals an unusual cavity length tuning behaviour. Computer-based simulations supporting these experimental observa-

tions and their interpretation are also described

QSuS10
Temporal behavior of Bessel and axial Stokes beams at Bessel beam pumping, R.V.Chulkov, A.S.Grabchikov, V.A.Lisinetskii, V.N.Belyi, N.A.Khilo, V.A.Orlovich, *Stepanov Inst. of Phys., Belarus.* Temporal oscillations in simultaneously generated axial and Bessel Stokes waves for Raman conversion at Bessel beam pumping have been observed experimentally and explained theoretically as a result of nonlinear wave coupling.

QSuS11
Restriction of the efficiency of photoinduced second harmonic generation in germanium-silicate glass, M.K.Balakirev, V.A.Smirnov, L.I.Vostrikova, *Inst. of Semicond. Phys., Russia.* Big growth of light absorption in high-induced electric field has been detected during investigation of photoinduced second harmonic generation in germanium-silicate glass. The absorption blocks the recording of field grating and generation process.

QSuS12
Cascaded third harmonic generation in single quadratic crystal by a focussed laser beam, R.Ivanov, K.Koynov, S.Saltiel, *Univ. of Sofia, Bulgaria.* Generation of third harmonic wave by second order cascading in single crystal with focussed fundamental beam is investigated theoretically. For obtaining maximum third harmonic efficiency optimisation of beam waist position and phase mismatches of the two steps is required.

QSuS13
Consecutive third harmonic generation in the crystals with modulated second order nonlinearity, E.Yu.Morozov, G.D. Laptev, *Moscow State Univ., Russia.* The conditions of high effective energy conversion and relative phase dynamics in consecutive third harmonic generation in periodically poled crystals with second order nonlinearity are investigated. The influence of the crystal domain structure aperiodicity on third harmonic efficiency is studied.

QSuS14
Nonlinear refraction and absorption of aqueous solution of As_2S_3, A.I.Ryasnyansky, M.K.Kodirov, *Samarkand State Univ., Uzbekistan,* R.A.Ganeev, T.Usmanov, *NPO "Akadempribor", Uzbekistan.* We report, for the first time to our knowledge, on preparation of colloidal solution of chalcogenide semiconductor As_2S_3 by laser ablation method. Nonlinear-optical characteristics of solution were investigated by the Z-scan method on the wavelength of Nd:YAG laser radiation (λ=1064 nm, τ=25 ns).

QSuS15
Cw hyper-Raman laser and four-wave mixing in atomic sodium, S.I.Kablukov, *Inst. of Automation and Electrometry, Russia,* M.Klug, B.Wellegehausen, *Univ. Hannover, Germany*. We report about experimental investigations on cw hyper-Raman (HR) generation and coupled parametric four wave-mixing in atomic sodium. Features of the HR-oscillation in ring cavities and directional dependencies will be discussed

QSuS16
The absorption (amplification) spectrum of weak wave in three-level quantum system of V-type, A.A.Afanas'ev, L.S.Gaida, A.I.Martinovich, *Stepanov Inst. of Phys., Belarus.* The absorption (amplification) spectrum of a probe wave in the presence of powerful wave with their interaction in three-level quantum system of V-type is investigated. The interpretation of the spectral modulation of the probe wave absorption coefficient is presented. The probe wave amplification effect with the frequency-degenerate interaction is analysed.

QSuS17
Bessel light beams self-diffraction in liquid medium, N.S.Kazak, E.G.Katranji, A.N.Khilo, A.A.Ryzhevich, *Stepanov Inst. of Phys., Belarus,* I.A.Utkin, *Div. for Optical Problems in Inform. Technologies, Belarus.* For the first time some features of a self-diffraction of Bessel light beams in a liquid medium have been investigated and explained. Possibility of application of Bessel light beam self-diffraction method for investigation of nonlinear medium parameters has been confirmed.

QSuS18
Dynamics of localised states in a nonlinear system with inhomogeneous input field, Weiping Lu, S.L.Lachinova, *Heriot-Watt Univ., UK*. We study the dynamics of localized states in a nonlinear system with inhomogeneous input field. We further investigate the control and steering of localized states in the system for applications in target detection and tracking.

QSuS19
Amplification at cesium D_2 line hyperfine transitions under low power optical pumping, A.Korolev, V.Nazarov, *Corning Ltd., Russia.* Amplification has been realized at Cs D_2 line hyperfine transitions to the ground atomic states. Effect was observed in Cs vapor cell with low pressure He buffer gas under double wavelength resonant optical pumping of atoms in the lambda-scheme with cw and pulsed diode lasers radiation and was interpreted as result of induction of levels population inversion.

QSuS20
Peculiarities of hydrogen monitoring, G.M.Mikheev, T.N.Mogileva, D.G.Kaluzhny, *Inst. of Appl. Mechanics, Russia,* Georg.M.Mikheev, *Joint-stock Company "Chuvashenergo", Russia.* Stimulated Raman Scattering (SRS) and Coherent anti-Stokes Raman scattering (CARS) methods were used for hydrogen monitoring in propane and ethane gases. It is shown that the effect of motional narrowing is important for hydrogen monitoring.

QSuS21
Ultraviolet-induced transient absorption in BBO and LBO crystals and its influence on frequency conversion, N.Kondratyuk, A.Shagov, *Solar Laser Systems, Belarus,* A.Yurkin, *Siberian Single Crystal-EKSMA, Russia,* G.Kataev, *Stepanov Inst of Phys., Belarus.* We performed intensity-dependent transmission of BBO and LBO crystals measured at 266 nm. The optical properties of the 266 nm-induced transient absorption are discussed. We calculated the defect absorption cross-section at 266 nm and 532 nm. We investigated the efficiency at 314 nm of BBO OPA and LBO OPA pumped by fourth harmonic of Q-switched Nd:YAG laser.

QSuS22
Multiwave quasi-phase matching stimulated Raman scattering with dispersion of Raman gain, N.S.Makarov, St.-Petersburg State Inst. of Fine Mechanics and Optics (Technical Univ.), Russia, V.G.Bespalov, *Vavilov State Optical Inst., Russia.* The influence of Raman gain dispersion results in the difference between second Stokes generation efficiency about 30 % in hydrogen and 15 % for barium nitrate because of smaller Raman shift.

QSuS23
Second harmonic generation with Bessel light beams under conditions of acousto-optical diffraction, V.N. Belyi, A.G.Mashchenko, *Stepanov Inst. of Phys., Belarus,* P.A.Khilo, L.I.Kramoreva, *Technical Univ., Belarus.* The process of second harmonic generation with Bessel light beams in conditions of collinear diffraction on ultonic wave is studied. The conversion efficiency and output patterns for the process are determined for collinear and vectorial interactions.

QSuS24
Self-action effects in nonstationary laser radiation frequency doubling in regular structure medium, I.A.Kulagin, U.K.Sapaev, T.Usmanov, A.A.Uzaqov, D.B.Yusupov, *Tashkent Aviation Inst., Uzbekistan, NPO Akadempribor, Uzbekistan.* Influence of self-action effects on nonstationary laser radiation frequency doubling in regular structure medium is analysed. It is shown that a difference of the dimensional symmetry of the second and third order susceptibilities can result in modification of optimal domain organisation. The conditions when the high order nonlinearity influence increases the efficiency of nonstationary second harmonic generation of phase-modulated laser pulse are defined.

QSuS25
Beam propagation factor changes in type II second-harmonic generation in pulse compression regime, A.Dement'ev, *Inst. of Phys., Lithuania,* F.Ivanauskas, A.Kurtinaitis, *Vilnius Univ., Lithuania.* The developed algorithm and the program makes it possible to optimize the process of the SHG of ultrashort laser pulses with time delay and to identify the conditions where sufficiently high degree of the pulse compression with a relatively low degradation of their quality is achieved.

QSuS26
Spatial distribution of energy densities of light beams diffracted on light-induced nonlinear grating built-in into Fabry-Perot interferometer, A.V.Kazberuk, G.V.Sinitsyn, *Div. for Optical Problems in Inform. Technologies, Belarus.* A Fabry-Perot interferometer is considered in nonlinear intermediate layer of which sinusoidal modulation of dielectric constant is created by two coherent light beams. The results on spatial distribution of light fields are presented.

QSuS27
Optical parametric amplification and second harmonic generation in glass with nonlinear polymer waveguides, M.Alsikh Khalil, *AEC, Syria,* G.Vitrant, *LEMO-EMSERG, France,* F.Kajzar, *DEIN/SPR, CEA, France.* We report on modal dispersion phase matching in an original structure. The measured second harmonic conversion efficiency is $4.5?10^{-5}$%/W/cm between the modes TM0 fundamental and TM2 harmonic. And we have obtained 1dB internal gain after propagation over 5mm. The numerical simulations of this structure have shown good tolerance of the variation of the thickness.

QSuS28
Gas-phase generation of third harmonic with crossed laser beams, V.E.Peet, R.V.Tsubin, *Univ. of Tartu, Estonia.* Generation of resonance-enhanced third harmonic in xenon for collinear and non-collinear excitation modes has been studied. Comparison of generation efficiency and numerical simulation of the tuning curves have been carried out.

QSuS29
Temperature non-critical THG in LBO crystal with self-adaptive temperature compensation, V.G.Dmitriev, *RDI POLYUS, Russia,* V.A.Dy'akov, V.I.Pryalkin, *Moscow State Univ., Russia,* S.G.Grechin, *Bauman MSTU, Russia.* The results of theoretical and experimental investigations of temperature non-critical THG in LBO crystal are represented. The possibility of a realization of anomalous non-critical on temperature THG is exhibited with a self-adaptive compensation of influence of temperature dependencies of crystal refraction coefficients and thermo-deformations.

QSuS30
Principles of angular optical echo-spectroscopy, O.M.Fedotova, O.K.Khasanov, *Inst. of Phys. of Solids & Semicond., Belarus.* Theory of the angular optical echo-spectroscopy is developed. As is shown not only blue shift of the photon echo frequency but red one can be observed as well. Besides, the non-collinear scheme of the echo signal excitation leads to its oscillatory structure.

QSuS31
Optical limiting and third harmonic generation in metal-doped polyvinylpyrrolidone, R.A.Ganeev, S.R.Kamalov, R.I.Tugushev, T.Usmanov, *NPO "Akadempribor", Uzbekistan,* A.I.Ryasnyansky, M.K.Kodirov, *Samarkand State Univ., Uzbekistan,* V.A.Li, *Inst. for Polymer Chemistry and Phys., Uzbekistan.* We present our studies of optical limiting (OL) and nonlinear optical characteristics measurements (nonlinear refractive indices, nonlinear absorption coefficients) in aqueous polyvinylpyrrolidone (PVP) solutions doped with various concentrations of cobalt using picosecond infrared and visible radiation. OL at λ=532 nm was attributed to the self-defocusing and

nonlinear absorption due to reverse saturation absorption. Third harmonic conversion efficiencies in iron- and zinc-doped PVP were measured to be $8 \cdot 10^{-7}$ and $5 \cdot 10^{-7}$ respectively.

QSuS32
Polarization instability and four-wave mixing in cavity with resonant medium, O.G.Romanov, A.L.Tolstik, I.I.Gancherenok, *Belarusian State Univ., Belarus,* L.Wenke, B.Fleck, *Friedrich Schiller Univ., Germany.* The dynamics of orthogonal polarization modes in anisotropic plane resonators with resonant medium has been studied. A model of light-induced anisotropic effects in a resonant medium under polarized excitation in conditions of strong saturation has been developed. The origination conditions of polarization instability and its influence on spatial-temporal dynamics have been determined.

QSuS33
Investigation of self-modulation regimes, V.M.Yasinskii, *Stepanov Inst. of Phys., Belarus.* The self-modulation regimes, stimulated by interaction of four waves with orthogonal elliptic polarizations, were detected and experimentally investigated in the ring CO_2 laser with the non-planar cavity. Such regimes enable one to investigate the dynamics of interaction of four waves with elliptical orthogonal polarizations under the conditions of a class B laser with a quasi-homogeneous character of amplification line broadening.

QSuS34
Influence of cubic nonlinearity on the quality of the second-harmonic of high-intensity short laser pulses, A.Dement'ev, *Inst. of Phys., Lithuania,* V.Girdauskas, R.Kazragyte, O.Vrublevskaja, *Vytautas Magnus Univ., Lithuania.* Conversion efficiency and quality changes of the second and fundamental harmonics pulses during type I SHG of axially symmetric super-Gaussian laser beams have been modeled numerically, taking into account diffraction, group velocity mismatch and Kerr nonlinearity of the medium.

QSuS35
Nonlinear optics of the extremely short pulses in one-axis crystal, S.V.Sazonov, A.F.Sobolevskii, *Kaliningrad State Univ., Russia.* The microscopic semiclassical approach for the description of dynamics of extremely short optical pulses in anisotropic one-axis media is offered. On the basis of this approach the system of two non-linear wave equations of the pulse ordinary and extraordinary components is obtained and analyzed.

QSuS36
Multistability in aerosol microlaser due to spatial modes overlapping, L.A.Kotomtseva, G.P.Lednyeva, A.V.Korzhov, *Stepanov Inst. of Phys. Belarus.* Coexistence of several values for the steady state intensities and frequencies due to spatial mode overlapping in spherical microparticle with two modes is demonstrated. Conditions for multistability below and over the threshold are obtained.

QSuT · Quantum Optics

QSuT1
Generation of completely non-polarized biphoton light, A.Burlakov, M.Chekhova, S.Kulik, G.Rytikov, *Moscow State Univ., Russia.* We generate collinear frequency non-degenerate biphoton light in the singlet Bell's state and show that it is non-polarized in all orders and has properties of scalar light.

QSuT2
Measurement of the arbitrary polarization state of biphoton field, L.A.Krivitskiy, S.P.Kulik, G.A.Maslennikov, A.N. Penin, *Moscow State Univ., Russia.* We propose the experiment in which one can obtain all parameters that define an arbitrary polarization state of biphoton field.

QSuT3
Squeezing in PPNC (periodically poled nonlinear crystal) via Kerr effect, R.Singh, *General Phys. Inst., Russia.* It is shown that the squeezing in PPNC with Kerr media having self-phase modulation (SFM) and cross-phase modulation (XFM) effects are periodic. We have compared the squeezing properties of homogeneous nonlinear crystal (HNC) with PPNC having SFM and XFM. The revival and collapses of quasi-probability function are observed.

QSuT4
Effects of amplification on nonclassical measure of light fields, Youngchul Kim, Kisik Kim, Dae-Yoon Park, *Inha Univ., Korea.* We examine the effects of amplification on nonclassical measures of states as well as properties of light. The explicit form of the nonclassical measure at the output is obtained and a number of consequences are discussed.

QSuT5
Entanglement purification, S.Gasparoni, J.-W.Pan, G.Weihs, A.Zeilinger, *Univ. of Vienna, Austria.* Existing general purification protocols are based on the quantum CNOT operation, which is very difficul to implement. We present a method for the entanglement purification of general mixed entangled states without using the CNOT operation.

QSuT6
Decoherence and entanglement of atomic ensemble due to collective radiation decay, A.M.Basharov, *Moscow Engin. Phys. Inst., Russia.* It is shown, that the relaxation of two noninteracting atoms in a field of a common thermostat is reduced not only to decoherence, but also to opposite process - entanglement of atomic states. The entanglement can be stationary depending on initial conditions. All considered models are based on the Lindblad equations. Criterion of Peres-Horodecki is used to determine the entanglement.

QSuT7
Coherence effects in a driven micromaser pumped by polarized atoms, F.Casagrande, A.Lulli, *INFM – Univ. di Milano, Italy.* We describe the dynamics of a coherently driven micromaser pumped by polarized atoms, illustrating the effects of induced cavity field coherences on the steady-state behaviour, which can show up in standard atomic populations measurements.

QSuT8
Influence of thermal photons on coherently and incoherently driven atom in a high Q microcavity, T.B.Karlovich, S.Ya. Kilin, *Stepanov Inst. of Phys., Belarus.* The properties of coherently and incoherently driven atom in a high Q microcavity with thermal photons are discussed on the basis of analytical and numerical solution for P-distribution function in the case of large Rabi frequencies.

QSuT9
Superradiance and superfluorescence: quantum statistical derivation of Maxwell-Bloch description with fluctuating photon source, S.N.Andrianov, *Zavoisky Phys.-Tech. Inst., Russia,* Takashi Arisawa, *Japan Atomic Energy Res. Inst., Japan.* The comprehensive quantum statistical theory is built for optical superradiance in three-level atomic system in superfluorescent and amplified spontaneous emission regimes. The system of kinetic equations is derived in the framework of statistical operator method for Fourier transforms of populations and transition dipole momentums, quantity of photons and polarization fields that is generalized Maxwell-Bloch equation system. The account of photon number operators along with that of polarization fields allows the consideration of superradiance origin from quantum-electrodynamic fluctuations or triggering by external photons and to get the radiation formula for emitted photons in arbitrary propagation direction. This equation system is solved numerically. The comparison of obtained superradiance characteristics with available data on superradiance in gaseous and solid media shows good agreement that substantiates the developed theoretical model.

QSuT10
Theory of the electromagnetically induced transparency in super-cold atomic gas in a trap, E.D.Trifonov, A.S.Troshin, N.A.Vasil'ev, *Herzen Pedagogical Univ. of Russia, Russia.* The semiclassical theory of linear and nonlinear features of resonant pulses propagating throw atomic super-cold gas under condition of electromagnetically induced transparency caused by another pulse resonant to an adjoining transition is developed. The dramatically low group velocity of the probe pulse, recently observed, is analysed.

QSuT11
Multifrequency spectrum generation via acoustically induced transparency, Y.V. Radeonychev, O.Kocharovskaya, *Inst. of Appl. Phys. Russia.* A novel effect of acoustically induced transparency for propagation of multifrequency radiation in homogeneously broadened solid medium under condition of resonance between an intermode interval and vibration frequency is proposed.

QSuT12
General form of dark states in "atoms+quantized field" system, A.V.Taichenachev, A.M.Tumaikin, V.I.Yudin, *Novosibirsk State Univ., Russia.* We consider resonant interaction of atoms with degenerate ground state with quatized resonant field. The general form of dark states in this system are found and analyzed.

QSuT13
Electromagnetically induced transparency for gamma-quanta using a radio-frequency field, R.N.Shakhmuratov, *Zavoisky Phys.-Tech. Inst., Russia,* J.Odeurs, *Katholieke Univ. Leuven, Belgium.* We show that the radio-frequency driving of the excited nuclear spin in the resonant absorber is capable of making transparent the absorber for gamma-quanta. In this case the group velocity of the gamma-quanta can be slowed down many times.

QSuT14
Photon statistics and laser threshold for L and V, G.A.Koganov, R.Shuker, *Ben Gurion Univ., Israel.* Photon statistics of V and Λ laser schemes are presented and compared in terms of Fano factor, second order coherence and relative variance. The role of these parameters in describing laser field is discussed.

QSuT15
Storing and releasing the laser beams in a gas of moving atoms, G.Juzeliunas, M.Mašalas, *Inst. of Theor. Phys. and Astronomy, Lithuania.* We consider a novel scheme of storing and releasing of a continuous beam of probe light in a moving atomic medium illuminated by two spatially separated control lasers.

QSuT16
Matched pulses under electromagnetically induced transparency in four-level system: the case of short pulses, V.G.Arkhipkin, *Kirensky Inst. of Phys., Russia,* I.V.Timofeev, *Krasnoyarsk State Univ., Russia.* We show the possibility of nonlinear-optical generation of matched pulses with duration less than all relaxation times of the medium in resonant four-level system by electromagnetically induced transparency.

QSuT17
Recording and recovery of short laser pulse by adiabatic population transfer, V.G.Arkhipkin, *Kirensky Inst. of Phys., Russia,* I.V.Timofeev, *Krasnoyarsk State Univ., Russia.* The spatial localization of atomic coherence under adiabatic population transfer is shown. The technique of recording and recovery of short laser pulse is suggested.

QSuT18
Phase sensitive coherent phenomena in double L-atom system: $p/2$-pulse, adiabatic passage and coherent scattering in standing waves, S.Borisenok, Yu.Rozhdestvensky, *Inst. for Laser Phys., Russia.* We represent our investigation of phase sensitive coherent phenomena in double Λ-atom systems with closed interaction contour, both in the Raman-Nath approximation and in the approximation of a large detuning. The most interesting results is detailed description how p-pulse, adiabatic passage and coherent scattering depend on the interaction contour phase.

QSuT19
Induced quantum beat transparency in gamma range, A.V.Mitin, D.A.Roganov, *Kazan State Techn. Univ., Russia.* The induced interference transformation of gamma radiation in the medium with resonant nuclei is studied. The generation of quantum beat harmonics induced by two radiofrequency magnetic fields is considered. The transparency effect and its spatial and temporal dynamics are demonstrated.

QSuT20
Study of the properties of coherent dense media using Faraday rotation, I.Novikova, A.B.Matsko, G.R.Welch, *Texas A&M Univ., USA.* The nonlinear Faraday effect is an excellent tool for studying coherent media by providing complete information about the susceptibility. We demonstrate that ground-state coherence is strongly affected by radiation trapping, ac-stark shifts, and velocity-changing collisions.

QSuT21
Strongly dispersive transparent media, L.Spani Molella, A.Wicht, A.Rocco, *Max-Planck-Inst. für Gravitationsphysik, Albert-Einstein-Inst., Germany,* M.Müller, M.Rudolf, R.-H.Rinkleff, K.Danzmann, *Univ. Hannover, Germany.* Phase and absorption of laser fields in highly dispersive non absorbing media are investigated with a three beam heterodyne interferometer and an improved Mach-Zender interferometer. Possible applications for gravitational waves physics are presented.

QSuT22
Stability of the quantum statistical properties of emission of one mode vertical-cavity surface-emitting lasers relative to the polarization fluctuations, J.-P.Hermier, I.Maurin, E.Giacobino, *Univ. Pierre et Marie Curie, France,* M.I.Kolobov, *Univ. des Sci. et Techn. de Lille, France,* Yu.M.Golubev, T.Zernova, *St.-Petersburg State Univ., Russia.* It was demonstrated theoretically the linearly polarized regimes of lasing in the one mode vertical-cavity surface-emitting lasers (VCSELs) are ever stable relative to the amplitude fluctuations independently of the magnitudes of the linear dichroizm and linear berefridgence. At the same time the areas of stability relative to the polarization fluctuations in dependence on the linear berefridgence can be essentially deformed even for the small magnitude of the linear dichroizm in comparison with a complete absence of the one.

QSuT23
Parametric resonance and self-induced excitation of dipole oscillations of a molecule rotating in the near zone of metallic surface, A.A.Belyanin, V.V.Kocharovsky, *Texas A&M Univ., USA,* Vl.V.Kocharovsky, *Inst. of Appl. Phys. Russia,* V.Ju.Martianov, *Nizhny Novgorod State Univ., Russia.* The phenomenon of parametric instability of dipole oscillations of a molecule rotating in the vicinity of a conducting medium is found and investigated analytically. Coherent radiation from a bunch of parametrically excited rotating molecules is analyzed.

QSuT24
Spontaneous emission of two-level atom in microstructure, S.V.Sukhov, *Inst. of Radioengin. and Electr., Russia.* In the frames of quantum electrodynamics, the behavior of spontaneous decay is investigated for a single two-level atom embedded into a microscopic object. It is obtained that spontaneous decay strongly depends on the geometrical arrangement of atoms in microstructure.

QSuT25
Spontaneous emission and linewidth in class-A and class-B lasers, E.G.Lariontsev, G.M.Stephan, *Moscow State Univ., Russia.* An analytical theory of spontaneous emission and the quantum-limited linewidth of class-A and class-B lasers is developed. Our formula for the spontaneous emission rate R into the lasing mode agrees with the well-known expression only near threshold and far above threshold the value of R is two times lower as compared with the standard treatment. We also develop an analytical formula for the quantum-limited linewidth.

QSuT26
Quantum limits for switching and computing in multicomponent bosonic systems, A.P.Alodjants, A.Yu.Leksin, A.V. Prokhorov, S.M.Arakelian, *Vladimir State Univ., Russia.* Quantum polarization properties of multimode bosonic system being both an optical field in tunnel-coupled optical fibers and two coupled Bose-condensates are considered. For the first time, the analysis of the switching effect of the Stokes parameters has been carried out for light in quantum polarization states. The quantum limits to observe/measure of the switching effect due to quantum fluctuations of the initial particle numbers are obtained. The quantum steady-state solutions as well as a photonic "superfluid state" problem are discussed. The modification of the standard SU(2) algebra and also the phase problem for interaction of atomic system (in a Bose-Einstein condensate state) with quantized optical field is considered.

QSuT27
Single-photon emission from a single quantum dot, V.Zwiller, S.Jeppesen, M.-E.Pistol, L.Samuelson, *Lund Univ., Sweden,* P.Jonsson, H.Blom, G.Björk, *Royal Inst. of Techn. (KTH), Sweden.* We report on photon emission statistics from single self-assembled InAs quantum dots embedded in GaAs. We show that these quantum dots are promising candidates to be used in highly efficient single-photon sources.

JSuF · Laser Biomedicine and Chemistry. Laser Applications in Medicine

JSuF1
Spatial redistribution of particles in liquid under the action of interfering laser beams, B.A.Bushuk, S.B.Bushuk, T.Sh.Efendiev, V.M.Katarkevich, A.N.Rubinov, *Stepanov Inst. of Phys., Belarus.* Spatial redistribution of different types of particles in liquid, including human lymphocytes and erythrocytes, induced by interference laser field was studied in dependence on period of inter-ference fringes, light power, and properties of a suspension.

JSuF2
Laser spectroscopic methods for monitoring of component content of biological fluids, M.M.Kugeiko, V.A.Firago, *Belarussian State Univ., Belarus.* Possibility to increase an accuracy of the determination of biological fluids component content by the methods based on cumulative measurements is shown. New spectral basis-nephelometric and modified correlation methods are developed for monitoring of biological fluids content.

JSuF3
Study of erytrocyte membranes using novel fluorescent probes and site-selective laser spectroscopy, N.A.Nemkovich, J.V.Kruchenok, A.N.Sobchuk, A.N.Rubinov, *Stepanov Inst. of Phys., Belarus.* For investigation of human erythrocyte membranes we used 4'-aminoflavonols with excited-state intramolecular proton transfer (ESIPT) in combination with laser spectrofluorimetry. The spectral heterogeneity of flavonols in the studied systems was obtained. This effect allows studying the microcharacteristics of a membrane with a spatial resolution about 1 nm. Application of this approach provided an efficient method for detection of pathologies in membranes induced by various factors.

JSuF4
Periodic metal-dielectric substrates for efficient Raman bioanalyses, O.S.Kulakovich, A.A.Gaiduk, S.V.Gaponenko, *Inst. of Molec. and Atomic Phys., Belarus,* N.D.Strekal, V.F.Oskirko, S.A.Maskevich, *Y.Kupala State Univ., Belarus.* Deposition of coinage metals on a crystallographic surface of a colloidal crystal is proposed to fabricate regular metal surface on a scale of 250-500 nm to get strong surface enhanced Raman scattering. Well-defined parameters of these substrates, high stability and reproducibility are advantages for a wide chemical and bioanalytical application.

JSuF5
Laser synthesis of hydrogen peroxide enantiomers from a racemic solution by means of NOA-CARS, S.S.Bychkov, B.A.Grishanin, V.N.Zadkov, *Moscow State Univ., Russia.* A laser scenario for preferential synthesis of lef- or right-handed enantiomers of hydrogen peroxide molecules from an isotropic solution (vapor) is considered. It is shown that the entanglement between rotational and torsional states induced by Raman excitation can be used to effectively synthesize a required sign of enantiomers.

JSuF6
Localization of dielectric spheres by the gradient force in the interference field of a laser radiation, A.N.Rubinov, A.A.Afanas'ev, Yu.A.Kurochkin, S.Yu.Mikhnevich, I.E.Ermolaev, *Stepanov Inst. of Phys., Belarus.* The theory of the selective spatial separation and localization of dielectric spheres of different size in a liquid under the action of gradient forces in a field of laser radiation with the periodically modulated intensity is developed. The effect of "zero force" is predicted for definite relations between the radius of sphere and period of radiation modulation.

JSuF7
Laser control systems of organic pollutants of drinking and technologic water, Yu.P.Meshalkin, *Inst. of Physiology, Russia.* The use of laser-indused fluorescence (LIF) spectroscopy is fairly accepted as a fast and reliable method for the online detection of organic pollutants of drinking and technologic water.In this work for LIF excitation the radiation of 4th harmonic of Nd:YAG laser with wavelength 266 nm was used. As a criteria of the water quality estimation the ratio of the water-dissolved organics LIF intensity to the intensity of the Raman scattering of the water was employed.

JSuF8
Holographic investigation of interaction of organic dye with DNA, Yu.D.Lantukh, S.N.Letuta, S.N.Pashkevitch, E.K.Alidjanov, D.A.Razdobreev, O.K.Davydova, H.N.Nikiyan, *Orenburg State Univ., Russia.* The work is devoted to investigation of holographic recording in methylene blue-DNA system. The base of dynamic recording is the triplet photochromism of the dye. Stationary relief-phase holograms are formed as a result of heat generation and rearrangement of polymeric conformation of DNA.

JSuF9
Laser induced structural optical effects in blood, S.Yakovleva, *Ekaterinburg Cardiology Sci.-Practical Center, Russia,* V.Zakharov, *Samara State Aerospace Univ., Russia.* The experimental investigation of the low-level laser radiation effect on a metastable non-tinted phosphor shows the nonlinear refraction index alteration, which in own turn stimulates the transformation of phospholipid molecules aquation. The refraction index alteration was observed for a wide range of laser parameters (0.5..5 mW, 450..1200 nm) with the saturation on the same time interval (5..7 min), which may be used as criteria for laser radiation effectiveness.

JSuF10
Human body optical properties kinetics in low-level laser field, S.Kotova, V.Yakutkin, *Samara Branch of Physical Inst., Russia,* S.Yakovleva, *Ekaterinburg cardiology Sci.-Practical Center, Russia,* V.Zakharov, *Samara State Aerospace Univ., Russia.* The experimental investigation of the low-level laser radiation effect on a human body tissue shows the nonlinear refraction index alteration which have bell-shaped appearance. This effect observed in wide range of parameters, but maximum alteration was achieved on 633 nm. It was shown that everyday laser irradiation of human body leads to refraction index stabilization. This effect may be used as criteria of optimal treatment duration in medical practice.

JSuF11
Spectroscopy and electronic structure of DCM excited states and its fluorinated

derivatives, S.L.Bondarev, V.N.Knyukshto, S.A.Tikhomirov, I.I.Kalosha, *Inst. of Molec. and Atomic Phys., Belarus,* V.I.Tyvorskii, D.N.Bobrov, A.A.Turban, O.G.Kulinkovich, *Belarus State Univ., Belarus.* The steady state and time-resolved spectroscopic studies with second-order polari-zability measurements of DCM and its fluorinated derivatives are reported. An influence of structural and environment characteristics on the spectroscopic and nonlinear properties of investigated compounds will be discussed.

JSuF12
Ultraviolet radiation action on intracellular phospholipids turnover. The mathematical model, M.M.Stolnitz, A.Yu.Peshkova, *Saratov State Univ., Russia.* Intracellular phospholipids turnover under ultraviolet irradiation is considered as a nonlinear dynamic system.. Orchestred actions of phospholipases and phospholipids resynthesis are taken into account. Some complex dynamic modes (biphasic response, nonlinear oscillations) are analyzed.

JSuF13
The study of clearing of skin by osmotically active drugs, E.I.Galanzha, V.V. Tuchin, *Saratov State Univ., Russia,* A.V.Solov`eva, T.V.Stepanova, *Saratov State Medical Univ., Russia,* Qingming Luo, Haiying Cheng, *Huazhong Univ. of Sci. and Techn., China.* Glucose and glycerol as hyperosmotic agents cause the dose-dependently and time-dependently tissue clearing. Presented results are useful for developing of the functional imaging techniques and for the study of blood microvessells *in vivo*.

JSuF14
Photoinduced depolarization in nanopolyacetylene, V.A.Ruilova-Zavgorodniy, D.Yu.Paraschuk, *Moscow State Univ., Russia,* V.M.Kobryanskii, *Inst. of Chemical Phys., Russia.* We report on the first observation of a photoinduced depolarization effect in a p-conjugated material. This effect was found in nanopolyacetylene films using cw pump-probe polarimetry. The nature of the photoinduced depolarization is discussed.

JSuF15
Wavelet analysis structure of laser images biotissue architechtonics, A.G. Ushenko, O.V.Angelsky, D.N.Burkovets, *Chernivtsi Univ., Ukraine,* G.V.Demyanovskii, *"Dephis" Ltd., Ukraine.* This work is devoted to the elaboration of complex polarization-correlometry and wavelet-analysis of object laser fields, formed by the structured biotissues with the following working out the principles of optical diagnostics of their physiological state. The histological sections of physiologically normal muscular tissue of the rats' heart and necrotically (infarct) changed one have been investigated.

JSuF16
Results of in-vitro tests hair removal technology by means of "long" light pulses, A.V.Belikov, C.V.Prikhodko, *Inst. of Fine Mechanics and Optics, Russia.* This paper represents a technology of hair removal by means of non-coherent and laser's light pulses having 100ms-duration. Spectral and energy characteristics of a light source are given here. Results of an in-vitro test are described.

JSuF17
The study of resected biotissue viability dynamics, using laser-induced fluorescence spectroscopy, P.M.Larionov, M.M.Mandrik, *Inst. of Circulation Pathology, Russia,* A.N.Malov, N.A.Maslov, A.M.Orishich, *Inst. of Theoretical and Appl. Mechanics, Russia.* We discovered, that the loss of myocardium tissue viability leads to its laser-induced fluorescence spectra alteration. This could be utilized for low-invasive rapid control of transplant viability before and during the surgery.

JSuF18
Comparison of amplitude and phase modulation techniques for automated optical counting of alternated tonsil epithelium cells, N.Mechkarov, *Central Lab. of Optical Storage and Processing of Inform., Bulgaria,* T.Tzenova, T.Karchev, *Medical Univ., Bulgaria.* Two methods for automated counting of alternated tonsil epithelium cells are compared. The first method used is based on visualization of the cells as an amplitude objects. In comparison with the amplitude method similar scheme based on phase-modulation technique is applied. The advantage of the phase method is that the coloring of the cells could be omitted.

JSuF19
Laser light scattering study of supermolecular structures in blood protein solutions in the presence of heavy metal ions, G.P.Petrova, Yu.M.Petrusevich, A.N. Evseevicheva, D.I.Ten, *Moscow State Univ., Russia.* Conditions of formation and destruction of dipole clusters in aqueous solutions of protein macromolecules in the presence of heavy metal ions, in particular the temperature effects, are investigated by laser light scattering. Formation of dipole clusters of blood plasma proteins is discussed from the viewpoint of the physical mechanism of the toxic effect of heavy metals on live organism.

JSuF20
Fluorescence imagings and in situ spectrophotometry in fluorescence diagnosis of papillomas and early stage cancer of larynx and bronchus, V.Sokolov, E.Filonenko, L.Telegina, *Moscow Res. Oncologycal Inst., Russia,* N.Zharkova, V.Smirnov, V.Fabelinskii, *General Phys. Inst., Russia.* The comparative investigations of autofluorescence and 5-ALA induced fluorescence in detection of papillomas and early stage cancer of larynx and bronchus are presented. The results obtained suggest that the combination of both autofluorescence and 5-ALA induced fluorescence imaging with in situ spectrophotometry of tissue can improve the ability to detect early stage cancer.

JSuF21
Simulation of tissue heating by a short light pulse, V.V.Barun, A.P.Ivanov, *Stepanov Inst. of Phys., Belarus.* An optical-thermal model of heat transfer through multi-component biological tissue is designed to include heat exchange between the components and environment. On this basis, temperature rise and its relaxation after short pulse exposure are analytically calculated for varying light wavelengths, blood contents, and environmental conditions.

JSuF22
Numerical simulation of optimum modes of vascular pathology of a skin removal by laser radiation, Y.V.Bobitskii, I.V.Demkovych, I.V.Rudnytskyy, *Natl Univ. "Lvivska Politechnika", Ukraine.* The nonlinear mathematical model of interaction between laser radiation and layered tissue of skin (epidermis–dermis–vascular pathology) is constructed. Optimum modes of vascular pathology laser destruction are designed at different skin surface cooling mechanisms.

JSuF23
Optical coherence tomography of multilayer tissue based on the dynamical stochasic fringe processing, E.Alarousu, J.Hast, R.Myllyla, *Univ. of Oulu, Finland,* I.Gurov, A.Zakharov, *Inst. of Fine Mechanics and Optics, Russia.* It is proposed to use a stochastic fringe model and Kalman filtering method for noise-immune dynamic envelope evaluation of noisy low-coherent fringes obtained in interferometer when a measuring wave is scattered by a tissue to be evaluated.

JSuF24
Destruction products after-burning in the course of laser ablation of biotissues, A.K.Dmitriev, S.V.Ivanov, A.N.Konovalov, V.N.Kortunov, V.A.Ul'yanov, *ILIT, Russia,* A.V.Koshcheev, *Central Aerohydrodynamic Inst., Russia.* After-burning of emitting particles during biotissue laser ablation is experimentally studied using previously developed method and statistical analysis of destruction products. Theoretical model is developed for laser-induced changes of particle sizes and optical parameters.

JSuF25
Ultraviolet laser "Maria" in treatment fiber-cavernous lung tuberculosis, A.M.Prokhorov, G.P.Kuzmin, V.K.Bashkin, *General Phys. Inst., Russia,* V.G.Dobkin, D.L.Fayzulin, *Central Res. Inst. for Tuberculosis, Russia,* S.M.Babichenko, *Genestho AS, Estonia.* We suggested using K_2F excimer laser with a wavelength of 248 nm to treat lung tuberculosis. "Maria" laser medical device was designed, which operates in the frequency band of microbacteria destruction. An experimental laser was developed, where generation is excited by a surface discharge with a repetition rate up to 2000 Hz.

JSuF26
In vivo optical clearing of the human skin, N.A.Lakodina, A.N.Bashkatov, E.A. Genina, Yu.P.Sinichkin, V.V.Tuchin, *Saratov State Univ., Russia,* R.K.Wang, *Keele Univ., UK.* For in vivo studies of the human skin clearing a fiber probe reflectance spectroscopy and OCT were used. The intra dermis injection of glucose was applied as the immersion procedure. The skin clearing mechanism based on refractive index matching of dermal collagen fibrils and the interstitial space to which glucose diffuses is discussed.

JSuF27
Modelling of scattering spectra of laser-light radiation interacted with eye lens tissue in apply to diagnostics, N.L.Larionova, I.L.Maksimova, *Saratov State Univ., Russia.* In this paper the results of calculations of scattering spectra of eye lens model that obtained by employing of different approximate and numerical methods are presented. The comparison demonstrates the good conformity of calculating results with experimental scattering spectra of eye lens. By using of derived spectral data the color coordinates are calculated and the conformities of color characteristics modifications are analyzed in depend on eye lens model parameters.

JSuF28
Spectral and luminescence characteristics of organic nanostructures, S.N. Letuta, *Orenburg State Univ., Russia.* Spectral and luminescence characteristics and stability of organic nanostructures by action of intensive laser radiation are investigated. As a result of self-organization of cation dye molecules on DNA surfaces, nanostructures (supramolecular systems) are being formed.

JSuF29
Perovskite laser—a new laser for aesthetic medicine, A.V.Lukashev, N.I.Tankovich, *Paradigm Medical Corporation, USA.* The new aesthetic laser is based on a perovskite crystal. The laser generates powerful light between 540–1340 nm. The mechanism of selective and homogeneous thermolysis is used for clinically proven results in hair removal, vein treatment and skin rejuvenation.

JSuF30
Investigation of influence of layered structure of strongly scattering object on the light propagation, V.B.Volkonskiy, O.V.Kravtsenyuk, V.V.Lyubimov, V.A.Skotnikov, *Inst. for Laser Phys., Russia.* For the optical diffuse tomography it is experimentally shown in the frequency-domain technique that the possibility exists to estimate the width and the depth of location of the nonscattering layer in the strongly scattering medium.

JSuF31
Optimization of aspect number for time-domain optical diffuse tomography, A.G.Kalintsev, O.V.Kravtsenyuk, V.V.Lyubimov, *Inst. for Laser Phys., Russia,* N.A.Kalintseva, *State Technical Univ., Russia.* For the optical diffuse tomography the possibility is shown to decrease sufficiently the number of aspects of relative shadow measurement and to obtain using methods of shadows interpolation the reconstructed image with acceptable quality.

JSuF32
Laser induced fluorescence in diagnosis of dental caries, E.Drakaki, M.Makropoulou, A.A.Serafetinides, *Natl Techn. Univ. of Athens, Greece,* M. Khabbaz, *Univ. of Athens, Greece.* The autofluorescence spectra of hard dental tissues, both in normal and pathology areas were investigated. The aim was a test of the specificity

and the sensitivity of the laser induced fluorescence technique compared with the conventional ones.

JSuF33
Spectroscopic criterion of diagnostics of malignant neoplasms of the mucous membrane of the bladder, V.E.Prokop'ev, *Inst. of High-Current Electronics, Russia,* S.P.Selivanov, *Cancer Res. Inst., Russia.* The measurement and analysis of scattering, absorption and fluorescence spectra of patients' biological tissues in vivo and in vitro using spectrometric devices make it possible to realize differential diagnostics of malignant tumors at the time of general examination, endoscopic procedure or surgical operation. The given paper presents a simple spectroscopic algorithm and criteria for differential diagnostics of the normal and malignant tissues based on a considerable difference in the from of the curved autofluorescence spectra of the normal and tumoral tissues while their radiation at the wavelength of 334 nm.

JSuF34
Photodynamic effects of 5-aminolevulinic acid-induced porphyrin, V.E.Prokop'ev, *Inst. of High-Current Electronics, Russia,* L.V.Gerdt, S.P.Selivanov, *Cancer Res. Inst., Russia,* V.V.Udut. Myeloid cells of leucosis (k-562), normal leucocytes, lymphocytes and erythrocytes entering into reaction of blast-transformation were cultivated in vitro when adding to the growth culture of 5–aminolevulinic acid (5-ALA) at a concentration of 50–2000 mkg/ml during 1–24 hours. The level of porphyrin accumulation was evaluated by measuring spectral parameters of fluorescence on spectrofluorimeter MPF-4 and the method of fluorescence microscopy. It is found that porphyrin accumulation occurs in myeloleukosis cells only. The optimal incubation tame and 5 ALA concentration securing maximal fluorescence intensity of porphyrin in cells make up 4 hours and 700mkg/ml, respectively.

JSuF35
Low level laser therapy of acute and chronic pain—results of the trials and light delivery optimization, E.Stoykova, *Central Lab. for Optical Storage and Processing of Inform., Bulgaria,* T.Roeva, *Shumen Univ. "K. Preslavski", Bulgaria.* We report 70% of successful treatments for a low-level GaAs-laser therapy for a variety of conditions, which is comparable with the conventional therapy. For optimization of the light delivery, the spatial maps of the absorbed dose in a homogeneous medium are compared for collimated or divergent light beams by a Monte-Carlo simulation.

JSuF36
Temperature effect on submolecular dopole structures in aqua albumin solutions in presence of Pb ions, G.P.Petrova, Yu.M.Petrusevich, D.I.Ten, *Moscow State Univ., Russia.* The physical mechanism of heavy metals toxic effect on plasma blood proteins is connected with the formation of supermolecular structures—dipole clusters. The aggregation processes in water solutions of serum albumin in the presence of Pb ions in narrow range of temperatures near the protein isoelectric point has been investigated by laser light scattering.

JSuF37
Propagation of pseudo-nondiffracting laser beams through tissue phantoms, *T.King, Univ. of Manchester, UK,* H.MacKenzie, *Herriot-Watt Univ., UK,* R.Myllylae, *Univ. of Oulu, Finland,* A.Mashchenko, V.Tugbaev, *Stepanov Inst. of Phys., Belarus.* The photons of so-called pseudo-nondiffracting laser beams diffused through scattering phantoms of skin tissue retain coherent properties sufficient for self-reconstruction of transverse profiles possessing the narrow long core with weak background of concentric rings.

JSuF38
Smart medical system "PERFOCOR" for TMLR application, V.Ya.Panchenko, V.V.Vasiltsov, E.N.Egorov, A.N.Semenov, A.V.Soloviev, MN.Tarasov, V.A.Ul'yanov, *ILIT, Russia,* L.A.Bokeria, I.I.Berishvili, *Bakoulev Res. Cardio-Vascular Surgery Center, Russia.* The requirements have been discussed to laser systems performing the TMLR procedure. It has been shown that of the wide spectrum of medical lasers the needed requirements can be only satisfied by high-power CO_2 lasers. The paper provides the technical characteristics of medical laser systems of "Perfocor" series, based one CO_2 lasers developed at the ILIT RAS.

JSuF39
A theoretical model for optical coherence tomography, Y.Feng, S.Zhang, J.BElder, *Keel Univ., UK,* L.Wu, R.K.Wang, *Cranfield Univ., UK.* We have presented a detailed theoretical description of the optical coherence tomography. We demonstrate application of this model in simulations and compare it with the experimental results.

JSuF40
Compact fibre-optic two-photon fluorescence microscope: toward endoscopic imaging, Min Gu; D.Bird, *Swinburne Univ. of Technology, Australia.* We present a new two-photon fluorescence microscope based on a single-mode fibre coupler, which acts as a low-pass filter for collecting two-photon fluorescence. This instrument may make two-photon fluorescence endoscopy possible for in vivo medical applications.

QSuU · Superstrong Laser Fields and Their Interaction with Matter

QSuU1
Negative ions source using femtosecond laser plasma, I.M.Lachko, O.V.Chutko, V.M.Gordienko, B.V.Mar'in, A.B.Savel'ev, R.V.Volkov, *Moscow State Univ., Russia.* For the first time negative ions were detected during femtosecond laser plasma interaction. Plasma plume was produced under interaction of 200 fs laser pulses ($I > 10^{15}$ W/cm^2) with solid target of Si. Energy and atomic spectra of negative ions are reported.

QSuU2
Hot electrons temperature enhancement in femtosecond laser-induced plasma created on the surface of laser-modified crystalline targets, R.V.Volkov, M.S.Dzhidzhoev, D.M.Golishnikov, V.M. Gordienko, P.M.Mikheev, A.B.Savel'ev, *Moscow State Univ., Russia.* The results of experiments on interaction of 200 fs, $2 \cdot 10^{16}$ W/cm^2 laser pulse with laser-modified solid targets are reported. The hot electrons temperature enhancement is observed. The dependence of this effect on the target type is investigated.

QSuU3
Molecular reorientation in intense femtosecond laser fields, L.Quaglia, C.Cornaggia, *CEA Saclay, France,* M.Brewczyk, *Univ. of Bialystok, Poland.* A 60-fs pump-probe experiment shows that molecular reorientation during multiionization is a very fast process for light molecules. A unified two-dimensional hydrodynamic model of molecular multiionization and multifragmentation supports the experimental results.

QSuU4
Laser-induced orientation of molecules accompanied by suppressed dissociation, M.S.Molodenski, O.V.Tikhonova, *Moscow State Univ., Russia.* Laser-field dynamics of a 2D molecular hydrogen ion is studied numerically using a rigid rotator model. The time-dependent evolution of a nuclear wave-packet is analyzed and dynamic alignment along laser polarization axis is established, with laser-field parameters being found to provide small dissociation.

QSuU5
Influence of resonant states mixing of three-level system on the realization of multiphoton transitions from them, V.V.Suran, I.I.Bondar, *Uzhgorod Natl Univ., Ukraine.* The experimental studies of resonance transitions from resonantly mixed states of Ba atoms were performed. The large probability of multiphoton transitions with violation of parity selection rule for dipole approach was discovered.

QSuU6
Ultra-intense laser pulse absorption and fast particles generation at interaction with inhomogeneous foil targets, A.A.Andreev, K.Yu.Platonov, *Inst. for Laser Phys., Russia,* T.Okada, S.Toraya, *Tokyo Univ. of Agriculture and Techn., Japan.* We analyze in the theory and 2D3V PIC simulations the absorption of short ultra-relativistic intensive laser pulse at the interaction with foils of variable density gradient and fast particle generation. The angular distributions of fast particles are calculated and the optimal conditions for the minimal ion emittance are founded.

QSuU7
Effects of background field and filament field interaction in femtosecond laser pulses, O.G.Kosareva, V.P.Kandidov, A.A.Koltun, *Moscow State Univ., Russia,* S.L.Chin, *Univ. Laval, Canada.* With simultaneous consideration of wide background (≈1 cm) of the radiation and small-scale structure of the filament (< 100 microns) we obtained quantitative agreement between simulated and experimentally obtained spatial and energy characteristics of a pulse propagating in air. Time-dependent simulations confirmed the results calculated from a simple model of filament-background interaction.

QSuU8
Processes induced by powerful femtosecond pulses in bulk dielectrics, T.V.Smirnova, O.M.Fedotova, O.K.Khasanov, *Inst. of Solid State and Semicond. Phys., Belarus,* B.Rethfeld, V.V.Temnov, P.Zhou, V.Gruzdev, K.Sokolowski-Tinten, D.von der Linde, *Univ. of Essen, Germany.* The propagation of powerful femtosecond pulses through a bulk dielectric sample is simulated numerically and studied analytically in order to know the influence of the different processes on the optical properties of the medium.

QSuU9
High-energy above-threshold ionization revisited within an alternative strong-field approach, V.I.Usachenko, V.A.Pazdzersky, A.V.Koval, *Inst. of Appl. Laser Phys., Natl Univ. of Uzbekistan, Uzbekistan.* The highly-nonlinear multiphoton phenomenon of high-energy above-threshold ionization (HATI) of laser-exposed atomic system is considered theoretically and studied numerically within frame of a new developed fully quantum-mechanical strong-field approach. All the calculated HATI photoelectron spectra are shown to reproduce fairly well the conventional phenomenological rule for the extent of high-energy plateau and position of its cut-off energy.

QSuU10
Two-electron mechanism of doubly charged ions formation upon multiphoton ionization of Ba atoms in two laser fields, I.I.Bondar, V.V.Suran, M.I.Dudich, *Uzhgorod Natl Univ., Ukraine.* The production of doubly charged ions is studied upon multiphoton ionisation of Ba atoms exposed simultaneously to two radiation fields: the fundamental radiation of a tunable colour centre laser and its second harmonic. A two-electron mechanism was shown to be responsible for the production of these ions.

QSuU11
Acceleration of charged particles by intense optical pulses propagating in the self-channeling regime, A.L.Galkin, M.Yu.Romanovsky, O.B.Shiryaev, V.V.Korobkin, *General Phys. Inst., Russia,* Ya.M.Zhileykin, *Moscow State Univ., Russia.* Ponderomotive electron acceleration and ion acceleration due to the Coulomb explosion to high energies (several MeV) are possible when intense laser pulses are self-channeled in matter. Acceleration parameters (velocities, energies, and spectra) are calculated.

QSuU12
Femtosecond x-ray line emission from specially designed targets irradiated by short laser pulses, A.A.Andreev, *Inst. for Laser Phys., Russia,* J.Limpouch, *Czech Technical Univ. in Prague, Czech Republic,* H. Nakano, *NTT Basic Res. Labs, Japan.* Special types of targets (multi-layer foils and droplets) are proposed in order to increase the energy of K_α line emission from laser plasma simultaneously with

shortening of x-ray pulse up to hundred femtoseconds. The emission is studied, both experimentally, and by means of analytical model and numerical simulations.

QSuU13
Dynamics of large clusters irradiated by a super-intense ultrashort laser pulse, M.B.Smirnov, *Max-Born Inst., Germany,* V.P.Krainov, *Moscow Inst. of Phys. and Technology, Russia.* Dynamics of atomic clusters irradiated by a super-intense ultrashort laser pulse is derived. The simple analytic expression has been obtained for the transfer cross section of elastic scattering of free electrons on the ionized cluster in cluster plasma.

QSuU14
Dynamics of the Coulomb explosion of large hydrogen iodide clusters irradiated by super-intense ultrashort laser pulses, V.P.Krainov, *Moscow Inst. of Phys. and Technology, Russia,* A.S.Roshchupkin, *Moscow Engin. Phys. Inst., Russia.* Dynamics of the inner and outer above-barrier ionization and of the Coulomb explosion are calculated for large hydrogen iodide clusters irradiated by super-intense femtosecond laser pulses. The energy distribution of the iodine multiple atomic ions in laser focal volume is derived.

QSuU15
Nikishov-Rohrlich vs. Lorentz-Dirac approach for a free-electron inside a superintense laser pulse, H.Nieto, F.De Zela, *Pontificia Universidad Católica del Perú, Perú.* We compare the Lorentz-Dirac vs. Nikishov-Rohrlich equations of motion for a free-electron interacting with an e-m pulse, with regard to the backscattered radiation predicted in each case. We obtain noticeable differences for the emmited energy.

QSuU16
Asymmetric emission of rescattered photoelectrons in intense laser fields with elliptical polarization, N.I.Shvetsov-Shilovski, S.V.Popruzhenko, S.P.Goreslavski, *Moscow State Engin. Phys. Inst., Russia.* Angular distributions generated by an intense elliptically polarized laser field in the high energy part of above-threshold ionization spectrum are presented and discussed in the context of recent experimental observations.

QSuU17
Interfering laser-induced continuum structures in helium, A.I.Magunov, *General Phys. Inst., Russia*, I.Rotter, *Max-Planck-Inst. für Physik Komplexer Systeme, Germany*, S.I.Strakhova, *Moscow State Univ., Russia*. The coherent effects in overlapped resonances induced by two lasers in the continuum of helium from different discrete states are studied theoretically. The shapes of the probe field photoionization cross-sections and the photoelectron angular distribution are examined as a function of laser field intensities.

QSuU18
Laser complex for investigation of atomic and nuclear processes in laser produced plasmas, V.S.Belyaev, A.P.Matafonov, *Central Res. Inst. of Machine Building, Russia.* The paper describes the development of the laser complex, which contains 5 TW laser facility and diagnostic system for investigation on atomic and nuclear radiation from laser-produced plasma. The paper presents our results of the investigation on generation x-ray, gamma-radiation and neutrons in laser-produced plasma.

QSuU19
The light amplification in the process of spontaneous bremsstrahlung of an electron in the field of a nucleus and two light waves, S.P.Roshchupkin, V.A.Tsibul'nik, *Appl. Phys. Inst., Ukraine.* A total differential cross section of spontaneous bremsstrahlung of an electron scattered by a nucleus in the field of two light waves is investigated. It is shown that the total differential cross section in the interference region can on some orders of magnitude exceed the corresponding noninterference total cross section.

QSuU20
Electron acceleration process in laser produced plasma. Theoretical model and experimental verification, V.S.Belyaev, *Central Res. Inst. of Machine Building, Russia,* V.N.Mikhaylov, *Inst. of Strategic Stability, Russia.* The relationship between kinetic energy of hot electrons generated from laser-produced plasma and intensity of laser radiation in wide diapason has been established. The theoretical results have good verification by numerous experiments including original own ones.

QSuU21
Relaxation processes for polyatomic molecules super-excited by CO_2 laser radiation, G.A.Zalesskaya, D.L.Yakovlev, E.G.Sambor, *Inst. of Molec. and Atomic Phys., Belarus.* New aspects of super-excited molecule behavior (vibrational-to-electronic energy transformation, infrared emission from high vibrational levels, efficient V-V relaxation) were analyzed by study luminescence originating from strong CO_2 laser excitation of polyatomic molecules in ground electronic state.

QSuU22
Optical properties of dimers in the intensive laser field, E.P.Sineavsky, O.V. Yatlichenko, A.M.Rusanov, *Inst. of Appl. Phys., Moldova.* The model of the repulsing level is used to investigate the multiphonon excimer luminescence in the intensive laser field. It is shown, that in the high-frequency region the broad luminescence bands defined by the generation of higher optical harmonics is appeared. The new method for describing of the excimer luminescence is developed to take into account of the squeezed vibration states.

QSuU23
Resonant interference effect in the processes of scattering of an electron by a photon in a field of two strong lights waves, O.I.Denisenko, O.I.Voroshilo, S.P. Roshchupkin, *Appl. Phys. Inst., Ukraine.* The resonant differential cross section of the scattering process of an electron by a photon in a field of two strong light waves in the interference area is obtained.

QSuU24
Particle transport in magnetic fields of laser-produced plasma. Advanced distinctives and its applications, V.S. Belyaev, *Central Res. Inst. of Machine Building, Russia,* V.N.Mikhaylov, *Inst. of Strategic Stability, Russia.* The quantum nature of anomalous diffusion in plasmas in magnetic field as a tunneling transition of potential barrier was demonstrated. The coefficient of anomalous diffusion was determined. It is demonstrated that this coefficient controls cyclotron emission, dynamic pinch, field-induced (tunneling) ionization of atoms, particle transport in magnetic fields of plasma.

QSuU25
Calculations angular distribution in resonant Auger decay, A.Yu.Elizarov, *Ioffe Phys.-Tech. Inst., Russia,* I.I.Tupitsyn, *St-Petersburg State Univ., Russia.* The angular anisotropy a_2 parameter have been calculated for $Xe(N_{4,5}N_{4,5}N_{4,5})$ and $Kr(M_{4,5}N_1N_{2,3})$ Auger transitions using the Hartree-Fock method. The two-step model is used for description of the Auger process. Expressions for the angular anisotropy parameters in the LS and jj coupling schemes are used for a closed-shell system. Exchange effect is used in all calculation.

QSuU26
Time-dependent intensity in a dielectric microparticle illuminated by chirped pulse, H.P.Ledneva, I.R.Katseva, *Stepanov Inst. of Phys., Belarus.* It is obtained that internal intensity of droplet illuminated by chirp pulse can be decreased by comparison the case in which no chirp occurs and the magnitude of intensity depends on spatial structures of resonances.

QSuU27
Resonant interference effect in the photoproduction of electron-positron pairs on a nucleus in the strong field of two light waves, S.P.Roshchupkin, *Appl. Phys. Inst., Ukraine.* The resonant photoproduction of electron–positron pairs on a nucleus in the strong field of two circularly polarized light waves propagating in the same direction is theoretically investigated. It is shown that the resonant differential cross section can on some orders of magnitude exceed the corresponding nonresonant cross section.

QSuU28
Nondegenerative chirped pulses optical parametric amplifier based on KD*P crystal, G.Freidman, N.Andreev, V.Ginzburg, E.Katin, A.Koritin, E.Khazanov, V.Lozhkarev, O.Palashov, A.Sergeev, I.Yakovlev, *Inst. of Appl. Phys., Russia.* It was shown that optical parametric amplifiers based on KD*P crystal may considerably enhance the possibilities creating of up to multipetawatt level femtosecond lasers at 911nm and 1250nm wavelengths. Elements of such lasers are discussed, and their parameters are optimized.

QSuV · Cold Atoms and Atomic Optics

QSuV1
Levy flights with cold atoms in a standing-wave cavity, V.Sirotkin, M.Uleysky, S.Prants, V.I.Il'ichev, *Pacific Oceanological Inst., Russia.* Nonlinear dynamics of a cold two-level atom in a standing-wave cavity is considered in the strong-coupling regime. In a range of the atom-field detuning, the center-of-atom motion is shown to be fractal with long-lasting Levy flights interrupted by chaotic oscillations in optical potential wells.

QSuV2
Quasi-classical analog of Kapitca oscillator for cool atoms in standing wave, S.Borisenok, *Herzen Russian State Pedagogical Univ., Russia,* Yu.Rozhdestvensky, *Inst. for Laser Phys., Russia.* We demonstrate new dynamic phenomenon for atoms in oscillating standing wave. This effect, being quasi-classical analog of Kapitca oscillator, is result of the modification of the atomic effective potential. It allows us to obtaine the focussing of cooled atoms in the range much smaller than wave length of the optical standing wave.

QSuV3
Chaotic dynamics of a single two-level atom in the field of plane standing electromagnetic wave, V. Gubernov, *UNSW at ADFA, Australia.* In this work we investigate the motion of neutral two-level atom in the plane standing electromagnetic wave using semiclassical approximation. We show that for experimentally achievable parameter values, the dynamics of atom can be chaotic.

QSuV4
Nonlinear Landau-Zener model, A.Ishkhanyan, *Engin. Center of NASA, Armenia,* J.Javanainen, *Univ. of Connecticut, USA.* Analytic results on a nonlinear Landau-Zener problem are presented, focusing on photoassociation of a BEC. When the resonance is crossed slowly, the probability for failure of adiabaticity is directly proportional to the rate at which the resonance is crossed.

QSuV5
Superfluid pairing in a polarized dipolar Fermi gas, M.A.Baranov, *Univ. of Hannover, Germany,* Val.S.Rychkov, *Kurchatov Inst., Russia,* G.V.Shlyapnikov, *FOM AMOLF, The Netherlands,* M.S.Mar'enko, *Kapitza Inst. for Physical Problems, Russia, Inst. of Radio Engin. and Electronics, Russia.* We calculate the critical temperature of a superfluid phase transition in a polarized Fermi gas of dipolar particles. In this case the order parameter is anisotropic and has nontrivial energy dependence.

QSuV6
Surface polaritons in smooth three-layer structures, A.M.Ishkhanyan, *Engin. Center of NASA, Armenia,* G.P.Chernikov, *Kurchatov Inst., Moscow, Russia.* Surface polariton problem for three-layer structures with smooth sign-constant profiles of the dielectric permittivity that have a zero in a single point is studied. The dispersion relation for the case of real parameters involved is analyzed.

QSuV7
Effects of resonance dipole-dipole interaction in atomic dynamics in an optical

dipole trap, D.N.Yanyshev, B.A.Grishanin, V.N.Zadkov, *Moscow State Univ., Russia.* Theoretical study of a computer simulation results for stochastic dynamics of two atoms trapped in an optical dipole trap under the action of a probe resonant radiation is presented. The radiation force correlations resulting from our model lead in addition to cold collisions to a tendency for atoms escape in pairs from the trap.

QSuV8
Laser cooling of a magnesium beam in a transverse magnetic field, V.I.Baraulia, A.E.Bonert, A.N.Goncharov, *Inst. of Laser Phys., Russia.* A comparative analysis of transverse and longitudinal configurations of a magnetic field for a Zeeman slower is given. A description of the magnetic system of the transverse field with permanent magnets for laser cooling of a Mg beam and experimental results of its application are presented.

QSuV9
Dynamical suppression of radiative decay via atomic deflection by a standing light wave, W.P.Schleich, *Univ. Ulm, Gernany* V.P.Yakovlev, *Moscow State Engin. Phys. Inst., Russia,* M.A.Efremov, M.V.Fedorov, *General Phys. Inst., Russia.* We consider the radiative decay of a two-level atom scattered by a resonant standing light wave. Scattering is shown to suppress the Rabi oscillations and to slow down the atomic radiative decay giving rise to a power law behavior of the time-dependent level populations rather than the exponential one.

QSuV10
Coherent backscattering of light in atomic systems: application to weak lokalization in an ensemble of cold alkali atoms, M.D.Havey, *Old Dominion Univ., USA,* D.V.Kupriyanov, I.M.Sokolov, *State Technical Univ., Russia.* We theoretically examine the effects of weak localization of light in ultracold monatomic gases. We specifically report the shape and relative intensity of light scattered in the nearly backward direction for ^{85}Rb.

QSuV11
Energy shift of an interacting Bose gas in a harmonic trap, Mingzhe Li, You-Hua Luo, Haixiang Fu, Yu-Zhu Wang, *Shanghai Inst. of Optics and Fine Mechanics, China.* An interacting Bose gas in harmonic trap is investigated for its energy shift due to the interaction and trap. The effect on transition temperature of Bose-Einstein condensation is opposite to the case in free space.

QSuV12
Disappearance and regeneration of atomic interference fringes by manipulating the internal state, A.Morinaga, S.Yanagimachi, K.Suzuki, *Tokyo Univ. of Sci., Japan.* We demonstrated the generation of the atomic interference fringes between different two excited states overlaped in space and time by converting from an excited state to the other state with an excitation by two resonant lights.

QSuV13
Spatial lock-in detection of cold atoms with Michelson interferometer, Quan Long, Yuzhu Wang, *SIOFM, Chinese Academy of Sci., China.* We demonstrate a new method of absorption imaging of cold atoms by spatially modulating probe laser with a Michelson interferometer to increase signal-to-noise ratio.

QSuV14
Quantum effects of cold atoms in electrostatic trap, You-Hua Luo, Mingzhe Li, Yuzhu Wang, *Shanghai Inst. of Optics and Fine Mechanics, China.* We suggest a novel trap of trapping neutral atoms with static electric field of four point charges, and discuss the quantum effects of cold neutral atoms in the trap. The results show possible stable confinement.

QSuV15
Persistent spectral hole burning in LiF crystal with F_2- color centers, V.V.Fedorov, S.B.Mirov, M.Ashenafi, L.Xie, *Univ. of Alabama at Birmingham, USA.* The spectroscopic parameters of zero-phonon and multy-phonon transitions were studied at 14–350 K temperature range. The first demonstration of persistent spectral-hole burning stable at RT in LiF crystals with F_2-color centers is reported.

QSuV16
Direct trapping of Na atoms from a dispenser, M. Morinaga, *Univ. of Electro-Commun., Japan.* Sodium atoms are trapped directly from a dispenser. With its relatively small size, this scheme is suited for the micro trap and atom chip application.

QSuV17
Cavity-enhanced dipole forces for dark-field seeking atoms and molecules, T.Freegarde, Univ. di Trento, Italy, K.Dholakia, *Univ. of St. Andrews, UK.* Dipole traps for weak-field seeking species require dark regions surrounded by a bright optical field. Confocal cavities allow resonant enhancement of such interesting mode superpositions, permitting deep blue-detuned traps using low power lasers.

QSuV18
Cold trapped molecules, R.J.Knize, T.Takekoshi, B.M.Patterson, J.R.Lowell, *US Air Force Academy, USA.* We will present our progress towards producing cold trapped molecules. A photoassociation laser is used to produce cold molecules from cold atoms. These cold molecules are then be trapped in a focussed CO_2 laser beam.

QSuV19
Time-domain atomic multiple beam interferometer phase-shifted by the scalar Aharonov-Bohm Effect, T.Aoki, K.Shinohara, M.Yasuhara, A.Morinaga, *Tokyo Univ. of Sci., Japan.* We developed an atomic multiple beam interferometer with a phase shift due to the scalar Aharonov-Bohm effect. Increasing the number of pulses, the narrow-line effect like an Airy function occurred.

QSuV20
Theoretical study of the multi Bragg scattering in standing wave, S.Borisenok, *Herzen Russian State Pedagogical Univ., Russia,* Yu.Rozhdestvensky, *Inst. for Laser Phys., Russia.* The transition probability of the second order Bragg resonance had been calculated for atom wave packet in a standing wave. These analytical results are in a good agreement with the numerical calculations.

Conference Hall JOINT				

8:30–9:00
JMA · EPS Prizes Award Ceremony
G.Huber, *Hamburg Univ., Germany, Presider*

JMA1 · 8:30
Awarding prizes of the Quantum Electronics and Optics Division (QEOD) of the European Physical Society (EPS):

EPS QEOD Main Prizes sponsored by NKT

EPS QEOD Fresnel Prizes

9:00–10:00
JMB · Plenary Lectures II
E.Ippen, *M.I.T., USA, Presider*

JMB1 · 8:30 · PLENARY LECTURE
Quantum interference of macromolecules, A.Zeilinger, *Univ. of Vienna, Austria.* The present status and the future prospects of experimentally observing quantum interference of macromolecules will be discussed. Such future experiments will significantly go beyond the present ones with C60- and C70-molecules, all the way up into the domain of biologically relevant molecules.

10:00–10:30 COFFEE BREAK

10:30–12:30 EXHIBIT ONLY TIME

10:00–10:30 COFFEE BREAK

10:30–12:30 EXHIBIT ONLY TIME

Conference Hall — IQEC/LAT-YS

14:00–16:00
YMA · Keynote Lectures IV
F.Auzel, *CNRS/GOTR, France, Presider*

YMA1 · 14:00 · KEYNOTE LECTURE
Nonlinear optics of photonic crystals, A.M.Zheltikov, *Moscow State Univ., Russia.* The physics behind the enhancement of nonlinear-optical processes in photonic crystals is discussed. Different types of periodic structures allowing photonic band gaps to be produced in one and two dimensions will be considered. These structures enhance the whole catalog of nonlinear-optical processes, including self- and cross-phase modulation, wave mixing, as well as harmonic and supercontinuum generation.

Hall 1 — IQEC

14:00–16:15
QMA · Solid-State Lasers
H.Weber, *Univ. of Bern, Switzerland, Presider*

QMA1 • 14:00 • INVITED
New developments of diode pumped solid-state lasers in the near infrared and visible spectral region, G.Huber, *Univ. Hamburg, Germany.* This paper reviews recent advances in diode pumped solid-state lasers with respect to fundamental operation and intracavity frequency doubling into the visible spectral region. In the near IR, trivalent Yb and divalent Cr offer excellent efficiencies (80–90%).

QMA2 • 14:30
912 nm high power diode pumped Nd:GdVO$_4$ laser, V.A.Mikhailov, S.Kutovoi, A.I.Zagumennyi, Y.D.Zavartsev, I.A.Shcherbakov, A.A.Sirotkin, *General Phys. Inst., Russia,* Z.Faouzi, *UTAR Scientific Inc., Canada.* The CW room temperature diode pumped Nd: GdVO$_4$-laser with intracavity frequency doubling is presented. Output power of 2,5 W and of 0.21 W were obtained at the fundamental (912 nm) and second harmonic (456 nm) wavelengths correspondingly.

Hall 2 — IQEC

14:00–15:45
QMB · Coherent Phenomena and Phase Control
M.Motzkus, *Maz-Planck-Inst. of Quantum Optics, Germany, Presider*

QMB1 • 14:00
Control of multi-photon processes in molecules with phase modulated femtosecond pulses, V.V.Lozovoy, K.A.Walowicz, I.Pastirk, M.Dantus, *Michigan State Univ., USA.* We demonstrate a pulse-shaping method for controlling two- and three-photon excitation processes. This method is robust and can find applications in contt methods for microscopy, photochemistry, photodynamic therapy, optical data storage and communications.

QMB2 • 14:15
Theory of coherent control of quantum dynamics by laser fields, Yosuke Kayanuma, Yoshihiko Mizumoto, *Osaka Prefecture Univ., Japan.* Theory of the coherent modulation of quantum dynamics of a two-level system and semiconductors by a laser is presented. The band-gap of semiconductors is shown to be controlled by applying an intense infrared laser field.

QMB3 • 14:30
Triggered optical superradiance in biphenyl crystal doped by pyrene, V.V. Samartsev, A.A.Kalachev, V.A.Zuikov, *Zavoisky Kazan Phys.-Tech. Inst., Russia,* P.V.Zinoviev, N.B.Silaeva, B.I.Verkin, *Phys.-Tech. hst. of Low Temperatures, Ukraine.* Triggered optical superradiance is observed for the first time in a solid (biphenyl crystal with pyrene molecules at liquid-helium temperature at the wavelength of 373 nm, corresponding to the 0–0 transition of pyrene molecules). The theory of this phenomenon is developed, which is in good agreement with experimental data.

Hall 3 — IQEC

14:00–16:00
QMC · Single Photon Optics, Entanglement, and Statistics I
S.Ya.Kilin, *Stepanov Inst. of Physics, Belarus, Presider*

QMC1 • 14:00 • INVITED
Single photons and entangled photons from a quantum dot microcavity, Y.Yamamoto, *Stanford Univ., USA.* A single quantum dot micro-post DBR micro cavity was demonstrated to produce regulated single photons with $g^{(2)}(0)$?0.01 and β?0.8. Such a single photon source is applicable to both BB84 and BBM92 quantum key distribution systems.

QMC2 • 14:30
Photon scattering by atomic dipoles in optical micro-waveguides, P.Domokos, P.Horak, H.Ritsch, *Univ. of Innsbruck, Austria.* We present a quantum description of the interaction of atoms with optical fields strongly confined in two spatial dimensions, as in solid state microstructures or in microscopic fiber waveguides.

Hall 4 — LAT

14:00–16:00
LMA · Laser Processing of Advanced Materials and Laser Microtechnologies III
K.Sugioka, *RIKEN—Inst. of Physical and Chemical Res., Japan, Presider*

LMA1 • 14:00 • INVITED
Controlled synthesis of nanoclusters and nanostructured oxide films by nanosecond and femtosecond pulsed laser ablation, W.Marine, *FRE CNRS 2165, France.* We present fundamental and applied aspects of nanoclusters synthesis within laser induced plume together with analysis of structural and electronics properties of corresponding nanostructured films. These nanostructures exhibit excellent optical properties and random laser effect.

LMA2 • 14:30 • INVITED
Nanoparticles produced by laser ablation of solids in liquid environment, A.V.Simakin, N.A.Kirichenko, G.A.Shafeev, *General Phys. Inst., Russia,* V.V.Voronov, *General Phys. Inst., Russia.* The formation of nanoparticles is reported under laser ablation of various elements (Ti, Si, Ag, Au, etc.) and compounds (CdS, ZnSe) in liquids (H_2O, C_2H_5OH, $C_2H_4Cl_2$, etc.). The use of a high-repetition-rate Cu vapor laser allows high rate of nanoparticles formation as the suspension in liquid.

Hall 5 IQEC	Hall 6 IQEC			

14:00–16:00
QMD · Absolute Phase of Laser Pulses
S.L.Chin, *Laval Univ., Canada, Presider*

QMD1 • 14:00 • INVITED
Absolute-phase effects of few-cycle laser pulses, G.G.Paulus, F.Grasbon, H.Walther, P.Villoresi, M.Nisoli, S.Stagira, E.Priori, S.De Silvestri, *Max-Planck-Inst. for Quantum Optics, Germany.* For few-cycle laser pulses, the temporal evolution of their electric fields depends on the phase of the carrier with respect to the pulses' envelope. Employing multiphoton ionization, we measured this so-called absolute phase for the first time.

QMD2 • 14:30 • INVITED
Strong field non-sequential multiple ionization: At and far below the threshold for impact ionization, H.Rottke, E.Eremina, W.Sandner, *Max-Born-Inst., Germany,* A.Dreischuh, F.Lindner, F.Grasbon, G.G.Paulus, H.Walther, *Max-Planck-Inst. für Quantenoptik, Germany,* R.Moshammer, B.Feuerstein, J.Ullrich, *Max-Planck-Inst. für Kernphysik, Germany.* The final state momentum analysis after strong field non-sequential multiple ionization of Ar and Ne shows atom specific features. This points to distinct ionization mechanisms being active for different atomic species.

14:00–16:00
QME · Symposium on Entangled States: Fundamentals and Applications
L.Lugiato, *Univ. dell'Insubria, Italy, Presider*

QME1 • 14:00 • INVITED
Quantum holography, B.E.A.Saleh, *Boston Univ., USA.* Entangled two-photon beams may be used in holography. One beam creates a self-referenced Gabor hologram of an object and is detected without spatial resolution. The other is measured with spatial resolution to create the hologram.

QME2 • 14:30 • INVITED
Quantum images: spatial entanglement of quantum fluctuations in light, and its applications, C.Fabre, *Univ. Pierre et Marie Curie, France.* We will show how one can produce an entanglement between quantum fluctuations of light at different points of an optical image, and how to use such spatial quantum correlations to improve information acquisition in images.

Conference Hall — IQEC/LAT-YS

14:00–16:00
YMA · Keynote Lectures IV—Continued

YMA2 · 15:00 · KEYNOTE LECTURE
Progress in quantum dots for optoelectronics applications, Y.Arakawa, *Univ. of Tokyo, Japan.* Since the first proposal of quantum dots in 1982 various effort has been devoted towards quantum dot devices. In particular, quantum dot lasers are one of the most promising devices for practical applications. In this paper, we review historical evolution, the currant state of the art, and future prospect of the quantum dot lasers and related devices.

Hall 1 — IQEC

14:00–16:15
QMA · Solid-State Lasers—Continued

QMA3 • 14:45
Transversal self-lasing in active medium of high peak power Ti:Sa lasers, M.P.Kalachnikov, V.Karpov, H.Schoennagel, *Max-Born-Inst., Germany.* Paitic self-lasing in high aperture Ti:sapphire crystals is analyzed. It is shown that self-lasing has the highest increment in direction perpendicular to the optical axis of the crystal. Different variants of possible solutions are proposed.

QMA4 • 15:00
Third harmonic generation of a continuous wave Ti:sapphire laser in external enhancement cavities, R.Zinkstok, S.Witte, E.J.van Duijn, J.Mes, W.Hogervorst, *Vrije Univ. Amsterdam, The Netherlands.* An all-solid-state tunable continuous wave laser operating around 260 nm with a bandwidth Γ ? 3 MHz has been developed by generating the third harmonic of a Ti:Sapphire laser inside external enhancement cavities. An output power of several tens of milliwatts has been produced.

QMA5 • 15:15
Tunable diode-pumped continuous-wave Cr^{2+}:ZnS laser, I.T.Sorokina, E.Sorokin, *TU Wien, Austria,* S.Mirov, V.Fedorov, *Univ. of Alabama at Birmingham, USA,* V.Badikov, V.Panyutin, *Kuban State Univ., Russia.* We demonstrate direct diode-pumping at 1.6 μm of the Cr^{2+}:ZnS, yielding tunable over 400 nm polarized radiation at up to 25 mW of output power. Continuous-wave Er-fiber laser pumped Cr^{2+}:ZnS laser delivers 0.7 W at up to 40% slope efficiency, tunable over 700 nm.

Hall 2 — IQEC

14:00–15:45
QMB · Coherent Phenomena and Phase Control—Continued

QMB4 • 14:45
Raman scattering process in a three-level atomic system under quantum interference conditions, E.A.Manykin, S.A.Vlasov, *Russian Res. Center «Kurchatov Inst.», Russia.* Infrared Raman scattering processes in a three-level atomic system under quantum interference of the optical transitions, induced by the long bichromatic pumping pulses, are studied theoretically. The dynamics of the alkali metal system is investigated and is compared with experimental data.

QMB5 • 15:00
Effects of coherent short polarized optical pulse interaction with an ensemble of isolated two-electron quantum dots, S.O.Elyutin, A.I.Maimistov, *Moscow State Engin. Phys. Inst., Russia.* The evolution of the polarized ultra-short pulse propagating in the resonant medium which is represented by ensemble of insulated quantum dots is numerically studied. Coherent propagation, photon-echo and optical nutation effects are discussed. The polarization features of a short pulse transmission through a thin layer of quantum dots are considered.

QMB6 • 15:15
EIA and EIT resonances for closed optical transitions, A.V.Taichenachev, A.M.Tumaikin, V.I.Yudin, *Novosibirsk State Univ., Russia.* For the two-photon spectroscopy with co-propagating light beams (arbitrary elliptical polarizations, "fly-of-time" regime of interaction) the following classification of all closed optical transitions take place: 1) $F_g = F \to F_e = F-1$ and $F_g = F \to F_e = F$ with EIT phenomena; 2) $F_g = F \to F_e = F+1$ with EIA. The principal role of the spontaneous transfer of the Zeeman coherence is shown analytically.

Hall 3 — IQEC

14:00–16:00
QMC · Single Photon Optics, Entanglement, and Statistics I—Continued

QMC3 • 14:45
Storage, manipulation and control of a single-photon wave packet using photon echo techniques, S.A.Moiseev, *Zavoisky Phys.-Tech. Inst., Russia,* S.Kroll, *Lund Inst. of Technology (LTH), Sweden.* Storage and complete reconstruction of single photon fields can be realised using a novel photon echo technique where the single photon field is spatially and temporally separated from the other laser pulses required to realise the scheme.

QMC4 • 15:00 • INVITED
Generation of polarization squeezed and entangled light beams, E.Giacobino, *Univ. Pierre et Marie Curie, France.* Entangled light beams have raised a lot of interest lately in the context of quantum information. Entangled beams can be obtained from polarization squeezed beams and vice-versa. Several experimental realizations of such beams, including one based on the use of laser-cooled atoms are presented.

Hall 4 — LAT

14:00–16:00
LMA · Laser Processing of Advanced Materials and Laser Microtechnologies III—Continued

LMA3 • 15:00 • INVITED
Laser-assisted fabrication of novel forms of carbon, V. Z. Mordkovich, *Intern. Center for Materials Res., Japan.* A review of recent advances in laser technologies for fabrication of novel forms of carbon (fullerenes or carbon nanotubes of different types or carbon onions) is presented.

Hall 5 IQEC	Hall 6 IQEC			

14:00–16:00
QMD · Absolute Phase of Laser Pulses—Continued

14:00–16:00
QME · Symposium on Entangled States: Fundamentals and Applications—Continued

QMD3 • 15:00
Interference enhancement of the recollision processes, S.P.Goreslavski, Ph.A. Korneev, S.V.Popruzhenko, *Moscow State Engin. Phys. Inst., Russia,* W.Becker, *Max-Born-Inst., Germany.* Simple analytical theory of intensity dependent resonance-like enhancements in spectra of above-threshold ionization, high harmonic generation and nonsequential double ionization is presented. It provides a transparent physical picture of the phenomenon.

QME3 • 15:00 • INVITED
Quantum tomography, M.C.Teich, *Boston Univ., USA.* We propose a new technique, called quantum optical coherence tomography (QOCT), for carrying out tomographic measurements with dispersion-cancelled resolution. The technique, which makes use of entangled-photon interferometry, can also be used to extract the frequency-dependent refractive index of the medium.

QMD4 • 15:15
Infra-red-laser Surface photo-emission and the "lucky-electron" model, Ph.Martin, *Ecole Polytechnique, France.* We will present a mid-infrared laser-surface interaction experiment and demonstrate that the "lucky-electron" model based on a phase-matching condtion between the temperature dependent mean electronic collision time and the laser electric field is useful and reliable.

Conference Hall IQEC/LAT-YS	Hall 1 IQEC	Hall 2 IQEC	Hall 3 IQEC	Hall 4 LAT
14:00–16:00 **YMA · Keynote Lectures IV—Continued**	**14:00–16:15** **QMA · Solid-State Lasers—Continued** **QMA6 • 15:30** ***Rare earth doped double chloride crystals (TR^{3+}:KPb_2Cl_5) as new materials for UV, VIS and Mid-IR solid state lasers,*** A.Tkachuk, *Vavilov State Optical Inst., Russia,* S.Ivanova, *St.Petersburg State Univ., Russia,* L.Isaenko, A.Yelisseyev, *Design and Techn. Inst. for Monocrystals, Russia,* S.Payne, R.Page, M.Nostrand, *LLNL, USA.* Spectroscopic study of low-phonon energy TR:KPb_2Cl_5 crystals grown by Bridgman techniques showed that their optical spectra exhibit intense absorption and emission bands. **QMA7 • 15:45** ***Self-starting five optical cycle pulse generation in Cr^{4+}:YAG laser,*** S.Naumov, E.Sorokin, G.Tempea, I.T.Sorokina, *TU Wien, Austria.* We demonstrate stable self-starting near transform-limited pulses down to 24 fs at up to 450 mW output power from a KLM Cr:YAG laser using chirped mirrors in combination with prisms. We also realize alternative method of self-starting using a SESAM mirror. **QMA8 • 16:00** ***Concept of laser cooled high-power excimer pumped ultraviolet $LiLu_{1-x}Yb_xF_4:Ce^{3+}$ tunable laser,*** V.V.Semashko, A.K.Naumov, R.Yu.Abdulsabirov, S.L.Korableva, *Kazan State Univ., Russia.* The concept of high-power excimer pumped UV tunable $LiLu_{1-x}Yb_xF:Ce^{3+}$ laser with the active medium laser cooling using the intraconfigurational $^2F_{5/2}$-$^2F_{7/2}$ transition of co-dopant Yb^{3+} ions is proposed and discussed. The prospective of laser cooling of other UV and VUV solid-state active media are estimated.	**14:00–15:45** **QMB · Coherent Phenomena and Phase Control—Continued** **QMB7 • 15:30** ***Positive and negative dispersion in a three-level Λ system,*** A.D.Wilson-Gordon, H.Friedmann, *Bar-Ilan Univ., Israel.* When a Λ system interacts with linearly polarized pump and probe fields, the probe dispersion can be switched from positive to negative by changing the pump Rabi frequency or the splitting between the lower levels.	**14:00–16:00** **QMC · Single Photon Optics, Entanglement, and Statistics I—Continued** **QMC5 • 15:30** ***Light propagation through highly nonlinear atomic medium with steep sign-reversible dispersion,*** A.M.Akulshin, A.Cimmino, G.I.Opat, *The Univ. of Melbourne, Australia.* Long-lived coherent Zeeman states prepared by two-photon Raman transitions in alkali atoms result in steep anomalous dispersion and enhanced Kerr nonlinearity. Pulse propagation with negative group velocity ($-c/5100$) and efficient degenerate four-wave mixing at low light intensity are reported. **QMC6 • 15:45** ***Towards controlled coupling between a high-Q whispering-gallery mode and a single nanoparticle,*** S.Goetzinger, O.Benson, *Berlin Humboldt-Univ., Germany,* V.Sandoghdar, *ETH, Switzerland.* We report on our recent experiments that aim at the realization of coupling between a single nano-emitter and high-Q whispering-gallery modes. We discuss Q-factor degradation and first experiments with semiconductor nanocrystals.	**14:00–16:00** **LMA · Laser Processing of Advanced Materials and Laser Microtechnologies III—Continued** **LMA4 • 15:30** ***Nanoisland nucleation in surface thermal spikes by femtosecond laser pulses,*** A.E.Volkov, M.V.Sorokin, *Kurchatov Inst., Russia.* The effect of the surface heating on decay of supersaturated solution of adatoms/impurity atoms resulting in the nucleation of nanoislands in the vicinity of laser spots. **LMA5 • 15:45** ***Nanotubes self-assembly in one-beam optical trap,*** W.E.Collins, W.Lu, S.Morgan, A.Zavalin, *Fisk Univ., USA.* C_{60} aggregated clusters were grown inside of a gradient one-beam optical trap. AFM measurements show aggregations having typical sizes of 5-15x1.5-2 µm, consisting of 30-100 nm tubes, bundled together. Micro-Raman spectra are provided.

16:00–16:30 COFFEE BREAK

Hall 5 IQEC	Hall 6 IQEC			

14:00–16:00
QMD · Absolute Phase of Laser Pulses—Continued

QMD5 • 15:30
Strong-field stabilization of atoms in the relativistic domain, H.R.Reiss, *Universidad de Salamanca, Spain.* Photoionization of hydrogen at stabilization intensities is examined using the relativistic, three-dimensional Strong-Field Approximation. It is found that relativity enhances stabilization for circular polarization, but eliminates it for linear polarization.

QMD6 • 15:45
X-ray pulse generation in atomic gases in dynamic stabilization regime: propagation effects, D.V.Kartashov, M.Yu.Ryabikin, A.M.Sergeev, *Inst. of Appl. Phys., Russia.* We study propagation effects in ultrashort x-ray harmonic pulse generation in the atomic high-frequency stabilization regime. We analyze the role of various factors limiting the growth of harmonic field in the gas. The comparison with the well-known low-frequency regime is made.

14:00–16:00
QME · Symposium on Entangled States: Fundamentals and Applications—Continued

QME4 • 15:30 • INVITED
Entanglement entropy and spatial patterns of spontaneous single photons, C.K.Law, *Chinese Univ. of Hong Kong, China,* K.W.Chan, J.H.Eberly, *Univ. of Rochester, USA.* We apply the Schmidt decomposition to study the continuum entanglement generated in: (1) Short-pulse-pumped down conversion; (2) Spontaneous emission with recoil. The properties of photon wavefunctions derived from the Schmidt eigenfunctions are discussed.

16:00–16:30 COFFEE BREAK

Conference Hall IQEC/LAT-YS	Hall 1 IQEC	Hall 2 IQEC	Hall 3 IQEC	Hall 4 LAT
16:30–17:30 **YMB · Keynote Lectures V** Yu.Tolmachev, *St. Petersburg State Univ., Presider*	**16:30–18:45** **QMF · Solid-state and Gas Lasers** V.G.Dmitriev, *Research Inst. "Polyus", Russia, Presider*	**16:30–18:30** **QMG · Nonlinear Optical Techniques** W.Kiefer, *Univ. Wuerzburg, Germany, Presider*	**16:30–18:30** **QMH · Single Photon Optics, Entanglement, and Statistics II** P.Tombesi, *Univ. Camerino, Italy, Presider*	**16:30–18:30** **LMC · Laser Processing of Advanced Materials and Laser Microtechnologies IV** M.Libenson, *Vavilov State Optical Inst., Russia, Presider*
YMB1 · 16:30 · KEYNOTE LECTURE ***Laser welding and cutting: Recent insights into fluid-dynamics mechanisms,*** V.S.Golubev, *IPLIT, Russia.* The comprehensive physical models of laser welding and cutting require to investigate the complicated problems in the fields of nonstationary hydrodynamics of the melt, two-phase gasdynamics, plasma jets, etc.The main goal of the presentation is to outline the "bridges" between the outcomes of fundamental research in the field of physical hydrodynamics and the results of investigations in the field of practical laser materials processing.	**QMF1 · 16:30 · INVITED** ***Polymer-filled nanoporous glass composite—a new class of materials for laser optics,*** M.F.Koldunov, *R&D Enterprise "Optronika", Russia,* D.P.Pacheco, *Phys. Sci. Inc., USA.* Results are presented on the mechanical, optical and lasing properties of polymer-filled nanoporous glass (PFNPG) composite doped with various laser dyes. This composite has high mechanical strength and laser damage threshold, good thermooptical characteristics, and low light-scattering losses. High laser efficiencies (up to 80%) have been obtained over a wide spectral range (from 540 to 660 nm) under Q-switched, doubled Nd^{3+}:YAG pumping. The service life of 3-mm thick composite elements exceeds 106 shots at a fixed excitation site for some laser dyes. These PFNPG composite elements can be lased efficiently at repetition rates of 33 Hz and higher.	**QMG1 · 16:30** ***The study of signal lineshape under spontaneous parametric down-conversion as a method of diagnostics of periodically poled domain structures,*** G.Kh.Kitaeva, A.N.Penin, *Moscow State Univ., Russia.* We propose to use the frequency-angular spectra of spontaneous parametric down-conversion for the measurement of spatial variation of the second-order optical susceptibility in crystals with regular and unregular periodically poled ferroelectric domain structures.	**QMH1 • 16:30** ***Experimental investigation of photon statistics of twin beams,*** Yun Zhang, Katsuyuki Kasai, Masayoshi Watanabe, *Commun. Res. Lab., Japan.* We present the photon number statistics of twin beams. The measured variances exhibited a quantum correlation of up to -4.9 dB between signal and idler, whereas their photon number distributions were super-Poissonian.	**LMC1 · 16:30 · INVITED** ***Photochemical laser technology for integrated-optical components of polymer basis,*** S.Metev, *Bremen Inst. of Appl. Beam Technology, Germany.* UV laser radiation has been used to photochemically modify the optical properties of some polymers. This process has been used to produce integrated optical components on polymer chips for applications in the optical information technology.
		QMG2 · 16:45 ***Magnetic-dipole and electric-dipole resonance enhancement of second harmonic generation in NiO and $KNiF_3$,*** V.V. Pavlov, R.V.Pisarev, *Ioffe Phys.-Tech. Inst., Russia,* M.Fiebig, D.Fröhlich, Th.Lottermoser, H.-J.Weber, *Univ. Dortmund, Germany.* Second harmonic generation (SHG) has been studied in two model centrosymmetric cubic antiferromagnets, NiO and $KNiF_3$. The observed SHG spectra have been attributed to a two-photon excitation due to combined magnetic-dipole and electric-dipole transitions between the 3d levels of the Ni^{2+} ions.	**QMH2 • 16:45** ***Measurement of the micromaser linewidth,*** F.Casagrande, A.Ferraro, A.Lulli, R.Bonifacio, *INFM - Univ. di Milano, Italy,* E.Solano, H.Walther, *Max-Planck-Inst. for Quantum Optics, Germany.* We propose a scheme, which allows to derive the micromaser linewidth due to phase diffusion from the measured statistics of atomic populations. We present analytical results and the numerical simulations of a planned experiment.	
	QMF2 · 17:00 ***Highly efficient CW 946-nm Nd:YAG laser emission under direct 885-nm pumping,*** V.Lupei, N.Pavel, *Inst. of Atomic Phys., Romania,* T.Taira, *Inst. of Molec. Sci., Japan.* Highly efficient (0.68 slope efficiency in absorbed power) 946-nm laser emission is obtained by pumping into the emitting level $^4F_{3/2}$ of a 1-at.% Nd:YAG, with a 885-nm Ti:sapphire laser; a strong reduction of heat generation could be also obtained.	**QMG3 · 17:00** ***Electroclinic effect in thin cells of ferroelectric liquid crystals probed by optical second harmonic generation,*** Yu.G.Fokin, T.V.Murzina, O.A.Aktsipetrov, *Moscow State Univ., Russia,* S.Soria, G.Marowsky, *Laser-Laboratorium Goettingen e.V., Germany.* Switching behaviour of ferroelectric liquid crystals (FLC) induced by DC-electric field and the temperature is probed by optical second harmonic generation technique. The unswitchable FLC subsurface layer is observed which retains the permanent structure due to electroclinic effect.	**QMH3 • 17:00** ***Velocity effects in electromagnetically induced gratings in cold cesium atoms,*** G.C.Cardoso, J.W.R.Tabosa, *Univ. Federal de Pernambuco, Brazil.* Natural and sub-natural linewidth resonances are observed in the laser diffraction on electromagnetically induced gratings in a sample of cold cesium atoms. The observed spectra reveal the important role played by the atomic motion.	**LMC2 · 17:00 · INVITED** ***Laser applications for biotechnical components,*** A.Gillner, E.Bremus, Ph.Jacobs, *Fraunhofer Inst. für Lasertechnik, Germany.* Microfluidic devices like microchannels for capillary electrophoresis, microreactors and microtiterplates are produced in a wide range of polymer materials. For those parts laser processing offers appropriate solutions for tool manufacturing and rapid prototyping as well as for packaging.

Hall 5 IQEC	Hall 6 IQEC			

16:30–18:30
QMI · Laser-Plasma and Laser-Atom Experiments and Theory
V.M.Gordienko, *Moscow State Univ., Russia, Presider*

QMI1 · 16:30 · INVITED
Multiterawatt picosecond laser "Progress-P": upgrade and laser plasma experiments, A.A.Andreev, V.G.Borodin, A.V.Charukchev, V.N.Chernov, V.M.Komarov, V.A.Malinov, V.M.Migel, Yu.V.Mikhailov, N.V.Nikitin, A.V.Serdukov, *Res. Inst. for Complex Testing of Optical Devices, Russia,* V.P.Andrianov, G.N.Ignatyev, A.E.Zakharov, *Res. Inst. of Pulse Technique, Russia.* Upgrade of 30 TW Nd- glass laser Progress-P is discussed. The master oscillator and preamplifier is proposed to change, to reduce the output laser pulse duration and so to raise output laser peak power up to 70–100 TW. Laser plasma experiments on fast-ion induced nuclear reaction in picosecond plasma are presented.

QMI2 · 17:00
Efficiency of isomer γ-fluorescence induced by laser plasma, A.Andreev, A.Van'kov, K.Platonov, Yu.Rozhdestvensky, S.Chizhov, V.Yashin, *Inst. for Laser Phys., Russia.* We represent first experimental results by observation of gamma-fluorescence in Rb-isomer, which is induced by x-ray pumping from laser plasma. The application to low - energy nuclear spectroscopy is talked over.

16:30–18:30
QMJ · Symposium on Entangled States: Fundamentals and Applications
A.Sergienko, *Boston Univ., USA, Presider*

QMJ1 · 16:30 · INVITED
Spatial squeezing and entanglement in quantum information, I.V.Sokolov, *St.Petersburg State Univ., Russia,* A.Gatti, L.A.Lugiato, *Univ. dell'Insubria, Italy,* M.I.Kolobov, *Univ. de Lille 1, France.* We discuss the extension of continuous variable protocols of quantum information onto the broadband in space-time light fields. The properties of spatially-multimode entanglement are considered. The difference between the global and the reduced fidelity of essentially multimode quantum teleportation is investigated.

QMJ2 · 17:00 · INVITED
Spin squeezing, A.Sorensen, *Aarhus Univ., Denmark.* Spin squeezed states are weakly entangled states of a large number of atoms, which are both easy to construct and robust against decoherence. The properties of squeezed states and methods of producing them will be discussed.

Conference Hall IQEC/LAT-YS	Hall 1 IQEC	Hall 2 IQEC	Hall 3 IQEC	Hall 4 LAT
16:30–17:30 **YMB · Keynote Lectures V—Continued**	**16:30–18:45** **QMF · Solid-state and Gas Lasers—Continued**	**16:30–18:30** **QMG · Nonlinear Optical Techniques—Continued**	**16:30–18:30** **QMH · Single Photon Optics, Entanglement, and Statistics II—Continued**	**16:30–18:30** **LMC · Laser Processing of Advanced Materials and Laser Microtechnologies IV—Continued**
	QMF3 · 17:15 ***Polarization switch of polymer microlaser by using excitation pulses with orthogonal polarization,*** V.A.Sautenkov, S.A.van den Berg, E.R.Eliel, G.W.'t Hooft, *Leiden Univ., The Netherlands.* Through time-resolved and time-integrated measurements we study the polarization properties of a polymer microlaser when pumped by two mutually delayed, orthogonally polarized femtosecond pulses. A switch in the dominant polarization mode is observed.	**QMG4 · 17:15** ***Nonlinear optoelectronic image processing for detection and tracking of small moving objects,*** Weiping Lu, S.L.Lachinova, R.G.Harrison, *Heriot-Watt Univ., UK.* We report on a new approach of nonlinear optoelectronic image processing for detection and tracking of small moving objects. Localized solutions of this system are adapted for significantly improved object visibility. Simulation results are presented.	**QMH4 • 17:15** ***Experimental study of Stokes linewidth in resonant four-wave mixing in hot Rb vapor.,*** E.E.Mikhailov, Yu.V.Rostovtsev, G.R.Welch, *Texas A&M Univ., USA.* We report linewidth dependences for transmission resonance of a weak anti-Stokes component and generated Stokes component during four-wave mixing in atomic vapor. We observe larger linewidth of the generated field relative to the input field.	
	QMF4 · 17:30 ***Properties of rare-earth-doped yttrium oxide ceramics,*** K.Takaichi, J.Lu, T.Murai, T.Uematsu, A.Shirakawa, Ken-ichi Ueda, *Univ. of Electro-Commun., Japan,* H.Yagi, T.Yanagitani, *Konoshima Chemical Co. Ltd., Japan,* A.A.Kaminskii, *Inst. of Crystallography, Russia.* Recently, highly transparent ceramics have been able to be fabricated. It has been difficult to grow rare-earth-doped yttrium oxides, but we fabricated them as ceramics successfully. These are very attractive in laser science and engineering.	**QMG5 · 17:30** ***Enhancement of stimulated Raman scattering in PPKTP,*** V.Pasiskevicius, J.A.Tellefsen, F.Laurell, *Royal Inst. of Technology SCFAB, Sweden,* R.Butkus, V.Smilgevicius, A.Piskarskas, *Vilnius Univ., Lithuania.* Enhancement of stimulated Raman scattering in PPKTP OPO has been investigated. It originates in certain periodicity crystals from the resonant interaction between the parametric fields and the crystal lattice vibration modes.	**QMH5 • 17:30 • INVITED** ***Quantum communication with entangled states of atoms and light,*** E.S.Polzik, J.L.Sorensen, B.Julsgaard, C.Schori, *Univ. of Aarhus, Denmark.* A novel approach to quantum interface between light and atomic ensembles has been developed. In the first demonstration of this approach we have generated a long-lived entangled state of two separate macroscopic atomic samples.	**LMC3 · 17:30 · INVITED** ***Laser deposition of thin films of doped chalcogenide glass for optoelectronic applications,*** M.Martino, *Univ. of Lecce, Italy.* Thin films of Pr doped chalcogenide glass, of interest as active waveguide for optical amplification at 1.3 mm, were deposited by KrF Pulsed Laser Deposition. Films were characterized by using the RBS, m-lines and photoluminescence techniques.
	QMF5 · 17:45 ***New crystalline Raman lasers,*** T.T.Basiev, V.V.Osiko, A.M.Prokhorov, *General Phys. Inst., Russia.* Review on search, development, and investigation of new SRS crystals and solid state Raman lasers is presented. Nanosecond (steady state) and pico-femtosecond (transient) regimes of highly efficient operation are discussed.	**QMG6 · 17:45** ***Stimulated scatterings of light in water,*** A.N.Baranov, *Moscow State Univ., Russia,* A.D.Kudryavtseva, N.V.Tcherniega, *Lebedev Phys. Inst., Russia.* Stimulated Raman scattering, stimulated Brillouin scattering and stimulated Rayleigh wing scattering characteristics in water have been investigated in pico- and nanosecond excitation range at different conditions of excitation. Possible applications are discussed.		

Hall 5 IQEC	Hall 6 IQEC			

16:30–18:30
QMI · Laser-Plasma and Laser-Atom Experiments and Theory—Continued

QMI3 · 17:15
Threshold phenomena in strong laser-atom processes, B.Borca, A.F.Starace, *Univ. of Nebraska, USA,* A.V.Flegel, M.V.Frolov, N.L.Manakov, *Voronezh State Univ., Russia.* We demonstrate that well-known threshold phenomena of multichannel reaction theory influence greatly the features and magnitudes of strong laser-atom processes when the threshold of a concrete multiphoton channel is crossed as the laser frequency or intensity are varied.

QMI4 · 17:30
Tunneling versus nontunneling high-harmonic generation: relativistic effects, D.B.Milosevic, W.Becker, W.Sandner, Suxing Hu, A.F.Starace, *Univ. of Sarajevo, Bosnia and Herzegowina.* Two different mechanisms of high-harmonic generation are presented and compared: tunneling-propagation-recombination or three-step and nontunneling or surfing mechanism. For both models theory and numerical results are presented. Relativistic effects are analyzed.

QMI5 · 17:45
Strong field effects at the double Stark resonance in Rydberg atoms of sodium, I.I.Ryabtsev, D.B.Tretyakov, *Inst. of Semicond. Phys., Russia.* The Double Stark Resonance at the 36P–37P two-photon microwave transition has been investigated in various conditions. Stark tuning of the energies allowed for an observation of great increase of the probability when the virtual intermediate level crossed the real 37S one.

16:30–18:30
QMJ · Symposium on Entangled States: Fundamentals and Applications—Continued

QMJ3 · 17:30 · INVITED
Entanglement and non-locality, G.Bjork, H.Heydari, P.Usachev, B.Hessmo, *Royal Inst. of Technology, Sweden.* We discuss the experimental implementation of tests of nonlocality for single and multiexcitation states.

Conference Hall	Hall 1 IQEC	Hall 2 IQEC	Hall 3 IQEC	Hall 4 LAT
	16:30–18:45 **QMF · Solid-state and Gas Lasers—Continued**	**16:30–18:30** **QMG · Nonlinear Optical Techniques—Continued**	**16:30–18:30** **QMH · Single Photon Optics, Entanglement, and Statistics II—Continued**	**16:30–18:30** **LMC · Laser Processing of Advanced Materials and Laser Microtechnologies IV—Continued**
	QMF6 · 18:00 ***Experimental and theoretical study of ulthort pulse generation from a side-pumped mode-locked Yb-doped double-clad fiber laser,*** A.Hideur, B.Ortaç, T.Chartier, M.Brunel, *UMR 6614 CORIA, France,* H.Leblond, M.Salhi, F.Sanchez, *Univ. d'Angers, France.* We present a passively mode locked side-pumped Yb-doped double-clad fiber laser. Mode-locking properties are experimentally and theoretically described. High energy 670 fs pulses are obtained after compression, and different regimes of emission are described.	**QMG7 · 18:00** ***Parametric amplification by electromagnetically-induced waveguiding and phase-matching,*** A.D.Wilson-Gordon, D.Bortman-Arbiv, H.Friedmann, *Bar-Ilan Univ., Israel.* Electromagnetically induced phase matching (EIPM) leads to enhanced parametric amplification (PA) of probe and four-wave mixing beams, copropagating with a strong spatial-solitonlike pump. Regions of good EIPM in the pump transverse profile give the main contribution to PA.	**QMH6 • 18:00** ***Quantum limit on the resolution of multimode interferometers,*** J.Söderholm, G.Björk, B.Hessmo, *Royal Inst. of Tech. (KTH), Sweden.* We show that there is no fundamental advantage in using multimode interferometers to detect phase shifts. The accuracy is found to be limited by the de Broglie-wavelength associated with the energy used in the measurement.	**LMC4 · 18:00** ***Controlled growth of nanostructured carbon-based materials by pulsed laser deposition,*** E.Fogarassy, F.Antoni, *CNRS-PHASE, France,* T.Szorényi, *Res. Group on Laser Phys., Hungary.* Carbon-based materials have been deposited at room temperature by pulsed excimer (ArF) laser ablation of a graphite target both under vacuum and in various atmospheres, such as nitrogen and argon, at different pressures. The results suggest that the formation, composition and structuration of the deposits are mainly governed by gas phase processes.
	QMF7 · 18:15 ***Tm^{3+}:$YLiF_4$ as an ultraviolet lasing system,*** T.D.Medoidze, Z.G.Melikishvili, A.G.Papashvili, G.A.Tsintsadze, *Inst. of Cybernetics, Georgia,* T.I.Sanadze, *Tbilisi State Univ., Georgia.* Spectroscopic and dynamic properties of high lying energy levels in Tm^{3+}:$YLiF_4$ were investigated at room temperature. As the result three new channels for lasing in the visible and ultraviolet spectral ranges were observed.	**QMG8 · 18:15** ***Modeling of build-up dynamics of Stokes pulses shorter than hypersound wave period in a SBS-compressor,*** *A.Dement'ev, Inst. of Phys., Lithuania,* V.Girdauskas, O.Vrublevskaja, *Vytautas Magnus Univ., Lithuania.* Dynamics of SBS-compression of short laser pulses (1-2 ns) has been investigated numerically. The influence of the hypersound wave period and the Kerr nonlinearity of the medium on the energy, duration and quality of the Stokes pulse has been analyzed.	**QMH7 • 18:15** ***Strong driving assisted multipartite entanglement in cavity QED,*** E.Solano, G.S.Agarwal, H.Walther, *Max-Planck Inst. for Quantum Optics, Germany.* We propose a method for generating large families of multipartite entangled states by considering the interaction of N two-level atoms, driven by a strong external coherent driving, with a high quality cavity.	**LMC5 · 18:15** ***Formation and decomposition of laser-deposited metastable Fe-Cr phases,*** A.Gorbunov, A.A.Levin, A.Mensch, D.C.Meyer, A.Tselev, P.Paufler, W.Pompe, *Dresden Univ. of Technology, Germany,* E.Wieser, L.Bischoff, H.Reuther, *Res. Center Rossendorf, Germany,* D.Eckert, *Inst. for Solid State and Materials Res. (IFW), Germany.* Instead of forming supersaturated body centered cubic solid solutions, the PLD Fe-Cr alloy films crystallize in unusual metastable intermetallic phases. Structural and magnetic transformations in these films induced by annealing and ion implantation are studied.
	QMF8 · 18:30 ***Requirements and methodology for producing an electrically excited oxygen iodine laser,*** A.E.Hill, *Texas A&M Univ., USA.* An electrically excited oxygen iodine laser must adhere to stringent physical criteria, and alludes success to date. Here, electric metastable oxygen generator work is presented that addresses all necessary criteria. A successful laser should emerge.			

18:30–20:00 IQEC/LAT POSTER SESSIONS II

Hall 5 IQEC	Hall 6 IQEC			

16:30–18:30
QMI · Laser-Plasma and Laser-Atom Experiments and Theory—Continued

QMI6 · 18:00
Phase control of the photoionization and external photoeffect in the intense bichromatic laser field, V.A.Astapenko, V.M.Buimistrov, *Moscow Inst. of Phys. and Technology, Russia.* Angular distribution of the photocurrent from K atom under various polarizations of the bichromatic field components is calculated so as the photocurrent from the metal surface as a function of the component phases.

QMI7 · 18:15
Atomic structure effects on a magnetic-field-induced two-color frequency mixing in atoms, K.V.Khalev, V.D.Ovsiannikov, V.V.Chernushkin, *Voronezh State Univ., Russia.* Effects of atomic spin and fine-structure splitting on polarization dependence of a magnetic-field-induced two-color frequency mixing in alkali atoms are analyzed for three double-resonant three-photon routes.

16:30–18:30
QMJ · Symposium on Entangled States: Fundamentals and Applications—Continued

QMJ4 · 18:00 · INVITED
Decoherence and deentanglement of optical fields, S.Ya.Kilin, *Stepanov Inst. of Phys., Belarus,* M.G.Raymer, *Univ. of Oregon, USA.* It is shown that initial pure-state quantum entanglement that has been significantly destroyed by decoherence can be restored nearly perfectly. This finding suggests a proposal for a new measure for entanglement applicable to mixed states.

QMJ5 · 18:30
Entanglement in the spin sub-systems of spatially separated atomic ensembles, D.V.Kupriyanov, I.M.Sokolov, A.V.Slavgorodskii, *St.Petersburg State Techn. Univ., Russia.* We describe the mechanism of entanglement between the ground states of two spatially separated atomic ensembles via its optical coupling. Such an entangled state can be stored in the long-living spin subsystems.

18:30–20:00 IQEC/LAT POSTER SESSIONS II

LME · Advanced Lasers and Systems

LME1
Effect of de-tuning on the temperature dependence of 650nm resonant cavity leds, K.Hild, T.E.Sale, T.J.C.Hosea, *Univ. of Surrey,* UK, M.Hirotani, Y.Mizuno, T.Kato, *R & D Lab, Daido Steel Co. Ltd., Japan.* The temperature performance of RCLEDs with differing quantum well-cavity detuning are compared. Carrier leakage is the dominant mechanism, so at constant current, the output falls monotonically with increasing temperature irrespective of detuning.

LME2
Closed-loop stabilisation of quasi-cw passively modelocked Nd-based lasers, G.J.Valentine, D.Burns, A.I.Ferguson, *Univ. of Strathclyde, UK.* Active stabilisation of passive modelocking is shown using an intracavity loss modulator. The parameter range for cw passive modelocking is extended. Stabilised modelocking of a 310 MHz, 65W quasi-cw laser is demonstrated.

LME3
Continuous wave Yb,Tm:KYW microchip laser, A.N.Kuzmin, Yu.V.Kuzminyh, *Stepanov Inst. of Phys., Belarus,* A.A.Demidovich, *Inst. of Molec. and Atomic Phys., Belarus,* A.N.Titov, *Vavilov State Optical Inst, Russia,* M.Mond, S.Kueck, *Univ. Hamburg, Germany.* Diode pumped Yb,Tm:KYW microchip laser in CW regime of operation is demonstrated. The maximum output power of 18mW for 520 mW of absorbed pump power has been achieved with a slope efficiency of 6%.

LME4
A new method for single picosecond pulses generation in double-section dye laser with nanosecond pump, E.A.Ermilov, I.M.Gulis, *Belarusian State Univ., Belarus.* A new technique for generation of tunable single picosecond pulses was proposed in two-resonator double-section dye laser with short cavity pumped by nanosecond pulses with energies significantly exceeding the excitation threshold.

LME5
Light-induced cooling of active medium of high-power cw TEA CO_2 laser, I.I.Filatova, V.V.Azharonok, V.D.Shimanovich, *Inst. of Molec. and Atomic Phys., Belarus.* A gas kinetic temperature change of powerful TEA CO_2 laser active medium, that is conditioned by a self-influence of laser radiation on plasma parameters, is investigated. It is shown that the laser radiation got through the inverse medium gave rise to the cooling of the active medium.

LME6
Plasma's neutral component heating and spatial structure of RF planar discharge for SLAB CO_2 laser, I.I.Filatova, V.V.Azharonok, V.D.Shimanovich, *Inst. of Molec. and Atomic Phys., Belarus,* L.N.Orlov, *Stepanov Inst. of Phys., Belarus.* Spatial gas kinetic temperature profiles along the electrode gap and spatial structure of planar alpha radio-frequency discharge in laser N_2/CO_2/He gas mixtures have been determined by emission spectroscopy methods.

LME7
Short length solid-state Raman laser, A.S.Grabtchikov, V.A.Lisinetskii, A.G. Shvedko, R.V.Chulkov, P.A.Apanasevich, V.A.Orlovich, *Stepanov Inst. of Phys., Belarus.* We represent results of the investigation for Raman conversion in the short length Raman laser on barium nitrate crystal at pumping with the 300 ps laser pulses. Advantages of this scheme are discussed.

LME8
Diode pumped microchip Raman lasers, A.S.Grabtchikov, A.N.Kuzmin, V.A.Lisinetskii, V.A.Orlovich, *Stepanov Inst. of Phys., Belarus,* A.A.Demidovich, *Inst. of Molec. and Atomic Phys., Belarus,* A.N.Titov, *Vavilov State Optical Inst., Russia,* O.V.Kuzmin, *STC FIRN, Russia.* Data on characteristics of Raman self-frequency conversion in Yb:KYW microchip laser and intracavity Raman conversion in barium nitrate crystal placed in the Nd:LSB microchip lasers are presented.

LME9
New compact and efficient DFB laser on jelly-like dye-doped gelatin, T.Sh.Efendiev, V.M.Katarkevich, A.N.Rubinov, *Stepanov Inst. of Phys., Belarus.* Simple and efficient steady-state distributed feedback (DFB) laser on the basis of new photosensitive medium—jelly-like dye doped gelatin is reported. Under pumping with second harmonics of nanosecond YAG:Nd-laser such DFB laser provides up to 18–20% efficiency at 0.01–0.03 nm linewidth.

LME10
Two-frequency CO_2-laser with orthogonal elliptic polarizations of modes, V.M.Yasinskii, *Stepanov Inst. of Phys., Belarus.* The experimental results of the investigation of the two-frequency CO_2-laser with orthogonal elliptic polarizations of modes are represented. It was experimentally shown that in the CO_2 laser the interaction of waves with circular orthogonal polarizations is much weaker than that of waves with linear orthogonal polarizations.

LME11
The laser methods applications for an Earth global defence system, B.A.Kuzyakov, Yu.V.Sorokin, *SPA ASTROPHYSIKA, Russia.* A present paper deals with the perspective laser methods applications for an Earth global defense system. The dangerous asteroids discovering possibilities, the measurements of various cosmic objects parameters and its matter etc. are under analysis.

LME12
Laser analyzer, E.O.Artamonova, S.V.Oshemkov, A.A.Petrov, V.B.Smirnov, V.Yu. Cherepanov, *St.Petersburg State Univ., Russia.* Laser analyzer is intended for direct scanning analysis of monolithic and powdered samples for the aims of ecological investigations without sample preparation (crushing, grating, dissolving, etc.). Relative detection limits for elements with high and intermediate volatility in geological samples proved to be from 10 to 1000 ppb.

LME13
The conception for creation of industrial high-power CO lasers with open working cycle, I.Ya.Baranov, *Baltic State Tech. Univ., Russia.* The designs of industrial high-power CO lasers are proposed with continuous formation of a CO laser mixture during laser operation, excitation in radio-frequency (RF) discharge in supersonic gas flow and without ejecting toxic CO molecules into atmosphere by converting CO to CO_2.

LME14
CO_2 laser with high repetition rate, M.F. Borisov, *Res. Inst. for Complex Testing of Optical Devices, Russia.* CO_2 laser with pulse repletion rate up to 20 kHz. Pulse duration is 3–20 ms. Gas pressure in a chamber is 0.1–0.3 bar. Single pulse energy is 0.5–5 mJ. Average power is 10 W.

LME15
Superpowerful lasers on active media created by optical pumping with pulsed chemical HF (DF) lasers radiation, B.G.Bravy, G.K.Vasiliev, E.F.Makarov, Yu.A.Chernyshev, *Inst. of Problems of Chem. Phys., Russia.* The paper presents experimental and computational substantiation for short-pulsed ($\sim 10^{-12}$ s) superpoweful laser complex based on mixture of N_2O and $^3/_2$ with Kr, which are to be pumped by the radiation of chain chemical HF laser.

LME16
Zinc oxide as a functional material for UV powder lasers, S.A.Druzhinin, Ch.M. Briskina, V.M.Markushev, *Inst. of Radioengin. and Electronics, Russia,* L.N.Demianets, L.E.Li, *Inst. of Crystallography, Russia.* Spectra of UV radiation of zinc oxide powders obtained by hydrothermal synthesis at different conditions were investigated at nanosecond excitations. Phenomenological analysis of probable mechanisms of lasing in zinc oxide powders was performed.

LME17
Single frequency tunable LiF:F_2^--color center laser/amplifier for molecular gas laser pumping, T.T.Basiev, M.E.Doroshenko, S.B.Kravtsov, V.V.Skornyakov, P.G.Zverev, S.S.Alimpiev, S.M.Nikiforov, *General Phys. Inst., Russia,* G.Hager, *Phillips Lab., USA.* Nd-pumped computer controlled tunable LiF:F_2^- color center laser system with linewidth 0.008-0.01 cm^{-1} was developed for 1.1?1.25 μm spectral region. Master oscillator power amplifier setup with output energy of 50 mJ at 3 Hz repetition rate with conversion efficiency of 30% was used for pumping mid IR HCl molecular gas laser. HCl molecular gas cascade lasing at 3.881 μm and 3.696 μm with efficiency of about 2% was observed.

LME18
Fluorescence spectroscopy and interferometric measurements of refractive index changes of Nd:YAG laser crystals under intensive diode pumping, O.L.Antipov, O.N.Eremeykin, V.A.Vorob'ev, *Inst. of Appl. Phys., Russia,* A.P.Savikin, *Nizhny Novgorod State Univ., Russia.* Refractive index changes of Nd:YAG laser crystals under intensive diode pumping in combination with laser pulse pumping at 266 nm or 532 nm are studied using a sensitive polarizing interferometer. The "electronic" component of the refractive-index changes caused both by population inversion of the working transition and excitation of high-energy levels of Nd^{3+} ions are determined based on fluorescence spectroscopy data.

LME19
Nd:YAG laser with cavity dumping at combined Q-switching, A.V.Fedin, Y.A. Chaschin, *Kovrov State Technological Academy, Russia,* T.T.Basiev, *General Phys. Inst., Russia.* A CW pumped Nd:YAG laser with combined Q-switching by an active Q-switch based on a radially variable Fabry-Perot interferometer and a passive Q-switch on a LiF:F_2^-crystal, is submitted. The conditions for a matched cavity dumping are achieved.

LME20
New methods of control of fast-flow laser operation regimes, A.I.Fedoseev, A.V.Mushenkov, A.I.Odintsov, N.E.Sarkarov, *Moscow State Univ., Russia.* Fast-flow laser systems with controllable dynamical regimes were analyzed. The possibility of self-modulated oscillations with the frequency ~100 kHz and the regime switching time ~10 ms was shown. The mechanism of self-modulated and chaotic oscillation in fast-flow lasers was studied.

LME21
Phase-locking of three lasers by spatial filter method, A.F.Glova, A.Yu.Lysikov, *TRINITI, Russia.* The expression for optical coupling coefficients between lasers of the periodic one-dimensional array with a focal spatial filter is received and phase-locking range for three lasers is determined. The influence of the filter transmittance on phase-locking efficiency is shown.

LME22
Intracavity second harmonic generation in diode-pumped quasi-cw YAG:Nd^{3+} laser, S.V.Frolov, I.V.Glukchich, A.V.Stepanov, *SRI EPhD n.a.D.V.Efremov, Russia,* S.G.Grechin, E.A.Sharandin, *Bauman MSTU, Russia.* Results of experimental investigations of a frequency conversion processes for In-traCavity SHG in KTP crystal of a quasi-CW laser are represented. Spatial parameters forming for SH inside cavity, and relation ones with energy parameters are represented.

LME23
Application of thulium-doped fluoride and telluride glasses in a fiber amplifiers and lasers, A.A.Andronov, I.A.Grishin, V.A.Guryev, A.P.Savikin, *Univ. of Nizhny Novgorod, Russia,* P.B.Baskov, V.V.Sakharov, *Res. Inst. for Chem. Technology, Russia.* An efficient luminescence from a Thulium-doped fluoride glass ZBLAN and a tungsten-telluride glass TWL was experimentally observed. Radiative transitions of Tm^{3+} in these glasses lie in a spectral range from near-UV to mid-IR with possessing broad bands and large lifetimes, making these media very attractive for optical applications.

LME24
Numerical simulations of laser diode-pumped Nd:YAG zig-zag slab amplifiers, N.A.Kaliteevskii, B.G.Malinin, E.P.Mironov, V.G.Pankov, N.N.Rosanov, V.E.Semenov, A.N.Shatsev, V.D.Vinokurova, V.E.Yashin, *Inst. for Laser Phys., Russia,* K.Gaebel, *XTREAME technologies, Germany.* We present the description of computer software and results of numerical simulations of high-power laser with diode-pumped Nd:YAG zig-zag slab amplifiers in the pulse repetitive mode. The comparison with the experiments confirms the adequacy of the model.

LME25
Full optimization of e-beam pumped infra-red Xe-laser, A.V.Karelin, O.V.Simakova, *General Phys. Inst., Russia.* The results of numerical complete optimization of IR Xe-laser are submitted. The maximal output lasing characteristics are reached in an Ar-Xe mixture at wavelength 1.73 mm. The optimization problem was multi-parameter task. The maximal generating efficiency had value of 4.5% and the maximal value of a specific output energy was 19 J/l.

LME26
The factors determining images colour in projective microscope with copper vapor laser generating linearly polirized light, V.T.Karpukhin, I.I.Klimovskii, M.M.Malikov, V.Ya.Mendeleev, S.N.Skovorod'ko, *United Inst. of High Temperatures, Russia.* The investigation of different luminous surface by projective microscope on the base copper vapor laser with unstable resonator and prism Glan have shown, that the ratio of green and yellow colors in their image is determined by background radiation, roughness size, reflectivity and curvature surface, form of reflection diagram.

LME27
Stabilization of the behavior of a solid-state laser with intracavity second harmonic generation by means of optoelectronic feedback, P.Khandokhin, V.Zhislina, *Inst. of Appl. Phys., Russia.* Using the model of a bipolarized laser we develope a method of suppressing chaotic oscillations at ISHG. The introduction of opto-electronic feedback leads either to the steady state regime or to sinusoidal oscillations with constant amplitude.

LME28
Optimization of parameters of gas mixtures in CO_2 lasers by method of simplex-lattice planning of experiment, A.V.Komissarov, V.F.Lazukin, S.L.Pogorelsky, *Instr. Design Bureau, Russia.* Optimization of parameters of the 4-component gas mixture in CO_2 laser is carried out using the method of simplex-lattice planning of experiment. The cubic radiation power model, the cubic small-signal gain model, the cubic power saturation model and the cubic optimum pressure model are obtained. Radiation power for obtained CO_2, N_2, He and Xe optimal concentration is 10% higher then that for the standard (CO_2:N_2:He:Xe = 1:1:3 + 5%).

LME29
Improvement of the industrial laser beam using phase correction of the high modes, M.G.Galushkin, V.P.Yakunin, *IPLIT, Russia,* P.V.Korolenko, V.G.Makarov, A.T.Polosko, *Moscow State Univ., Russia.* Theoretically and experimentally characteristics of the industrial transverse-flow CO_2-laser with high-mode selection and phase correction were investigated. For the first time transform of the high order Hermite-Gaussian mode to the narrow divergence beam had been carried out over a range of the output power up to 1kW.

LME30
Multichannel modal liquid crystal wavefront corrector, S.P.Kotova, M.Yu. Kvashnin, M.A.Rakhmatulin, O.A.Zayakin, *Lebedev Physical Inst., Russia,* I.R.Guralnik, N.A.Klimov, *Samara State Univ., Russia,* P.Clark, M.Langlois, G.D.Love, A.F.Naumov, C.Santos, *Univ. of Durham, UK,* M.Yu.Loktev, G.V.Vdovin, *TU Delft, The Netherlands.* 37-channel modal liquid crystal wavefront correctors with a 30 and 80 mm diameter aperture are developed. Optical response, voltage-phase and dynamic properties of the devices have been studied. The possibility of synthesis of low order aberrations was experimentally demonstrated.

LME31
Resource characteristics of sealed-off TEA-CO_2 lasers, B.A.Kozlov, N.A.Egoshkin, A.V.Belikov, P.V.Trubitsin, *Radio-Engineering Academy, Russia.* Influence of the plasma-chemical, electro-discharge and autoemissive processes on the resource of sealed-off pulse-periodical TEA-CO_2 lasers have been investigated. The main interrelations of the resource with the chemical composition of working mixtures, pumping parameters and electrode materials are determined. 500 hours resources in TEA-CO_2 lasers with pulse repetition rates up to 1 kHz and average radiation power 120-160 W are achieved.

LME32
Pulse-periodical TEA-N_2 and TEA-Xe lasers, B.A.Kozlov, R.I.Ashurkov, V.K.Darymov, A.V.Folomkin, D.V.Kizlitsin, *Radio-Engineering Academy, Russia.* Analytical corellation for maximum value of pulse repetition rate forming of the volume discharge in dense gases is obtained. The role of the thermal deformation of electrodes and energy transfer efficiency from pulse generator into volume discharge plasma in mixtures N_2:He and Xe:He are determined. A maximum average radiation power up to 60 W in TEA-N_2 and TEA-Xe lasers are achieved.

LME33
Multi-fold Raman compression of diode-pumped Nd:YAG laser pulses, G.Pasmanik, A.Shilov, E.Shklovsky, *Passat Ltd., Canada,* O.Kulagin, *Inst. of Appl. Phys., Russia.* Optical compression via backward SRS of 300 ps- and 3 ns- pulses at repetition rates of 100 Hz and 1000 Hz respectively was studied. We demonstrated greater that 100-fold compression ratio with high conversion efficiency.

LME34
Broadband source based on Yb-doped double-clad fibers, V.M.Paramonov, A.S.Kurkov, M.Yu.Tsvetkov, *General Phys. Inst., Russia,* I.D.Zalevsky, *"Sigm Plus", Russia.* We have fabricated broadband source emitting in a range 1.06-1.12 μm based on the cladding pumped Yb-doped fiber. FWHM of 40 nm and a maximum power of 10 mW were achieved. The source can be used for the low-coherent reflectometry.

LME35
Self-Q-switched double-clad Yb-doped fiber laser, D.Grukh, A.Kurkov, *General Phys. Inst., Russia,* I.Razdobreev, *Univ. des Sciences et Technologies de Lille, France,* A.Fotiadi, *Faculte Polytechnique de Mons, Belgium.* We have realized self Q-swithed double-clad Yb-doped fiber laser. An average power as high as 1.4 W was achieved. Pulse repetition rate is in a range of 5–50 kHz, pulse duration is 5–10 ns. An output peak power as high as 5 kW can be estimated.

LME36
Stimulated rotational and vibrational Raman conversion of high-quality XeCl laser beam in hydrogen, N.G.Ivanov, V.F.Losev, V.E.Prokop'ev, *High Current Electronics Inst., Russia.* An experimental study of stimulated Raman conversion of high-coherent XeCl laser radiation in H_2 has been carried out. About 70 vibrational-rotational components were realized with a circularly polarized laser beam pump. High spatial and temporal coherence of conversed radiation was obtained. Quantum efficiency of conversion in first vibrational Stokes was achieved 95%.

LME37
A single mode waveguide gas laser, S.L.Pogorelski, V.F.Lazukin, V.F.Maiboroda, A.M.Bormashov, *KBP Instrument Design Bureau, Russia.* A mode selection method for square waveguides is proposed. One has to cut up the waveguide and turn the parts around axis. Such asymmetry causes great losses for minor modes. Theory and experiments are presented.

LME38
Properties of whispering gallery lasers based on drop-shaped region in a fiber, L.N.Magdich, *Res. POLUYS Sci. Inst., Russia,* S.V.Torchigin, *Inst. of Informatics Problems, Russia.* It is shown that the density of resonance frequencies in the laser can be much smaller than that in conventional microsphere lasers because the resonance modes with great axial indexes are absent in such geometry.

LME39
Q-switch YVO_4:Nd^{3+} diode-pumped solid-state microchip subnanosecond pulses laser with repetition rate up to 100 kHz, S.G.Grechin, E.A.Sharandin, *Bauman MSTU, Russia,* S.I.Derzhavin, V.V.Kuzminov, D.A.Mashkovsky, *General Phys. Inst., Russia.* The results of high repetition rate subnanosecond pulses generation investigated both theoretically and experimentally for solid-state diode-pumped YVO_4:Nd^{3+} microchip laser with garnet:Cr^{4+} passive Q-switch are presented. The fundamental mode single pulse oscillation parameters are determined.

LME40
Use of microwave discharges for excitation of planar CO_2 lasers, A.P.Mineev, S.N.Nefedov, P.P.Pashinin, *General Phys. Inst., Russia.* A breadboard model of a planar CO_2 laser excited by a wide-aperture microwave discharge of size 2 x 20 x 250 mm was elaborated and constructed. Test experiments were carried out with a repetitive uniform microwave discharge with pulse duration of 10–15 ms, repetition frequency of 0.1–2 kHz at a level of the input microwave power of 1.8 kW per pulse and a cw power of 300 W. The spatial structure of the microwave discharge at pressures up to 50 torr of the laser gas mixture is studied.

LME41
Study of rf-excited planar CO_2 laser, A.P.Mineev, S.M.Nefedov, P.P.Pashinin, *General Phys. Inst., Russia*. Performance of a planar cw CO_2-laser excited by RF waves at two fixed frequencies of 40 and 125 MHz is studied. A laser output power of 100 W and efficiency about 10% have been achieved, and the influence of the excitation frequency has been studied. The hybrid waveguide-unstable optical resonators were used in the planar laser.

LME42
Polarization dynamics of Yb-doped double-clad fiber laser, N.K.Sabinin, M.A.Gladychevskii, K.G.Leontiev, *Optic-telecom Ltd., Russia,* O.E.Nanii, V.G.Voronin, A.N.Turkin, A.V.Vukolov, *Moscow State Univ., Russia,* A.S.Kurkov, I.A.Savochkin, *General Phys. Inst., Russia*. We report stochastic polarization switching between two orthogonal linear polarizations in Yb-doped double-clad fiber laser with residence times that vary by 3 orders of magnitude by changing pump power. The physical model explaining basic experimental observed regularities is proposed.

LME43
Acousto-optically induced unidirectional single mode operation of a cw and Q-switched ring laser, O.E.Nanii, D.D.Scherbatkin, V.G.Voronin, K.N.Belov, A.V.Vukolov, *Moscow State Univ., Russia.*

LME44
$BeAl_6O_{10}$:Cr^{3+}: A promising active medium for femtosecond lasers, V.V.Petrov, E.V.Pestryakov, V.I.Trunov, A.V.Kirpichnikov, *Inst. of Laser Phys., Russia,* A.I.Alimpiev, *Techn. Inst. of Monocrystals, Russia.* The new laser crystals $BeAl_6O_{10}$:Cr^{3+} were grown and spectral-luminescence and CW laser properties were investigated. We confirmed these crystals are perspective for generation of femtosecond pulses in the near IR region under LD pumping.

LME45
Transversal modes selection in Nd lasers by a dye cell-apodizer, S.K.Sobolev, L.M.Vinogradsky, *Russian Federal Nuclear Center, Russia,* N.E.Bykovsky, Yu.V.Senatsky, A.V.Shelobolin, I.G.Zubarev, *Lebedev Physical Inst., Russia,* V.M.Mizin, *Sci. Center RF-NIOPIK, Russi?.* Different transversal modes generation was achieved at near full working apertures in Nd:YAG and glass lasers with an

intracavity bleachable dye cell-apodizer.Cell designs for mode shaping and output laser beams profiling are considered.

LME46
Transverse diode-pumping solid-state YAG:Nd^{3+} active elements: efficiency and homogeneity, T.A.Emel'yanova, S.G. Grechin, E.A.Sharandin, *Bauman MSTU, Russia,* S.V.Frolov, I.V.Glukchich, A.V.Stepanov, *STC MIT, SRI EPhD n.a. D.V.Efremov, Russia.* Theoretically and experimentally the transverse diode pumping of active element YAG:Nd^{3+} with air and liquid cooling are investigated. It is shown that parameter - product active element diameter on effective absorption coefficient is equal 3,2–4.

LME47
Pumping of discharge gas lasers on dense gases by generators with inductive energy storage, V.F.Tarasenko, E.H.Baksht, I.D.Kostyrya, A.N.Panchenko, *High Current Electronics Inst., Russia.* Generators with inductive energy storage units and semiconductor opening switches designed for laser excitation are described. Transverse discharge XeCl (output energy of 2 J), XeF (0,04 J), non-chain HF-laser (0,6 J), and CO_2-laser (3,2 J) are developed. Longitudinal Cu (p.r.r. 10 kHz; average power 3,2 W) and N_2 (100 Hz; 0,012 W) lasers are developed.

LME48
Barium-nitrate-based Raman lasers excited with LiF:F_2^-laser and its second harmonic, A.I.Vodchits, I.I.Mishkel, V.A.Orlovich, P.A.Apanasevich, *Stepanov Inst. of Phys., Belarus.* Raman lasers on barium nitrate crystal pumped with the radiation of nanosecond LiF:F_2^- laser and its second harmonic have been developed and optimized. These lasers effectively generate the continuously tunable radiation in spectral ranges of about 1240–1800 and 590–690 nm, respectively.

LME49
Laser mode conversion by means of a ring interferometer, V.V.Jakutkin, S.P.Kotova, N.N.Losevskii, M.A.Rakhmatulin, V.G.Volostnikov, *Samara Branch of Lebedev Physical Inst., Russia.* Controlled transformation of TEM_{00} laser mode into the spiral beams by means of a ring resonator with a beam rotator is studied. The possibility of usage of spiral beams as light fields with non-zero orbital momentum for microobject manipulations is shown. Experimental results on the transmission of torque from these beams to particles captured by a laser beam are presented.

LME50
Room temperature laser action of erbium doped YLF crystals, A.Tkachuk, *Vavilov State Optical Inst., Russia,* M.Iskandarov, A.Nikitichev, *Inst. for Laser Physics, Russia.* Laser oscillation around 1.6 μm was realized at room temperature for Er:YLF crystal (1 at. %). The output energy of 22.5 mJ was achieved with slope efficiency about 30%. As a pump source was used a pulse Yb–Er glass laser emitted at 1.53 μm.

LME51
All-optical programmable 100 GHz phase modulation of narrow band nanosecond energetic pulses, S.Montant, X.Ribeyre, L.Videau, C.Rouyer, *CEA CESTA, France,* C.Sauteret, A.Migus, *Univ. Paris 6, France.* We experimentally demonstrate a pure optical scheme of phase modulation narrow bandwidth nanosecond energetic pulses. This leads to a 100 GHz programmable phase modulation and pulse shaping capability.

LME52
Effect of FBG on Er/SBS fiber laser performance, A.A.Fotiadi, P.Mégret, M.Blondel, *Faculté Polytechnique de Mons, Belgium.* 15-ns self-starting periodic pulsation caused by dynamical backscattering process in a fiber has been investigated with an Er-doped fiber laser at a 20–160 mW pump power. The use of a narrow bandwidth FBG in the fiber cavity improves the laser performance.

LME53
Mid-IR microchip gain switched and cw lasers based on ZnS and ZnSe chromium doped crystals, S.B.Mirov, V.V.Fedorov, K.Graham, I.S.Moskalev, *The Univ. of Alabama at Birmingham, USA,* V.V.Badikov, V.Panutin, *Kuban State Univ., Russia.* The spectroscopic measurements and the first CW and gain switched microchip lasing in ZnS:Cr^{2+} and ZnSe:Cr^{2+} crystals are reported with CW output power up-to 100mW (53% slope efficiency) and pulse energy up to 1 mJ.

LME54
Novel phase conjugating mirros with 10 W peak power threshold based SBS in yetterbium doped fiber amplifiers, Ch.Haenisch, A.Heuer, M.Ostermeyer, R.Menzel, *Univ. of Potsdam, Germany.* Low threshold phase conjugation is achieved by stimulated Brillouin scattering (SBS) in an active multimode Yb-doped fiber. With a probe pulse duration of 100 ns the obtained SBS-threshold of 1 μJ corresponds to a peak power of 10 W. Reflectivities of more than 1 are obtained.

LME55
Corrugated neat thin-film conjugated polymer distributed feedback lasers, A.Penzkofer, W.Holzer, *Univ. Regensburg, Germany,* T.Pertsch, N.Danz, A.Braeuer, *Fraunhofer Inst. für Angewandte Optik und Feinmechanik Jena, Germany,* H.-H.Hoerhold, H.Tillmann, C.Bader, *Univ. Jena, Germany.* The surface and edge emitting DFB laser action of Thianthrene-DOO–PPV thin films on corrugated second-order silica gratings is studied by transverse picosecond laser pumping. Low-threshold narrow-line emission in the green wavelength region is achieved.

LME56
Influence of self-focusing onto the reflectivity of a stimulated Brillouin scattering phase conjugate mirror, Seong Ku Lee, Dong Won Lee, Hong Jin Kong, *Korea Adv. Inst. of Sci. and Technology, Korea,* Young Sik Kim, *Dankook Univ., Korea.* We have found that the reflectivity of the Stimulated Brillouin Scattering phase conjugating mirror (SBS-PCM) is dependent on the pumping beam's characteristics. The single longitudinal mode gives no breakdown in the SBS-PCM medium in the pumping energy range up to 400mJ, while the multimode gives the serious breakdown at the pumping energy over 10mJ so that its reflectivity is lower than the single mode case. We investigate this phenomena in more detail and its result will be discussed in this paper.

LME57
Transition to complete synchronization in coupled Nd:YAG lasers, K.V.Volodchenko, M.Choi, Chil-Min Kim, *Pai Chai Univ., Korea,* Young-Jai Park, *Sogang Univ., Korea,* Gyu Ug Kim, *Kumoh Natl Univ. of Technology, Korea.* In mutually coupled cw Nd:YAG lasers, the transition from phase synchronization to complete synchronization without lag synchronization is observed as the coupling strength increases. We analyze the transition by using the phase difference.

LME58
Various types of synchronization of transverse laser modes, J.W.Ryu, K.V.Volodchenko, Chil-Min Kim, *Pai Chai Univ., Korea,* H.J.Her, G.M.Cho, *Sogang Univ., Korea,* G.U.Kim, *Kumoh Natl Univ. of Technology, Korea.* Multi-transverse mode spots of a cw Nd:YAG laser exhibit non, intermittent, anti-phase, phase, or complete synchronization according to the transverse mode and its input power. We analyze the behavior in an experiment.

LME59
Characteristics of the Nd:YAG laser system with stimulated Brillouin scattering phase conjugate mirror, Dong Won Lee , Seong Ku Lee, Hong Jin Kong, *Korea Adv. Inst. of Sci. and Technology, Korea,* Young Sik Kim, *Dankook Univ., Korea.* We report the characteristics of a Nd:YAG laser system with a stimulated Brillouin scattering phase conjugate mirror. The cavity structure can be changed between the plane-plane and confocal cavities. The spatial and temporal modes are investigated in detail depending on the cavity structure. These results are compared with the traditional laser cavity system with a conventional mirror.

LME60
Measurement of signal-to-noise ratio for a mixture of coherent and incoherent sources using digital sampling oscilloscope, Gyeong-il Kweon, Jung-ho Choi, Jiheon Jeong, *LG Cable Ltd., Korea.* Signal-to-noise ratio for a mixture of a laser signal with a narrow band amplified spontaneous emission source is directly measured using a digital sampling oscilloscope and found in good agreement with theoretical result.

LME61
Ferroelectric PVDF polymer light pipe for THz waves, T.Hidaka, H.Minamide, H.Ito, S.Maeta, T.Akiyama, *Shonan Inst. of Technology, Japan.* We developed a novel ligth pipe for THz electromagnetic waves using ferroelectric PVDF polymer as the wall material. The transmission efficiency of the PVDF light pipe was better than that constructed with Cu.

LME62
Microwave modulation characteristics of a dual-frequency laser diode, T.Hidaka, H.Ito, I.Morohashi, H.Shimura, *Shonan Inst. of Technology, Japan.* We report the microwave modulation characteristics of a dual-frequency DBR semiconductor laser diode. With injecting strong microwaves, one of the modes was enhanced and the other mode was reduced; the situation changed with the modulation frequency.

LME63
Phase-locking in multi-core fiber lasers, Jianqiu Xu, Junhua Lu, G.Kumar, Jianren Lu, K.Ueda, *Univ. of Electro-Commun., Japan.* Phase-locking in multi-core fiber lasers are investigated by coupled-mode theory. It is found phase-locking of the output field comes from the gain in coupling coefficients and enhanced by population saturation effects. The nonidentity bewteen the cores will suppress the phase locking.

LME64
Fabrication and operation of Er-Yb glass waveguide laser arrays at 1.5 micron, Gin Jose, *Mahatma Gandhi Univ., India,* G.Sorbello, S.Taccheo, R.Osellame, R.Ramponi, P.Laporta, *INFM-Politecnico di Milano&CEQSE-CNR, Italy,* V.Foglietti, E.Cianci, *IESS-CNR, Italy.* Waveguide laser arrays are fabricated on Er:Yb-doped phosphate glasses by a two-step ion exchange technique. Fiber-coupled single-mode output powers of ~1 mW are obtained at different wavelengths spanning the whole telecom C band between 1530–1565 nm.

LME65
High efficiency generation of the dye-doped polymer laser with 1.06 micron pumping, V.I.Bezrodnyi, Inst. of Phys., Ukraine, A.A.Ishchenko, *Inst. of Organic Chemistry, Ukraine.* For the first time the tunable lasing from the dye laser with the polymer active medium has been obtained with 1.06 micron pumping. The conversion efficiency of 43% and the tunable range of 63 nm have been reached with the use of polymethine dye in polyurethane matrix.

LME66
A versatile ultrashort pulse laser system and its potential applications, R.Danielius, A.Dubietis, A.Juozapavicius, A.Piskarskas, G.Tamoauskas, A.Varanavicius, *Vilnius Univ., Lithuania.* We present highly integrated pico/femtosecond Nd:glass laser system equipped with frequency up and down-conversion utilities which covers ultraviolet-to-infrared spectral range.

LME67
Intrinsic limits of the efficiency of erbium 3-μm lasers in q-switch regime, S.Georgescu, O.Toma, H.Totia, *Natl Inst. for Lasers, Plasma and Radiation Phys., Romania.* Mathematical modeling is used to find the intrinsic limits of the efficiency of Q-switched 3-μm erbium lasers. The low efficiency of these lasers could be significantly improved by adjusting the duration of the pump pulses.

LME68
Effect of axial external magnetic field on the output power, H.Ghomi, H.Latifi, B.Shokri, *Shahid Beheshti Univ. Iran.* Effect

of the external magnetic field on copper Bromide laser was studied. Variation of the output power in different charging voltage and gas pressure was measured. By applying external magnetic field (0.19 Tesla) on 14 kHz copper Bromide laser output power increases up to factor of 5.

LME69
High-energy single pulse and multispike operation with a passive polymer Q-switch, V.I.Bezrodnyi, *Inst. of Phys., Ukraine,* A.A.Ishchenko, *Inst. Of Organic Chemistry, Ukraine,* M.S.Mazloum, *Malek Univ., Iran.* High-energy single and multispike generations have been achieved from the neodymium laser with the use of polymer passive Q-switches. Temporal and energetic characteristics of the radiation have been studied. These regimes are suitable for applying in technological processes.

LME70
Research on optically pumped XeF(C-A) laser technology, Yu Li, Liu Jingru, Zhang Yongsheng, Hu Zhiyun, Yi Aiping, Ma Lianying, *Northwest Inst. of Nuclear Technology, China.* XeF(C-A) laser system has been designed. By using the method of photodissociation of XeF2, the maximum output energy of laser is 167mJ with the pulse duration of about 600ns and the emission spectrum is 470~490nm.

LME71
Theoretical analysis of limiting factors at third harmonic generation in barium vapors, A.I.Ryasnyansky, M.K.Kodirov, *Samarkand State Univ., Uzbekistan,* R.A.Ganeev, *NPO «Akadempribor», Uzbekistan.* This paper presents investigation results on theoretical analysis of the third harmonic generation in barium vapors. The limiting factors (Kerr effect, two-photon absorption and interference) are considered.

LME72
Tunable OPO for differential absorption LIDARs, G.M.Apresyan, V.S.Ayrapetyan, K.A.Sargsyan, T.K.Sargsyan, *"LT-PYRKAL" cjsc, Armenia.* Operatively controlled OPO on $LiNbO_3$ crystal is developed. Radiation wavelength tuning (1.4–1.8, 3-4um) and pulse-to-pulse shifting upto 200Å are realized. Radiation spectral width makes 3–4cm^{-1}. It is pressed up to 10 times through FP etalon.

LME73
High-energy parametric convertor based on KTP crystals, A.S.Galumyan, A.V.Hakobyan, K.A.Sargsyan, T.K.Sargsyan, *"LT-PYRKAL" cjsc, Armenia.* High-energy external cavity parametric oscillator on crystals KTP with eye-safe radiation wavelength 1.573um is developed. Pulse energy 60mJ at repetition rate 25 Hz is obtained. Parametric radiation divergence does not exceed 4mrad. Stable operation possibility is obtained.

LME74
Eye safe intracavity optical parametric oscillator pumped by passively Q-switched Nd:YAG slab laser, W.Zendzian, J.K.Jabczynski, J.Kwiatkowski, Z.Mierczyk, M.Skorczakowski, *Military Univ. of Technology, Poland.* 1.9 mJ energy and 0.65 MW peak power at 1572 nm was demonstrated in intracavity optical parametric oscillation with xcut KTP crystal in diode pumped Cr^{4+}:YAG passively Q-switched Nd:YAG slab laser. Five-fold shortening of pulse duration and doubling of peak power with respect to pump beam were achieved.

LME75
Output parameters and discharge stability of a non-chain discharge HF-lasers, V.M.Orlovskii, A.N.Panchenko, V.F.Tarasenko, *High Current Electronics Inst., Russia.* Laser action and discharge in gas mixtures of SF_6 with hydrogen and hydrocarbons are studied. Non-chain HF- lasers with specific output energy of 8,8 J/l (73 J/l?atm) and efficiency with respect to deposited energy of 5,5% were created. It was shown that formation and sustaining of volume discharge in gas mixtures containing large fraction of electronegative gases is determined by buildup of negative ions in conducting regions of the volume discharge.

LME76
Investigation of the state-to-state rotational relaxation rate constants for carbon monoxide (CO) using infrared double resonance, S.P.Phipps, T.C.Smith, G.D.Hager, *Air Force Res. Laboratory/Directed Energy Directorate, USA,* M.C.Heaven, *Emory Univ., USA,* J.K.McIver, W.G.Rudolph, *Univ. of New Mexico, USA.* State-to-state rotational relaxation of carbon monoxide (CO) has been studied using an IR-IR double resonance technique. The full room temperature CO-CO rotational relaxation matrix for rotational levels up to J=29 was deduced from computer simulations of the data.

LME77
InGaN/GaN violet-blue multiple quantum well heterostrucure lasers for temperature range of 80–450 K, M.Heuken, *AIXTRON AG , Germany.*

LME78
The analytical model of active medium and optimal resonator of CO-laser, I.I.Litvinov, *Scientific Council on Cybernetics RAS, Russia.* Similar to known models for four-level medium the compound analytical model of CO-laser is offered. This model may be useful for engineering calculations and for recalculation of real laser characteristics of active medium in experiments.

LME79
Q-switched Er:YAG radiation transmission through medical COP-coated silver hollow glass waveguide, A.Serafetinides, *Nat. Technical Univ. of Athens,Greece.*

LME80
Diffraction mirrors for generation of radial polarized beam in industrial CO_2 laser, V.G.Niziev, *ILIT RAS, Russia.*

LME81
1.7 THz tunable quasi-single mode grating stabilized diode laser in the 920 nm range, D.Bloch, M.Ducloy, G.Dutier, O.Lopez, *Univ. Paris-Nord, France,* A.Yarovitsky, *Lebedev Physical Inst., Russia.*

LME82
Simple sub-10 fs laser with a long Ti: Sapphire crystal, A.A.Babin, A.M.Kisilev, A.V.Kirsanov, N.P.Morozov, A.N.Stepanov, *Inst. of Appl. Physics, Russia.*

YMC · IQEC/LAT-YS I

YMC1
Self-starting oscillator with cavity completed by population grating: the influence of phase nonreciprocity, D.V.Chausov, O.L.Antipov, *Inst. of Appl. Phys., Russia,* M.J.Damzen, *Imperial College, UK.* The influence of phase nonreciprocity on the self-starting Nd:YAG oscillator with cavity formed by population grating has been studied experimentally and numerically. It is found that optimizing the phase nonreciprocity of the cavity results in a decrease in generation threshold and an increase in output power.

YMC2
Room-temperature luminescence of chromium ions in silica-based optical fibers, V.V.Dvoyrin, V.M.Mashinsky, V.B. Neustruev, E.M.Dianov, *General Phys. Inst., Russia,* A.N.Guryanov, A.A.Umnikov, M.V.Yashkov, *Inst. of Chemistry of High-Purity Substances, Russia.* Absorption and luminescence spectra of optical fibers with silica-based core doped with chromium are studied. For the first time, the broadband luminescence of Cr^{4+} and Cr^{3+} ions was observed at room temperature with the quantum yield up to 10 %.

YMC3
Spectral broadening of ultra-short pulses in gas medium by stimulated Raman scattering, E.V. Ermolaeva, *Inst. of Fine Mechanics and Optics, Russia,* V.G. Bespalov, *Vavilov State Optical Inst., Russia.* The influences of phaseself and cross modulation processes upon Stokes and pump waves spectra broadening during their propagation in Raman-active medium with different values of non-linearity coefficient is investigated.

YMC4
Influence of xenon and nitrogen admixtures on the radiation spectra of gas-discharge plasma at the working mixtures of HgBr/HgCl-laser, N.N.Guivan, A.N.Malinin, *Uzhgorod Natl Univ., Ukraine.* Influence the small admixtures of Xe and N_2 on the radiation spectra of pulse - periodic (1000 Hz) barrier and surface (occuring simultaneously) discharges at atmospheric pressure (121.6 kPa) on the working mixtures of the HgBr/HgCl-laser ($HgBr_2$ and $HgCl_2$ vapour with helium) has been investigated.

YMC5
Pulse dynamics of oxide confinement vertical cavity semiconductor lasers, V.Lysak, P.Ivanov, I.Sukhoivanov, *Natl Univ. of Radio Electronics, Ukraine.* In this work we investigate pulse behaviour of oxide confinement vertical cavity surface emitting laser for both main and side modes. It's shown that the relative pulse delay time difference between main and side modes is about 30%.

YMC6
The optical fiber laser on a incandescent lamp, N.G.Osipova, E.Z.Savin, *Far-Eastern State Transport Univ., Russia.* The opportunity of use of a tncandescent lamp is considered as a source of jump at creation of the optical fiber laser. The results received during research of experimental installation, confirm an opportunity of such realization.

YMC7
The ring laser on a fiber doping by chromium, N.G.Osipova, E.Z.Savin, *Far-Eastern State Transport Univ., Russia.* In work are given technology of creation of active fibers by a method of impregnation and results of research of the ring laser on the single mode fiber, doping by ions of transitive metal, namely chromium.

YMC8
The ring optical fiber converter, N.G. Osipova, E.Z.Savin, *Far-Eastern State Transport Univ., Russia.* In the present work the converter constructed on optical single mode fiber with a step structure of a parameter of refraction, doping by ions of transitive metal Cr^{3+} is investigated

YMC9
Applications of novel organometallic polymers with fast third-order optical nonlinearity, A.V.Afanas'ev, A.P.Zinov'ev, O.L.Antipov, A.I.Korytin, *Inst. of Appl. Phys., Russia,* L.G.Klapshina, J.Yu.Fominyh, *Inst. of Metallo-Organic Chemistry, Russia,* W.E.Douglas, *Université Montpellier II, France.* The third-order nonlinear optical properties of novel organometallic polymers have been studied. The electronic nonlinear optical susceptibility was found by picosecond z-scan technique. Optical switching was investigated in nonlinear resonators with polymers inside.

YMC10
New sub-Doppler absorption resonances in a thin gas cell by means of a running monochromatic wave, S.Ahmadi, H.Tajalli, *Tabriz Univ., Iran,* A.Ch.Izmailov, *Inst. of Photoelectronics, Azerbaijan.* Theoretical investigation is carried out through the interaction of the plane running monochromatic light wave, having an arbitrary intensity, with atoms (molecules) of a rarefied gas in the plane cell (at the normal incidence of the wave). Cases of the closed and open resonance transition from the nondegenerate ground (or metastable) quantum level are considered. Possible sub-Doppler resonances are analyzed in the wave absorption, caused by the transient establishment of the optical coherence on the transition, Rabi oscillations between its levels, and optical pumping during free flights of particles between walls of the cell. Obtained results can be used in the sub-Doppler spectroscopy and for the stabilization of laser frequencies in thin gas cells.

YMC11
Cavity solitons in a two-level laser in the presence of local field effects, V.Ahufinger, J.Mompart, R.Corbalan, *Univ. Autònoma de Barcelona, Spain,* J.Garcia-Ojalvo, M.C.Torrent, R.Vilaseca, *Univ. Politècnica de Catalunya, Spain.* We investigate local field effects on the spatio-

temporal dynamics of broad-area homogeneously broadened two-level lasers. In the presence of a Fourier filter, we show that laser emission can be in the form of cavity solitons.

YMC12
The dynamics of average time parameters of femtosecond pulses in transparent nonlinear media, D.L.Belov, Yu.A. Shpolyanskiy, S.A.Kozlov, *Inst. of Fine Mechanics and Optics, Russia.* Analytical expressions describing the dynamics of duration and center of mass of intense femtosecond pulses in transparent optical media are derived. A limited set of integral characteristics is found to determine exhaustively the scenario of pulse evolution in the medium.

YMC13
Spectra analysis of turbulent pulsation on data of intra-cavity four-wave mixing, S.A.Buyarov, Y.N.Zavalov, *IPLIT, Russia.* The spectra analysis of turbulent pulsation of active-medium flow on data of intra cavity four-wave mixing in FAF CO_2 laser was been performed. The estimation of boundary between inertial and viscous intervals was obtained.

YMC14
Colliding femtosecond pulses in a finite 1-d photonic crystal, N.Mattiucci, C.Sibilia, M.Bertolotti, M.Centini, G.D'Aguanno, *Univ. "La Sapienza" di Roma, Italy,* M.Scalora, M.Bloemer, C.M.Bowden, *U.S. Army Aviation & Missile Command, USA.* We describe novel propagation effects that characterise colliding pulses in one-dimensional photonic crystals. We show that it is possible to enhance or suppress stimulated processes, and consider second harmonic generation as an example.

YMC15
Spatial envelope of quadratic cavity soliton, O.A.Egorov, A.P.Sukhorukov, I.G. Zakharova, *Moscow State Univ., Russia.* Quadratic cavity soliton envelope is described as a superposition of a bulk soliton and plane wave background. Soliton parameters derived by the variation method are in a good agreement with the results of numerical simulation.

YMC16
Nonlinear interaction dynamics in molecular media with proton phototransfer, D.V.Gorbach, M.A.Kitsak, Yu.I.Miksyuk, *Belarusian State Univ., Belarus.* The interaction dynamics of light fields has been studied in Fabry-Perot interferometer and also under four-wave mixing in multicomponent solutions of complex organic compounds with proton phototransfer. The conditions for dynamic instability of the light fields have been determined. The relationship between the characteristics of self-oscillations and the parameters of acid-base balance has been demonstrated.

YMC17
Spectral method of solution the problem of femtosecond pulses three-wave interaction in nonlinear-optical crystals, S.S.Grechin, *Moscow State Univ., Russia.* The short-cut equations for the spectral method of investigation of the three-wave interaction process in nonlinear crystals are obtained in plane wave approximation for spectral complex amplitude. The limits of applying are mentioned.

YMC18
About the nature of the enhancement of the nonlinear optical response from metallic rough surface, N.A.Janunts, K.S.Bagdasaryan, Kh.V.Nerkararyan, *Yerevan State Univ., Armenia.* It is shown that during the propagation of a surface polariton through a system of two touching metallic semicylinders its wavelength decreases to zero and the strengths of the wave fields increase anomalously as it approaches to the edge of the groove.

YMC19
Dispersion-managed regimes of dissipative soliton lasers, A.K.Komarov, *Inst. of Automation and Electrometry, Russia.* The laser passive mode-locking with a frequency band limitation of resulting pulses due to an additional spectrum-dependent loss is analysed. The application of discovered multistability and hysteresis to optical communications and information processing is discussed.

YMC20
Exploration of the verges of application of paraxial approximation in self-focusing research, A.Kurasov, O.Bogumirsky, *Inst. of Fine Mechanics and Optics, Russia.* Results of the numerical calculation of self-focusing of monochromatic waves in paraxial and non-paraxial approximations are compared. It is shown that the main difference of the results is in the possibility of registration energy fading due to self-reflection phenomena in non-paraxial approximation, which is absent in paraxial approximation. Quantitative differences in spaces between the focuses and its sizes can reach 8%.

YMC21
Diffraction of waveguide modes on grating-like structure in copper-doped helium-implanted $LiNbO_3$ waveguide, Yu.M.Larionov, M.N.Frolova, S.M.Shandarov, *State Univ. of Control Systems and Radioelectronics, Russia,* S.M.Kostritski, *Kemerovo State Univ., Russia.* The results of experimental investigation of copper-doped helium-implanted optical waveguide formed on $LiNbO_3$ substrate are presented. Diffraction phenomena such as a diffraction of an excited mode into other modes and diffraction of leaky TM modes on a periodical structure of waveguide layer forming during the fabrication waveguides by proton and helium implantation were observed.

YMC22
Parametric interactions in a strongly coupled system "dense extended medium - resonant field" for the generation of ultrashort pulses, S.N.Bagayev, *Inst. of Laser Phys., Russia,* V.S.Egorov, I.B.Mekhov, P.V.Moroshkin, I.A.Chekhonin, *St-Petersburg State Univ., Russia.* Resonant parametric amplification of a broadband laser field was considered for the case of optically dense extended two-level medium. New spectral harmonics generated through the field–matter interaction can be used for the synthesis of ultrashort pulses under certain phase-locking condition.

YMC23
Investigation of high-speed dynamics of 1.55 μm InGaAsP/InP laser diodes, S.G.Rusov, *Stepanov Inst. of Phys., Belarus,* A.G.Ryabtsev, *Belarus State Univ., Belarus.* Numerical simulation of the evolution of the laser output power at the threshold of high-speed long wavelength laser diodes on the basis of non-stationary equations have been performed. The nonlinear dynamics characteristics were revealed.

YMC24
Investigation of nonlinear optical parameters of organic dyes, A.I.Ryasnyansky, M.K.Kodirov, *Samarkand State Univ., Uzbekistan,* R.A.Ganeev, R.I.Tugushev, T.Usmanov, *NPO Akadempribor, Uzbekistan*. The results of experimental measurements and theoretical calculations of nonlinear-optical parameters of organic dye vapors and solutions (naphthalene, paraterphenyl, anthracene, pentacene and tetracene) by the third harmonic generation and the Z-scan methods are presented. Third- and fifth-order nonlinear susceptibilities responsible for third harmonic generation, Kerr-induced third-order nonlinear susceptibilities and nonlinear refractive indices of organic dyes are measured and compared with theoretical results obtained by free-electron method.

YMC25
Optical limiting in amorphous chalcogenide films, A.I.Ryasnyansky, M.K.Kodirov, *Samarkand State Univ., Uzbekistan,* Uzbekistan, R.A.Ganeev, T.Usmanov, *NPO Akadempribor.* The characterization of nonlinear parameters of chalcogenide films (As_2S_3, $As_{20}S_{80}$, $2As_2S_3/As_2Se_3$, $3As_2S_3/As_2Se_3$) is presented. Their nonlinear refractive indices and two-photon absorption coefficients were measured by the Z-scan method. Optical limiting properties of chalcogenide films were investigated both experimentally and theoretically. It was shown 25-fold optical limiting for As_2S_3 film.

YMC26
Generalized strong interaction approximation in the theory of nonlinear interaction of phase-modulated laser pulses, U.K.Sapaev, I.A.Kulagin, T.Usmanov, *NPO Akadempribor, Uzbekistan.* The generalized method of strong interaction of nonlinear waves has been developed to analyse the influence of group velocity mismatch of phase-modulated laser pulse on efficiency of second harmonic generation taking into account influences of third order nonlinearities and divergence of fundamental radiation. It is shown that influence of the self-action effects and the divergence can result in increase the efficiency of the transient second harmonic generation of phase-modulated pulse.

YMC27
Second harmonic generation on semiconductor/oxide multilayer, L.Sciscione, C.Sibilia, E.Fazio, M.Bertolotti, *Univ. "La Sapienza" di Roma, Italy,* Y.Dumeige, J.A.Levenson, *CNRS UPR20, France,* A.Fiore, J.X.Chen, M.Ilegems, *Ecole Polytechnique Fédérale de Lausanne, Switzerland,* M.Scalora, *U.S. Army Aviation & Missile Command, USA.* We have experimentally demonstrated second harmonic generation in a 17-period $Al_{0.3}Ga_{0.7}As/Al_2O_3$ multilayer, photonic band gap structure.

YMC28
Nonparaxial dynamics of the space-time spectrum of ultrashort pulses in a transparent nonlinear medium, A.V.Sidorouk, *Inst. of Fine Mechanics and Optics, Russia.* We investigate theoretically the nonparaxial self-focusing of ultrashort pulses of light in a transparent isotropic nonlinear medium with dispersion. The new equation for the space-time spectrum dynamics of the nonparaxial radiation propagation is proposed.

YMC29
On the description of plasma nonlinearity of transparent optical media induced by high-intensive femtosecond pulses, S.A.Stumpf, A.A.Korolev, *Inst. of Fine Mechanics and Optics, Russia.* New model of dielectric media ionization dynamics in the field of intensive laser pulses is proposed. An enhanced wave equation, describing wide-spectrum femtosecond pulse propagation in nonlinear medium with induced plasma non-linearity, is obtained.

YMC30
Formation and interaction of photorefractive soliton arrays, D.Traeger, C.Denz, *Westfaelische Wilhelms-Univ., Germany,* J.Petter, *Technische Univ. Darmstadt, Germany.* We present experimental realizations of two-dimensional soliton arrays in a photorefractive nonlinear optical material, focusing on interaction among different solitons of the array. The stability of these configurations and their ability to guide waves is investigated.

YMC31
Dynamics of light-induced absorption in BTO crystals, M.I.Tsyrkan, E.Yu.Ageyev, A.M.Plesovskikh, A.A.Kazarin, A.E.Mandel, S.M.Shandarov, *State Univ. of Control Systems and Radioelectronics, Russia,* Yu.F.Kargin, A.V.Egorysheva, V.V.Volkov, *Kurnakov Inst. of General and Inorganic Chemistry, Russia.* Dynamics of light-induced absorption in BTO crystals grown from melt with different stoichiometric composition and doped BTO crystals was investigated. The experimental results were compared with theoretical three-level electron transport model, which includes the deep donors in three-valence state and the shallow traps.

YMC32
Stable vortex laser autosolitons with different topological charges, N.A.Veretenov, A.G.Vladimirov, *St-Petersburg State Univ., Russia,* N.N.Rosanov, S.V.Fedorov, A.N.Shatsev, *Inst. for Laser Phys., Russia.* We demonstrate the existence of stable vortex autosoliton solutions in the transverse section of a bistable laser. Stability domains of these solutions are calculated and scenarios of their break up are described.

YMC33
Optical limiting within capillary waveguides, J.J.Wathen, J.J.Butler, *US Naval Academy, USA,* J.S.Shirk, *US Naval Res. Lab., USA.* A study of the optical properties of nonlinear compounds housed within capillary waveguides is presented. The study concentrates on the optical limiting capabilities of nonlinear waveguides. Experimental samples are compatible with optical fiber systems.

YMC34
Novel chromophores as electro-optical component for photorefractive compositions, I.V.Yurasova, O.L.Antipov, N.L.Ermolaev, *Inst. of Appl. Phys., Russia,* I.G.Ilyina, *Moscow State Univ., Russia.* Electro-optical susceptibility of novel organometalic and organic materials with intramolecular charge transfer has been investigated. Promising materials for photorefractive compositions are determined. Two and four-wave mixing, and self-action of He-Ne laser beam at 633 nm have been studied in the created photorefractive compositions.

YMC35
Towards an optical cardio-magnetometer, G.Bison, S.Schwarzer, P.Sproll, A.Weis, *Univ. of Fribourg, Switzerland.* We develop a low-cost magnetometer, which is sensitive enough to detect the magnetic field of the human heart (resolution < 1 pT). The techique is based on an optical-r.f. double resonance in optically pumped Cs vapor.

YMC36
Spectroscopic applications of photodetachment microscopy, F.Goldfarb, C.Blondel, C.Delsart, *CNRS II, France.* Electrons photodetached from negative ions in an electric field produce interference patterns. We can perform high resolution spectroscopic measurements from such interferograms. Previously tested on atomic species, this method was recently applied to OH-molecules.

YMC37
Interferometric system for laser beam quality analysis, R.V.Grishayev, *IPLIT, Russia.* Hilbert transform-based processing algorithm was realized in software for phase retrieval from shearing interferograms with taking into account strongly irregular background illumination of intensity distribution of interferogram.

YMC38
Spectral and luminescence properties of Nd^{3+} ions in $SrWO_4$ and $BaWO_4$ crystals, O.K.Alimov, A.V.Komyakova, P.G.Zverev, I.S.Voronina, N.M.Polozkov, L.I.Ivleva, T.T.Basiev, V.V.Osiko, *General Phys. Inst., Russia.* Spectral and luminescent properties of Sr and Ba tungstate crystals with different Nd^{3+} concentration and excessive charge compensators were investigated at various temperatures (14 K, 77 K, 300 K). Several types of Nd^{3+} optical centers were discovered. High potential of these crystals for Raman applications was proved by laser experiments.

YMC39
Simulation of processes in bichromatic laser: New scheme of management by electrooptical locks, V.O.Ravodin, *Tomsk State Univ., Russia.* Processes in laser source of two-frequently radiation (or bichromatic laser) are stimulated. A electronic circuit of smooth cross management by electrooptical locks for minimization of time interval between lasers pulses is suggested.

YMC40
New technique of mass measurement based fiber optic current sensor, R.Wongsudin, P.P.Yupapin, *King Mongkut's Inst. of Technology Ladkrabang, Thailand.* New technique of standard kilogram i.e. mass measurement using optical and current sensors is presented. The metal bar mass is measured by using relative measurement between current and fiber birefringence where the induced current in the metal bar is related to the birefringence of the sensing fiber.

YMC41
Electromagnetically induced transparency in ?-system with a standing-wave drive, S.A.Babin, D.V.Churkin, E.V.Podivilov, V.V.Potapov, D.A.Shapiro, *Inst. of Automation and Electrometry, Russia.* Probe-field spectra are measured in ?-configuration with a standing-wave drive. The EIT peak appears split with increase of the drive intensity and/or detuning. Developed theory clarifies that the resonance is induced by the higher spatial harmonics of coherence.

YMC42
New excess noise reduction technique of quantum nondemolution measurements of optical solitons, D.A.Ivanov, *St-Petersburg State Univ., Russia,* V.V.Kozlov, *Univ. Ulm, Germany.* Quantum-nondemolition measurements of quantum solitons in optical fibers suffer from phase noise introduced by self-phase modulation. We propose the arrangement for homodyne detection, which is free of this noise.

YMC43
Supernarrow resonance and time oscillations of density matrix of 3-level atomic V-system driving in strong field, B.A.Karpichev, V.B.Smirnov, S.V.Uvarova, E.E.Fradkin, *St-Petersburg State Univ., Russia.* Time dependence of inversion and non-diagonal elements of density matrix interfernced by bi-chromatic field: strong one on a 1-2 transition and probe one on a 1-3 transition is considered. We use theoretical calculations in symmetric case of field distribution. Supernarrow resonance is observed under some conditions at the intermode distances of bi-fields.

YMC44
Phase sensitivity of parametric amplification at low frequency pumping, A.V.Nikandrov, A.S.Chirkin, *Moscow State Univ., Russia.* Quantum theory of parametric amplification of signal wave with frequency ? and 3? is presented. It is revealed that behavior of photon number and quadrature components on the frequency 3? depend on relation of pumping wave phase and signal phase.

YMC45
Information processes in echo-holography and multi-level quantum gate, I.A.Rusanova, L.A.Nefediev, *Kazan State Pedagogical Univ., Russia.* The information-theoretic formalism of research of the resonant multi-level system with phasememory is advanced. The process of transformation of the classical information, placed in an object laser pulse, in the potential (structural) quantum information of resonant multi-level system is investigated at record stimulated optical echo-hologram.

YMC46
Quantum counter propagation in one dimensional PBG structures, S.Severini, G.Cesaroni, C.Sibilia, M.Bertolotti, *Univ. "La Sapienza" di Roma, Italy,* M.Scalora, C.M.Bowden, *U.S. Army Aviation & Missile Command, USA.* In this work we have studied the quantum properties of one-dimensional PBG structure, as a quantum scattering process, in order to show the possibility of create entangled states. Our goal is to demonstrate the possibility of obtaining singlet or triplet entangled states, using a PBG in a particular Mach-Zehnder configuration.

YMC47
Entangled states of multicomponent Bose-condensate and single photon optical field, A.V.Prokhorov, A.P.Alodjants, S.M.Arakelian, *Vladimir State Univ., Russia.* In our paper we consider the problem of interaction and entanglement of multicomponent Bose–Einstein condensate with single photon optical pulse under the resonance condition. The quantum effect like collapse and revivals has been predicated for different regimes of interaction in the system.

YMC48
Anomalous laser cooling in nonuniform elliptically polarized field, O.N.Prudnikov, A.V.Taichenachev, A.M.Tumaikin, V.I.Yudin, *Novosibirsk State Univ., Russia.* Atomic kinetics in a field of $e-q-\bar{e}$ configuration, formed by counterpropagating waves with elliptical polarization is analyzed. We find that for the small detunung $|\delta| < \gamma$ there exists area of field parameters ε and θ where atom cooling is differ from well known cases of σ_+-σ_- and lin⊥lin field configurations. The laser cooling temperature is analyzed in this area as function of light waves ellipticities.

YMC49
Nonlinear dynamics of the atom-photon interaction in a cavity, V.Yu.Sirotkin, M.Yu.Uleysky, *Pacific Oceanological Inst., Russia.* Nonlinear dynamics of the atom-photon interaction in a high-Q cavity with a basic model of quantum and atom optics is studied theoretically and numerically. We demonstrate that different regimes of atomic motion, chaotic, intermittent with Levy flights, and regular, may occur under changing the atom-cavity detuning.

YMC50
Comparison of the approximation accuracy of quartz glass dispersion in the methods of slowly-varying envelope and slowly-varying profile, M.A.Bakhtin, S.Yu.Kolesnikova, *Inst. of Fine Mechanics and Optics, Russia.* The approximation accuracy of the linear dispersion of quartz glass in the slowly-varying envelope method and slowly-varying profile method is investigated. It was shown that slowly-varying profile approximation can be used for pulses with supercontinuum spectrum.

YMC51
Evolution of the ultrashort electromagnetic spike in a cubic nonlinear media, E.V.Kazantseva, *Moscow Engin. Phys. Inst., Russia.* The propagation of the ultrashort pulses with few cycles is considered in the framework of the Duffing model. Numerical simulations demonstrate that the high frequency pulses evolve as the breather-like pulses and they are very robust against collisions with steady-state one. Evolution of low frequency modulated pulse lead to conversion into quasiharmonic wave.

YMC52
Diffraction of a spherical wave from a circular aperture, M.Lebedev, *St-Petersburg State Univ., Russia.* The problem of diffraction of a spherical ultrashort pulse from a circular aperture using the methods of linear systems theory is considered. The pulse response of the optical system is obtained.

YMC53
Modeling of interaction of ultrashort laser pulses with dense clustered plasma at intensities above 10^{15} W/cm^2, I.Bogatyrev, A.B.Savel'ev, *Moscow State Univ., Russia.* We developed numerical code for direct simulation of interaction of super strong electromagnetic wave with group of clusters consisting of 10-100 ions each. We will present results on interaction dynamics for both single and multiple cluster case.

YMC54
Wave-packet description of multiphoton stimulated bremsstrahlung, M.A.Efremov, M.V.Fedorov, R.V.Karapetian, *General Phys. Inst., Russia.* Multiphoton stimulated bremsstrahlung of electron beam scattered at external static potential in the presence of an intense electromagnetic wave is considered. Incident electron wave functions are taken in the form of wave packets. Relationship between classical and quantum-mechanical (plane-wave) pictires is studied.

YMC55
Numerical simulations for propagation of superstrong femtosecond laser pulses in gas-filled capillary, D.V.Kartashov, *Inst. of Appl. Phys., Russia.* Spectrum transformation of high intensity femtosecond laser pulse in gas-filled dielectric capillary tubes is investigated numerically. Efficient pulse compression due to ionization self-phase modulation is predicted in medium with normal dispersion. Spectral and temporal characteristics of ionization harmonics of the driving pulse are studied.

YMC56
Plasma channel formation by axicon focusing of femtosecond laser radiation inside transparent dielectrics, A.Babin, D.Kartashov, D.Kulagin, A.Stepanov, *Inst. of Appl. Phys., Russia.* The numerical simulation of the axicon focusing of high-energy femtosecond radiation through the transparent dielectrics and the processes of a self-interaction and plasma generation

were made. The time dependence of a laser intensity and electron concentration at the axis of an axicon are presented. Spectral evolution also is investigated.

YMC57
Relativistic electromagnetic solitons in a hot quasi-neutral plasma, M.Passoni, M.Lontano, *Istituto di Fisica del Plasma "P. Caldirola", CNR, Italy,* S.Bulanov, *General Phys. Inst., Russia.* The one-dimensional model for the interaction of EM waves of relativistic amplitude with a multicomponent hot plasma is applied to the case of an electron-ion plasma. The scalings of the soliton characteristics is given and discussed.

YMC58
Modeling of hot dense laser plasma dynamics and its influence on low nuclear level photoexcitation, E.V.Petrova, M.A.Joukov, *Moscow State Univ., Russia.* Numerical simulation of photoexcitation of low energy nuclear levels in hot, dense laser-produced plasma is carried out. Obtained results identify hot electrons as the chief contributor to the excitation process.

YMC59
Formation of picosecond neutron pulses under interaction of femtosecond laser pulses with nanostructured solid targets, E.V.Rakov, M.A.Joukov, *Moscow State Univ., Russia.* Simulation of the neutrons generation dynamic in plasma produced by femtosecond laser pulses was realized. The influence of such parameters as initial deuterium concentration and temperature, plasma layer depth on neutron pulse duration was investigated. Finally good coincidence with experimental data was obtained.

YMC60
Femtosecond plasma expansion into background gas: shock wave formation and low energy nuclear isomers decay, A.A.Rusanov, *Moscow State Univ., Russia.* The influence of hydrodynamic expansion of plasma into background gas on plasma parameters (ionization degree, temperature, etc) and internal conversion decay is numerically studied.

YMC61
The estimation of parameters of femtosecond laser plasma from ionic current measurements, D.S.Uryupina, P.M.Mikheev, R.V.Volkov, *Moscow State Univ., Russia.* We designed algorithms based on 1D collisionless two-temperature hydrodynamic model allowing to assess thermal and hot electron mean energies, ratio of their concentrations and plasma charge state from ionic time-of-flight measurements.

YMC62
Transition and diffraction radiation: application for diagnostics of nanostructures, S.N.Dobrovolsky, N.F.Shul'ga, *Kharkov Inst. of Phys. and Technology, Ukraine.* The problem of application of transition and diffraction radiation by relativistic electrons for the nano-structures diagnostics is presented. We've showed that in the some regions of waves, the intensity of transition radiation is sufficiently depending from transversal size and shape of nanostructured target. The obtained results point to the possibility of using transition and diffraction radiation of electrons for the diagnostics of thin nanostructured films.

YMC63
Second-harmonic generation in anisotropically nanostructured silicon, L.P.Kuznetsova, L.A.Golovan, A.B.Fedotov, D.A.Sidorov-Biryukov, V.Yu.Timoshenko, P.K.Kashkarov, A.M.Zheltikov, *Moscow State Univ., Russia.* Second-harmonic generation is investigated in birefringent porous silicon films produced by anisotropic nanostructuring of (110) Si. The experiments and calculations have revealed phase matching for second-harmonic generation. The phase matching is tunable by porosity variation and by filling the pores with dielectrics.

YMC64
Thermally induced transmission variations in ZnSe/MgF_2 photonic band gap structures, M.C.Larciprete, C.Sibilia, S.Paoloni, G.Leahu, R.LiVoti, M.Bertolotti, *Univ. di Roma, "La Sapienza", Italy,* M.Scalora, *U.S. Army Aviation & Missile Command, USA.* We investigate thermally induced transmission variation in ZnSe/MgF2 multilayer structures in the 600–700nm range. The induced temperature increase produces thermal expansion and refractive index changes, thus giving a maximum transmission variation of 40% at 660 nm.

YMC65
Optical near-field microscopy of material with nanocrystalline semiconductor particles, A.B.Evlyukhin, A.Ye.Petrov, O.V.Griboedova, *Vladimir State Univ., Russia.* This work is devoted to the theoretical study of optical properties of nanocrystalline semiconductor objects in dielectric transparent materials by scanning near-field optical microscope.

YMC66
Ultrafast optical studies of carriers relaxation in self-assembled quantum dots, D.Riabinina, D.Morris, Ch.Doiron, D.Houde, *Univ. de Sherbrooke, Canada,* S.Fafard, *Alcatel Optronics Canada, Canada.* The carrier dynamics of the multilayer samples of self-assembled InAs/GaAs QDs has been investigated using time-resolved PL measurements. The modelisation of energy band structure alllows to estimate the importance of capture and relaxation proceses in these structures.

YMC67
Laser spectroscopy of semiconductor (CdSe) quantum wires and quantum dots, O.A.Shaligina, E.A.Zhukov, V.L.Lyaskovskii, *Moscow State Univ., Russia.* Time-resolved inhomogeneously broadened spectra of CdSe/ZnSe self-assembled quantum dots and CdSe quantum wires with dielectric barriers excited by laser pulses have been measured. The kinetics of the spectra and their changes at high excitation have been explained by the dependence of the recombination time upon the size of nanostructures and by state filling in quantum dots and phase space filling of excitons in quantum wires.

YMC68
Large magnetooptical Kerr rotation in photonic bandgap structure, M.V.Shuba, *Gomel State Univ., Belarus.* It has been studied peculiarities of laser beams transformation in multilayer system "magnetooptic periodic structure–defect layer–periodic structure". It has been grounded the opportunity of essential enhancement of magnetooptical Kerr rotation with achievement of high reflection.

YMC69
Manifestation of the Barnett-Loudon sum rule for spectral properties of complex multilayer structures, S.V.Zhukovsky, *Belarusian State Univ., Belarus.* The number of peaks in transmission spectra of arbitrary multilayer structures is found to solely depend on the structure's overall optical thickness, which proves analogous to Barnett-Loudon sum rule for modified spontaneous emission rate.

YMC70
Secondary electrooptical effect in photonic crystals and nanostructures, A.L.Zykov, *Gomel State Technical Univ., Belarus.* In the long-wave approximation it has been shown that the presence SEOE results in disappearance of electrooptical interaction at the certain ratio of thickness of NS components.

YMC71
Triplet-triplet annihilation fractal kinetics of aromatic hydrocarbons in polymers, V.V.Bryukhanov, A.N.Ivanov, I.G. Samoussev, *Kaliningrad State Techn. Univ., Russia.* Annihilation delayed fluorescence and phosphorescence of 1,2-benzantracene in polyvinylbutyrene and polystyrene film were studied as functions of time over temperature range from 80 to 360 K. Their long-time decays were analyzed in terms of two annihilation models: stationary annihilation and exciton random migrations on fractal polymer medium.

LMF · Laser Processing of Advanced Materials and Laser Microtechnologies

LMF1
Real time spatio-temporal instabilities for laser-induced hydrodynamic phenomena on the surface of condensed matters, V.G.Prokoshev, A.O.Kucherik, D.V.Abramov, I.I.Klimovskii, A.F.Galkin, S.M.Arakelian, *Vladimir State Univ., Russia.* The experimental study in a real time for laser-induced hydrodynamic phenomena has been carried out by the laser brightness amplifier. New effects of spatio-temporal instabilities have been observed. The mathematical modeling of hydrodynamic instabilities on surface of melted material has been carried out by the methods of nonlinear dynamics and fractal geometry.

LMF2
Luminescence of metallic films, resulting from micro-destruction of surface layer under action of laser pulses, A.F.Banishev, V.Ya.Panchenko, A.V.Shishkov, *IPLIT, Russia.* The paper presents the results of studying the luminescence of metallic films from Cu, Ti, Al, Mo exposed to millisecond and submicrosecond laser pulses, as well as to combined action of two laser pulses. The mechanism of luminescence excitation explains by reactions of structural defects interaction as the result of plastic deformation and microdestruction of a material.

LMF3
Formation of unstable structural defects on silicon surface under submicrosecond laser action, A.F.Banishev, V.S.Golubev, A.Yu.Kremnev, *IPLIT, Russia.* The paper presents an investigation of reversible and irreversible structural defects in the thin surface layer of monocrystalline silicon under the action of short laser pulses in different gases and in vacuum. Emission of particles, that accompanies the surface destruction, is also studied.

LMF4
Power CW CO_2-laser plasmatron for CVD of diamond, A.P.Bolshakov, V.I.Konov, S.A.Uglov, *General Phys. Inst., Russia,* F.Dausinger, *Univ. Stuttgart, Germany.* Novel nonvacuum CW CO_2-laser plasma CVD technique was proposed and experimentally realised. The results of parametric investigations of the laser plasma stability and diamond films deposition conditions are discussed.

LMF5
Plasma effects during ablation and drilling using ultrashort pulsed solid-state lasers, D.Breitling, A.Ruf, P.Berger, F.Dausinger, *Univ. Stuttgart, Germany,* S.M.Klimentov, T.V.Kononenko, P.A.Pivovarov, V.I.Konov, *General Phys. Inst., Russia.* Plasma and vapor plumes have been studied by various optical methods (time-resolved shadow and resonance absorption photography, transmission measurements; spectroscopy) for both single pulse ablation as well as high-repetition rate drilling with ultra-short laser pulses.

LMF6
Optical guiding along Gaussian and Bessel light beams, A.Carruthers, S.A.Tatarkova, V.Garces-Chavez, K.Dholakia, *Univ. of St Andrews, UK,* K.Volke-Sepulveda, S.Chavez-Cerda, *INAOE, México.* We present detailed data for guiding microscopic particles in a Bessel light beam. Bessel light beams offer significantly extended guiding distances compared with Gaussian beams. A counter-propagating geometry shows elongated 1D array of trapped spheres.

LMF7
Peculiarities of laser-induced volume destruction of materials, Yu.A.Chivel, *Inst. of Molec. and Atomic Phys., Belarus.* The results of experimental and theoretical investigations of volume destruction of materials under the pulsed laser action are considered. Low-threshold character of ablation is interpreted on the basis of developed model. The possible mechanism of reduction of destruction critical

parameters when passing to nanosize defects is proposed.

LMF8
Optical characteristics and parameters of laser plasma on the basis of $CuSbS_2$ and $CuInS_2$ compounds, A.K.Shuaibov, L.L.Shimon, M.P.Chuchman, A.I.Dashchenko, I.E.Kacher, *Uzhgorod Natl Univ., Ukraine.* The emission of plasma formed at influence of a beam of the neodymium laser on a polycrystalline fusion mixture of the $CuSbS_2$ and $CuInS_2$ was investigated. Existential characteristics of emission, the temperature and density of electrons of the laser plasmas specify a prevailing role of dissociative and dielectron recombination processes, self-absorption in population of the excited levels of copper, antimony and indium atoms.

LMF9
Self-channeling of femtosecond visible laser pulse with microjoule energy and micromodification in transparent target, E.A.Chutko, V.M.Gordienko, B.A.Kirillov, S.A.Magnitskii, A.A.Shashkov, R.V.Volkov, *Moscow State Univ., Russia.* We observed self-channeling of a single femtosecond visible laser pulse in the bulk of fused silica. The filament length and diameter versus pulse power have been measured. The laser-induced micromodification was close to the filament form.

LMF10
Transfer of electronic excitation energy and secondary processes in the media used for optical limiting, M.V.Gryaznova, O.V.Chistyakova, V.V.Danilov, A.I.Khrebtov, A.G.Kalintzev, T.A.Shahverdov, *Inst. for Laser Phys., Russia.* Influence of electron excitation energy transfer and secondary effects, occurred under action of laser radiation, on dynamics and efficiency of optical limiting is discussed. Two different systems, operating on effects of two-photon absorption and reverse saturable absorption, are considered as an example.

LMF11
Laser-magnetron deposition of nitride material thin layers, B.K.Kotlyarchuk, D.I.Popovych, V.K.Savchuk, A.S.Serednytski, Pidstryhach *Inst. for Appl. Problems of Mechanics and Mathematics, Ukraine.* The cycle of works on optimization of technology of fabrication thin nitride materials (AlN, AlN:Mn) is carried out depending on conditions and process of their condensation and investigation mechanical stresses in system AlN-Al_2O_3.

LMF12
Transmission of a laser pulse through opaque liquids, S.I.Dolgaev, A.V.Simakin, G.A.Shafeev, *General Phys. Inst., Russia.* Beam propagation of a free-running erbium laser through opaque liquids is experimentally investigated. It is shown that the propagation of laser pulse through liquids owns to formation of a vapor channel formed by the beam itself.

LMF13
Laser cutting of advanced materials, V.D.Dubrov, I.O.Bazyleva, M.G.Galushkin, V.S.Golubev, N.G.Dubrovin, E.A.Dubrovina, V.A.Karasev, Yu.N.Zavalov, *IPLIT, Russia.* Results of CO_2-laser cutting of advanced materials (special steels, ceramics, nuclear reactor alloys) are presented. It was found experimentally and by theoretical modeling that there exist specific optimal values of the LC parameters enabling the energy - and quality - effective process.

LMF14
Marking of materials by CO_2 laser beam scanning, C.Blanaru, R.Cernat, L.Chitu, D.C.Dumitras, *Natl Inst. for Laser, Romania.* We present experimental results on marking technology of natural, synthetic and biological (vegetal or animal) materials, with a low power CO_2 laser beam coupled to a PC controlled optical scanner.

LMF15
Modification of titanium and titanium nitride by IR and UV lasers irradiation, A.V.Fedenev, I.M.Goncharenko, N.N.Koval', V.M.Orlovskii, V.F.Tarasenko, S.B. Alekseev, M.A.Shulepov, *High Current Electronics Inst., Russia.* Color of the surface was observed to be changed from bright yellow to red and dark-blue with irradiation of titanium surface depending on the accumulated laser radiation energy and wavelength. The presented results testify to a possibility of this effect implementation for obtain of cbt raster images (colored images as well).

LMF16
Laser welding of aluminium by combined radiation, A.V.Fedin, I.V.Shilov, Ye.A.Chaschin, *Kovrov State Techn. Academy, Russia.* A laser welding of aluminium by combined radiation of two Nd:YAG lasers is proposed, theoretically studied, and experimentally tested. A train of nanosecond Megawatt pulses imposes on the forward front of a microsecond Joules pulse. The 1.5–2 times increase of welding depth and 2–2.5 times decrease of seam porosity was confirmed.

LMF17
Interaction model for near infrared pulsed laser sintering of metal powders, P.Fischer, V.Romano, H.P.Weber, *Univ. of Bern, Switzerland.* The densification processes occurring in metallic powders upon interaction with pulsed laser radiation have been studied experimentally and compared with results obtained from a numerical simulation model. The analysis of the sintered samples shows consolidation features, which are in very good agreement with the model predictions.

LMF18
Multilayered films deposition from pulsed laser plume in a high-intensity electrostatic field, V.Yu.Fominski, V.N. Nevolin, A.L.Smirnov, I.V.Kostichev, *Moscow State Engin. Phys. Inst., Russia.* Pulsed laser deposition in a uniform electrostatic field was used to grow multilayered $^{56}Fe/MoS_2/^{57}Fe$ films. This method was recognized to be promising for the efficient intermixing processes thus initiating the new chemical bond formation in the interfacial layers.

LMF19
Surface alloying of metals by nanosecond laser pulses under transparent overlays, I.Smurov, *Ecole National d'Ingénieurs de Saint-Etienne, France,* A.Smirnov, V.Fominski, *Moscow State Engin. Phys. Inst., Russia.* Laser irradiation of thin film/substrate system through a transparent overlay produces a region of a high vapor pressure over the surface, thus providing a good contact at the film/substrate interface and significantly retarding vaporization of the film. A decrease in the thermal resistance of the interface, a strong overheating of the melt, and reduced energy losses in the vaporization processes—all these factors give rise to variation in the basic parameters determining alloys formation.

LMF20
Laser welding of sheet steels, using filler wire, V.D.Shelyagin, V.P.Garashchuk, V.Yu.Khaskin, *Paton Electric Welding Inst., Ukraine.* Use of filler wires of 0.8–1.0 mm diameter is proposed for laser welding of sheet steels 0.5–2.0 mm thick to simplify and reduce the cost of preparatory operations (for instance, edge abutment), as well as eliminate a number of defects of weld formation.

LMF21
Laser-induced phase transformations in GaAs, S.P.Zhvavyi, G.D.Ivlev, E.I.Gatskevich, D.N.Sharaev, *Inst. of Electronics, Belarus.* The melting and crystallization processes induced in monocrystalline GaAs under ruby laser irradiation in air and transparent liquid media have been studied by means of time-resolved reflectivity and pyrometric measurements and by numerical simulation.

LMF22
Remote metals cutting by radiation of two lasers, A.F.Glova, S.V.Drobyazko, *TRINITI, Russia.* An efficient remote metals cutting at simultaneous action of the radiation of cw CO_2 laser and pulse-periodical YAG:Nd laser is possible. Specific energy outlays are close to the values at treatment by fine-focused radiation of pulse-periodical CO_2 lasers.

LMF23
The laser treating of metal and transparent dielectrics as a method of structure changes operating, A.N.Chumakov, *Inst. of Molec. and Atomic Phys., Belarus,* A.Yu.Ivanov, V.A.Liopo, S.V.Vasilyev, *Grodno State Univ., Belarus.* Changer in atomic and molecular structure of solids caused by irradiation with laser pulses were investigated. The effects of ordering in amorphous matrix and disordering in cluster region at certain specific laser radiation energies were obtained.

LMF24
Phase transformations induced in amorphous silicon by excimer laser pulse irradiation, G.D.Ivlev, E.Gatskevich, *Inst. of Electronics, Belarus.* The kinetics of laser-induced phase transitions in amorphous Si layer have been studied by time-resolved reflectivity measurements and by numerical modeling. It has been established the final phase can be amorphous, amorphous with crystal nucleuses or polycrystalline in dependence on laser energy density and number of pulse.

LMF25
Influence of the base preheating on the cracking effect of laser-cladded coatings, R.Jendrzejewski, G.Sliwinski, *Inst. of Fluid-Flow Machinery, Poland,* A.Conde, J.de Damborenea, *CENIM/CSIC, Spain.* For stellite coatings on the chromium steel base prepared by means of a direct laser remelting of metal powder the experimentally observed microcracking depends on the base preheating and the effect is modelled and discussed.

LMF26
Experimentally research on pulsed excimer laser deposited films, Jingru Liu, Ting Bai, Tiejun Li, Dongsheng Yao, Lige Wang, *Northwest Inst. of Nuclear Technology, China.* The large area of Diamond Like Carbon films (DLC) were deposited by the pulsed excimer lasers. The effect of laser plasma characteristics on the film quality was given. The amorphous silicon film deposited by laser was also studied.

LMF27
Decomposition of bis (acetylacetonato) copper (II) under action of laser radiation, V.S.Kazakevich, G.V.Krjuchkova, A.L.Petrov, G.N.Popkov, *Lebedev Physical Inst., Russia,* V.N.Serezhkin, I.A.Martynov, *Samara State Univ., Russia.* Decomposition of bis(acetylacetonato) copper(II) under the influence of radiation of CW oxygen-iodine laser and radiation of pulse -periodic EBCD CO-laser and formation both the pure copper, and copper oxide(II) are investigated.

LMF28
Laser induced structure transformations of diamonds, V.I.Konov, V.V.Kononenko, T.V.Kononenko, S.M.Pimenov, P.Fischer, V.Romano, H.P.Weber, A.V.Khomich, R.A.Khmelnitskiy, *General Phys. Inst., Russia.* Results are reported on the laser-induced graphitization of CVD diamond plates and laser annealing of ion-implanted diamond single crystals using nano- and picosecond pulses of excimer lasers and basic and higher harmonics of YAP:Nd laser.

LMF29
Laser-induced chemical deposition generated microstructures, Liu Libing, Zhao Yi, Li Minghui, *Natl Die & Mold CAD Engin. Res. Center, China.* A new technique named Laser-induced Chemical Liquid Deposition based Rapid Prototyping (LCLD&RP) is proposed. The Laser-induced Chemical Vapor Deposition based Rapid Prototyping (LCVD&RP) process has been used in for several years, and it has faced some critical problems in deposition rate and facility cost. To overcome these shortcomings, the feasibility of LCLD&RP is discussed and demonstrated.

LMF30
The development of a model of destruction of heterogeneous materials under the action of laser radiation, V.V.Lyubimov, Yu.Gaidakov, *Tula State Univ., Russia.* The laser destruction model of heterogeneous materials is developed. This model contains the description of heat transfer process, phase transformation on the material surface and separation of the material components. Simulation of laser ablation showed that speed of destruction is defined by the value of heat

dissipation into the material and size of the ruined components.

LMF31
Processes of energy transfer in Ga-Ge-S:Er^{3+} chalcogenide system, A.A.Ma-n'shina, T.Yu.Ivanova, A.V.Kurochkin, Yu.S.Tver'yanovich, V.B.Smirnov, *St.Petersburg State Univ., Russia.* Estimations of the nonradiative and multiphonon relaxation rates for Ga-Ge-S:Er system demonstrate the occurrence of energy transfer from Er^{3+} ion to the electronic states of glass matrix. The way of the practical application of this phenomenon (the realization of spectral selective infrared emission detector) is suggested.

LMF32
Laser distillation synthesis of crystalline MoO_3. V.M.Marchenko, D.I.Murin, *General Phys. Inst., Russia,* V.V.Koltashev, S.V.Lavrishchev, V.G.Plotnichenko, *General Phys. Inst., Russia.* Continuous laser distillation synthesis of MoO_3 was realized by irradiation of molybdenum foil in atmosphere by cw CO2-laser. Monocrystalline crystallites of up to 500x200x5 μm^3 were evidenced by x-ray microanalysis, scanning electron microscopy and Raman spectroscopy.

LMF33
Comparative analysis of optical breakdown kinetics of atomic nitrogen and carbon vapor, V.I.Mazhukin, *IMM, Russia,* M.V.Mazhukin, *Moscow State Univ., Russia.* The time of optical breakdown in evaporated carbon and atomic nitrogen is numeri-cally calculated using the models of kinetic nonequilibrium ionization. Modeling showed that for relatively low intensities $G<10^{12}$ W/cm^2 the optical breakdown occurs earlier in carbon, while for high $G>10^{12}$ W/cm^2 it does in nitrogen.

LMF34
Generation of optoacoustic pulse in the target under short laser irradiation, V.I.Mazhukin, *IMM, Russia,* N.M.Belyakova, *Moscow State Univ., Russia.* Hydrodynamic type of Stephan problem is used to model generation and propagation of optoacoustic pulses, carrying information about heating dynamics and phase transformations of the media in the laser treatment of Si.

LMF35
The role of capillary thermo-concentration instability in light interaction with solutions, V.S.Mayorov, *IPLIT, Russia.* Capillary thermo-concentration instability is realized in heterogeneous systems. Thermodynamic analysis for solutions shows the existence of wide range where surface tension grows with temperature. This instability causes processes of mass transfer, relaxations, redistribution of components.

LMF36
Laser-induced transparency, S.N.Andreev, A.A.Samokhin, *General Phys. Inst., Russia.* Steady state laser vaporization regime of condensed matter is investigated in the case of laser-induced transparency in irradiated targets. Vaporization front stability problem is also considered taking into account bulk absorption in the target and different Mach number in evaporation plume.

LMF37
Pulsed laser deposition of $MoSe_x$(Ni)/a-C tribological coatings, V.N.Nevolin, V.Yu.Fominski, R.I.Romanov, A.L.Smirnov, *Moscow State Engin. Phys. Inst., Russia,* W.Scharff, *Inst. fuer Umweltanalysen, Germany.* There were studied tribo-induced both chemical and structural changes occurred in the $MoSe_x$(Ni)/a-C antifrictional coatings that were formed by pulsed laser deposition under varied conditions. The influence of these parameters on the wear resistance of the coatings was investigated.

LMF38
Erosion plume characteristics determination in ablation of metallic copper, niobium and tantalum targets, O.A.Novodvorsky, O.D.Khramova, E.O.Filippova, *IPLIT, Russia,* C.Wenzel, J.W.Bartha, *Dresden Univ. of Technology, Germany.* The erosion plume resulting from ablation of copper, niobium and tantalum targets in vacuum with excimer laser irradiation (308 nm) was studied using Langmuir probe and optical emission spectroscopy. The ion and atom velocities, the ion velocity distribution, the electron temperature of different plume regions were determined. An acceleration of tantalum ions with CO_2 laser irradiation has been studied.

LMF39
Continuous motion of interference patterns using the angular Doppler effect, L.Paterson, M.P.MacDonald, J.Arlt, W.Sibbett, K.Dholakia, *St.Andrews Univ., UK,* K.Volke-Sepulveda, *INAOE, México.* We achieve stable optical frequency shifts from below 1 Hertz to hundreds of Hertz using the angular Doppler effect. These shifts are used to create continuous motion of interference patterns to manipulate optically trapped particles.

LMF40
Condensation of Au atoms on graphite surface during pulsed laser deposition, M.A.Pushkin, A.V.Zenkevich, V.N.Tronin, V.I.Troyan, V.N.Nevolin, *Moscow Engin. and Phys. Inst., Russia,* D.O.Filatov, G.A.Maximov, *Nizhny Novgorod State Univ., Russia.* Pulsed laser deposition of Au submonolayer coatings on pyrolitic graphite surface results in the formation of two-dimensional nanoclusters with fractal boundaries as revealed by scanning-tunneling microscopy. The theoretical model describing the mechanism of surface nucleation under extremely high deposition rates is presented.

LMF41
The features of melt flows in a shallow pool in presence of radiation of pulse periodic laser, G.G.Gladush, S.V.Drobyazko, N.B.Rodionov, Yu.M.Senatorov, L.I.Antonova, *TRINITI, Russia.* Experimental, numerical and theoretical investigations are carried out to study the features of non-closed melt flows in a shallow pool under the action of vapors and gravity. In transparent liquid in presence of pulse periodic laser irradiation flows of higher intensity generated in the center of the focus spot and directed deep into the pool are studied.

LMF42
Self-organized 3D structures under laser evaporation of solids: formation and properties, S.I.Dolgaev, A.V.Simakin, V.V.Voronov, G.A.Shafeev, *General Phys. Inst., Russia.* Formation of self-organized 3D structures under laser irradiation of solids (Si, Ge, etc.) by sufficiently long sequence of nanosecond laser pulses of order of 104. At laser fluence close to the melting threshold this leads to appearance of an array of micro-cones on the solid surface that protrude above the surface.

LMF43
Laser deposition of luminescence active Er^{3+} doped chalcogenide glass films, E.N.Borisov, V.B.Smirnov, O.A.Sokolova, A.S.Tverjanovich, Yu.S.Tverjanovich, *St-Petersburg State Univ., Russia.* The setup for deposition of chalcogenide films doped with rear-earth ions by excimer laser ablation are discussed. Physical-chemical and optical (including luminescence) properties of deposited film of system Ga-Ge-S-Er comparatively bulk glass are reported.

LMF44
Application of near infrared pyrometry for CW Nd:YAG laser welding of stainless steel and laser cladding of stellite, Ph.Bertrand, I.Smurov, M.Ignatiev, *Ecole Nationale d'Ingénieurs de St Etienne, France,* D.Grevey, *Lab. Traitement des Matériaux, France.* A bi-dimensional monochromatic and a 1-spot multiwavelengths pyrometers were applied for surface temperature monitoring (dynamics of temperature gradients, transient periods and steady-state temperature distribution) in Nd:YAG CW laser welding, cladding and micro-cladding.

LMF45
Sensitive surface cleaning using excimer laser scanner, K.-H.Steglich, H.Harde, *Univ. der Bundeswehr Hamburg, Germany.* We present a surface cleaning system using galvo mirrors together with a KrF-excimer laser for removal of environmental and radioactive contaminations adhering on the top of sensitive surfaces.

LMF46
Introduction in laser thermodynamics of motive forces of light, A.Sukhodolsky, *General Phys. Inst., Russia.* The communication is to introduce the laser thermodynamics of motive forces of light as the fundamentals to the problem of available conversion efficiency in a new generation of the engineering both propulsion and power systems.

LMF47
Pulsed laser ablation synthesis of nanosized particles in liquid media, V.A.Ageev, V.S.Burakov, A.F.Bokhonov, M.I.Nedel'ko, V.A.Rozantzev, N.V.Tarasenko, *Inst. of Molec. and Atomic Phys., Belarus.* The fabrication of metallic nanosized powders with a narrow size distribution based on pulsed laser ablation in liquid environment is described. The correlation between the emission characteristics of ablated plume and properties of fabricated powders is discussed.

LMF48
Precipitation of thin metal film by laser radiation, D.T.Alimov, B.I.Gainullin, S.A.Ubaidullaev, *Heat Phys. Dep. of the Academy of Sci. of Uzbekistan, Uzbekistan.* It has been experimentally shown that laser radiation can carry into effect as an annealing of non-homogeneous surface as surface development and also to receive the films with orientated roughness in dependence on regime.

LMF49
UV laser induced photolysis and desorption of molecules adsorbed on transparent substrates, V.N.Varakin, A.P.Simonov, *Karpov Inst. of Phys. Chemistry, Russia.* The excitation spectra for UV dissociation of adsorbed molecules was shown to resemble gaseous ones, while the long-wavelength edge for resonant photodesorption occurred to be noticeably red-shifted compared with that for radiation absorption by gaseous molecules.

LMF50
Two-dimensional nanoscale patterning of fused silica, polyimide and diamond-like films, Yu.K.Verevkin, V.V.Korolikhin, V.N.Petryakov, N.M.Bityurin, *Inst. of Appl. Phys., Russia,* N.G.Bronnikova, *'Salyut-Micro', Russia,* Yu.Yu.Guschina, D.O.Filatov, *Univ. of Nizhny Novgorod, Russia.* Specific features of structure formation with four coherent XeCl laser beams at the surfaces of different materials are investigated. In polyimide, phase modification takes place. On quartz, a relief providing phase changes of passed radiation is created.

LMF51
Formation of nanocrystals in a-Si:H films under excimer laser treatments, M.D.Efremov, V.A.Volodin, S.A.Kochubei, *Inst. of Semicond. Phys., Russia,* V.V.Bolotov, *Inst. of Sensor Microelectronics, Russia,* D.V.Marin, *Novosibirsk State Univ., Russia.* Selforganization of nanocrystals in aSi films under excimer laser treatments were studied using Raman spectroscopy. Dependence of nanocrystal size and concentration on parameters of laser treatments was experimentally studied and numerically simulated.

LMF52
Laser-induced structure defects and their influence on the HgTe-CdTe properties, A.O.Zaginey, B.K.Kotlyarchuk, Y.E.Syvenkyy, *Inst. of Appl. Problems of Mechanics and Mathematics, Ukraine.* This paper examines the experimental researches of structural defect generation in HgTe-CdTe after pulse laser treatment and the influence of these defects on mechanical, optical and galvano-magnetic properties of the samples.

LMF53
High-precision laser installation for the forming of 3-D well-ordered structured of defect centers inside the transparent dielectrics, Yu.V.Zaporozhchenko, A.V. Karankevitch, N.A.Tylets, V.V.Zavideev, *JV "LOTIS TII", Belarus.* Technical parameters of the four channel installation on the basis of 100 Hz Nd:YAG laser prepared for the serial production, have been represented. Controlling software, algorithms of optimi-

zation, software for discretization and decomposition of 3-D objects on geometrical primitives has been developed.

LMF54
Raman estimation of purity and thermal conductivity of single-wall carbon nanotube soot based on laser heating effect, S.V.Terekhov, E.D.Obraztsova, V.I.Konov, A.S.Lobach, *General Physics Inst., Inst. of Problems of Chem. Physics, Russia,* U.Dettlaff-Veglikowska, S.Roth, *Max-Planck-Inst. für Festkörperforschung, Germany.*

LMF55
Laser-induced oxidation of single-wall carbon nanotubes produced by disproportionation of carbon monoxide, S.N.Bokova, E.D.Obraztsova, S.V.Terekhov, *General Physics Inst., Russia*, U.Dettlaff-Veglikowska, S.Roth, *Max-Planck-Inst. für Festkorperforschung, Germany.*

LMF56
Pulsed laser deposition of oxides with the aid of radio frequency discharge, V.Marotta, S.Orlando, G.D'Amico, G.P. Parisi, *CNR—Istituto per i Materiali Speciali, Italy,* A.Giardini, A.Paladini, *Univ. "La Sapienza", Italy.* We report on the radio frequency assisted laser ablation deposition of thin films of tungsten, zinc, zirconium oxides, suitable for electronic and optical applications. The experiments were carried out in a stainless steel vacuum chamber.

QMK · Special Symposium on Entangled States

QMK1
Atom-photon entanglement, K.Suacke, J.Volz, M.Weber, C.Kurtsiefer, H.Weinfurter, *Ludwig-Maximilians-Univ. Muenchen, Germany.* We report on first experimental steps towards the proof of entanglement between a single Rubidium atom atom and the emitted photon performing a Bell-type experiment in a microscopic optical dipole trap.

QMK2
Ultrafast generation of two-photon entangled states using two non-linear crystals, G.Di Giuseppe, M.Atatüre, M.Shaw, Ying-Tsang Liu, A.Sergienko, B.E.A.Saleh, M.C.Teich, *Boston Univ., USA.* Quantum interference experiments with two-photon states generated by spontaneous parametric down-conversion of an ultra-short pump pulse impinging on two nonlinear optical crystals are investigated. In particular, we analyze the influence of the frequency and wave-vector distributions on the visibility of the fourth-order polarization interference pattern and its connection with the polarization entanglement.

QMK3
Minkowskian invariants of multi-photon Stokes tensors, G.Jaeger, M.Teodorescu-Frumosu, A.Sergienko, B.E.A.Saleh, M.C. Teich, *Boston Univ., USA.* We show that there is an invariant scalar, the quantum Stokes scalar, corresponding to the Stokes four-vector length for single photons, and that the generalization of the Stokes parameters to the case of multiple, entangled photons gives rise to a previously unknown Minkowskian tensors yielding new "n-photon Stokes scalars."

QMK4
Refractive-index measurements using quantum interference of entangled-photon pairs, M.Atatüre, Ying-Tsang Liu, G.Di Giuseppe, A.V.Sergienko, B.E.A.Saleh, M.C.Teich, *Boston Univ., USA.* We present a novel interferometric technique for refractive-index measurements on liquid and gaseous media. This technique relies on coincidence-detection of photon pairs generated by spontaneous parametric down-conversion from cascaded nonlinear crystals.

Conference Hall JOINT				

8:30–10:20
JTuA · Prokhorov and Basov Memorial Session
S.N.Bagayev, Inst. of Laser Physics, Russia, *Presider*

JTuA1 · 8:30
Alexander M. Prokhorov: A great scientist and enjoyable personality, Ch.H.Townes, *Univ. of California at Berkeley, USA*. (will be presented by the session presider)

JTuA2 · 8:40
Physics of high-power laser–transparent solids interaction in ultrashort time domain, A.A.Manenkov, *General Physics Institute, Russia.*

JTuA3 · 9:05
Solid-state lasers with energy transfer processes in the gain medium, G.Huber, *Univ. Hamburg, Germany*, I.A.Scherbakov, *General Physics Inst., Russia.*

JTuA4 · 9:30
Coherence and lasers, A.N.Oraevsky, *P.N.Lebedev Physical Inst., Russia.*

JTuA5 · 9:55
Academician Basov: the Father of inertial fusion. A scientific and human approach, G.Velarde, *Polytechnical Univ. of Madrid, Spain.*

10:00–10:30 COFFEE BREAK

10:00–10:30 COFFEE BREAK

Conference Hall — JOINT

10:30–12:30
JTuD · IQEC/LAT Tutorials III
O.Svelto, *Politechnico di Milano, Italy, Presider*

JTuD1 · 10:30 · TUTORIAL LECTURE
Atom and nanoparticles, V.S.Letokhov, *Inst. of Spectroscopy, Russia.* Modification of spectral properties (frequency and rate of spontaneous emission, dipole-dipole interaction) of atomic in near vicinity and inside of nanobody of various shapes will be considered. Theoretical and experimental results will be reviewed.

Hall 1 — LAT

10:30–12:15
LTuA · Solid-State Lasers II
E.M.Dianov, *General Physi. Inst., Russia, Presider*

LTuA1 · 10:30 · INVITED
Cr^{2+} lasers, S.Kueck, E.Heumann, *Univ. of Hamburg, Germany.* An overview about the research in the field of lasers based on the tetrahedrally coordinated Cr^{2+} as active ion will be given. Recent results on the laser characteristics in different host materials will be presented.

LTuA2 · 11:00
Ultralow-pump-threshold laser diode pumped Cr:LiSAF laser, V.Kubecek, *Czech Technical Univ., Czech Republic,* J.-C.Diels, R.Quintero, *Univ. of New Mexico, USA.* Operation of laser diode pumped Cr:LiSAF laser with extremely low pump-threshold equal to 650 uW using modified single stripe 50 um diode was demonstrated. Performance of the laser in mode-locked regime using semiconductor saturable absorber will be reported.

Hall 2 — IQEC

10:30–12:30
QTuA · Photonic Crystals
C.M.Bowden, *U.S. Army Aviation&Missile Research, Development, and Engineering Ctr, USA, Presider*

QTuA1 · 10:30 · INVITED
Dynamic nonlinear effects in photonic band gap structures, J.W.Haus, *Univ. of Dayton, USA.* This talk summarizes recent collaborative results on enhanced nonlinear phenomena in one-dimensional photonic crystals. Of special interest are applications to optical limiting and modulation instabilities, and harmonic generation in planar waveguide structures.

QTuA2 · 11:00
Nonlinear generation of very high order UV modes in microstructured fibers pumped with femtosecond oscillator, A.Efimov, F.G.Omenetto, A.J.Taylor, *Los Alamos Natl Lab., USA,* J.C.Knight, W.J.Wadsworth, Ph.St.J.Russel, *Univ. of Bath, UK.* We report generation of high-order spatial modes in the UV range through nonlinear frequency conversion of the femtosecond 800 nm radiation in microstructured fibers. The process is distinct from supercontinuum generation and is sensitive to fiber tip morphology.

Hall 3 — JOINT

10:30–12:30
JTuB · Postdeadline Papers I
TBA, *Presider*

Hall 4 — JOINT

10:30–13:00
JTuC · New Diagnostics Techniques
A.V.Priezzhev, *Moscow State Univ., Russia, Presider*

JTuC1 · 10:30 · INVITED
Spectroscopic and light scattering diagnostic techniques, L.T.Perelman, E.Vitkin, Hui Fang, I.Itzkan, *Harvard Univ., USA.* Spectroscopic techniques can be used to diagnose early cancer in various tissues. In this talk we will discuss light scattering spectroscopy capable of characterizing structural properties of tissue on cellular and sub-cellular scale.

JTuC2 · 11:00 · INVITED
Optics of blood and laser diagnostics of cardiovascular and oncology diseases, A.V.Priezzhev, G.P.Petrova, Yu.M.Petrusevich, A.M.Saletsky, A.Yu.Tyurina, A.V. Boiko, V.L.Voeikov, K.N.Novikov, E.B.Buravliova, V.B.Koshelev, O.E.Fadyukova, *Moscow State Univ., Russia.* Alterations of optical properties in samples of whole blood, diluted suspensions of RBCs, and blood serum were studied with static and dynamic light scattering, laser diffractometry, chemoluminometry, and other techniques, in relation to experimentally induced cerebral ishemia in rats and car-

Hall 5 IQEC	Hall 6 IQEC	Room 1 LAT		
10:30–12:30 **QTuB · Laser-Electron Scattering, X-Ray and Fast Particles Generation** M.V.Fedorov, *General Phys. Inst., Russia, Presider*	**10:30–13:00** **QTuC · Symposium on Entangled states: Fundamentals and Applications IV** V.N.Zadkov, *Moscow State Univ., Russia, Presider*	**10:30–12:30** **LTuB · Symposium on Adaptive Optics for High-Power Lasers I** A.Kudryashov, *Inst. of Laser and Inf. Technologies, Russia, Presider*		
QTuB1 · 10:30 · INVITED ***Laser astrophysics,*** H.Takabe, *Osaka Univ., Japan.* The physics of production of relativistic dense laser plasmas and antimatter plasmas in laboratories is reviewed. Possible laboratory experiments modeling strong-field astrophysical phenomena are described.	**QTuC1 · 10:30 · INVITED** ***Is entanglement a resource for quantum metrology?,*** P.Tombesi, *Univ. di Camerino, Italy.* It will be shown how and under which conditions it is possible to improve the measurement sensitivity of a weak force by using two meters in an entangled state.	**LTuB1 · 10:30 · INVITED** ***Multi-stage Ti:Sapphire laser with closed-loop adaptive optical system—modification of intensity profile and correction of wavefront distortions*,** H.Baumhacker, G.Pretzler, K.J.Witte, M.Hegelich, M.Kaluza, *Max-Planck-Inst. for Quantum Optics, Germany*, S.Karsch, A.Kudryashov, V.Samarkin, A.Roukossouev, *Inst. of Laser and Inf. Technologies, Russia.*		
QTuB2 · 11:00 ***The Kapitza-Dirac effect; diffractive and Bragg scattering,*** D.Freimund, K.Aflatooni, H.Batelaan, *Univ. of Nebraska-Lincoln, USA.* We report the observation of the Kapitza-Dirac effect for electrons. Results for both diffractive and Bragg scattering will be presented. The possibility to use this effect for electron interferometry will be discussed.	**QTuC2 · 11:00 · INVITED** ***Quantum properties of non-linear interferometers,*** G.Leuchs, N.Korolkova, O.Gloeckl, C.Silberhorn, F.Koenig, *Univ. Erlangen-Nuernberg, Germany.* Quantum interferometry with fiber solitons is presented. The soliton quantum noise is controlled using the non-linear Kerr effect. Linear or non-linear coupling of interacting pulses is exploited in interferometric setups for high-precision measurements and entanglement generation.	**LTuB2 · 11:00 · INVITED** ***Prospects of an adaptive mirror system for high intensity laser experiments with the MBI-multi-terawatt Ti:Sa laser***, P.V. Nickles, M.Schnerer, S.Ter Avetisyan, S. Busch, E.Gubbini, U.Eichmann, A.Kudryashev, A.Alexandrov, M.Kalashnikov, H.Schonnagel, W.Sandner, *Max-Born-Inst., Germany, and ILIT RAS, Russia.*		

Conference Hall JOINT	Hall 1 LAT	Hall 2 IQEC	Hall 3 JOINT	Hall 4 JOINT
10:30–12:30 **JTuD · IQEC/LAT Tutorials III—Continued**	**10:30–12:15** **LTuA · Solid-State Lasers II—Continued**	**10:30–12:30** **QTuA · Photonic Crystals—Continued**	**10:30–12:30** **JTuB · Postdeadline Papers I—Continued**	**10:30–13:00** **JTuC · New Diagnostics Techniques—Continued**
	LTuA3 · 11:15 ***Diode-pumped 1.3-mm Nd:KGd(WO$_4$)$_2$ laser passively Q-switched with PbS- and PbSe-doped glasses,*** V.G.Savitski, N.N.Posnov, A.M.Malyarevich, K.V.Yumæshev, *Inter.Laser Center, Belarus,* A.A.Lipovskii, *St.-Petersburg State Tech.Univ., Russia.* Passive Q-switching of 1.35 mm diode-pumped Nd:KGd(WO4)2 laser with PbS- and PbSe-quantum dots-doped phosphate glasses and kinetics of bleaching for these materials are presented.	**QTuA3· 11:15** ***Self-phase modulation and enhanced spectral broadening of 40-fs Ti: sapphire laser pulses in photonic-molecule modes of a cobweb microstructure fiber,*** A.N.Naumov, A.M.Zheltikov, *Moscow State Univ., Russia,* P.Zhou, V.Temnov, A.P.Taevitch, D.von der Linde, *Univ. Essen, Germany,* V.I.Beloglazov, N.B.Skibina, A.V.Shcherbakov, *Inst. of Glass Struct. Technology and Equipment, Russia.*		diovascular and oncology diseases in human patients.
JTuD2 · 11:30 · TUTORIAL LECTURE ***Precision measurements in gravitational physics,*** V.B.Braginsky, *Moscow State Univ., Russia.* The goal and the key elements of the laser interferometer gravitational wave observatory are presented. The most serious problems, which define the achievable sensitivity of the gravitational wave antennas, are listed.	**LTuA4 · 11:30** ***Cr^{4+}-doped garnet crystals for Q-switching of Nd-lasers,*** V.B.Tsvetkov, D.A.Nikolaev, I.A.Shcherbakov, *General Phys. Inst., Russia,* I.A.Ivanov, A.M.Bulkanov, *R&D Inst. for Materials Res., Russia.* Growth and annealing technology for Cr^{4+}-doped garnets is developed. We show the influence of preparation technology for Cr^{4+}-crystals to operation characteristics as passive Q-switches of Nd-lasers.	**QTuA4· 11:30** ***Giant third-harmonic generation in porous silicon photonic crystals and microcavities,*** M.G.Martemyanov, T.V. Dolgova, A.A.Fedyanin, O.A.Aktsipetrov, *Moscow State Univ., Russia.* Experimental angular spectrum of the third-harmonic radiation generated in microcavities grown from porous silicon photonic crystals shows enhancement by three orders of magnitude in the vicinity of the microcavity mode and at the photonic band gap edges.		**JTuC3 · 11:30 · INVITED** ***Speckle-correlation diagnostics of non-stationary mass transfer and structural transitions in tissues,*** D.Zimnyakov.
	LTuA5 · 11:45 ***Influence of temperature dependent excited state absorption on a broadly tunable UV Ce:LiLuF laser,*** K.S.Johnson, D.W.Coutts, *Oxford Univ., UK.* Polarized emission and excited state absorption (ESA) cross-sections of Ce:LiLuF$_4$ are reported. At 327 nm π-polarized operation gives best results because the ESA cross-section is lower, despite the lower gain cross-section for this polarization.	**QTuA5· 11:45** ***Optical chaos in nonlinear photonic crystals,*** K.N.Alekseev, *Univ. of Oulu, Finland,* A.V.Ponomarev, *Krasnoyarsk State Univ., Russia.* We examine spatial evolution of lightwaves in a photonic crystal with a quadratic nonlinearity when simultaneously a second harmonic and a sum-frequency generation are quasi-phase-matched. We show that the multiwavelength generation is often chaotic.		

Hall 5 IQEC	Hall 6 IQEC	Room 1 LAT		
10:30–12:30 **QTuB · Laser-Electron Scattering, X-Ray and Fast Particles Generation—Continued**	**10:30–13:00** **QTuC · Symposium on Entangled states: Fundamentals and Applications IV—Continued**	**10:30–12:30** **LTuB · Symposium on Adaptive Optics for High-Power Lasers I—Continued**		
QTuB3 · 11:15 · INVITED ***Generation and transport of fast electrons in laser matter interaction at relativistic intensities,*** F.Amiranoff, S.D.Baton, L.Gremillet, M.Koenig, E.Martinolli, J.J.Santos, O.Guilbaud, C.Rousseaux, M.Rabec Le Gloahec, T.Hall, D.Batani, E.Perelli, F.Scianitti, CNRS-CEA-Ecole Polytechnique-Paris VI, France.				
	QTuC3 · 11:30 · INVITED ***Efficient linear optical quantum computation,*** A.G.White, T.B.Bell, N.K.Langford, G.J.Milburn, J.L.O'Brien, G.J.Pryde, T.C.Ralph, *Univ. of Queensland, Australia.* Efficient linear-optical quantum computation offers the possibility of a scaleable quantum logic architecture using linear optics and single photon sources. We discuss both the key concepts and our efforts towards its experimental realisation.	**LTuB3 · 11:30 · INVITED** ***Wavefront correction for diffraction-limited focal spot on 80 J/1 ns laser facility,*** J.Fuchs, B.Wattellier, H.Bandulet, P.Michel, J.P.Zou, J.C.Chanteloup, C.Labaune, A.Michard, *Univ. Paris VI, Ecole Polytechnique, France,* S.Depierreux, *CEA-DAM, France,* A.Kudryashov, A.Aleksandrov, *IPLIT, Russia.* Using a closed-loop Adaptive Optics (AO) technique implemented on the LULI six-beam high-energy (100 J, 1 ns) Nd:Glass laser facility we are able to improve the wavefront quality in order to obtain focal spot close to the diffraction limit.		
QTuB4 · 11:45 ***Relativistic ponderomotive forces and method of laser-driven electron acceleration insensitive to field phase,*** A.Bahari, V.D.Taranukhin, *Moscow State Univ., Russia.* Polarization dependence of relativistic ponderomotive forces is theoretically predicted and confirmed with numerical simulations. New method of laser-driven electron acceleration with high-intensity two-polarized laser beam, on the basis of this effect, is proposed and studied.				

Conference Hall — JOINT

10:30–12:30
JTuD · IQEC/LAT Tutorials III—Continued

Hall 1 — LAT

10:30–12:15
LTuA · Solid-State Lasers II—Continued

LTuA6 · 12:00
Overview of Nd:YAP laser emission at 1.34 nicron under flashlamp (pulsed mode) and diode-pumping (cw and Q-switched mode), J.P.Boquillon, O.Musset, M.Boucher, *Univ. de Bourgogne, France.* Nd:YAP overpasses all other materials for emission around 1.3 mm. We present results obtained under flashlamp-pumping: maximum power 60 W, overall efficiency up to 4.6% and under CW diode-pumping: maximum power 6W and 30% optical efficiency (CW). Acousto-optics Q-switching is also realized.

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Hall 2 — IQEC

10:30–12:30
QTuA · Photonic Crystals—Continued

QTuA6 · 12:00
Theory of propagation of powerful monochromatic radiation in photonic band gap structure with third order nonlinearity, V.A.Bushuev, A.D.Pryamikov, *Moscow State Univ., Russia.* We have investigated an interaction of powerful monochromatic radiation with nonlinear photonic band gap structures and built up a theory that describes its propagation in the one.

QTuA7 · 12:15
Equations for spectral supercontinuum generation in microstructure fibers, S.A.Kozlov, Yu.A.Shpolyanskiy, *Inst. for Fine Mech. and Optics, Russia.* New field and spectral equations adequate for femtosecond spectral supercontinuum generation in microstructure (photonic-crystal) fibers are derived. Various phenomena accompanying and causing spectral ultrabroadening of femtosecond pulses are investigated numerically depending on input pulse parameters and fiber properties.

Hall 3 — JOINT

10:30–12:30
JTuB · Postdeadline Papers I—Continued

Hall 4 — JOINT

10:30–13:00
JTuC · New Diagnostics Techniques—Continued

JTuC4 · 12:00
Dynamical spectroscopy to analysing of sizes of clusters of medical interests, A.N.Korolevich, *Stepanov Inst. of Phys., Belarus,* N.P.Prigun, *Medical Inst., Belarus.* We investigated the possibilities of employing the method of photon-correlation spectroscopy for analysing the changes in he sizes of biological clusters in normal and sick people. We analysed the spectra of intensity fluctuation of light scattered by large (whole blood erythrocytes) and small (surgical bile vesicles) clusters under native conditions and diseases.

JTuC5 · 12:15
Numerical simulation of laser beam propagation through suspension of aggregating particles, A.V.Priezzhev, V.V.Lopatin, O.E.Fedorova, *Moscow State Univ., Russia.* Two different theoretical approaches were used to calculate the phase functions of single erythrocytes and their aggregates. With the help of these functions the indicatrice of a plane whole blood layer was obtained by means of angle-resolved Monte-Carlo simulation for 633 nm wavelength of incident light.

JTuC6 · 12:30
Investigation of the biomechanics of microhemocirculation by a phase-sensitive laser method, S.N.Bagayev, V.N. Zakharov, A.L.Markel, Yu.D.Obraztsov, V.A.Orlov, S.V.Panov, A.A.Parygin, Yu.N.Fomin, *Inst. of Laser Phys., Russia.* A phenomenon of formation of an acoustic field in the lumen of microvessels unknown before has been detected. High-frequency oscillations of arterioles, capillaries, and venules occur at microhemocirculation. This effect forms the basis of transcapillary exchange providing gas exchange and nourishment of the organism at the cellular level.

Hall 5 IQEC

10:30–12:30
QTuB · Laser-Electron Scattering, X-Ray and Fast Particles Generation —Continued

QTuB5 · 12:00
Charge distributions of atomic ions after irradiation of large Xe clusters by a super-intense ultrashort laser pulse, V.P.Krainov, *Moscow Inst. of Phys. and Techn., Russia,* M.B.Smirnov, *Max-Born Inst., Germany.* The evolution of large (10^6 atoms) Xe clusters irradiated by super-intense (10^{18} W/cm^2) femtosecond laser pulse is considered. We derive the inner and outer multiple ionization, and also the Coulomb expansion of the cluster. Charge distribution of atomic ions produced by collision ionization is calculated.

QTuB6 · 12:15
Near diffraction limited high-contrast 10 terawatt laser, V.Yanovsky, S.-W.Bahk, C.Felix, N.Saleh, P.Rousseau, V.Chvykov, G.Mourou, *Univ. of Michigan, USA.* We report on development of high contrast diffraction limited 10 TW Ti::Sapphire laser. The laser consists of only 2 amplifiers: high-energy regenerative amplifier and cryogenically cooled 4-pass amplifier.

Hall 6 IQEC

10:30–13:00
QTuC · Symposium on Entangled states: Fundamentals and Applications IV—Continued

QTuC4 · 12:00
Decoherence-free proposal to generate the paradox of Schrodinger's cat using continuous variable entanglement, M.D.Reid, *The Univ. of Queensland, Australia.* I propose to reveal macroscopic entanglement through proof of Einstein-Podolsky-Rosen correlations using measurements with macroscopically distinct outcomes. For certain states, the paradox of the Schroedinger cat, a defiance with macroscopic reality, is predicted.

QTuC5 · 12:15
The Einstein-Podolsky-Rosen paradox, entanglement and quantum cryptography, M.D.Reid, *The Univ. of Queensland, Australia.* Criteria sufficient to demonstrate the Einstein-Podolsky-Rosen paradox are used to prove security where Alice and Bob construct a key using continuous variable Einstein-Podolsky-Rosen correlated fields sent from a distant source.

QTuC6 · 12:30 · INVITED
Quantum searching-with and without entanglement, M.O.Scully, M.S.Zubairy, *Texas A&M Univ., USA.* Schemes based on resonant and dispersive atomic interactions with the fields fort quantum searching of unsorted data will be presented. Implementatation of quantum logic gates for quantum searching will also be discussed.

Room 1 LAT

10:30–12:30
LTuB · Symposium on Adaptive Optics for High-Power Lasers I—Continued

LTuB4 · 12:00 · INVITED
Novel diode pumped laser cavities with intracavity beam shaping, J.Bourderionnet, A.Brignon, J.-P.Huignard, *Thomson-CSF, France.*

				Hall 4 JOINT

10:30–13:00
JTuC · New Diagnostics Techniques—Continued

JTuC7 · 12:45
Application of holographic interferometer "CONUS" to prosthetic dentistry, A.Larkin, I.Lebedenko, R.Levin, M.Grosmann, D.Skulanov, V.Shchepinov, *Moscow Engin. Phys. Inst., Russia, Univ. Louis Paster Lab. des Systemes Photoniques, France.* New method of holographic interferogram interpretation is proposed. It is based on the use of holographic interferometer "Conus", which increases tangential component determination sensitivity. This interferometer was used for substantiation of new dental bridge construction.

12:30–14:00 LUNCH (on your own)

	Hall 6 IQEC			
	10:30–13:00 **QTuC · Symposium on Entangled states: Fundamentals and Applications IV—Continued**			

12:30–14:00 LUNCH (on your own)

Conference Hall — IQEC/LAT-YS

14:00–16:00
YTuA · IQEC/LAT-YS Keynote Lectures VI
A.M.Zheltikov, *Moscow State Univ., Presider*

YTuA1 · 14:00 · KEYNOTE LECTURE
New opportunities of investigating phase transformations and lattice dynamics using femtosecond X-ray pulses, D.von der Linde, *Univ. Essen, Germany.* New X-ray sources that emit bursts of multi-kilovolt radiation of femtosecond duration have become available. These ultrashort X-ray pulses enable X-ray diffraction experiments with femtosecond time resolution to be carried out and allow observation of ultrafast changes in the atomic structure.

Hall 1 — IQEC

14:00–16:00
QTuD · Excimer and Semiconductor Lasers
Y.Arakawa, *Osaka Univ., Japan, Presider*

QTuD1 · 14:00
Liquid xenon excimer laser, A.G.Molchanov, *Lebedev Phys. Inst., Russia.* The history and characteristics of a first excimer liquid xenon laser are considered. The modern theory and new possibilities of condensed rare-gas VUV excimer lasers are discussed.

QTuD2 · 14:15
High power and efficient ArF and KrF excimer lasers on He:Ar(Kr):F_2 gas mixture, S.N.Bagayev, A.M.Razhev, A.A.Zhupikov, E.S.Kargapoltsev, *Inst. of Laser Phys., Russia.* The high-voltage excitation circuit of LC-inverter type for pumping the ArF and the KrF excimer lasers on the He:Ar(Kr):F_2 gas mixture has been performed. Maximum output up to 0,85 J (ArF) and 1,1 J (KrF) was achieved.

QTuD3 · 14:30 · INVITED
Quantum dot lasers and VCSELs for telecom applications, V.M.Ustinov, *Ioffe Phys.-Tech. Inst., Russia.* We discuss MBE growth and characteristics of a laser active region based on InAs/GaAs quantum dots. We also show spectral, threshold, and output power characteristics of QD edge-emitting lasers and VCSELs grown on GaAs substrates.

Hall 2 — IQEC

14:00–16:00
QTuE · Nonlinear Beam Dynamics
A.P.Sukhorukov, *Moscow State Univ., Russia, Presider*

QTuE1 · 14:00
Oscillation induced motion, D.Michaelis, *Fraunhofer Inst. für Angew. Optik und Feinmechanik, Germany,* U.Peschel, F.Lederer, *Friedrich-Schiller-Univ., Germany,* D.V.Skraybin, *Univ. of Bath, UK,* W.J.Firth, *Univ. of Strathclyde, UK.* Based on symmetry arguments a theory is developed to describe the transition from resting to moving solitary waves near Hopf bifurcations in dissipative systems. Theoretical results are compared with numerical simulations for different nonlinear systems.

QTuE2 · 14:15
Noncollinear interaction of optical beams with vortices in nonlinear medium, V.Pyragaite, K.Regelskis, V.Smilgevicius, A.Stabinis, *Vilnius Univ., Lithuania.* A noncollinear interaction (degenerate four-wave mixing) of two singular beams in Kerr nonlinear medium is investigated. It is demonstrated that vorticity of diffracted beams significantly depends on the topological charges of pump beams.

QTuE3 · 14:30
Diffraction and polarization phenomena, N.N.Rosanov, S.V.Fedorov, P.I. Krepostnov, *Res. Inst. for Laser Phys., Russia.* We analyze diffraction and polarization phenomena with laser beam propagation through linear and quadratically nonlinear media with anisotropy of refractive index and absorption/amplification (dichroism). Dichroism changes the nature of diffractive spreading, and refractive index anisotropy mixes ordinary and extraordinary components of quadratic solitons.

Hall 3 — IQEC

14:00–16:00
QTuF · Femtosecond Synthesizers and High-Resolution Spectroscopy
V.S.Letokhov, *Inst. of Spectroscopy, Russia, Presider*

QTuF1 · 14:00 · INVITED
Stabilization of modelocked lasers for optical frequency metrology, S.T.Cundiff, T.M.Fortier, D.J.Jones, J.Ye, *JILA, Univ. of Colorado and NIST, USA.* Recent progress combining frequency-domain laser stabilization with femtosecond technology has allowed stabilization of the carrier-envelope phase. This has led to dramatic improvements in optical frequency metrology and promises to substantially impact time-domain experiments.

QTuF2 · 14:30 · INVITED
Femtosecond optical clock with the use of a frequency comb, S.N.Bagayev, S.V. Chepurov, V.I.Denisov, A.K.Dmitriyev, A.S.Dychkov, V.M.Klementyev, D.B.Kolker, I.I.Korel, S.A.Kuznetsov, Yu.A.Matyugin, M.V.Okhapkin, V.S.Pivtsov, M.N.Skvortsov, V.F.Zakharyash, *Inst. of Laser Phys., Russia,* T.A.Birks, W.J.Wadsworth, P.St.J.Russell, *Univ. of Bath, UK.* The results of investigations of the femtosecond optical clock based on optical frequency standards, Ti:Sapphire femtosecond laser, and tapered fiber are presented. Some blocks of the setup, i.e., the precise frequency measurement system and the tapered fiber are studied.

Hall 4 — JOINT

14:00–16:15
JTuE · Spectroscopic Techniques
A.Yu.Chikishev, *Moscow State Univ., Russia,* and A.A.Stratonnikov, *General Phys. Inst., Russia, Presiders*

JTuE1 · 14:00 · INVITED
Application of laser induced fluorescence spectroscopy for quantification of photosensitizers in tissues in vivo, A.A.Stratonnikov, N.V.Ermishova, V.B.Loschenov, *General Phys. Inst., Russia.* The paper address the problem of evaluation concentration of dyes applied for photodynamic therapy in tissues in vivo. Laser induced fluorescence spectroscopy and standard samples simulating tissue optical properties are used to solve the problem.

JTuE2 · 14:30 · INVITED
Early detection of the carious conditions by laser-induced fluorescence spectroscopy, E.G.Borisova, A.I.Gisbreht, L.A.Avramov, *Inst. of Electronics, Bulgaria,* Tz.T.Uzunov, *Medical Univ., Bulgaria.* Informative spectral changes of the tooth pre-carious stages are observed by the method of laser-induced fluorescence spectroscopy, which shows a perspective possibility to create an inexpensive detection system with wide clinical applications.

Hall 5 IQEC	Hall 6 IQEC	Room 1 LAT		
14:00–15:45 **QTuG · Lasing and Optical Transitions in Nanostructures** T.Itoh, *Osaka Univ., Japan, Presider*	**14:00–16:15** **QTuH · Symposium on Quantum Nucleonics I** A.V.Andreev, *Moscow State Univ., Russia, Presider*	**14:00–16:30** **LTuC · Symposium on Adaptive Optics for High-Power Lasers II** P.Nickles, *Max-Born-Inst., Germany, Presider*		
QTuG1 · 14:00 · INVITED ***Lasing in disordered nanostructures,*** H.Cao, J.Y.Xu, Y.Ling, A.L.Burin, E.W.Seelig, R.P.H.Chang, *Northwestern Univ., USA.* We achieved lasing in disordered gain media. Recurrent light scattering provides coherent feedback for lasing. We demonstrated that disorder-induced scattering can lead to three-dimensional confinement of light in mirometer-sized random media.	**QTuH1 · 14:00 · INVITED** ***Operation criteria for nuclear gamma-ray lasing experiment,*** L.A.Rivlin, *MIREA, Russia.* We discuss the key problems general for different approaches to the gamma-ray lasing experiment that are currently under consideration (classic Moessbauer version, amplification without inversion, recoil assisted amplification by free nuclei with hidden inversion, etc.), establish a set of operation criteria, and estimate the possibility to fulfill them.	**LTuC1 · 14:00 · INVITED** ***Adaptive optics for high-power lasers,*** A.V.Kudryashov, *Inst. of Laser and Inf. Technologies, Russia.*		
QTuG2 · 14:30 ***Fractional decay of population inversion and spectral shift of superradiance in photonic crystals with pencil-like excitation,*** K.Sakoda, *Hokkaido Univ., Japan,* J.W.Haus, *Univ. of Dayton, USA.* Population inversion trapping and spectral shift of superradiance in photonic crystals due to anomalous Rabi splitting is demonstrated by means of the coupled-mode analysis for the pencil-like excitation of embedded two-level atoms.	**QTuH2 · 14:30 · INVITED** ***Atomic-nuclear resonance in plasma surroundings as a tool for pulsed release of the isomeric energy,*** S.A.Karamian, *Joint Inst. for Nuclear Res., Russia,* J.J.Carroll, *Youngstown State Univ., USA.* The nuclear levels—candidates for excitation due to the conversion of the atomic transitions are described.	**LTuC2 · 14:30 · INVITED** ***Improvements to the intensity of the HELEN high energy laser facility,*** N.W. Hopps, M.J.Norman, E.J.Harvey, C.Firth, K.Firth, P.M.R.Jinks, J.R.Nolan, T.H.Bett, *AWE plc, UK.* The kilojoule-class HELEN laser facility at AWE is now undergoing improvements to its focal intensity. The current status of the incorporation of chirped pulse amplification and static wavefront correction to the facility is described.		

Conference Hall — IQEC/LAT-YS

14:00–16:00
YTuA · IQEC/LAT-YS Keynote Lectures VI—Continued

YTuA2 · 15:00 · KEYNOTE LECTURE
Femtosecond laser produced high temperature plasma: X-ray generation and nuclear processes, V.M.Gordienko, *Moscow State Univ., Russia.* The processes of nuclear excitation and nuclear fusion induced in hot, dense plasma produced by a femtosecond pulse with intensity exceeding 10^{16} W/cm^2 is considered.

Hall 1 — IQEC

14:00–16:00
QTuD · Excimer and Semiconductor Lasers—Continued

QTuD4 · 15:00
Optical investigation and comparison of 1.3 mm GaInNAs multiple quantum-well lasers with InGaAsP and AlGaInAs, S.R.Jin, R.Fehse, S.J.Sweeney, G.Knowles, A.R.Adams, E.P.O'Reilly, *Univ. of Surrey, UK,* H.Riechert, S.Illek, A.Yu.Egorov, *Infineon Technologies AG, Corp. Research, Germany.* Optical properties of 1.3 µm GaInNAs has been systematically studied and compared with those of InGaAsP and AlGaInAs lasers in the temperature range of 80–400K. Their different high-temperature performance is strongly related to the relative contribution from carrier recombination mechanisms.

QTuD5 · 15:15
Photo-modulated reflectance methods for studying ligh emission from quantum wells confined in vertical microcavity surface-emitting structures, S.B.Constant,T.J.C.Hosea, *Univ. of Surrey, UK,* L.Toikkanen, I.Hirvonen, M.Pessa, *Tampere Univ. of Technology, Finland.* The emission from quantum wells confined in vertical microcavity surface-emitting structures, is studied with relation to the Fabry-Perot cavity mode, using novel non-conductive, non-destructive photo-modulated reflectance spectroscopy, in the red spectral region.

Hall 2 — IQEC

14:00–16:00
QTuE · Nonlinear Beam Dynamics—Continued

QTuE4 · 14:45
Transverse localized structures and their interactions: an overview of tuning properties, P.L.Ramazza, S.Boccaletti, U.Bortolozzo, F.T.Arecchi, *Istituto Nazionale di Ottica Applicata, Italy.* We demonstrate experimentally how the features of optical localized structures can be widely tuned by means of several parameters. As a consequence, we are able to control the interaction strength between pairs of localized structures.

QTuE5 · 15:00
Modulational instability of localized structures in a nonlinear interferometer, U.Bortolozzo, P.L.Ramazza, *Istituto Nazionale di Ottica Applicata, Italy.* We report the destabilization of solitary structures in a nonlinear interferometer. At high input intensity values, an azimuthal modulational instability leads to the localized structure breakup, with the appearance of chaotic delocalized patterns.

QTuE6 · 15:15
Time history of a light pulse polarization transformation in the isotropic phase of a nematic liquid crystal near transition to the mesophase, T.M.Il'inova, V.A.Makarov, T.B.Marchenko, A.P. Shkurinov, *Moscow State Univ., Russia,* A.S.Zolot'ko, *Lebedev Phys. Inst., Russia.* A laser pulse polarization is shown to be transformed non-uniformly in different points of the envelope at the output of a dish with a nematic liquid crystal in the isotropic phase. Various regimes of the pulse polarization self-action are considered according to the obtained analytical time dependence of the pulse ellipticity degree.

Hall 3 — IQEC

14:00–16:00
QTuF · Femtosecond Synthesizers and High-Resolution Spectroscopy —Continued

QTuF3 · 15:00 · INVITED
Phase coherent synthesis of optical frequencies and waveforms, J.Ye, S.T.Cundiff, J.L.Hall, K.W.Holman, D.J.Jones, R.J.Jones, J.D.Jost, H.C.Kapteyn, L.-S.Ma, R.Shelton, *JILA, NIST and Univ. of Colorado, USA.* We explore the use of femtosecond optical frequency combs for precision frequency metrology, optical clock, optical frequency synthesizer, and optical pulse synthesis.

Hall 4 — JOINT

14:00–16:15
JTuE · Spectroscopic Techniques—Continued

JTuE3 · 15:00 · INVITED
Function-related conformational changes in protein molecules: laser spectroscopy and computer simulation, N.N.Brandt, A.Yu.Chikishev, Y.M.Romanovsky, *Moscow State Univ., Russia.* We present laser Raman, time-resolved fluorescence, and computer simulation data indicating that the functioning of a protein involves conformational changes in a molecule as a whole rather in its active and/or binding sites.

Hall 5 IQEC	Hall 6 IQEC	Room 1 LAT		
14:00–15:45 **QTuG · Lasing and Optical Transitions in Nanostructures—Continued**	**14:00–16:15** **QTuH · Symposium on Quantum Nucleonics I—Continued**	**14:00–16:30** **LTuC · Symposium on Adaptive Optics for High-Power Lasers II—Continued**		
QTuG3 · 14:45 ***Saturation of optical transitions in metal quantum dots,*** V.P.Drachev, E.N.Khaliullin, V.M.Shalaev, *Purdue Univ., USA,* F.Alzoubi, A.Buin, R.L.Armstrong, *New Mexico State Univ., USA,* S.G.Rautian, V.P.Safonov, *Inst. of Automation and Electrometry, Russia.* Our studies show that saturation of electron transitions between discrete states of metal nanoparticle results in a non-quadratic intensity dependence of the two-photon excited luminescence, hyper-Rayleigh scattering, and decrease in the local-field enhancement factor.				
QTuG4 · 15:00 ***Point-center semiconductor lasers: comparison of quantum dots, quantum dashes and impurity centers,*** P.G.Eliseev, *Lebedev Physical Inst., Russia,* A.A.Ukhanov, K.J.Malloy, *Univ. of New Mexico, USA.* Recent results are reviewed on lasers with point radiative centers. Ultra-low threshold (10–20 A/cm^2) in MBE-grown QD lasers is discussed. Comparison is given with anisotropic QDash laser structures and with Er-doped structures on optical cross-section, maximum gain and threshold, characteristics.	**QTuH3 · 15:00 · INVITED** ***Nuclear interference phenomena in gamma-rays,*** O.Kocharovskaya, *Inst. of Appl. Phys., Russia, Texas A&M Univ., USA.* We review our recent experimental and theoretical results on the interference phenomena taking place at the nuclear transitions in gamma-rays.	**LTuC3 · 15:00 · INVITED** ***Two generations of adaptive optical systems for ICF in China,*** Wenhan Jiang, Ning Ling, Yudong Zhang, Bing Xu, Zeping Yang, *Inst. of Optics and Electronics, China.* Two generation adaptive optical systems for inertial confinement fusion to improve the laser beam quality were developed in China. In this paper, the two systems will be introduced.		
QTuG5 · 15:15 ***Full vector analysis of electromagnetic field in finite anisotropic nanostructures: unraveling mysteries of nanostructured matter with finite differences in time domain,*** A.V.Tarasishin, M.V.Bashevoi, S.A.Magnitskii, V.A.Makarov, A.M. Zheltikov, *Moscow State Univ., Russia.* The results of full vector numerical analysis of electromagnetic field in finite anisortopic nanostructures based on the finite-difference time-domain technique are presented and compared with predictions of effective-medium and local-field-correction approaches.				

Conference Hall IQEC/LAT-YS

14:00–16:00
YTuA · IQEC/LAT-YS Keynote Lectures VI—Continued

Hall 1 IQEC

14:00–16:00
QTuD · Excimer and Semiconductor Lasers—Continued

QTuD6 · 15:30
Enhancement of excitonic effects in quantum wire light emitters, E.Kapon, L.Sirigu, H.Weman, D.Y.Oberli, M.-A.Dupertuis, A.Rudra, *Swiss Federal Inst. of Technology, Switzerland.* The optical properties of V-groove quantum wire laser and light emitting diodes (LEDs) under high magnetic fields are presented. The persistence of excitonic recombination both in laser structures and in LEDs will be discussed.

QTuD7 · 15:45
The temperature dependence of InGaAs/Al(GaAs)-based MQW semiconductor lasers emitting at 980 nm, D.Lock, A.R.Adams, A.D.Andreev, *Univ. of Surrey, UK,* S.J.Sweeney, D.Robbins, *Marconi Optical Components, UK.* It is found that around room temperature in 980nm InGaAs/Al(GaAs) MQW lasers, radiative recombination dominates and exhibits extremely stable characteristic temperatures (T_0 I_{rad})>1000 K. Above room temperature, increased Auger recombination occurs.

Hall 2 IQEC

14:00–16:00
QTuE · Nonlinear Beam Dynamics—Continued

QTuE7 · 15:30
Transverse modulation instability of periodic nonlinear waves in photorefractive SBN crystal, N.Korneev, A.Apolinar Iribe, *INAOE, México,* V.A.Vysloukh, *UDLA, México, Y.V.Kartashov, Moscow State Univ., Russia.* Transverse modulation instability of periodic nonlinear waves in photorefractive SBN crystals is investigated both theoretically and experimentally. It is shown that development of modulation instability leads to the hexagonal pattern formation.

QTuE8 · 15:45
Second harmonic generation of singular beams with fractional topological charges, I.V.Basistiy, M.S.Soskin, M.V.Vasnetsov, *Inst. of Phys., Ukraine,* I.G.Mariyenko, *Texas A&M Univ., USA,* G.Molina-Terriza, L.Torner, *Univ. Politecnica de Catalunya, Spain.* The second-harmonic generation (SHG) of optical-vortex laser beams with integer topological charge doubles the charge as well as the frequency. We report firstly the SHG of optical-vortex beams with fractional charges 1/3, 1/2, 2/3. Violation of the charge doubling rule is detected and discussed.

Hall 3 IQEC

14:00–16:00
QTuF · Femtosecond Synthesizers and High-Resolution Spectroscopy —Continued

QTuF4 · 15:30
Singlet oxygen deactivation rate, B.V.Zhdanov, D.K.Neumann, T.Henshaw, *Directed Energy Solutions, USA,* R.J.Knize, M.P.Murdough, *US Air Force Academy, USA.* Decay rates of the excited metastable molecular oxygen singlet states are measured as functions of ground state oxygen pressure and of the pressure of other buffer gases: Ar, He and N_2. The corresponding quenching rates of these oxygen states are calculated based on the results of these experiments.

QTuF5 · 15:45
XUV+UV laser isotopic studies of the $b^1\Pi_u$ state of N_2, J.P.Sprengers, W.Ubachs, *Australian Natl Univ., Australia,* K.G.H.Baldwin, B.R.Lewis, *Vrije Univ., The Netherlands.* We report on the isotopic dependence of rovibronic spectra in the $b^1\Pi_u$ state of N_2 using XUV + UV laser ionisation. We extend existing measurements, observing new $^{14}N^{15}N$ and $^{15}N_2$ bands for the first time.

Hall 4 JOINT

14:00–16:15
JTuE · Spectroscopic Techniques—Continued

JTuE4 · 15:30 · INVITED
Femtosecond spectroscopy of primary charge separation of charges at photosynthesis, V.A.Shuvalov, *Inst. of Photosynthesis, Russia.*

JTuE5 · 16:00
Laser fluorescence and chemiluminescence analysis of high excited state of NADPH and FAD in the response of phagocytes to laser radiation, V.V.Salmin, A.G.Sizykh, A.B.Salmina, A.S.Savchenko, A.S.Provorov, *Krasnoyarsk State Univ., Russia.* The hypothesis about two-quantum excitation and ionization of biomolecules induced by Nitrogen laser in phagocytes has been tested by means of chemiluminescence analysis of functional activity and fluorescence measurements in solutions of NADPH and FAD.

16:00–16:30 COFFEE BREAK

Hall 5 IQEC	Hall 6 IQEC	Room 1 LAT		
14:00–15:45 **QTuG · Lasing and Optical Transitions in Nanostructures—Continued**	**14:00–16:15** **QTuH · Symposium on Quantum Nucleonics I—Continued**	**14:00–16:30** **LTuC · Symposium on Adaptive Optics for High-Power Lasers II—Continued**		
QTuG6 · 15:30 ***Picosecond lasing in dye molecules-silver nanoaggregates- microcavity composites,*** A.S.Kuch'yanov, V.P.Safonov, N.S.Zakovryashin, *Inst. of Automation and Electrometry, Russia,* S.V.Perminov, *Inst. of Semicond. Phys., Russia.* Doping of active medium with absorbing and scattering material facilitates to lasing. Spectral, angular, and temporal characteristics of lasing in Rhodamine 6G-silver colloidal aggregates composite at pulsed excitation were studied. 10-ps laser pulses were observed.	**QTuH4 · 15:30 · INVITED** ***Elastic and inelastic nuclear resonant scattering of synchrotron radiation,*** E.Ercan Alp, W.Sturhahn, T.Toellner, J.Zhao, M.Hu, C.Labbe, *Argonne Natl Lab., USA.* The advances made in synchrotron radiation sources, crystal monochromators, polarization manipulation, and time resolved detectors have brought a qualitative change in the nature of nuclear resonant scattering experiments. We will present groundbreaking experiments performed in diverse fields like geophysics, biophysics, and materials science.	**LTuC4 · 15:30 · INVITED** ***Peta-Watt laser project with adaptive optics,*** C.Haefner, Th.Kuehl, *GSI Darmstadt, Germany.* **LTuC5 · 16:00 · INVITED** ***Dynamic holography using oa lc slms and its application to adaptive optics: state-of-the-art and prospects,*** V.Venediktov, *Inst. for Laser Physics, St. Petersburg, Russia.*		

16:00–16:30 COFFEE BREAK

Conference Hall — IQEC/LAT-YS

16:30–17:30
YTuB · IQEC/LAT-YS Keynote Lectures VII
A.Man'shina, *St. Petersburg State Univ., Russia, Presider*

YTuB1 · 16:30 · KEYNOTE LECTURE
Femtosecond holography, Yu.A.Tolmachev, *St-Petersburg State Univ., Russia.* Possibility of a new type of holography using non-dispersed ultrashort pulses of ligh is considered. Specific abilities and new fields of application as well as devices for the holography realization are described. Results of the computer simulation of the holography process will be presented.

Hall 1 — IQEC

16:30–18:45
QTuJ · Excimer and Semiconductor Lasers
M.Richardson, *CREOL, Univ. of Central Florida, USA, Presider*

QTuJ1 · 16:30
Temperature behaviour of stimulated and spontaneous emission in 1.3-µm InAs/GaInAs quantum dots lasers, I.P.Marko, *Inst of Phys., Belarus,* A.D.Andreev, A.R.Adams, *Univ. of Surrey, UK,* R.Krebs, J.P.Reithmaier, A.Forchel, *Univ. Würzburg, Germany.* The influence of the carrier distribution between dots and nonradiative recombination on the threshold current and stimulated emission is discussed for 1.3-µm "dots in a well" lasers in the temperature range 20–300 K.

QTuJ2 · 16:45
Phase-locking stability of the powerful laser diode array—myth or reality? Theory and experiment, V. V. Kuzminov, *General Phys. Inst., Russia.* Theoretical analysis of the mechanism that allows to increase dramatically the phase-locking bandwidth is presented. It allows creation of the powerful laser arrays free of both precise cavities allingment and heat release problems. Experiments are presented confirming the model.

QTuJ3 · 17:00
Phase synchronization of broad-area laser-arrays, V.Raab, R.Menzel, *Univ. of Potsdam, Germany.* The 25 broad-area emitters of a diode laser bar can be phase synchronized using a specially designed multiplexer. Coherent operation with 1000-fold improved beam quality is achieved.

Hall 2 — IQEC

16:30–18:30
QTuK · Nonlinear Effects in Lasers
R.De La Rue, Univ. of Glasgow, *UK, Presider*

QTuK1 · 16:30
Stimulated Brillouin scattering in an ytterbium-doped double-clad fiber laser, A.Hideur, M.Salhi, B.Ortac, T.Chartier, M.Brunel, G.Martel, C.Ozkul, *Univ. Rouen, France,* F.Sanchez, *Univ. d'Angers, France.* We present an experiment allowing the direct observation of Brillouin backscattering in an Yb-doped double-clad fiber laser. We demonstrate that stimulated Brillouin scattering is directly responsible of fast transient dynamics of the laser.

QTuK2 · 16:45
Observation of phase-locked soliton pairs in a fiber ring laser, Ph.Grelu, F.Belhache, F.Gutty, *Univ. de Bourgogne, France,* J.M.Soto-Crespo, *Consejo Superior de Investigaciones Científicas, Spain.* We report experimental observation of stable $\pm p/2$ phase-locked pulse pairs, in a passively mode-locked fiber ring laser. The precise phase relationship could stress dominant soliton-soliton interactions for pulses separated from 4 to 15 pulsewidths.

QTuK3 · 17:00
Copper selenide-doped glasses: nonlinear optical properties and laser saturable absorber applications, S.A.Zolotovskaya, K.V.Yumashev, P.V.Prokoshin, *Inter. Laser Center, Belarus,* V.S.Gurin, *Belarusian State Univ., Belarus,* A.A.Alexeenko, *Gomel State Technical Univ., Belarus.* Cu_xSe nanoparticles were produced in the silica sol-gel glasses. Bleaching relaxation times of the glasses are found to be of 0.7–1.4 ns in dependence on stoichiometry x of copper selenide nanoparticles. A mode-locking of 1.34 µm $Nd:YAlO_3$ laser with these glasses as saturable absorbers was demonstrated for the first time.

Hall 3 — IQEC

16:30–18:30
QTuL · High-Resolution Spectroscopy
W.Hogervost, *Vrije Univ., the Netherlands, Presider*

QTuL1 · 16:30 · INVITED
High resolution spectroscopy of solid hydrogen: towards new perspectives in optical physics, Kohzo Hakuta, *Univ. of Electro-Commun., Japan.* We show how the solid hydrogen can open new perspectives in optical physics. The key feature of solid hydrogen is demonstrated by high-resolution laser spectroscopy. Optical processes with strong-coupling between fields and medium are explored.

QTuL2 · 17:00 · INVITED
Precision measurement of the $n=2$ triplet P fine structure in helium: A determination of the fine-structure constant, E.A.Hessels, M.C.George, L.D. Lombardi, *York Univ., Canada.* The $n=2$ triplet P $J=1$-to-$J=2$ and $J=0$-to-$J=1$ fine-structure intervals in helium are measured to a precision of 1.4 kHz and 0.9 kHz, respecively. If these precise measurements are compared to similarly-precise theoretical predictions, a new 15 part per billion determination of the fine-structure constant.

Hall 4 — JOINT

16:30–18:30
JTuF · Ultrafast Chemistry and Biology
O.M.Sarkisov, Inst. of Chem. Phys., Russia, and Th.Papazoglou, *EU Res. Directorate General, Presiders*

JTuF1 · 16:30 · INVITED
Biological sensors and enzymes on the femtosecond time scale, J.-L.Martin, *Ecole Polytechnique-ENSTA, France.* The biological activity of proteins results from structural events occurring on a broad time domain including the femtosecond time scale. In order to obtain better insight and control of the relation between structural dynamics and protein function, we develop coherent femtosecond techniques, in particular in the terahertz domain. Recent data will be presented on proteins involved in the oxidative metabolism and in nitric-oxide- and oxygen-dependent signal transductions.

JTuF2 · 17:00 · INVITED
LIF after excitation with ultrafast laser irradiation, the response of a single cell and the effect of its scattering environment, Th.G.Papazoglou, *Res. Directorate-General, Belgium,* G.Zacharakis, *FORTH–IESL, Greece.* LIF after excitation with ultrafast laser irradiation, the response of a single cell and the effect of its scattering environment.

Hall 5 IQEC	Hall 6 IQEC			

16:30–18:30
QTuM · Optics of Nanostructures I
H.Cao, *Northwestern Univ., USA, Presider*

QTuM1 · 16:30 · INVITED
Two-dimensional photonic crystals of LATEX particles and their near-field response, Tadashi Itoh, *Osaka Univ., Japan.* A self-assembled monolayer of sub-mm latex particles has a characteristic photon dispersion called quasi-2D photonic band along the layer. The peculiar features of light propagation are demonstrated both in far- and near-field transmission and luminescence measurements.

QTuM2 · 17:00 · INVITED
Optical fibers using photonic crystals, J.C.Knight, T.A.Birks, B.J.Mangan, A.Ortigosa-Blanch, W.J.Wadsworth, P.St.J.Russell, *Univ. of Bath, UK.* Modern optical fibers deliver remarkable performance, but are constrained by the bulk properties of silica. By using the concept of a photonic crystal, one can devise new optical fiber waveguides with novel linear and nonlinear properties.

16:30–18:45
QTuN · Symposium on Quantum Nucleonics II
J.J.Caroll, *Youngstown Univ., USA, Presider*

QTuN1 · 16:30 · INVITED
Gamma-ray transitions induced by low-frequency radiation, H.R.Reiss, *Univ. de Salamanca, Spain,* M.R.Harston, *Centre d'Etudes Nucléaires de Bordeaux-Gradignan, France.* The general theory of induced nuclear gamma-ray emission from isomeric states is presented, where the inducing effects are explicitly nonperturbative intense-field mechanisms associated with a strong plane-wave electromagnetic field.

QTuN2 · 17:00 · INVITED
Probing the isomers through the shell, F.F.Karpeshin, *St.Petersburg State Univ., Russia.* We discuss the interaction of isomers with electromagnetic field through the electron shell.

Conference Hall IQEC/LAT-YS	Hall 1 IQEC	Hall 2 IQEC	Hall 3 IQEC	Hall 4 JOINT
16:30–17:30 **YTuB · IQEC/LAT-YS Keynote Lectures VII—Continued**	**16:30–18:45** **QTuJ · Excimer and Semiconductor Lasers—Continued**	**16:30–18:30** **QTuK · Nonlinear Effects in Lasers—Continued**	**16:30–18:30** **QTuL · High-Resolution Spectroscopy—Continued**	**16:30–18:30** **JTuF · Ultrafast Chemistry and Biology—Continued**
	QTuJ4 · 17:15 ***Coherent output from transversely coupled large aperture semiconductor lasers,*** E.O'Neill, V.Voignier, G.Wu, G.Huyet, *Natl Univ. of Ireland, Ireland.* We theoretically study two large aperture semiconductor lasers, which are transversely coupled through their injection profiles. We show that it is possible to produce a phase-locked coherent output and discuss the implications for high-power laser arrays.	**QTuK4 · 17:15** ***Two-dimensional solitons in a bistable laser,*** S.V.Fedorov, N.N.Rosanov, A.N. Shatsev, Research Inst. for Laser Phys., Russia, N.A.Veretenov, A.G.Vladimirov, *St.Petersburg State Univ., Russia.* We present results of semianalytical and numerical study of transversely two-dimensional dissipative optical solitons in a laser with a saturable absorber. We demonstrate motionless, moving and rotating solitons without and with wavefront phase dislocations of different order.		
	QTuJ5 · 17:30 ***Defects and doping in zinc oxide: transport and luminescence,*** Gang Xiong, J.Wilkinson, K.B.Ucer, R.T.Williams, *Wake Forest Univ., USA.* We find that raising dissociated oxygen pressure in reactive sputtering of ZnO suppresses intrinsic donor defects. Photoluminescence and amplified spontaneous emission of film, nanoparticle, and single-crystal ZnO will be reported.	**QTuK5 · 17:30** ***Existence of the phase jumps in the counterpropagating waves of the ring solid-state laser operating in the regime of synchronous chaos,*** N.V.Kravtsov, E.G.Lariontsev, S.N.Chekina, *Moscow State Univ., Russia.* It was discovered the experimental existence of consistent phase jumps in counterpropagating waves of the ring solid-state laser operating in the regime of the synchronous chaos.	**QTuL3 · 17:30 · INVITED** ***High-precision spectroscopy of strontium atoms in an optical lattice,*** Hidetoshi Katori, Tetsuya Ido, *Univ. of Tokyo, Japan.* Applying a light shift cancellation technique, we have demonstrated spectroscopy of strontium atoms in a one-dimensional optical lattice. With atoms confined in the Lamb-Dicke regime we observed a Doppler free spectrum of 13 kHz.	**JTuF3 · 17:30** ***Adaptive optic pulse compression in the few cycle regime: real time observation of dissociative state dynamics of proteins,*** M.R.Armstrong, *Univ. of Rochester, USA,* J.P.Ogilvie, A.M.Nagy, R.J.D.Miller, *Univ. of Toronto, Canada.* Amplified few cycle pulses generated using a noncollinear optical parametric amplifier with a combination of chirped mirrors and a deformable mirror are used to probe the early time dynamics of the dissociation of a ligand from a heme protein. The time dependent phase of vibrations is studied, providing insight into coupling between low and high frequency modes of the system.
	QTuJ6 · 17:45 ***Photonic quantum corral-like ring laser in Rayleigh's toroidal microcavity,*** O'Dae Kwon, B.H.Park, J.Bae, J.Y.Kim, *Pohang Univ. of Sci. & Techn., Korea.* Letokhov-Minogin trapping-induced photonic quantum corrals explain submicro-ampere thresholds observed in the photonic quantum ring laser with the linewidth narrowed presently down to 0.55 Å.	**QTuK6 · 17:45** ***Experimental study of vertical cavity surface emitting lasers with coherent optical feedback,*** G.Giacomelli, *Istituto Nazionale di Ottica Applicata, Italy,* F.Marin, M.Romanelli, *Univ. di Firenze, LENS and INFM, Italy.* We present the experimental investigation of the dynamics of a Vertical Cavity Surface Emitting Laser with coherent optical feedback. Both polarized and unpolarized feedback cases are studied. We compare the experimental findings with theoretical models.		**JTuF4 · 17:45** ***Bacteriorhodopsin—the basis of the molecular superfast-acting nanoelectronics,*** M.I.Samoilovich, A.V.Gurianov, *Joint-stock Comp. "OPALON", Russia,* A.F.Belyanin, E.P.Grebennikov, *CRTI "Technomash", Russia.* Unique combination of photo and electrosensitive properties of BR molecule with the effects available only in photon crystals based on opal matrices makes possible the application of BR in nanoelectronic devices and optical information processing and also for elaboration of the definite bond types between single molecules and molecule ensembles.

Hall 5 IQEC	Hall 6 IQEC			
16:30–18:30 **QTuM · Optics of Nanostructures I—Continued**	**16:30–18:45** **QTuN · Symposium on Quantum Nucleonics II—Continued**			

QTuM3 · 17:30
Giant second-harmonic generation in coupled microcavities based on nanostructured silicon, T.V.Dolgova, M.G. Martemyanov, A.A.Fedyanin, O.A.Aktsipetrov, *Moscow State Univ., Russia.* The giant enhancement of the second-harmonic generation due to localization of fundamental field in the vicinity of two cavity layers is experimentally observed in porous silicon coupled microcavities separated by distributed Bragg reflector.

QTuM4 · 17:45
FDTD simulation of terahertz time-domain spectroscopy of impurity modes in three-dimensional photonic crystals, M.Iida, M.Tani, K.Sakai, M.Watanabe, *Kansai Adv. Res. Center, Japan,* Shin-ichi Katayama, *School of Materials Sci., JAIST, Japan,* H.Kondo, M.Wada Takeda, *Shinshu Univ., Japan.* We present an FDTD analysis of impurity modes in 3D photonic crystals. Our numerical results agree with experimental ones. Our method enables us to estimate the optimal thickness of impurity layer for desired impurity mode(s).

QTuN3 · 17:30
Excitation from metastable nuclear levels under femtosecond laser plasma interaction, A.B.Savel'ev, A.V.Andreev, A.M.Dykhne, V.M.Gordienko, P.M.Mikheev, E.V.Tkalya, *Moscow State Univ., Russia.* We discuss different aspects arising while considering metastable isomers production and excitation in hot dense laser plasma: isomeric triggering, multi-quanta processes, etc.

QTuN4 · 17:45
Analysis of the destructive impact of the pump on the gamma-ray laser medium, A.A.Zadernovsky, *MIREA, Russia.* We formulate a set of requirements to the pump ensuring the recoil assisted gamma-ray lasing in deeply cooled ensembles of free nuclei without breakdown the condition of hidden inversion and destruction the amplifying medium. We discuss non-destructive pumping with modern x-ray sources.

Conference Hall	Hall 1 IQEC	Hall 2 IQEC	Hall 3 IQEC	Hall 4 JOINT
	16:30–18:45 **QTuJ · Excimer and Semiconductor Lasers—Continued**	**16:30–18:30** **QTuK · Nonlinear Effects in Lasers—Continued**	**16:30–18:30** **QTuL · High-Resolution Spectroscopy—Continued**	**16:30–18:30** **JTuF · Ultrafast Chemistry and Biology—Continued**
	QTuJ7 · 18:00 ***Dependence of the frequency of an optically injected semiconductor laser,*** S.Blin, G.Stéphan, P.Besnard, *ENSSAT, (UMR 6082), France.* We show that contrary to what is predicted by the Adler's model, optical injection in semiconductor laser is accompanied by frequency pushing (the injected laser frequency is pushed away from that of the free slave). However, pulling may be observed at very low level of injection (1–10 nanowatt) when the laser is not saturated by the external field. We used the recently introduced laser transfer function to explain these observations.	**QTuK7 · 18:00** ***Experimental study of the quality factor Q of optical resonators in barrel shaped regions of glass cylinder,*** I.K.Krasyuk, A.Yu.Semenov, V.P.Torchigin, V.I.Vovchenko, *General Phys. Inst., Russia.* The quality factor Q of optical resonators in barrel-shaped regions of glass cylinder was measured in a glass cylinder with the variable diameter. There are several decreases with different time constants T. The fastest is about several tens nanoseconds and lowest about 0.1 mkm is connected with the high Q (~2.4?10^8) resonator mode having minimal axial index.	**QTuL4 · 18:00** ***Theoretical progress in helium fine structure as a measure of the fine structure constant,*** G.W.F.Drake, *Univ. of Windsor, Canada.* Theoretical progress in calculating the helium 1s2p^{3}P fine structure splittings to order α^7 mc^2 is reviewed with the aim of determining the ne structure constant α from comparisons with recent high precision measurements.	**JTuF5 · 18:00** ***Femtosecond dynamics of photo excited states in nanocrystalls of α,?-Fe$_2$O$_3$ and in hydrous ferric oxides nanoparticles forming the mineral core of ferritin,*** V.A.Nadtochenko, N.N.Denisov, V.Yu. Gak, *Inst. of Problem of Chemical Phys., Russia,* F.E.Gostev, A.A.Titov, O.M.Sarkisov, *Inst. of Chemical Phys., Russia* V.V.Nikandrov, *Inst. of Biochemistry, Russia.*
	QTuJ8 · 18:15 ***Mid/far-infrared generation in semiconductor lasers due to resonant wave mixing,*** A.A.Belyanin, V.V.Kocharovsky, M.O.Scully, *Texas A&M Univ., USA,* F.Capasso, *Bell Labs, Lucent Technologies, USA,* Vl.V.Kocharovsky, D.S.Pestov, *Inst. of Appl. Phys., Russia.* A new scheme of mid/far-infrared generation in semiconductor lasers is discussed. It is based on resonant nonlinear mixing of two intracavity-generated near-infrared laser fields.	**QTuK8 · 18:15** ***Role of wave-guiding and nonlinearities in the formation of transverse structures in broad-area VCSELs,*** I.Babushkin, N.Loiko, *Stepanov Inst. of Phys., Belarus,* T.Ackemann, *Westfälische Wilhelms-Univ. Münster, Germany.* Theoretical and experimental investigations of spatial structures arising in a VCSEL due to nonlinearities are presented. The influence of current and refractive index profiles and polarization effects on the transverse Fourier mode selection is considered.	**QTuL5 · 18:15** ***Picosecond degenerate four-photon spectroscopy as a tool for precise measurements of subpicosecond intrasband relaxation times in ultra-thin metal films,*** Yu.V.Bobyrev, V.M.Petnikova, K.V.Rudenko, V.V.Shuvalov, *Moscow State Univ., Russia.* We will show that in spectral range 620-635 nm picosecond nonlinear response of ultra-thin Ni, Au and Pt films is determined by inter-band electronic transitions. This enables one to make an accurate estimation of intra-band relaxation time.	**JTuF6 · 18:15** ***Postphotodissociative reoxygenation of native hemoglobin and its subunits,*** B.M.Dzhagarov, S.V.Lepeshkevich, *Inst. of Molec. and Atomic Phys., Belarus,* J.Karpiuk, *Inst. of Phys. Chemistry, Poland,* V.S.Starovoitov, *Stepanov Inst. of Phys., Belarus.* Results of laser kinetic spectroscopy study for recombination of native human hemoglobin and its isolated α- and β-subunits with O$_2$ are represented. The results for the geminate stage of the process are analyzed in the frameworks of a simplified model based on a diffusion approximation for ligand migration in protein.
	QTuJ9 · 18:30 ***Physics of overtone CO laser operating on highly excited vibrational transitions,*** A.A.Ionin, *Lebedev Phys Inst., Russia,* A.P.Napartovich, *TRINITI, Russia.* Characteristic properties of overtone carbon monoxide laser operating on highly excited vibrational transitions (V~20–40) within spectral region of ~3–4 micron have been studied both experimentally and theoretically.			

18:30–20:00 IQEC/LAT POSTER SESSIONS III

Hall 5 IQEC	Hall 6 IQEC			

16:30–18:30
QTuM · Optics of Nanostructures I—Continued

QTuM5 · 18:00
Investigation of optical characteristics of 2D air-glass and metal-glass photonic superlattice crystals, A.P.Mironychev, *Inst. of Radioengin., Russia,* L.A.Melnikov, Yu.P.Sinichkin, Yu.S.Skibina, V.I.Tsoy, V.I.Kochubey, *Saratov State Univ., Russia,* E.V.Bekker, V.I.Beloglazov, N.B.Skibina, *TEGS Inc., Russia.* Results of numerical modeling and experimental investigation of transmission and reflection spectra of 2D air-glass and nanowire-metal glass superlattices having pitch 10…0.05 microns are presented demonstrating polarization dependencies, band gaps, and second harmonic of 1.06 microns.

QTuM6 · 18:15
A multimode waveguide interferometer, Yu.B.Ovchinnikov, T.Pfau, *Univ. of Stuttgart, Germany.* A new kind of a light interferometer based on a planar metal multimode waveguide is observed. Compare to all other known interferometers the fringe spacing of the waveguide-interferometer can be as small as one thousands of a light wavelength. The fringe spacing of about one nines of a light wavelength has been observed experimentally.

16:30–18:45
QTuN · Symposium on Quantum Nucleonics II—Continued

QTuN5 · 18:00
Simulation of x-ray spectrum and nuclear excitation in subpicosecond laser plasma, A.V.Andreev, R.A.Chalykh, *Moscow State Univ., Russia.* It is proposed model of laser plasma emission spectrum formation that enables us to determine the absolute value of the laser pulse to plasma emitted radiation conversion factor and x-ray spectrum. This is provides a means for direct calculation of the number of excited nuclei in dependent on the parameters of laser pulse.

QTuN6 · 18:15
On a possibility of compression of Mössbauer radiation into short pulses, E.Kuznetsova, R.Kolesov, O.Kocharovskaya, *Inst. of Appl. Phys., Russia, Texas A&M Univ., USA.* A way of compressing Mossbauer radiation into a sequence of coherent short pulses is described. Estimates for real media and experimental technique for the detection of produced short gamma-ray pulses are presented.

QTuN7 · 18:30
Solid-state materials doe coherent control of nuclear transitions, A.Konjhodzic, F.Vagizov, Z.Hasan, *Temple Univ., USA*. In nuclear transitions can be coherently controlled, the major obstacle of population inversion for gamma ray lasers can be overcome. This talk will review the status of solid-state materials in providing with suitable electronic and nuclear states combination to ctrongly couple the radiation field of a laser to the nuclear states.

18:30–20:00 IQEC/LAT POSTER SESSIONS III

YTuC · IQEC/LAT-YS II

YTuC1
Raman spectrometer for studying Raman anomalies in films and solutions of nanopolyacetylene, S.G.Elizarov, O.Yu. Nedopekin, D.Yu.Paraschuk, *Moscow State Univ., Russia.* A Raman spectrometer for studying anomalies of Raman response in nanopolyacetylene is developed. Three types of photodetection systems based on lock-in detection and photon counting were made and compared. Raman results on nanopolyacetylene are presented.

YTuC2
Mathematical modeling of the image in the laser brightness amplifier, D.V.Abramov, S.M.Arakelian, E.R.Fatkulin, A.O.Kucherik, V.G.Prokoshev, *Vladimir State Univ., Russia.* Mathematical and numerical modeling of formation of the image in the laser brightness amplifier has been carried out with account of effect of inhomogeneous amplification of a signal in the active medium. Distributions of a field to input and output of the amplifier were obtained.

YTuC3
Comparative investigation of passive Q-switches for continuous wave diode-pumped Er:glass laser, V.E.Kisel, V.G. Shcherbitsky, N.V.Kuleshov, *Belorussian State Politechnical Academy, Belarus.* Passive Q-switching of the continuous wave diode-pumped Yb, Er:glass laser was investigated with Co:ZnSe, Cr:ZnSe, Co:$MgAl_2O_4$ single crystals as saturable absorbers. Pulse energies up to 12 μJ and pulse durations as short as 20 ns were demonstrated.

YTuC4
Parameters of wide-aperture elements production from KDP type crystals, V.I.Bredikhin, S.P.Kuznetsov, O.A.Malshakova, *Inst. of Appl. Phys., Russia.* With use of optical shadow, laser and interference methods the researches of quality wide-aperture (up to 320 cm in a diameter) KDP crystal elements received by a method of diamond micromilling are carried out.

YTuC5
Resonant features of the ionic Raman laser in different ?-schemes, S.A.Babin, D.V.Churkin, S.I.Kablukov, V.V.Potapov, *Inst. of Automation and Electrometry, Russia*. The Raman laser output power depending on frequency of the pump laser demonstrates 1.5–2 times enhancement at exact resonance in ?-scheme having long-lived final level and no effect with that having short-lived one.

YTuC6
Continuous operating time of a laser intermixture for high power CO laser with open contour of work, K.M.Romodin, *Baltic State Technical Univ. "Voenmeh", Russia.* The method of continuous operating time of a laser intermixture for high power CO laser with open contour of work is considered. The continuous operating time of oxide of carbon by means of response of accessible gases of propane and dioxide of carbon on the catalytic agent. The laser intermixture is received by means of additions of oxide of carbon by air.

YTuC7
Effects of astigmatic aberration in holographic generation of Laguerre-Gaussian beam, A.Wada, Y.Miyamoto, T.Ohtani, N.Nishihara, M.Takeda, *Univ. of Electro-Commun., Japan.* We present a simple method of predicting the transformations of an LG beam with astigmatic aberration using a single parameter. Differences between single LG modes and phase singular beams generated by holograms are also discussed.

YTuC8
The influence of misalignments of mirrors on the characteristics of He-Ne/CH_4 laser, A.K.Dmitriyev, D.V.Ityaksov, A.A.Lugovoy, *Inst. of Laser Phys., Russia.* The results of theoretical and experimental investigations of the influence of misalignments of different elements of a telescopic resonator on the parameters of the resonator and laser beam in the stability range are presented.

YTuC9
Fractal properties of optical images of surface under laser action, D.V.Abramov, S.M.Arakelian, A.O.Kucherik, V.G.Prokoshev, *Vladimir State Univ., Russia.* The fractal methods of processing of optical images have been developed. The local dimensions of similarity information and topological entropy of images were calculated. These parameters allow determining the moment of change of hydrodynamical conditions of melted material movement.

YTuC10
Simple and effective RF modulation of diode lasers for atom optics applications, P.N.Melentiev, M.V.Subbotin, V.I.Balykin, *Inst. of Spectroscopy, Russia.* We demonstrate effective direct RF modulation of commercial diode lasers. By such a technique we put 40% of laser power in a first sideband at 26 mW of RF field power.

YTuC11
The statistical characteristics of laser beams with the wavefront dislocation structure, I.A.Budagovskiy, E.V.Naumova, A.T.Polosko, *Moscow State Univ., Russia.* The actual problem for singular optics and precision speckle-interferometry of definition of the basic transformation appropriateness of the statistical characteristics of laser beams with dislocation wavefront structure during their diffraction distribution is considered. The cases regular and random distributions of phase singularities on the wavefront are analyzed.

YTuC12
Polarization properties of second harmonic generation in ordered tissue, A.A.Lalayan, E.A.Janunts, *Yerevan State Univ., Armenia.* Two-photon fluorescence and second harmonic generation polarization properties have been studied in ordered native tissue. The strong polarization dependence of SHG can be explained by the low of propagation of the linear polarized light in the ordered tissue.

YTuC13
Doppler laser diagnostics and modelling of system capillary blood stream, A.O.Kucherik, V.G.Prokoshev, S.G.Serkin, P.P.Kuzin, S.M.Arakelian, *Vladimir State Univ., Russia.* In the given work are simulated system of capillaries near to a surface of a skin and process of formation of a signal in laser Doppler the analyzer. Dependences of distribution of speeds blood stream from topology of structure and parameters of an entrance stream are obtained.

YTuC14
Laser induced spectral emission studies of cariers dental tissues, T.N.Sokolova, E.L.Surmenko, V.V.Tuchin, *Saratov State Univ., Russia.* The laser spectral studies of tissues of human teeth, staggered by caries are described. The quantitative and qualitative changes of enamel composition are measured, as well as the laser damages of enamel after probe-taking.

YTuC15
Electro-optic modulator based on coupling of surface plasmon modes, N.A.Janunts, Kh.V.Nerkararyan, *Yerevan State Univ., Armenia.* It is shown that the process of transformation of surface plasmon polariton energy between modes located on two surfaces of the metallic layer strongly depends on the refractive indices of the surrounding dielectrics. This circumstance can be used for creation a modulator.

YTuC16
Estimation of geometric and energetic parameters of holographic identificators, A.A.Karalenka, *Belarussian State Univ., Belarus.* This report represents geometric and energetic designing aspects of holographic identificators. Admissions of linear positioning of recording-reproduction schemes and estimation of possible distortions are viewed. Mathematical model of reproduction of latent images is built.

YTuC17
Simulation of communication channels in photon counting mode, E.Lutkovskaya, N.Lutkovskaya, *Belarussian State Univ., Belarus.* The Monte-Carlo models of the optical channels are presented. Parameters of detectors were evaluated from the real experiment data. It was found that the synchronous counting mode allows improving the transmitting distance.

YTuC18
Using fractal and wavelet analysis for research of laser radiation fluctuations in near-the-ground paths, A.V.Mesniankine, *Moscow State Univ., Russia.* The method of analyzes of laser radiation fluctuations based on combined using of fractal and wavelet analyses have been developed. This method has been used during the experiments in near the ground optical paths under the condition of fine-scale turbulence intermittence. The fractal properties of laser radiation fluctuations have been detected for the first time.

YTuC19
Applicationn of chalcogenide vitreous semiconductors for manufacturing an optical discs master-matrix, N.L.Moskalenko, S.A.Kostyukevich, P.E.Shepeliavyi, A.A.Koptyukh, *Inst. of Semicond. Phys., Ukraine.* Results of investigation of photochemical properties chalcogenide vitreous semiconductors are represented. These layers can be used as media for manufacturing master-discs that can provide production of stampers for coping CD and DVD discs.

YTuC20
Compatible information: properties and application to physical problems, D.V.Sych, B.A.Grishanin, V.N.Zadkov, *Moscow State Univ., Russia*. The compatible information measure is used for analysis of a physical content of information transmitted through a quantum channel. General properties of the compatible information and its application to the two-atom Dicke problem are discussed.

YTuC21
Laser diagnostics of oil pollution in sea water in situ using time-resolved fluorimetry with variable strobing, I.V.Gerdova, M.A.Gerdov, D.V.Il'in, A.A.Meshkantsov, *Moscow State Univ., Russia.* In this report, the task of diagnostic of oil pollution is solved by means of the method of time-resolved fluorescence spectroscopy with variable strobing with help of artificial neural networks in view of two-fluorofor model.

YTuC22
Determination of the phytoplankton photophysical parameters - step to elaboration of the method of water quality bioindication, S.A.Burikov, P.N.Litvinov, D.V.Maslov, E.E.Ostroumov, *Moscow State Univ., Russia*. In present paper the first steps for elaboration of non-linear laser fluorimetry method of diagnostics of PP were performed. The first experimental results concerning with determination of photophysical parameters of laboratory algae cultures are presented in paper.

YTuC23
Calibration of the satellite data of the chlorophyll A concentrations by laser induced fluorescence, P.A.Salyuk, O.A.Bukin, M.S.Permyakov, A.J.Mayor, *Pacific Oceanological Inst., Russia.* The results of the comparing of the chlorophyll A concentrations measured by laser induced fluorescence from the moving sailboard and satellite remote sensing are present. The experiments were done during the scientific cruises around sea of Okhotsk in 2001.

YTuC24
Optical characteristics and parameters of antimony laser plasma, M.P.Chuchman, *Uzhgorod Natl Univ., Ukraine.* The results of spectroscopic investigations of the erosion laser plasma characteristics and parameters at influence of neodymium laser on antimony are presented. On basis of an emission dynamics, temperature and density of electrons, dielectron recombination time the important role of dissociative recombination reactions of complex ions in population of excited states of the antimony atoms is shown.

YTuC25
Towards homogenity control in chalcogenide system Ga-Ge-S:Er^{3+}, T.Yu.Ivanova, A.A.Man'shina, A.V.Kurochkin, *St-Petersburg State Univ., Russia.* Homogeneity of the REI distribution in the chalcogenide system Ga-Ge-S:Er^{3+} was studied for small concentration quenching conditions determination. The information about structural changes was obtained from the analysis of Judd-Ofelt parameters and cross-sections of hypersensitive REI transitions.

YTuC26
Ga-Ge-S:Er^{3+} glasses and films investigation by the Raman scattering methods, A.V.Povolotskiy, T.Yu.Ivanova, D.A.Vorob'ev, *St-Petersburg State Univ., Russia.* The structure and structural changes of the Ga-Ge-S:Er^{3+} glasses and films were studied by Raman scattering methods. The influence of the Er^{3+} on the medium range order of the glass structure was found. The results of the glass structural changes investigation were used for the films analysis.

YTuC27
Overtone pre-excitation – infrared multiphoton dissociation technique for carbon isotope separation, M.N.Polianski, O.V.Boyarkin, T.R.Rizzo, *Ecole Polytechnique Fédérale de Lausanne, Switzerland*. We develop a new approach to highly selective Molecular Laser Isotope Separation (MLIS) based on Overtone Pre-excitation and Infrared Multiphoton Dissociation (OP-IRMPD). Most of its isotopic selectivity is gained at the preexcitation step. It turns out, however, that this already high selectivity can be further increased up to an order of magnitude by collisions of parent molecules. The process has been applied to isotope separation of ^{13}C on CF_3H molecules and exhibits economically promising overall performance.

YTuC28
Coupling proton-transfer-reaction mass spectrometry with laser spectroscopy for on-line monitoring of volatile organic compounds at pptv levels, D.Mayr, T.D.Mark, *Univ. Innsbruck, Austria*. A system for on-line measurements of trace components has been developed on the basis of proton transfer reactions. The combination with laser spectroscopic methods could facilitate the identification of isobars in complex gas mixtures.

QTuO · Nonlinear Optical Phenomena II

QTuO1
Application of Z-scan technique to saturable non-linear optical media with excited state absorption, Yu.O.Barmenkov, A.V.Kir'yanov, M.del Rayo Aparecio Fernandez, *Centro de Investigaciones en Optica, Mexico.* The Z-scan technique is adapted for measuring the nonlinear refractive index in a saturable medium with excited state absorption. A difference from a classical case is explained by an aberration of the refractive lens induced by a probing beam. This technique is applied to study photorefractive properties of polymer films containing bacteriorhodopsin.

QTuO2
Light-induced ejection of Ca atoms from polymeric films: a source of Calcium atoms at room temperature?, E.Maccioni, N.Beverini, F.Mango, *INFM-UdR-Pisa, Italy.* Laser-induced fluorescence of calcium has been observed in Polydimethylsiloxane (PDMS) coated cells, illuminated with visible light. Ca atomic density in the gas phase is much higher than the normal room-temperature vapor pressure of calcium.

QTuO3
The effect of detuning from Raman resonance on the phase behavior of Raman solitary waves, R.V.Chulkov, V.A.Lisinetskii, A.S.Grabtchikov, V.A.Orlovich, *Stepanov Inst. of Phys., Belarus.* The effect of detuning from Raman resonance on the phase behavior of Raman solitary waves was investigated both experimentally and theoretically.

QTuO4
Z-scan studies of barium nitrate and Nd:KGW crystals, A.I.Vodchits, V.P.Kozich, V.A.Orlovich, P.A.Apanasevich, *Stepanov Inst. of Phys., Belarus.* Barium nitrate and Nd:KGW crystals have been studied using Z-scan technique with excitation by laser pulses of 8 ns width at 532 nm and 1 ps width at 790 and 395 nm. The nonlinear refraction indices have been determined.

QTuO5
Real-time gratings recording in nonlinear coating of planar waveguide, A.Korolev, A.Koklushkin, V.Nazarov, *Corning Sci. Center, Russia,* N.Kozhevnikov, M.Lipovskaya, *State Technical Univ., Russia.* Real-time gratings recording in a nonlinear coating of planar ion-exchange waveguide as well as possibility of control of their efficiency by an additional wave of another wavelength has been shown. Bacteriorhodopsin BR-96N suspension was used as a coating and method of phase-modulated beams was applied to measure the gratings efficiency.

QTuO6
High-perfomance supercontinuum generation in optical fibers, V.Archireev, A.Korolev, V.Solovjev, *Corning Sci. Center, Russia,* D.Nolan, *Corning Inc., USA.* We report on efficiency of supercontinuum generation in optical fibers pumped by tunable picosecond laser radiation. Optical fibers have been tested in region both of normal and anomalous dispersion. Highest efficiency of power transformation up to 90% and good flatness of output spectra in broad spectral area have been obtained by using Hi-NL optical fibers.

QTuO7
Nonlinear optics of fullerene-doped organic materials in the near infrared, A.V.Varnaev, *State Electrotech. Univ., Russia,* A.P.Zhevlakov, *Inst. for Laser Phys., Russia,* N.V.Kamanina, *Vavilov State Optical Inst., Russia.* An optical limiting effect and thin hologram recording have been studied in conjugated organic materials based on polyimide doped with fullerene C_{70} at wavelength of 1315 nm.

QTuO8
To the theory of the light bullet collapse, A.M.Goncharenko, I.L.Garanovich, *Div. for Optical Problems in Inform. Technologies, Belarus.* 3+1-dimension light bullets properties are investigated in the case of the medium with Kerr nonlinearity. Collapse problem is discussed and it is shown, both numerically and analytically, that the light bullets of the femotsecond range avoid collapse and are stable in the Kerr nonlinear medium.

QTuO9
Collision-induced decay of bound soliton states in optical fibres, V.A.Aleshkevich, Y.V.Kartashov, P.V.Sinilo, V.A.Vysloukh, *Moscow State Univ., Russia.* We have studied decay of N-soliton bound states induced by collision of bound state with additional low-energy perturbing pulse. Optimal conditions at which the fastest decay occurs are discussed.

QTuO10
Efficient collinear third-harmonic generation in a single two-dimensional nonlinear photonic crystal, T.S.Karaulanov, *Inst. of Electronics, Bulgaria,* S.M.Saltiel, *Univ. of Sofia, Bulgaria.* We propose novel multiphase matched process that starts with generation of a pair of symmetric second-harmonic waves. Each of them interacts again with the fundamental wave to produce two constructively interfering third harmonic waves collinear to the fundamental input wave.

QTuO11
Nonlinear dynamics of three-wavelength CO_2 laser with modulated losses, B.F.Kuntsevich, *Stepanov Inst. of Phys., Belarus,* A.N.Pisarchik, *Centro de Investigaciones en Optica, Mexico.* Synchronization effects in a a loss-modulated three-wavelength CO_2 laser have been theoretically studied in a wide range of modulation frequencies and amplitudes. Due to a strong coupling between rotational levels, the oscillations in all laser channels are completely synchronized.

QTuO12
Local field effect on self-induced transparency in dense resonant media, A.A.Afanas'ev, R.A.Vlasov, S.Yu.Mikhnevich, *Stepanov Inst. of Phys. Belarus,* O.K.Khasanov, D.V.Gorbach, O.M.Fedotova, T.V.Smirnova, *Inst. of Phys. Solids & Semicond. Belarus.* Self-induced transparency is investigated taking into account interatomic near dipole-dipole interactions. Pulse duration is assumed to fall between the both irreversible relaxation times. Modified area theorem is generalized to this case. Soliton solutions are analyzed.

QTuO13
Stimulated Raman scattering in lengthy AllWave fiber with Nd:YAG laser pumping, S.M.Kobtsev, S.V.Kukarin, A.A.Pustovskikh, N.V.Fateev, *Novosibirsk State Univ., Russia.* We report Raman spectra features in the Lucent AllWave fiber 3.5 km-long at picosecond Nd:YAG laser pump. A new spectral component at 1097 nm and 200 nm wide Raman band around 1500 nm were observed. 48% of the pump is converted to the band.

QTuO14
Miniature optical parametric 1.32–2.14 mm converter, V.L.Naoumov, A.M.Onischenko, A.S.Podstavkin, A.V.Shestakov, *RDI "Polus", E.L.S. Co., Russia.* High efficiency OPO has been designed for converting 1318 nm YAG:Nd^{3+} laser radiation into 2 μm eye-safe region. Conversion efficiency 30% and threshold energy 15mJ (1.1 J/cm^2) have been achieved at repetition rate 12.5 Hz. The divergence was less than 4 mrad up to 3 thresholds.

QTuO15
Soliton-like behaviour of the two-wave mixing in the inertial photorefractive media, P.A.Prudkovskii, *Moscow State Univ., Russia.* Two-wave mixing dynamics in inertial photorefractive media was studied both experimentally and numerically. We showed that sharp light intensity fluctuations are caused rather by complicated nonlinear dynamics than from electrical discharges or other noise sources.

QTuO16
Soliton cloning in multilevel resonant media, M.W.Carter, G.Vemuri, *Indiana Univ. Purdue Univ. Indianapolis, USA.* We report on the spatiotemporal dynamics of a pair of optical pulses in three-level lambda systems, with special emphasis on utilizing resonant media for cloning optical solitons with desired amplitude, phase, and speed.

QTuO17
Spectral properties of stimulated Brillouin scattering in single-mode optical fibers above threshold, A.A.Fotiadi, P.Mégret, M.Blondel, *Faculte. Polytechnique de Mons, Belgium.* We show that inhomogeneous broadening and hole burning of the spectrum of the SBS power reported recently for the SBS in single-mode fibers are closely connected with modification of the SBS statistics above the threshold and have the same origin as similar features of the SBS amplifier gain spectrum.

QTuO18
Cascade-avalanche up-conversion in type II quantum wells, E.Yu.Perlin, A.V. Ivanov, R.S.Levitskii, *Vavilov State Optical Inst., Russia.* A theory of a new efficient up-conversion mechanism is developed. The mechanism in-volves cascade optical transitions and Auger-like processes promoting a photon-avalanche effect. The threshold light intensities for the effect are tens or hundreds kW/cm^2 and the equilibration times are 10–100 ps.

QTuO19
Self-focusing and screening soliton propagation, V.V.Shepelevich, *Mozyr State Pedagogical Inst., Belarus,* R.Kowarschik, A.Kiessling, V.Matusevich, *Friedrich Schiller Univ. Jena, Germany.* Opportunities of the optimization of the self-focusing and screening soliton propagation in the cubic photorefractive (110)-cut crystal of 23 and 432 classes have been investigated theo-

retically for arbitrary direction of the external electric field.

QTuO20
Vector-field singularities of polarization transverse patterns in lasers, I.V.Veshneva, L.A.Melnikov, M.V.Ryabinina, *Saratov State Univ., Russia,* A.I.Konukhov, *Inst. of Radio-Engin. and Electronics, Russia.* Vector Karhunen-Loeve modes were used for the description of polarized laser transverse patterns dynamics. 2D vector field corresponding to the transverse distribution of their Stokes parameters was classified according to the behaviour near singularity points.

QTuO21
Variational approach to light propagation in a two level system, D.P.Caetano, S.B.Cavalcanti, J.M.Hickmann, *Univ. Federal de Alagoas, Brazil,* A.M.Kamchatnov, *Inst. of Spectroscopy, Russia,* R.A.Kraenkel, *Universidade Estadual Paulista — UNESP, Brazil.* Using a variational formulation we obtain a simultaneous solitary wave solution for the Maxwell-Bloch equation, describing the interaction of light with a two level system, and for the nonlinear Schrödinger equation, describing light propagation in the waveguide.

QTuO22
Nonlinear-optical characteristics of colloidal metals, semiconductors, fullerenes and organic dyes, R.A.Ganeev, S.R.Kamalov, I.A.Kulagin, T.Usmanov, *NPO Akadempribor, Uzbekistan,* A.I.Ryasnyansky, M.K.Kodirov, *Samarkand State Univ., Uzbekistan,* N.V.Kamanina, *Vavilov State Optical Inst., Russia.* The nonlinear optical parameters (nonlinear refractive indices, nonlinear susceptibilities and nonlinear absorption coefficients) of colloidal metal solutions (silver, gold, cooper and platinum), semiconductor chalcogenide films (As_2S_3, $As_{20}S_{80}$, $2As_2S_3/As_2Se_3$, $3As_2S_3/As_2Se_3$), dye vapors and solutions (naphtalene, paraterphenyl, antracene, pentacene and tetracene) and fullerene-doped polyimide films and solutions and frequency conversion in these media are investigated by Z-scan method and third harmonic generation.

QTuO23
Nonlinear refraction in epoxy based polymer with 4-aminoazobenzene due to orientation of azobenzene molecules under pulsed excitation, A.Borshch, M.Brodyn, V.Volkov, V.Lyakhovetsky, *Inst. of Phys., Ukraine,* A.Kutsenko, L.V.Pisarzhevsky, *Inst. of Phys. Chem., Ukraine.* Nonlinear refraction resulted from azobenzene molecules orientation induced by linear polarized laser pulsed radiation in a polymer structure based upon diglicidylether of bisfenol-A has been studied. Dynamics of the process was measured in a wide time scale.

QTuO24
Brillouin-gain shuffle via serial Kerr effects in single, Ilwhan Oh, *Mokpo National Univ., Korea.* Brillouin-gain shuffle is reported in single mode fiber. Acoustic modes by a mode-locked laser pump generate mixing harmonics that beat with Stokes wave. The beats act as probe signals, and result in serial Kerr effects.

QTuO25
Nonlinear resonant polarization rotation effect of a laser beam in ruby crystals, S.A.Bakhramov, A.M.Kokhkharov, O.R.Parpiev, E.V.Vaganov, *NPO "Akadempribor", Uzbekistan.* Nonlinear polarization rotation (NPR) of Q-switch ruby laser beam in a ruby ($Al_2O_3:Cr^{3+}$) crystal samples with various concentrations of ions Cr^{3+} is reported for the first time. Temperature dependence and resonant behavior of NPR-effect in research crystals was observed. The mechanism of NPR-effect in impure laser crystals is discussed.

QTuO26
Low-frequency dynamics of a multimode laser with selective saturable absorber, P.Khandokhin, Ya.Khanin, *Inst. of Appl. Phys., Russia.* We study the stability conditions of steady-state solution and features of low-frequency dynamics of a class B laser with selective saturable absorber in the framework of rate equation approach. The numerical simulation yields qualitatively new results.

QTuO27
The collective light-induced luminescence of ensembles of large molecules in an intensive laser field, G.M. Ermolaeva, V.A.Smirnov, V.B.Shilov, *Vavilov State Optical Inst., Russia.* New approach in the theory of light-induced luminescence of large molecule ensembles is presented. The main mechanism of the luminescence development is four-wave collective interaction. Results of the theory are in good accordance with experimental data.

QTuO28
$ZnGeP_2$ growth for nonlinear applications, G.A.Verozubova, A.I.Gribenyukov, V.V.Korotkova, *Inst. for Optical Monitoring, Russia.* In present paper problems of fabrications of transparent $ZnGeP_2$ crystals are considered: synthesis, growth defects. The defects have a negative impact on optical transparency. Postgrowth treatments allow reducing the absorption down to 0.01 cm^{-1} at 2 mm.

QTuO29
Cooperative bistability and local field effects in dense atomic systems, A.A.Afanas'ev, M.V.Voitikova, *Stepanov Inst. of Phys. Belarus.* We report cooperative bistability and local field effects in dense 3-level atomic system with excited-state dipole-dipole interaction. Cooperative nonlinearities induce a hysteretic dependence of double frequency luminescence of radiation field intensity.

QTuO30
Properties of nonlinear exciton-biexciton optical waveguide, P.I.Khadzhi, O.V.Korovai, *Inst. of Applied Phys., Moldova.* Properties of guided and surface modes of three-layer nonlinear waveguide taking into account the exciton-biexciton conversion by the photons of the same pulse are investigated. Decomposition of the same mode dispersion law into several noncoupled regions due to resonance character of nonlinear dielectric function is predicted.

QTuO31
Vacuum squeezing of cw light in coupler, S.A.Podoshvedov, Jaewoo Noh, Kisik Kim, *Inha Univ., Korea.* We investigate the spectra of vacuum fluctuations for waves propagating along an optical coupler. Large vacuum squeezing is predicted and its relationship to stable and unstable stationary solutions of the corresponding classical equations is discussed.

QTuO32
Effects of gain saturation on polarization switching in VCSELs, F.Prati, P.Caccia, *Univ. dell'Insubria, Italy,* F.Castelli, *Univ. degli Studi di Milano, Italy.* We present a generalized macroscopic spin-flip model, which includes gain saturation due to spectral hole burning and the frequency dependence of gain. The model reproduces correctly the polarization switching predicted by a full microscopic theory.

QTuO33
Two-beam self-reflection phenomenon in semiconductors, P.I.Khadzhi, L.Yu. Nadkin, K.D.Lyakhomskaya, *Dniester State Univ., Moldova.* New nonlinear optical phenomenon — two-beam self-reflection effect an optical homogeneous semi-infinite medium taking into account the exciton-biexciton conversion by the photons of different beams is investigated. The multistable reflectivity surfaces depending on intensities of two incident waves are studied.

QTuO34
Interaction of spatial solitons in photorefractive crystal with an alternating electric field, M.V.Borodin, S.M. Shandarov, M.N.Frolova, *State Univ. of Control Systems and Radioelectronics, Russia.* Coherent interaction of bright spatial solitons in photorefractive crystal with an external electric field of square-wave form in presence of synchronous modulation of the irradiance intensity are studied. Steering of soliton collision by variation both of the amplitude of the external field and modulation depth of light intensity is demonstrated.

QTuO35
Raman amplification of ultra-high-bit-rate sequences of laser pulses, V.A. Aleshkevich, Y.V. Kartashov, A.S. Zhukarev, P.V. Sinilo, *Moscow State Univ., Russia,* V.A. Vysloukh, *Univ. de las Americas, Mexico.* We have studied both numerically and analytically the process of Raman amplification of ultra-high-bit-rate laser pulse trains in optical fibres. To model the propagation of pulse trains we used periodical cnoidal waves.

QTuO36
Features of one-dimensional spatial optical solitons in barium-calcium titanate crystals, V.Shandarov, *Univ. of Control Systems and Radioelectronics, Russia,* D.Kip, M.Wesner, *Osnabrueck Univ., Germany,* J.Xu, *Nankai Univ., China.* The formation of one–dimensional spatial photorefractive screening solitons in new ferroelectric crystal of barium–calcium titanate doped with iron is experimentally studied. The features both of the soliton state and the selffocusing stage are discussed.

QTuO37
Coherent processes in non-linear birefringent active fibers, S.O.Elyutin, *Moscow State Engin. Phys. Inst., Russia.* The polarization and spatio-temporal dynamics of coherent pulses propagating in an active birefringent Kerr non-linear fiber are discussed basing on the numerical solutions of the fiber effects full set self-consistent system of equations for the circularly polarized components of a coherent optical pulse coupled to the ensemble of the doped resonance atoms.

QTuO38
Polarization properties of optical superradiance in $LaF_3:Pr^{3+}$ crystal, A.A.Kalinkin, A.A.Kalachev, V.V.Samartsev, *Zavoisky Kazan Phys.-Tech. Inst., Russia.* The polarization properties of optical two-clolor superradiance in $LaF_3:Pr^{3+}$ crystal are investigated theoretically. The triggering regime of excitation is considered. Optimal conditions for experimental observation of SR signals are determined.

QTuO39
Discrete velocities of slow soliton-like excitations in the copper (comparison of two independent experimental results), E.M.Kudriavtsev, S.D.Zotov, *Lebedev Phys. Inst., Russia.* Many components of laser-induced solitary wave structure were registered in copper by IR-detector and thermocouple. Their velocities U_i (with $i = 10–17, 29–31$) less than longitudinal speed of sound v_l by 2 to the power i.

QTuO40
Bistability, threshold self-start, and multistability of laser passive mode-locking, A.K.Komarov, K.P.Komarov, *Inst. of Automation and Electrometry, Russia,* F.M.Mitschke, *Univ. Rostock, Germany.* Novel mechanisms for multistability and threshold dependence of self-start of passive mode-locking on a seed fluctuation intensity have been found. Obtained theoretical results are compared with corresponding experimental ones for a Kerr-lens Ti:Sapphire laser.

QTuO41
Influence of imaginary component of dispersion parameters on optical pulses dynamics in amplifying lightguides, A.V.Zolotov, I.O.Zolotovskij, D.I.Sementsov, *Ulyanovsk State Univ., Russia.* Within the framework of linear model concerning the second-order dispersion effect the frequency modulated Gaussian pulse dynamics in amplifying fiber is investigated. The existance of imaginary dispersion parameters in dynamics equation for the pulse envelope curve is demonstrated to cause the essential effect on the pulse dynamics and duration.

QTuO42
Existence of embedded solitons in optical systems, K.Kolossovski, A.V.Buryak, R.A.Sammut, *Univ. of New South Wales at ADFA, Australia,* A.R.Champneys, *Univ. of Bristol, UK.* A general model describing formation of embedded solitons in various optical systems is developed. The major results include derivation of the general criterion for existence of discrete families

of embedded solitons and their position in parameter space.

QTuO43
Light-induced memorized director reorientation homeotropic nematic liquid crystals, M.I.Barnik, *Inst. of Crystallography, Russia,* V.F.Kitaeva, A.S.Zolot'ko, *Lebedev Phys. Inst., Russia.* New specific features of the light-induced orientational memory in nematic liquid crystals (independence of the conformational activity, change of the nonlinearity sign with the light wavelength, self-organization of the director field in the process of memory formation upon the light illumination, etc.) has been established in pure samples and those doped with various dyes.

JTuG · High Resolution Spectroscopy and High-Precision Measurements. Laser Systems for Precision Measuremens

JTuG1
Accurate vacuum-ultraviolet and ultraviolet photoionization spectroscopy on krypton and xenon, F.Brandi, W.Hogerorst, W.Ubachs, *Vrije Univ., The Netherlands.* High-resolution spectroscopy, performed on nine transitions from the ground state of Kr and Xe by means of vacuum-ultraviolet and ultraviolet resonance-enhanced photoionization, results in new accurate values for the energy level values and isotope-dependent ionization energies.

JTuG2
Extremely thin cell transmission spectroscopy: disappearance and revival of the Dicke narrowing, A.Yarovitski, G.Dutier, S.Saltiel, A.Lezama, D.Bloch, M.Ducloy, *Univ. Paris 13, France,* D.Sarkisyan, A.Papoyan, *Armenian Inst. for Phys. Res., Armenia.* In a very short vapor cell, the Dicke narrowing of an absorption line, maximal for a l/2 thickness is experimentally shown, in the optical domain, to oscillate with the cell thickness.

JTuG3
Theory of CPT resonance for alkali atom vapors in a buffer gas cell, A.V.Taichenachev, V.I.Yudin, *Novosibirsk State Univ., Russia,* R.Wynands, *Univ. Bonn, Germany,* J.Kitching, L.Hollberg, *NIST, USA.* We develop an analytical theory of CPT resonance, taking into account the full atomic level structures as well as all field-induced effects. The analysis is carried out under the assumption of the total collisional depolarization in the excited state. A good qualitative agreement with experiments for Cs in Ne is obtained.

JTuG4
Stimulated Raman scattering on the forbidden 2^1S-2^3S transition of helium, E.V.Baklanov, A.V.Konovalov, *Inst. of Laser Physics, Russia.* The stimulated Raman scattering method of high-resolution laser spectroscopy for the 2^1S-2^3S forbidden transition of helium have been analyzed. Analysis made has shown that the measurement this transition frequency is possible.

JTuG5
CPT resonances in thermal ^{85}Rb vapor: D_1 versus D_2 line excitation, S.Knappe, J.Kitching, L.Hollberg, *NIST, USA,* M.Stahler, R.Wynands, *Univ. Bonn, Germany,* A.Taichenachev, V.Yudin, *Novosibirsk State Univ., Russia.* We have compared coherent population trapping (CPT) resonances, both experimentally and theoretically, for D_1- and D_2-line excitation of a thermal ^{85}Rb vapor and find a nearly ten-fold improvement for certain applications when using the D_1-line.

JTuG6
Fine structure-resolved spectroscopy on single nitrogen-vacancy color center in diamond, F.Jelezko, I.Popa, J.Wrachtrup, *Univ. of Stuttgart, Germany,* A.P.Nizovtev, S.Ya.Kilin, *Stepanov Inst. of Phys., Belarus.* Observation of the fine structure of the triplet-triplet ^3A-^3E optical transition of the single NV color centers in diamond and measurements of the g(2)(t) correlation functions for different fine-structure transitions are reported along with the interpretation of the observed spin-selective photokinetics in terms of five-level photophysical model.

JTuG7
Calculations of potential curves for alkali dimers at excited asymptotes M*(ns)+M, B.Norman, W.T.Zemke, R.Côté, M.Pichler, W.C.Stwalley, *Univ. of Connecticut, USA.* Potential curves near a variety of excited asymptotes have been studied experimentally using photoassociation of ultracold atoms. Here we predict potential curves for comparison with prior experiments and to estimate optimal conditions for future experiments.

JTuG8
Intracavity laser spectroscopy with inhomogeneously broadened fiber laser, E.Ovchinnikov, U.Stapelfeld, V.M.Baev, P.E.Toschek, *Inst. für Laser-Physik, Germany.* Sensitivity of absorption measurements in the cavity of Nd- and Yb-doped fiber lasers depends on the absorption linewidth. The contribution of homogeneous broadening to the total gain broadening is determined by the fit of numerical simulations to the experimental data.

JTuG9
Inhibition of the radiation trapping in cesium vapor into silane-coated cells, H.N.de Freitas, A.F.A.da Rocha, M.Chevollier, M.Oria, *Univ. Federal da Paraíba, Brazil.* Radiation trapping in cesium vapor is observed to be less efficient into silane-coated than into bare glass cells. The hyperfine polarization relaxation on the cell walls is responsible for the efficiency of this multiple scattering mechanism.

JTuG10
On dependence of the shape of nonlinear resonance on a spatial distribution of light beams intensity, A.V.Taichenachev, V.I.Yudin, *Novosibirsk State Univ., Russia,* M.Stahler, J.Kitching, L. Hollberg, *NIST, USA,* R.Wynands, *Univ. Bonn, Germany.* The influence of spatial distribution of light intensity on a spectroscopic signal is investigated. We demonstrate, that this factor is of principle importance and it leads to the considerable change of the shape and width of nonlinear resonances. The comparison between two profiles of light beams with cylindrical symmetry (step-like and Gaussian) is made.

JTuG11
Reflective nonlinear polarization spectroscopy of media with light induced anisotropy, A.Lavrinenko, *DTU, Denmark,* I.Gancheryonok, *Belarusian State Univ., Belarus.* We give full vectorial description of a reflective variant of nonlinear polarization spectroscopy. An expression for the obtained signal with arbitrary pumping is derived. Specific configurations are investigated as important examples of the general approach.

JTuG12
Measurement of the E2 transition probability in Ca, N.Beverini, E.Maccioni, F.Sorrentino, *Univ. of Pisa and INFM, Italy.* We have measured the ratio between the transition rates of the intercombination line at 657 nm in Calcium and the quadrupole line at 457.5 nm, by the integrated absorption technique. We found a value of 53.6 ± 0.8.

JTuG13
Neural network data analysis for intracavity laser spectroscopy, P.V.Nazarov, V.V.Apanasovich, V.M.Lutkovski, *Belarus State Univ., Belarus,* P.Ya.Misakov, *Inst. of Mol. and Atomic Phys., Belarus.* The method for the determination of analyzed element concentration from intracavity laser spectrum of trace amounts of substances is considered. It allows achieving the better sensitivity than conventional analytical methods. The method was tested on spectra of Cs water solutions.

JTuG14
Modal refractive index of 1.3 mm InGaAsP, AlGaInAs and GaInNAs multiple quantum well lasers under high hydrostatic pressure, S.R.Jin, R.Fehse, S.J.Sweeney, G.Knowles, A.R.Adams, E.P.O'Reilly, *Univ. of Surrey, UK,* H.Riechert, S.Illek, A.Yu.Egorov, *Infineon Technologies AG, Corporate Res., Germany.* The effective modal refractive index for 1.3 μm InGaAsP, AlGaInAs and GaInNAs semiconductor lasers is determined by measuring longitudinal mode separation up to pressure of 15kbar. A small pressure coefficient of 0.3–0.5%kbar in index for the three material lasers is shown.

JTuG15
Study of carrier concentration in Si - doped GaAs by Raman scattering and photoreflectance spectroscopy, L.P.Avakyants, P.Y.Bokov, A.V.Chervyakov, *Moscow State Univ.,* I.P.Kazakov, V.T.Trofimov, *Lebedev Physical Inst., Russia.* Raman scattering (RS) and photoreflectance (PR) spectroscopy have been used for characterization of Si-doped GaAs epitaxial layers with carrier concentration 10^{17}–10^{19} cm^{-3}. RS and PR complement each other for contactless characterization free carrier concentration of GaAs in wide range $10^{17} < n < 10^{19}$ cm^{-3}.

JTuG16
Fine structure of laser-induced annihilation signal in the antiprotonic helium, M.V.Ryabinina, L.A.Melnikov, *Saratov State Univ., Russia.* Laser-induced coherent population dynamics in the antiprotonic helium under the action of short laser pulse are studied numerically accounting hyperfine structure of the transition from metastable long-lived state having large orbital quantum numbers to Auger-decayed state

JTuG17
Experimental investigations of the influence of a tapered fiber on the intermode frequency stability of highly stable femtosecond pulses, S.N.Bagayev, S.V.Chepurov, A.M.Goncharenko, V.M. Klementyev, D.B.Kolker, S.A.Kuznetsov, Yu.A.Matyugin, V.S.Pivtsov, V.F.Zakharyash, *Inst. of Laser Phys., Russia,* T.A.Birks, W.J.Wadsworth, P.St.J.Russell, *Univ. of Bath, UK.* A technique and results of high precision measurements of the intermode frequency of a femtosecond Ti:Sapphire laser at the input and output of a tapered fiber are described. The experiments have shown that the intermode frequency stability does not depend on the broadened spectrum range.

JTuG18
Experimental investigations of the femtosecond pulse train spectrum broadened by tapered fiber, S.N.Bagayev, S.V.Chepurov, V.I.Denisov, V.M. Klementyev, D.B.Kolker, I.I.Korel, S.A.Kuznetsov, Yu.A.Matyugin, V.S.Pivtsov, V.F.Zakharyash, *Inst. of Laser Phys., Russia,* T.A.Birks, W.J.Wadsworth, P.St.J. Russell, *Univ. of Bath, UK.* Experimental investigations of the tapered fiber influence on the spectral characteristics of a passed femtosecond pulse train were made. The envelope of the broadened spectrum and the noise pedestal of intermode beats for various experimental conditions are presented.

JTuG19
Characterization of high-quality plane wavefronts by optical and atom-interferometric methods, A.Chernyshov, *Lebedev Phys. Inst., Russia,* G.Wilpers, U.Sterr, F.Riehle, J.Helmcke, *Phys.-Tech. Bundesanstalt, Germany.* Ideally flat wavefronts are prerequisite to atom interferometers and optical clocks. The characterization and optimization of the laser beams by shearing interferometers, Shack-Hartmann sensors and special atom interferometers leads to an improved optical frequency standard.

JTuG20
Laser-induced antiproton-positron recombination in traps, M.V.Ryabinina, L.A.Melnikov, *Saratov State Univ., Russia.* Laser stimulation of direct and cascaded antiproton-positron recombination to antihydrogen states $n \sim 3$ in Penning and Paul traps are investigated theoretically and numerically taking into account velocity distribution, polarization of laser, and axial magnetic field.

JTuG21
Laser frequency standards with different optical schemes, S.N.Bagayev, A.K.Dmitriyev, A.A.Lugovoy, D.V.Ityaksov, *Inst. of Laser Phys., Russia.* A transportable He-Ne/CH_4 frequency standard with possibility

to realize two schemes of telescopic cavity has been created. Frequency shifts depending on various parameters, stability, and reproducibility for both schemes will be presented.

JTuG22
Spectral properties and frequency control of optical parametric oscillators for applications in metrology, E.V.Kovalchuk, A.I.Lvovsky, A.Peters, *Univ. Konstanz, Germany.* We characterize a cw OPO featuring narrow linewidth and the possibility of phase locking to optical frequency standards. We present a novel scheme for transferring frequency stability between the IR and visible.

JTuG23
Narrow optical resonances in an active interferometer with a nonlinear absorber for laser frequency stabilization, S.N.Bagayev, P.V.Pokasov, D.Yu.Primakov, *Inst. of Laser Physics, Russia.* Narrow optical resonances in an interferometer with saturated absorption and amplified media at 3,39 μm were observed. The resolution limiting factors in experiment and a scheme of frequency standard based on active interferometer are discussed.

JTuG24
Development of the primary frequency standard on cold atoms, Yu.S.Domnin, V.P.Kostromin, V.M.Tatarenkov, *VNIIFTRI, Russia.* The state of affairs with the development of the Russian cesium fountain is presented. Design of the physical parts, laser and optical system is briefly outlined. Preliminary cooling results are presented.

JTuG25
Automated frequency locking system for stabilized lasers, A.V.Novoselov, V.S.Stoyanov, *VNIIFTRI, Russia.* Automated system is developed for frequency locking of lasers, using saturated absorption spectroscopy technique. Areas of application include laser frequency standards, laser cooling of atoms.

JTuG26
Light shift and laser sidebands in gas-cell atomic clocks using optical pumping and coherent population trapping, T.Karaulanov , C.Andreeva , S.Cartaleva, Y.Dancheva, B.Todorov, A.Yanev, *Inst. of Electronics, Bulgaria,* S.Jaquet, G.Di Domenico, P.Thomann, G.Mileti, *Observatoire Cantonal, Switzerland.* Theoretical and experimental investigation of the light shift in optical pumping and coherent population trapping based frequency standards is reported. A possibility for realization of a minimal (possibly zero) light shift configuration will be discussed.

JTuG27
Diffraction and transverse transit-time effect in stabilized laser, T.V.Radina, A.F.Stankevitch, *St.-Petersburg State Univ., Russia.* The shift of the molecular resonance peak in the He-Ne-CH_4 laser connected with combined action of transverse transit-time effect and the nonreciprocity of the wave-fronts curvature of counterpropagating waves in the cavity was investigated.

JTuG28
Amplitude and phase nonreciprocity in a ring gas laser, T.V.Radina, A.F.Stankevitch, *St-Petersburg State Univ., Russia.* It is shown theoretically that diffraction leads to the amplitude nonreciprocity in a laser with the alignment resonator. The phase nonreciprocity is associated with the resonator misalignment.

JTuG29
Frequency stabilization of DBR laser and saturated absorption spectroscopy with Cs, S.Chawla, A.SenGupta, S.Pugla, B.K.Roy, *Natl Phys. Lab., India.* DBR laser has been frequency stabilized against Cs hyperfine transition by designing side lock servo and controlling the laser current. Doppler profile and Cs saturated absorption features exhibit strong dependence on pump and probe polarization.

JTuG30
Laser fluorescence tests of iodine vapor cells, A.M.Negriyko, V.M.Khodakovskiy, *Inst. of Phys., Ukraine.* The iodine vapor cell is important element of metrological stabilized lasers. The presence in the cell of foreign gases causes the laser frequency fluctuation. In this paper we paid the particular attention for the influence of irrelevant iodine isotopes on frequency shift of hyperfine components.

JTuG31
Development of laser tsunami-meter, S.Sakata, *Natl Res. Inst. for Earth Sci. and Disaster Prevention, Japan,* M.A.Gubin, A.Araya, *Univ. of Tokyo, Japan,* Tsuboi Daisuke, *Akashi Corp., Japan.* A laser tsunami-meter, which adopts Fabry-Perot interferometers, has been in the process of development. On the basis of experimental results by the first instrument, the second instrument is now being constructed.

JTuG32
Laser setup for hydrogen monitoring, G.M.Mikheev, T.N.Mogileva, D.G.Kaluzhny, A.Yu.Popov, *Inst. of Appl. Mechanics, Russia.* Simple Nd^{3+}:YAG laser setup for hydrogen monitoring in rarefied gas mixtures by the methods of stimulated Raman scattering and coherent anti-Stokes Raman spectroscopy is presented.

JTuG33
Laser spark determination of trace metals in the air, V.E.Evtiheev, S.V.Oshemkov, A.A.Petrov, *St-Petersburg State Univ., Russia.* Laser spark plasmas was investigated as an atomizer for emissive and fluorescence analysis of aerosols in the air. Emissive and fluorescence spectra were excited by laser spark plasmas and by radiation of dye laser. Limits of detection for determination of metals in the air are 10^{-5} and 10^{-7}% for emissive and fluorescence analysis respectively.

JTuG34
Laser profile analysis of solid samples, O.N.Ezhov, S.V.Oshemkov, A.A.Petrov, *St-Petersburg State Univ., Russia.* The combined technique for determination of profile elements concentrations in the volume of solid sample near its surface is realized. The technique is based on pulsed laser ablation of analyzed samples coupled with laser excitation of analytical fluorescence spectra.

JTuG35
On-line interferogram demodulation with reduce of optical system vibration effect, S.V.Zuev, V.A.Krutikov, V.A.Tartakovsky, A.A.Tikhomirov, *Inst. for Optical Monitoring, Russia.* A possibility of live fringe-pattern phase restorative by means of estimates of separate lines or sections of interferogram is submitted. It is possible if the phase is accepted the monotonous function in each section of interferogram. Thus, realization of on-line interferogram demodulation is possible and, besides, the fringe-pattern vibration effect is reduced.

JTuG36
A laser system for the AURIGA detector optical transduction chain, L.Conti, M.De Rosa, F.Marin, *Univ. di Firenze, Italy.* We present a laser system for an high sensitivity opto-mechanical transducer. Two high-Finesse cavities are used for freqency stabilization and residual fluctuation measurements. The system presents a very low frequency noise in the kHz range.

JTuG37
Diode lasers as an accurate light source, T.Alahautala, E.Lassila, R.Hernberg, *Tampere Univ. of Technology, Finland.* An illumination device producing kW level light pulses at 808 nm and/or 670 nm is demonstrated. The device comprises stacked diode laser bars without heat sinks. Beams are combined using a single parabolic optical element.

JTuG38
Optical correlation techniques for characterizing rough surfaces, O.V.Angelsky, P.P.Maksimyak, *Chernivtsy Univ., Ukraine.* New feasibilities are considered for optical correlation diagnostics of rough surfaces with different distributions of irregularities. The influence of deviations of the height surface roughness distribution from a Gaussian probability distribution on the accuracy of optical analysis is discussed. The possibilities for optical diagnostics of fractal surface structures are shown and the set of statistical and dimensional parameters of the scattered fields for surface roughness diagnostics is determined.

JTuG39
Research of waveguide sensors for pressure measuring laser systems, A.G.Sobolev, E.N.Epihkine, N.V.Masalsky, V.A.Volkov, *Inst. for Microprocessors, Russia.* Original method for pressure measuring has been discussed. The method is based on changing of propagation conditions for guided optical mode in connected waveguide due to external pressure. Theoretical analysis, computing simulation, and experimental investigation for several modifications of waveguide sensors have been done.

JTuG40
Investigation of optical absorption in laser mirrors by means of photothermal radiometry technique, G.Ya.Kolodnyi, O.E.Sidoryuk, Yu.D.Golyaev, *R&DI Polus, Russia.* Mirrors created by means of ion beam sputtering deposition were investigated. Weak absorption of near IR and visible radiation was measured by means of laser modulated photothermal radiometry technique.

JTuG41
Transformation of falling radiation into cylindrical surface polaritons, M.N. Libenson, D.S. Smirnov, *Vavilov State Optical Inst., Russia.* It has been considered the transformation efficiency of laser radiation into cylindrical surface plasmon-polaritons on a resonance harmonic grating covered cylindrical waveguide. It has been investigated the case when polaritons are propagated along a waveguide. The results are interesting for the development of effective probes for near-field optical devices.

JTuG42
Optical profile restoration from differential microscope response with additive noise, D.V.Baranov, E.M.Zolotov, *General Phys. Inst., Russia,* A.A.Yegorov, *People's Friendship Univ. of Russia, Russia.* The influence of the stochastic additive noise on the image formation in heterodyne differential microscope is investigated. An algorithm of the optical profile restoration of rectangular groove from microscope response with the noise is proposed.

JTuG43
A new remote method for estimating the parameters of optical elements, I.E.Kozhevatov, E.A.Rudenchik, N.P.Cheragin, E.H.Kulikova, *Inst. of Appl. Phys., Russia.* A new remote method for estimating parameters of optical elements is developed. The method is based on the use of an high order interference of white light reflected from the sample sides. Method gives a possibility for measuring the optical thickness with accuracy to ~ 0.5nm on 70mm aperture and distance to some meters.

JTuG44
Measuring a coherence length of the laser diode radiation by the prism coupling technique, A.V.Khomchenko, E.V.Glasunov, D.N.Kostyuchenko, *Inst. of Appl. Optics, Belarus.* A new technique for measuring the coherence length of the laser diode radiation is considered. This approach is based on recording of the contrast changes in the angular Fourier spectrum of guided modes at controlled matching of the light propagation distance in waveguide to the coherence length of light.

JTuG45
Dynamics of the coherence process in two levels systems under incoherent pump, R.F.Malikov, R.K.Hismatullin, *Bashkir State Pedagogical Univ., Russia.* The dynamics of superradiance, coherent amplifier and of the stimulated photon echo in inhomogeneously broadened media under incoherent pump have been investigated. The new regimes of the superradiance and stimulated photon echo have been obtained. The self-oscillation superradiance has been the sphere of the particular interest. The study superradiance modes as a function of homogeneously and inhomogeneously luminescence line broadening has been made.

JTuG46
Vector area and vector area theorem mapping in crystals, V.N.Lisin, *Zavoisky Phys.-Tech. Inst., Russia.* Theory of a self-induced transparency for crystals is constructed. It takes into account that both the local symmetry and the crystal symmetry determine the directions of the dipole matrix element vectors of the optically excited ions.

JTuG47
Thermal field imaging in semiconductor materials, A.M. Grigoriev, *Laser Technology Center, Russia.* Optical registration of the thermal fields in the semiconductor materials by the light with a photon energy equals by energy gap has been investigated experimentally.

JTuG48
Laser induced dynamic gratings application for thermal conductivity measurement of CVD diamond, E.V.Ivakin, V.G.Ralchenko, A.V.Sukhodolov, A.V.Vlasov, *Stepanov Inst. of Phys., Belarus.* We demonstrate that the application field of the method of laser-induced dynamic gratings can be essentially widened towards the in-plane thermal conductivity measurement of light scattering samples. The phase sensitive technique developed is used to determine thermal conductivity of polycrystalline CVD diamond plates, which are known to exhibit a well-defined granular anisotropic structure.

JTuG49
Holographic interferometer for tge control of laser crystal inhomogeneities, S.Mikayelyan, A.Ordyan, R.Kochikyan, A.Stepanyan, *"LT-PYRKAL", cjsc, Armenia,* A. Kazaryan, *Inst. for Informatics and Automation problems, Armenia.* Holographic scheme of laser crystal control is proposed. Fringe pattern enters the computer, after special filtration procedures the computer generates maximal value of the wave-front distortions and image in 3D space.

QTuP · Physics and Optical Diagnostics of Nanostructures

QTuP1
Magnetoabsorption in the size-limited systems in the present of a field of resonance laser radiation, E.P.Sinyavskii, E.I.Brusenskaya, *Inst. of Appl. Phys., Moldova.* We investigate the light absorption for the quantum well in a longitudinal external magnetic field in the presence of the resonant laser radiation. When the frequency of laser radiation corresponds to the cyclotron frequency, the shape of the absorption coefficient might define completely of the infrared radiation intensities.

QTuP2
Radiation transfer in Fe-containing Langmuir-Blodgett films, V.M.Anishchik, V.V.Grushevsky, A.I.Khmelnitsky, H.V. Krylova, *Belarusian State Univ., Belarus.* The effect of radiation transfer induced by UV-light in Fe-containing Langmuir-Blodgett films has been experimentally observed. The theoretical explanation has been given treating it as an appearance of quasi-stationary states of d-electrons of Fe on d-orbitals of carbon atoms.

QTuP3
High refractive index and amplification in a heterogeneous media, A.N.Oraevskii, I.E.Protsenko, *Lebedev Physical Inst., Russia.* Anomalously high values of resonant refractive index, absorption or amplification are predicted for a heterogeneous medium composed of metallic nanoparticles suspended in a transparent, or active matrix. The width and the frequency of the resonance depend on the form and the matherial of nanoparticles.

QTuP4
Nonlinear with laser radiation intensity self-quenching of excited molecules in polydisperse nanostructure, M.G.Kucherenko, A.V.Sidorov, *Orenburg State Univ., Russia.* Steady-state annihilation kinetics of quasiparticles in polydisperse nanostructure is investigated. Changes of the kinetic regime of deactivation are discovered in the case of logarithmic normal distribution for pore sizes. Computer simulation of processes for triplet and singlet electronic excited states is realized.

QTuP5
Local optical field distribution in photonic crystals with microcavities probed by SNOM technique, A.Maidykovski, A.Fedyanin, O.Lebedev, O.Aktsipetrov, *Moscow State Univ., Russia.* Spatial distribution of local optical field across one-dimensional photonic crystals with microcavities is studied by means of SNOM technique. Localization of radiation at resonance wavelength in the vicinity of microcavity ?/2 spacer layer is observed.

QTuP6
Minimal-cladding holey fibers: mode properties and nonlinear-optical applications, A.B.Fedotov, S.O.Konorov, A.N. Naumov, A.M.Zheltikov, *Moscow State Univ., Russia,* Ping Zhou, V.V.Temnov, A.P.Tarasevitch, D.von der Linde, *Univ. Essen, Germany,* Yu.N.Kondrat'ev, V.S. Shevandin, A.V.Khokhlov, K.V.Dukel'skii, *Vavilov State Optical Inst., Russia,* S.N.Bagayev, *Inst. of Laser Phys., Russia,* V.B.Smirnov, *Russian Center of Laser Phys., Russia.* A holey fiber, where the cladding is reduced to a minimal configuration of a single ring of holes, allows the field structure, dispersion, and optical losses of holey-fiber modes to be explored in a methodologically consistent way. Efficient spectral broadening of 40-fs Ti:Sapphire laser pulses and third-harmonic generation with 30-ps Nd:YAG laser pulses are demonstrated.

QTuP7
Wave characteristics in photonic crystals with passive and active layers, O.N.Kozina, L.A.Melnikov, I.V.Elterman, *Saratov State Univ., Russia.* The gain/attenuation and wave propagation directions in the photonic band-gap structure having layers with gain/losses was investigated and classified using the instabilities theory.

QTuP8
Nonlinear process in PC under the non-collinear interaction, A.V.Andreev, A.V. Balakin, A.B.Kozlov, I.A.Ozheredov, I.R.Prudnikov, A.P.Shkurinov, *Moscow State Univ., Russia,* P.Masselin, G.Mouret, *Univ. du Littoral, France.* Second-order nonlinear-optical processes in one-dimensional photonic crystal prepared from centrosymmetric materials are investigated in non-collinear geometry. Comparison of the surface and bulk contributions to sum frequency generation is carried out.

QTuP9
Light scattering by atomic nanostructures: a study of optical resonances, S.G.Moiseev, *Military Commun. Univ., Russia.* The influence of the system parameters, such as the number of atoms, geometry and orientation with respect to the external field, on the spectral characteristics of a nano-sized atomic assembly is investigated in detail. The relations among the number of atoms, interatomic distance and the resonance frequency shift for some simple configurations are obtained.

QTuP10
Optical properties of nanowires, M.Boustimi, *CNRS-UMR6082, France.* The optical response of metallic nanowires is found tacking account of the non-local electron's response by a self-consistent method and jellium model. Exact formula of the reflection factor is obtained and used to show extinction properties of certain metallic nanowires (Au, Cu, Ag).

QTuP11
Charge transfer between CuBr quantum dots and matrix glass, Il gon Kim, Kiwan Jang, Dongsun Yoo, Seongtae Park, S.J.Cho, *Changwon Natl Univ., Korea.* Hole burning spectrum of CuBr quantum dots has measured by the selective excitation techniques. There are two processes in the decay of the hole depth. Decay time of the fast processes is 4 minutes and the slow process is 2 hours.

QTuP12
Rapid thermal annealing effects of $In_{0.5}Ga_{0.5}As$ quantum dots by heterogeneous droplet epitaxy, Chang Myung Lee, Sam Kyu Noh, Joo In Lee, *Korea Res. Inst. of Standards and Sci., Korea,* Jae-Young Leem, Inje Univ., Korea, Dong-Han Lee, *Chungnam Natl Univ., Korea,* T.Mano, N.Koguchi, *Natl Res. Inst. for Metals, Japan.* In this letter, we present photoluminescence (PL) studies for tuning the energy levels in InGaAs quantum dot by heterogeneous droplet epitaxy with rapid thermal annealing at temperatures from 500 to 800 .

QTuP13
Polarization diffractive optics of chiral nanogratings, T.Vallius, P.Vahimaa, J.Turunen, Yu.Svirko, *Univ. of Joensuu, Finland.* We show that at normal incidence, the gold-silica planar chiral gratings can rotate the polarization azimuth of the transmitted light wave resembling the polarization properties of an optically active isotropic medium.

QTuP14
Two-photon excitation of Nd pair and quartet nano-clusters, T.T.Basiev, A.G. Papashvili, A.Ya.Karasik, *General Phys. Inst., Russia.* Nd^{3+}-containing nano-clusters in CaF_2 crystals are studied using two-photon tunable laser excitation of electronic transitions. Some features of coherent ion-ion coupling leading to 1–3cm^{-1} states splitting are demonstrated.

QTuP15
The nanoclusters created at the surface of zircon ($ZrSiO_4$) by means of CO_2 laser irradiation, A.F.Mukhamedgalieva, *Moscow State Mining Univ., Russia,* A.M.Bondar', *Baikov Inst. of Metallurgy and Materials Sci., Russia.* By means of photoluminescense and X-ray microprobe analyze of zircon ($ZrSiO_4$) irradiated by continuously and pulsed CO_2 laser it has been found that the laser irradiation result in the creation of long lived zirconium metallic nanoclusters $[Zr•€•Zr]^{n+}$.

QTuP16
Tunable spectral filters based on 1-D photonic crystals with liquid crystal defect layers, S.Ya.Vetrov, *Krasnoyarsk State Techn. Univ., Russia,* A.V.Shabanov, V.Ya.Zyryanov, *Kirensky Inst. of Phys., Russia.* It is shown, that there are thicknesses of a liquid crystal layers, at which the reorientation of optical axis of the nematic results in both appearance of new defect levels and essential change of a degree of localization of electromagnetic field in defect modes. The transmission spectrum of photonic crystal can also be modified qualitatively due to change of relative arrangement of several defect layers in the lattice.

QTuP17
Binding energy of localized excitons in InAs self-assembled quantum dots embedded into InGaAs/GaAs multi quantum wells, T.V.Torchynska, J.L.Casas Espinola, *ESFM - Natl Polytechnic Inst., Mexico,* P.G.Eliseev, A.Stintz, K.J.Malloy, *Univ. New-Mexico, USA,* R.Pena Sierra, *CINVISTAV-IPN, Mexico.* This paper presents the investigation of photoluminescence, connected with ground (GS) and excited (ES) states, and it thermal quenching in self-assembled InAs QD's, embedded in $In_{0.15}Ga_{0.85}As$/GaAs MQW structures, using variable temperatures (12–300K) and excitation light intensities (1–100W/cm^2). The same value of activation energy for GS and ES emission thermal quenching has been estimated. Last fact and corresponding energy diagram are discussed.

QTuP18
The conditions of metal conductivity in a quantum dot ensemble, A.I.Bibik, *Inst. of Molec. and Atomic Phys., Belarus.* The possibility of dielectric-metal transition (Mott transition) as a result of increase of concentration of charge carriers in the conductivity band of an ensemble of close-packed monodispersed nanocrystals is mathematically proved. The results of statistical analysis of conditions of occurrence of metal conductivity in a system of ordered and disordered semiconductor nanocrystals depending on their concentration, size and electron effective mass are reported.

QTuP19
Spectra and spin transition of ground state of quantum dot molecule, N.E.

Kaputkina, *Moscow Inst. for Steel and Alloys, Russia,* Yu.E.Lozovik, *Inst. of Spectroscopy, Russia.* Spectra of horizontally and vertically coupled quantum dot "molecules" are studied. Singlet-triplet transition controlled by interdot coupling and possibility to control system by normal and parallel magnetic field are investigated

QTuP20
Single-photon storage in a single quantum dot for the implementation of a solid-state quantum repeater, A.M.Bychkov, D.Bouwmeester, *Oxford Univ., UK.* We propose a semiconductor quantum dot device for storage of the quantum states of individual photons. The device may be used in realistic optical quantum communication, namely, to implement a solid-state quantum repeater.

QTuP21
Disturbing influence of an optical near-field aperture probe on electromagnetic field distribution and diagnostics of nanostructures, M.V.Bashevoy, A.A.Ejov, S.A.Magnitskii, D.A.Muzychenko, V.I.Panov, A.V.Tarasishin, J.S.Toursynov, *Moscow State Univ., Russia.* The results of experimental investigations and numerical modeling of influence of a near-field scanning optical microscope aperture probe on electromagnetic field distribution inside and near the surface of nanostructures are reported. Analysis is performed both for cw light and femtosecond pulses.

QTuP22
Second harmonic imagination of individual nanostructures for scanning far field microscopy, S.Bozhevolnyi, *Aalborg Univ., Denmark,* V.Lozovski, *Inst. of Semicond. Phys., Ukraine.* The far-field images at second harmonic were calculated for a system consisting of nonlinear parallelepipedal object and nonlinear substrate illuminated by scanning Gaussian beam. The object and substrate were supposed to have the nonlinearity corresponding to symmetry and crystallographic axes of the object were rotated relatively its geometric axes through 450.

QTuP23
Scanning near field microscopy of nanostructures, V.I.Belotelov, A.S.Logginov, A.P.Pyatakov, *Moscow State Univ., Russia,* A.K.Zvezdin, *Inst. of General Phys., Russia.* Theoretical approach to scanning near field microscopy in collection mode is developed. Numerical simulation of images for nanoparticles of different shapes is conducted that reveals the effect of polarization rotation near the particles edges.

LTuD · Symposium on Adaptive Optics for High-Power Lasers

LTuD1
Improvement of the LULI high-intensity CPA laser system focusability and repetition rate using an adaptive optical system, J.P.Zou, J.Fuchs, B.Wattellier, J.P.Chanteloup, C.Haefner, *Ecole Polytechnique, France, and GSI, Darmstadt, Germany.*

Conference Hall — JOINT

8:30–10:30
JWA · IQEC/LAT Tutorials IV
V.M.Gordienko, *Moscow State Univ., Russia, Presider*

JWA1 · 8:30 · TUTORIAL LECTURE
Generation and metrology of XUV attosecond pulses, P.Agostini, *Centre d'Etudes de Saclay, France.* Current approaches to the generation of sub-femtosecond XUV pulses and the new methods developed for measuring such pulses are reviewed with special attention to High Harmonic Generation. Some applications to attophysics are briefly outlined.

Hall 1 — LAT1

8:30–10:30
LWA · Phase Conjugation and Beam Propagation
S.Kueck, *Univ. of Hamburg, Germany, Presider*

LWA1 · 8:30 · INVITED
Compensation of thermal lenses in high-power solid-state lasers, Th.Graf, E.Wyss, M.Roth, H.P.Weber, *Univ. of Berne, Switzerland.* An adaptive negative thermal lens that compensates for the power-dependent positive thermal lens in a Nd:YAG laser rod is presented. A reduction of the thermal lens by more than an order of magnitude was demonstrated.

LWA2 · 9:00
A comparative analysis of laser wavelength effects on maritime atmospheric propagation, J.R.Cook, *Naval Res. Lab., USA.* The atmospheric extinction parameters were examined for different laser wavelengths based on 15 years of meteorological observations at different regions of the world.

Hall 2 — IQEC

8:30–10:30
QWA · Soliton Optics and Beam Dynamics
G.Stegeman, *CREOL, Univ. Central Florida, USA, Presider*

QWA1 · 8:30 · INVITED
Cavity solitons as pixels in semiconductor, S.Barland, M.Giudici, J.R.Tredicce, *Inst. Non Lineaire de Nice, France,* S.Balle, *IMEDEA, Spain,* M.Brambilla, T.Maggipinto, *Univ. di Bari, Italy,* L.A.Lugiato, L.Spinelli, G.Tissoni, *Univ. dell'Insubria, Italy,* T.Knödl, M.Miller, R.Jäger, *Univ. of Ulm, Germany.* By using a vertical cavity semiconductor amplifier with a large Fresnel number, driven by a coherent field, we provide the first proof of the generation of cavity solitons in semiconductors, written and deleted independently of each other and of the boundary.

QWA2 · 9:00
3D spatial solitons and their interactions via nonlocality in nematic liquid crystals, G.Assanto, M.Peccianti, K.A. Brzdakiewicz, *Univ. Roma Tre, Italy.* Generation and interaction of 3D spatial solitons in undoped nematic liquid crystals is governed by the reorientational nonlinearity with a significant nonlocality. We demonstrate solitons and their attraction, interlacing and merging outlining the role of nonlocality.

Hall 3 — IQEC

8:30–10:30
QWB · Fundamental Tests and Spectroscopy in an Extremely Thin Cell
A.Madej, *Inst. for Nat. Measurements Standards, NRC, Canada, Presider*

QWB1 · 8:30 · INVITED
Fundamental tests using rubidium and cesium clocks, A.Clairon, S.Bize, Y.Sortais, M.Abgrall, S.Zhang, D.Calonico, H.Marion, Y.Macsimovic, P.Laurent, P.Lemonde, G.Santarelli, A.Luiten, C.Salomon, *BNM-SYRTE, Observatoire de Paris, France*. By comparing hyperfine energy of Cs and Rb atoms one can search for an eventual time variation of the fine structure constant. Measurements over two years show no change at the $7 \cdot 10^{-15}$ year level.

QWB2 · 9:00 · INVITED
Cold atom space clocks and fundamental tests, C.Salomon, *Ecole Normale Supérieure, France,* N.Dimarcq, P.Laurent, M.Abgrall, Y.Maksimovic, A.Clairon, P.Lemonde, G.Santarelli, P.Uhrich, *Observatoire de Paris, France,* A.Jornod, P.Thomann, *Observatoire de Neuchatel, Switzerland,* P.Wolf, *Bureau Intern. des Poids et Mesures, France,* Ch.Sirmain, *Centre National d'Etudes Spatiales, France,* S.Feltham, *European Space Agency, ESTEC, The Netherland.* We describe the principle of a cold atom clock in space and the fundamental physics tests which will be performed by

Hall 4 — LAT

8:30–10:30
LWB · Laser Processing of Advanced Materials and Laser Microtechnologies V
V.Veiko, *Inst. of Fine Mechanics and Optics, Russia, Presider*

LWB1 · 8:30 · INVITED
Advanced laser processing of glass materials, K.Sugioka, K.Obata, K.Midorikawa, *RIKEN—Inst. of Physical and Chemical Res., Japan.* Various kinds of microprocessing of glass by advanced laser technologies are reviewed. Hybrid laser processing realized refractive index modification, micromachining, marking, painting and metalization of silicate glass, while femtosecond laser fabricated three-dimensional microstructures inside photosensitive glass.

LWB2 · 9:00 · INVITED
Laser surface microstructuring to improve tribological systems, V.Romano, H.P.Weber, *Inst. of Appl. Phys., Switzerland.* Short and ultrashort laser pulses were used for controlled micropatterning of surfaces to improve their wear behavior. A tenfold lifetime increase was found with patterns of optimized morphologies and dimensions tested under minimum lubrication conditions.

Hall 5 IQEC	Hall 6 LAT	Room 1 IQEC		
8:30–10:45 **QWC · Optics of Nanostructures II** V.M.Shalaev, *Purdue Univ., USA, Presider*	**8:30–10:30** **LWC · Communication Systems and Elements** N.Rosanov, *Inst. for Laser Physics, St. Petersburg, Russia, Presider*	**8:30–10:30** **QWD · Symposium on Light-Induced Phase Transitions and Optical Switching** N.Zheludev, *Univ. of Southampton, UK, Presider*		
QWC1 · 8:30 · INVITED ***Femtosecond interactions in nanoscale systems built from strongly confined quantum dots,*** V.I.Klimov, *Los Alamos Natl Lab., USA.* We report our recent results on single- and multi-exciton dynamics in isolated and communicating systems based on sub-10 nanometer colloidal nanoparticles (colloidal quantum dots). Specifically, we investigate intra-band carrier relaxation, the competition between radiative and nonradiative recombination, and inter-dot exciton transfer.	**LWC1 · 8:30 · INVITED** ***Optical routing and processing techniques and associated devices for communications,*** P.Bayvel, *Univ. College London, UK.* The possibilities to generate short optical pulses and to transmit these at multiple wavelengths over long distances in optical fibres has stimulated research in developing new techniques for wavelength routing and multi-wavelength optical processing such as switching, signal regeneration, and optical clock recovery: all of which can potentially simplify the routing and processing of telecommunication network data at very high bit-rates. The paper will review the advantages and limitations of these all-optical techniques and recent results.	**QWD1 · 8:30 · INVITED** ***Femtosecond x-ray diffraction measurement of a solid-solid phase transition in VO_2,*** A.Cavalleri, Cs.Tóth, *Lawrence Berkeley Natl Lab., USA,* C.W.Siders, *Univ. of Central Florida, USA,* J.A.Squier, *Univ. of California San Diego, USA,* P.Forget, J.C.Kieffer, *Univ. du Québec, Canada.* Femtosecond x-rays were for the first time used to probe a photo-induced solid-solid phase transition in VO_2. The fast timescale observed suggests that, in this regime, the structural distortion may not be thermally initiated.		
QWC2 · 9:00 · INVITED ***New optical phenomena for exciton system in quatum wells,*** Yu.E.Lozovik, *Inst. of Spectroscopy, Russia.* The light back-scattering and stimulated anomalous light transmission on coherent exciton phase in coupled quantum wells is considered. Engineering of dispersion relation and controlling photoluminescence and photon (laser) radiation with external fields are analyzed.	**LWC2 · 9:00 · INVITED** ***Advances in the design and fabrication of nonuniform Bragg gratings for DWDM applications,*** V.I.Sokolov, *IPLIT, Russia.* Advances in the design and fabrication of nonuniform Bragg gratings with space-modulated amplitude and phase shifts for the technology of Dense Wavelength Division Multiplexing are discussed. The methods for designing gratings with specified reflection/transmission spectra and laser technologies for their fabrication are presented. Various schemes of optical add/drop multiplexers based on nonuniform Bragg gratings are analyzed.	**QWD2 · 9:00 · INVITED** ***Laser-induced phase transformations on a nanoscale,*** V.V.Yakovlev, *Univ. of Wisconsin-Milwaukee, USA.* We report on our recent results on laser-induced phase transformations in semiconductor nanocrystals. We demonstrate that coherent laser excitation results in a selective modification of nanocrystals, which is accompanied with the change of the nanocrystals's size, shape and crystal structure.		

Conference Hall JOINT	Hall 1 LAT	Hall 2 IQEC	Hall 3 IQEC	Hall 4 LAT
8:30–10:30 **JWA · IQEC/LAT Tutorials IV—Continued**	**8:30–10:30** **LWA · Phase Conjugation and Beam Propagation—Continued**	**8:30–10:30** **QWA · Soliton Optics and Beam Dynamics —Continued**	**8:30–10:30** **QWB · Fundamental Tests and Spectroscopy in an Extremely Thin Cell—Continued**	**8:30–10:30** **LWB · Laser Processing of Advanced Materials and Laser Microtechnologies V—Continued**
	LWA3 · 9:15 ***Optimization of high-average-power Nd:YAG laser with cavity completed by dynamic holographic gratings,*** O.L.Antipov, A.P.Zinoviev, D.V.Chausov, V.A.Vorob'ev, *Inst. of Appl. Phys., Russia.* Several schemes of a high-average-power laser oscillator with a cavity completed by refractive-index and gain gratings that accompany population gratings induced in flash-lamp pumped Nd:YAG laser crystals by generating beams are investigated. The optimization of the laser is made for increase of average power of the generation of beams and its quality.	**QWA3 · 9:15** ***Noise-induced growth of arrays of spatial solitons in nonlinear optics,*** I.Rabbiosi, A.J.Scroggie, G-L.Oppo, *Univ. of Strathclyde, UK.* Domain walls with oscillatory tails can lock and form spatially irregular stable states in models of nonlinear optical devices. Their stochastic dynamics lead instead to the formation of periodic arrays of solitons.	comparison of this space clock with ground-based clocks at the level of $1{\cdot}10^{-16}$.	
JWA2 · 9:30 · TUTORIAL LECTURE ***Adaptive femtosecond quantum control: Principles and applications,*** G.Gerber, *Univ. Wuerzburg, Germany.* Femtosecond laser pulses are modified in a pulse shaper and optimized iteratively by a learning algorithm to reach specific goals in gas phase and liquid phase coherent control experiments.	**LWA4 · 9:30** ***Laser technology for leading lights,*** G.A.Kaloshin, *Inst. of Atmospheric Optics; Russia.* The paper describes the scientific-technological solutions of the Laser Range Lights are based on the usage of laser beams and on observation of aerosols scattering radiation of the atmosphere from a navigating symbol made by laser beams.	**QWA4 · 9:30** ***The dynamics of "optical needle" formation,*** N.N.Rosanov, V.E.Semenov, N.A. Solov'eva, N.V.Vyssotina, *Res. Inst. for Laser Phys., Russia.* We analyze numerically the process of formation of ultranarrow (subwavelength) spatial optical solitons–"optical needles"–in media with various mechanisms of the Kerr and saturating nonlinearities. We present characteristics of steady-state solitons, their internal modes, and the dynamics of "optical needle" generation by a picosecond laser pulse.	**QWB3 · 9:30** ***New test of the isotropy of space using cryogenic optical resonators,*** H.Müller, S.Herrmann, C.Braxmaier, A.Peters, *Univ. Konstanz, Germany,* A.I.Sunaga, S.Schiller, *Heinrich-Heine-Univ. Düsseldorf, Germany.* We present a new optical test of the isotropy of space (Michelson–Morley experiment) using cryogenic resonators. First results already yield a 6-fold improvement over the best previous measurement. Current status and future prospects are discussed.	**LWB3 · 9:30** ***Intracavity laser-processing of reflecting surfaces,*** V.Osipov, V.Valyavko, *Stepanov Inst. of Phys., Belarus,* A.Feld, B.Chichkov, *Laser Zentrum Hannover, Germany.* By observing the laser generation dynamics during the intracavity processing of reflecting surfaces, physical mechanisms responsible for the fabrication of periodic submicrometer structures will be studied.
	LWA5 · 9:45 ***Phase locking of holographic solid-state Nd-lasers by parallel coupling in gain gratings,*** T.T.Basiev, *General Phys. Inst., Russia,* A.V.Fedin, A.V.Gavrilov, S.N.Smetanin, *Kovrov State Technological Academy, Russia.* A laser scheme for phase locking of radiation of two self-phase-conjugated Nd:YAG lasers by coupling in active rod gain gratings is proposed, theoretically studied, and experimentally tested. A single-mode, single-frequency radiation of the proposed system has the peak power equal to 15 MW, which exceeds the summed peak power of two initial lasers.	**QWA5 · 9:45** ***Reconstruction of Bessel beam in Kerr nonlinear medium,*** R.Butkus, R.Gadonas, J.Janusonis, A.Piskarskas, K.Regelskis, V.Smilgevicius, A.Stabinis, *Vilnius Univ., Lithuania.* It is demonstrated that truncated in azimuth Bessel light beam is reconstructed after the beam passes through a benzene cell. The phenomenon is explained as Bessel beam self-action in Kerr nonlinear medium.	**QWB4 · 9:45** ***Probing atom-surface interaction in an extremely thin cell,*** G.Dutier, S.Saltiel, A.Yarovitski, P.Valente, D.Bloch, M.Ducloy, *Univ. Paris 13, France,* D.Sarkisyan, A.Papoyan, *Armenian Inst. for Phys. Res., Armenia.* Spectroscopy in an extremely thin cell of dilute vapor offers attractive new possibilities for the probing of atom-surface interaction.	**LWB4 · 9:45** ***Laser-assisted direct manufacturing of functionally graded 3D objects,*** A.Iakovleva, E.Trunova, I.Smurov, D.Grevey, *ENISE, France.* By coaxial powders injection into a laser beam 3D objects with functionally graded properties were manufactured. Material gradients can be smooth or sharp, multilayered structures can be obtained as well. Experiments were carried out applying stainless steel and stellite powders.

Hall 5 IQEC	Hall 6 LAT	Room 1 IQEC		
8:30–10:45 **QWC · Optics of Nanostructures II —Continued**	**8:30–10:30** **LWC · Communication Systems and Elements—Continued**	**8:30–10:30** **QWD · Symposium on Light-Induced Phase Transitions and Optical Switching—Continued**		
QWC3 · 9:30 ***Fluorescence resonance energy transfer scanning near-field optical microscopy,*** G.Dietler, S.K.Sekatskii, G.T.Shubeita, *Univ. de Lausanne, Switzerland,* V.S.Letokhov, *Inst. of Spectroscopy, Russia.* Fluorescence Resonance Energy Transfer Scanning Near-field Optical Microscopy was recently proposed by us as a method to improve the spatial resolution of SNOM up to 1–5 nm. The first experimental images obtained by this method are presented.	**LWC3 · 9:30** ***Laser diode submitted to filtered optical feedback: a comparative study for arbitrary feedback strength,*** P.Besnard, *ENSSAT, France,* A.Naumenko, N.Loiko, *Stepanov Inst. of Phys., Belarus,* G.Ughetto, J.C.Bertreux, *Acatel Optronics Route de Villejust, France.* Influence of feedback strength on characteristics of a semiconductor laser is theoretically analyzed when it is coupled to filtered external cavity. Multiple reflections in external cavity are taken into account and we discuss the limits of a single-longitudinal mode description.	**QWD3 · 9:30 · INVITED** ***Photo-induced dielectricity in quantum paraelectric perovskite oxides,*** K.Tanaka, T.Hasegawa, I.Katayama, *Kyoto Univ., Japan.* Strong enhancement of static dielectric constant was observed in $SrTiO_3$ and $KTaO_3$ under photo-excitation over the band-gap. Dielectric measurements suggest ferroelectric micro-domains multiplied by photo-excitation induce macroscopic change in dielectricity.		
QWC4 · 9:45 ***Hyper-Rayleigh scattering in third and second harmonics from silver island films,*** N.V.Didenko, E.M.Kim, A.A.Nikulin, O.A.Aktsipetrov, *Moscow State Univ., Russia.* The effect of hyper-Rayleigh scattering (HRS) in third harmonic (incoherent optical third harmonic generation) is observed in silver island films for the first time. The indicatrix of HRS in third harmonic is compared with the indicatrix of HRS in second harmonic.	**LWC4 · 9:45** ***Timing jitter in autosoliton transmission system with semiconductor optical amplifiers and saturable absorbers,*** G.Onishchukov, Z.Bakonyi, U.Peschel, C.Knöll, D.Michaelis, F.Lederer, *Friedrich-Schiller Univ., Germany.* Low (2 ps at 30 000 km) timing jitter in a long-haul single channel autosoliton transmission is demonstrated in a re-circulating fiber loop set up. Distance evolution of the jitter and its dependence on system parameters are studied.			

Conference Hall JOINT	Hall 1 LAT	Hall 2 IQEC	Hall 3 IQEC	Hall 4 LAT
8:30–10:30 **JWA · IQEC/LAT Tutorials IV—Continued**	**8:30–10:30** **LWA · Phase Conjugation and Beam Propagation—Continued**	**8:30–10:30** **QWA · Soliton Optics and Beam Dynamics —Continued**	**8:30–10:30** **QWB · Fundamental Tests and Spectroscopy in an Extremely Thin Cell—Continued**	**8:30–10:30** **LWB · Laser Processing of Advanced Materials and Laser Microtechnologies V—Continued**
	LWA6 · 10:00 ***Study of the parameters and the origin of four-wave mixing in Nd:YAG active rod,*** D.A.Nikolaev, G.A.Bufetova, I.A. Shcherbakov, V.B.Tsvetkov, *General Phys. Inst., Russia,* O.L.Antipov, *Inst. of Appl. Phys., Russia.* Results of the investigation of parameters and relative contribution of refraction index and gain gratings mechanisms to four-wave mixing in Nd:YAG active rod are presented.	**QWA6 · 10:00** ***Intermediate asymptotic solutions to the nonlinear Schroedinger equation with gain,*** V.I.Kruglov, A.C.Peacock, J.D.Harvey, *Univ. of Auckland, New Zealand.* A parabolic self-similar asymptotic solution to the NLSE with gain has recently been found. Intermediate asymptotic results have now been obtained for propagation with small nonlinearity in the normal and the anomalous dispersion regimes.	**QWB5 · 10:00** ***Ultra-small atomic frequency references,*** J.Kitching, S.Knappe, L.Hollberg, *NIST, USA.* The performance of vapor-cell atomic clocks is analyzed as a function of cell size, particularly with regard to millimeter and sub-millimeter dimensions. Designs and prospects for ultra-small frequency references will be discussed.	**LWB5 · 10:00** ***Pulsed laser processing of porous silicon,*** V.Yu.Timoshenko, B.V.Kamenev, P.K.Kashkarov, *Moscow State Univ., Russia,* Th.Dittrich, *Technische Univ. München, Germany,* J.Rappich, *Hahn-Meitner-Inst., Germany.* Nanosecond-laser processing of porous silicon layers of different porosity was performed with pulses of a XeCl-laser and it was investigated by using time-resolved reflectivity measurements, photoluminescence, infrared spectroscopy, and scanning electron microscopy techniques.
	LWA7 · 10:15 ***Creation and industrial test approval of laser solid state resonators for cutting, welding, perforating in the articles made of advanced materials [aluminium, ceramics, tungsten, zirconium, titanium, silver and others],*** S.Usov, I.Minaev, *Tulamashzavod JSC, Russia.* The development and industrial test approval of pulse high-power solid-state resornator on the base of Nd/YAG crystals is described. Resonator made according to generator-amplifier scheme at the expense of some original technical decisions magnifies the thermal lens effect that makes it possible to increase efficiency by 1,5…2 times.	**QWA7 · 10:15** ***Optically induced nonlinear wave processes in photorefractive crystals,*** M.P.Petrov, V.V.Bryksin, *Ioffe Phys.-Tech. Inst., Russia,* H.Vogt, F.Rahe, E.Krätzig, *Osnabrueck Univ., Germany.* New nonlinear effects—overall (spatial and temporal) rectification and second harmonic generation of space charge waves—have been discovered in photorefractive crystals. In contrast to nonlinear optics, the rectification effect has a giant magnitude.	**QWB6 · 10:15** ***Laser-induced fluorescence of sub-micron Cs, Rb-vapour,*** D.Sarkisyan, A. Papoyan, Y.Pashayan, Yu.Malakyan, *Inst. for Phys. Res., Armenia,* D.Bloch, M.Ducloy, *Univ. Paris-Nord, France.* A strong Doppler narrowing of Cs and Rb lines has been observed with the help of an extremely thin cell of a wedged thickness 100–2000 nm. It is revealed that for all experimental conditions the linewidth of sub-Doppler profile of fluorescence of hyperfine transitions is narrower than that of absorption.	**LWB6 · 10:15** ***Laser-induced heterogeneous processes at deposition of elements from vapors of transition-metal carbonyls,*** S.A.Mulenko, *Inst. for Metal Physics, Ukraine.* Heterogeneous processes were investigated while deposition of elements from molybdenum carbonyl and iron carbonyl vapors under the action of KrF-laser radiation and Ar^+-laser radiation on glass and silicium substrate surface.

10:30–11:00 COFFEE BREAK

Hall 5 IQEC	Hall 6 LAT	Room 1 IQEC		
8:30–10:45 **QWC · Optics of Nanostructures II—Continued**	**8:30–10:30** **LWC · Communication Systems and Elements—Continued**	**8:30–10:30** **QWD · Symposium on Light-Induced Phase Transitions and Optical Switching—Continued**		
QWC5 · 10:00 ***Enhanced nonlinear-optical interactions in silicon nanocrystal assemblies,*** L.A. Golovan, A.B.Fedotov, L.P.Kuznetsova, P.K.Kashkarov, V.Yu.Timoshenko, A.M. Zheltikov, *Moscow State Univ., Russia.* Assemblies of Si nanocrystals (SNs), including those with strong in-plane anisotropy, are investigated by the second- and third-harmonic (TH) generation. Whereas polarization dependence of TH signal in SNs remains in general the same as for crystalline silicon, increase of TH intensity in several times for SNs was found. The later effect is likely to be connected with local-field effect in SNs.	**LWC5 · 10:00 · INVITED** ***Laser cryptography based on optical chaos,*** J.-P.Goedgebuer, L.Larger, P.Levy, X.Bavard, *GTL-CNRS Telecom, UMR CNRS 6603, Georgia Tech Lorraine, Univ. de Franche-Comté, France.* We explain how chaos can be used to encrypt messages from semiconductor lasers operating in a chaotic regime. Decryption is carried out via chaos synchronization. Practical experiments with DBR and tunable lasers are reported.	**QWD4 · 10:00 · INVITED** ***Femtosecond dynamics of photo-induced phenomena in low dimensional systems,*** T.Suemoto, *Univ. of Tokyo, Japan.* Femtosecond dynamics of photo-induced phenomena in low dimensional systems is discussed. Experiments on coherent excitation of the wave-packet oscillation in 1D CDW systems and the magnon bound states in a spin-ladder system will be presented.		
QWC6 · 10:15 ***Investigation of surface electromagnetic wave scattering in acoustic microscope,*** J.Bereiter-Hahn, *J.W.Goethe Univ., Germany,* M.M.Nazarov, A.P.Shkurinov, *Moscow State Univ., Russia.* We excited surface electromagnetic wave (plasmon) by laser beam on the metal film from one side and excited surface acoustical waves from the other side. Plasmon field distribution and plasmon-phonon interaction are observed.				
QWC7 · 10:30 ***Polarization self-action in silver nanoaggregates at pico- and nanosecond laser excitation,*** S.V.Perminov, *Inst. of Semicond. Phys., Russia,* A.S.Kuch'yanov, S.G.Rautian, V.P.Safonov, *Inst. of Automation and Electrometry, Russia,* V.P. Drachev, *Purdue Univ., USA,* E.N.Khaliullin, R.L.Armstrong, *New Mexico State Univ., USA.* Studied are the polarization ellipse self-rotation and nonlinear gyrotropy in silver colloidal nanoaggregates at 10-ns and 2.5-ps pulsed excitation. Possible mechanism of the optical nonlinearity is suggested.				

10:30–11:00 COFFEE BREAK

Conference Hall JOINT	Hall 1 LAT	Hall 2 IQEC	Hall 3 JOINT	Hall 4 LAT
11:00–12:00 **JWC · IQEC/LAT Tutorials IV** M.Ducloy, *Univ. Paris-Nord, France, Presider*	**11:00–12:30** **LWD · Semiconductor Lasers** D.R.Hall, *Heriot-Watt Univ., UK, Presider*	**11:00–12:30** **QWE · Nonlinear Pattern Formation and Nonlinear Nanooptics** M.S.Soskin, *Inst. of Physics, Ukraine, Presider*	**11:00–12:30** **JWB · Single Ion Optical Frequency Standards I** V.V.Smirnov, *General Physics Inst., Russia, Presider*	**11:00–12:30** **LWE · Laser Processing of Advanced Materials and Laser Microtechnologies VI** R.F.Haglund, *Vanderbilt Univ., USA, Presider*
JWC1 · 11:00 · TUTORIAL LECTURE ***Control and synchronization of homoclinic chaos and its implication for neurodynamics,*** F.T.Arecchi, *Univ. of Firenze, Italy*.	**LWD1 · 11:00** ***Design and characteristics of asymmetric quantum-well heterostructures with widen gain spectra,*** V.K.Kononenko, I.S.Manak, D.V.Ushakov, *Stepanov Inst. of Phys., Belarus.* Design of laser structures with nonuniform excitation that results in broad-band gain spectra is proposed. The active region contains quantum wells of different widths and potential barriers with suitable doping. The gain bandwidth of the GaInAs-GaInAsP laser diodes emitting at 1.55 μm exceeds 200 nm.	**QWE1 · 11:00 · INVITED** ***Laser induced nanoplasma with directional white-light emission,*** C.Favre, V.Boutou, H.Lambrecht, J.Yu, J.P.Wolf, *Univ. Claude Bernard Lyon 1, France,* W.Zimmer, M.Krenz, L.Woeste, *Freie Univ. Berlin, Germany,* R.K.Chang, *Yale Univ. New Haven, USA.* We report the first observation of highly directional white-light emission from a femtosecond-laser-induced nanoplasma plasma in water, the unique internal focusing properties of microdroplets confining the emission volume to nanometric dimensions.	**JWB1 · 11:00 · INVITED** ***Optical timepieces using single, laser-cooled mercury ions,*** J.C.Bergquist, S.Bize, R.E.Drullinger, W.M.Itano, U.Tanaka, C.E.Tanner, D.J.Wineland, S.A.Diddams, Th.Udem, L.Hollberg, *NIST, USA.* An optical frequency standard based on a $^{199}Hg^{+}$ ion is discussed. A fractional frequency instability of $7\cdot10^{-15}$ (at 1 s) has been realized for a laser locked to the $^{2}S_{1/2}$–$^{2}D_{5/2}$ electric-quadrupole transition at 282 nm (f_0≈1.06? 10^{15} Hz). The apparatus for a full systematic evaluation using two Hg^{+} standards is under construction.	LWE1 • 11:00 ***Laser studies of chiral molecules,*** M.Satta, S.Piccirillo, D.Scuderi, A.Paladini, D.Catone, A.Filippi, M.Speranza, A.Giardini, *Univ. di Roma "La Sapienza", CNR-Istit. Materiali Speciali, Univ. di Roma "Tor Vergata", Italy.*
	LWD2 · 11:15 ***ZnMgSSe/ZnSe deparate confinement heterostructure multiple quantum well lasers,*** G.P.Yablonskii, E.V.Lutsenko, V.N. Pavlovskii, V.Z.Zubialevich, A.L.Gurskii, *Stepanov Inst. of Phys., Belarus,* H.Kalisch, K.Heime, R.H.Jansen, *Inst. für Theor. Elektrotechnik RWTH Aachen, Germany,* B.Schineller, M.Heuken, *AIXTRON AG, Germany.* Laser and photoluminescence properties (thresholds, spectra, efficiency) of ZnMgSSe/ZnSe multiple quantum well heterostructures were investigated as a function of temperature (78–500 K) and excitation intensity (1–1000 kW/cm^2) using nitrogen and HeCd laser radiation.			**LWE2 · 11:15** ***Laser stimulation of diamond growth from compressed graphite,*** A.G.Molchanov, *Lebedev Physical Inst., Russia.* The new method of diamond growth from compressed graphite stimulated by pulsed-periodic laser emission is considered. The dependences of graphite temperature and diamond growth rate on the laser emission intensity and experimental results are presented.
	LWD3 · 11:30 ***Low-insertion-loss superlattice-based saturable absorber mirror for semiconductor laser mode locking,*** K.Vysniauskas, P.Suret, M.Jones, S.Hoogland, A.Garnache, A.C.Tropper, *Univ. of Southampton, UK,* J.S.Roberts, *Univ. of Sheffield, UK.* We demonstrate a novel low-loss semiconductor saturable absorber mirror in which a strained superlattice enhances quantum well carrier recombination. 5-ps pulse generation from an external cavity surface-emitting semiconductor laser has been demonstrated.	**QWE2 · 11:30** ***Nonlinear absorption in AgBr nanocrystals: two-photon absorption controlled by the optical Stark effect,*** E.Yu.Perlin, D.I.Stasel'ko, *Vavilov State Optical Inst., Russia.* Experimental data on nonlinear absorption of 30 ps 0.53 μm pulses in AgBr nanocrystals are interpreted in terms of two-photon absorption controlled by the optical Stark effect under double resonance at the adjacent interband transitions.	**JWB2 · 11:30 · INVITED** ***High resolution spectroscopy of a single In^{+} ion—towards an optical frequency standard,*** J.von Zanthier, M.Eichenseer, A.Yu.Nevsky, Ch.Schwedes, H.Walther, *Max-Planck-Inst. für Quantenoptik and LMU München, Germany.* Recent results on high-resolution spectroscopy of the $^{1}S_0$–$^{3}P_0$ clock transition of a single trapped laser-cooled indium ion are presented. This transition is studied with the purpose to realize an optical frequency standard.	**LWE3 · 11:30** ***Study on interaction of pulse-periodical IR-laser radiation with metals and polymers,*** V.M.Orlovskii, A.V.Fedenev, I.M.Goncharenko, N.N.Koval', V.F.Tarasenko, S.B.Alekseev, M.A.Shulepov, K.V.Oskomov, N.S.Sochugov, *High Current Electronics Inst., Russia.* The interaction of pulse-periodical CO_2, HF and Xe-laser radiation with surfaces of metals and polymers was studied. Correlation between parameters of surface erosion and modification was investigated for carbon steel 4140, stainless steel SUS304, lavsan and polyvinylchloride samples.

Hall 5 IQEC	Hall 6 LAT	Room 1 IQEC		
11:00–12:30 **QWF · Phase Transitions and Nanostructuring** D.Meschede, *Univ. of Bonn, Germany, Presider*	**11:00–12:30** **LWF · Magnetooptical and Liquid Crystal Schemes** TBA, *Presider*	**11:00–12:30** **QWG · Symposium on Light-Induced Phase Transitions and Optical Switching** M.Kuwata-Gonokami, *Univ. of Tokyo, Japan*, *Presider*		
QWF1 · 11:00 · INVITED ***Defect-deformational self-organization and nanostructuring of solid surface under laser action,*** V.I.Emel'yanov, *Moscow State Univ., Russia.* Computer processing of TEM, SEM and AFM digital images of surfaces, macro or nanostructured by such diverse technique as laser-induced recrystallization of thin silicon film, etching of silicon with formation of ensemble of pores and low temperature laser controlled deposition of Ga on silica substrate reveals a hidden long-range (quasi-hexagonal) order in spatial distribution of surface inhomogeneities. The periodicity and symmetry of laser-induced surface macro and nanostructures are well described by the developed theory of Defect-Deformational self-organization.	**LWF1 · 11:00** ***Ferroelectric liquid crystal spatial light modulator for location-based communication with higher data transfer rate,*** H.Itoh, T.Nishimura, Y.Yamamoto, H.Nakashima, *AIST CREST, JST, Japan,* T.Akiyama, T.Hidaka, *Shonan Inst. of Technology, Japan.* Characteristics of a ferroelectric liquid crystal spatial light modulator were evaluated for spatial optical interconnection of handheld communication terminals with very low power consumption and higher datarate for an implementation of location-based information service environment. **LWF2 · 11:15** ***Optical information recording on a dye doped cholesteric liquid crystal structure,*** G.Chilaya, A.Chanishvili, T.Medoidze, Z.Melikishvili, G.Petriashvili, G.Tsintsadze, *Inst. of Cybernetics, Georgia.* A new photoinduced effect of information recording in a luminescent dichroic dye doped cholesteric liquid crystal structure is observed. The effect allows carrying out repeatable recording-erase process of information.	**QWG1 · 11:00 · INVITED** ***Ultrafast x-ray spectroscopy: new possibilities to study dynamics in laser-excited materials,*** K.Sokolowski-Tinten, C.Blome, J.Blums, C.Dietrich, A.Tarasevitch, M.Horn-von-Hoegen, D.von der Linde, *Univ. of Essen, Germany,* A.Cavalleri, *Lawrence Berkeley Natl Lab., USA.* Time-resolved X-ray diffraction with sub-300 fs, multi-keV X-ray pulses is used to study ultrafast lattice dynamics during femtosecond laser-induced phase transitions in Germanium and Bismuth.		
QWF2 · 11:30 ***Photoconductivity via a nanoscale light-induced phase transformation,*** V.A.Fedotov, M.Woodford, N.I.Zheludev, *Univ. of Southampton, UK.* We report on a new mechanism of photoconductivity observed in elemental gallium. It is dependent on a fully reversible light-induced structural phase transformation occurring to a few nanometres depth at the metal's surface.	**LWF3 · 11:30** ***High-sensitivity optically addressed liquid-crystal lens,*** I.R.Guralnik, *Lebedev Physical Inst., Russia,* S.A.Samagin, *Samara State Univ., Russia.* For the first time, experimental samples of adaptive liquid-crystal lenses that require no additional lighting for wave front shaping by the wave's intensity variation are pre-sented. Both spherical and cylindrical lenses are fabricated and investigated.	**QWG2 · 11:30 · INVITED** ***Photoresistivity in a charge-density-wave material,*** K.Miyano, N.Ogawa, *Univ. of Tokyo, Japan.* Photoinduced slide to creep dynamic phase transition has been observed in a blue bronze in the charge-density-wave state. Light of moderate intensity can cause 'photoresistivity' with orders of magnitude increase in resistivity.		

Conference Hall JOINT	Hall 1 LAT	Hall 2 IQEC	Hall 3 JOINT	Hall 4 LAT
11:00–12:00 **JWC · IQEC/LAT Tutorials IV—Continued**	**11:00–12:30** **LWD · Semiconductor Lasers—Continued**	**11:00–12:30** **QWE · Nonlinear Pattern Formation and Nonlinear Nanooptics —Continued**	**11:00–12:30** **JWB · Single Ion Optical Frequency Standards I—Continued**	**11:00–12:30** **LWE · Laser Processing of Advanced Materials and Laser Microtechnologies VI —Continued**
	LWD4 · 11:45 ***Polarisation modulation response of VCSELs,*** B.Nagler, J.Albert, G.Verschaffelt, M.Peeters, K.Panajotov, I.Veretennicoff, J.Danckaert, *Vrije Univ. Brussel,* Belgium, S.Barbay, G.Giacomelli, F.Marin, *Univ. di Firenze, Italy.* We present an experimental and theoretical study of the current-driven polarisation modulation properties of VCSELs. The role of thermal effects in the polarisation switching dynamics in different types of VCSELs will be discussed.	**QWE3 · 11:45** ***Feedback-free hexagon pattern formation with nematic liquid crystals,*** S.G.Lukishova, RW.Boyd, K.L.Marshall, *Univ. of Rochester, USA.* High-definition patterns were observed in a single laser beam without feedback. During periodic irradiation by a pulsed laser beam, far-field patterns at the output of a dye-doped liquid crystal layer changed kaleidoscopically from stripes to multiple hexagons.		**LWE4 · 11:45** ***Modeling of the formation of deep 2D channels in metal targets via laser irradiation,*** O.N.Koroleva, V.I.Mazhukin, *IMM RAS, Russia,* M.M.Chuiko, *Inst. of Mathematics, Belarus.* Mathematical modeling is used to investigate the processes of melting and evaporation for pulsed laser drilling of metal targets. Application of dynamic adaptation allows modeling of the formation of the typical for microsecond range deep 2D channels.
	LWD5 · 12:00 ***IV-VI microcavity lasers for the mid-infrared with a PbTe active region,*** M.Boeberl, W.Heiss, T.Schwarzl, G.Springholz, *Univ. Linz, Austria,* J.Fürst, H.Pascher, *Univ. Bayreuth, Germany.* Mid-infrared emission from a PbTe layer in a IV-VI microcavity is demonstrated. The vertical laser structure was grown by molecular beam epitaxy. We observe optically pumped laser emission at 3.75 µm up to 316 K.	**QWE4 · 12:00** ***Observation of noisy pattern precursors in a passive optical system,*** G.Agez, P.Glorieux, E.Louvergneaux, C.Szwaj, *Univ. de Sci. et Technologies de Lille, France.* We study theoretically and experimentally the effects of noise on pattern formation in a liquid crystal subjected to an optical feedback. We observe, below threshold, precursors that anticipate the incoming pattern.	**JWB3 · 12:00 · INVITED** ***Narrow-linewidth lasers for frequency standards and metrology,*** P.Gill, G.P. Barwood, G.Huang, H.A.Klein, S.A.Webster, P.Blythe, M.Oxborrow, W.R.C.Rowley, S.N.Lea, H.S.Margolis, *Natl Phys. Lab., UK.* Developments in trapped ion optical frequency standards at NPL will be presented. This will include improvements to the narrow-linewidth lasers probing the cold trapped ion, together with new frequency measurements of these standards with a femtosecond comb.	**LWE5 · 12:00** ***The spall strength limit of matter at ultrahigh strain rate induced by laser shock wave,*** D.Batani, *Universita' degli Studi di Milano, Italy,* I.K.Krasyuk, P.P.Pashinin, A.Yu.Semenov, V.I.Vovchenko, A.V.Kilpio, E.V.Shashkov, *General Phys. Inst., Russia,* I.V.Lomonosov, *Inst. of Chemical Phys. Problems at Chernogolovka, Russia,* V.E.Fortov, *Inst. for High Energy Density, Russia.* New results of investigation of the dynamic fracture (spallation) by laser-induced shock waves are presented.
	LWD6 · 12:15 ***Thermal management of AlGaAs VECSELs using intra-cavity sapphire and silicon carbide heatspreaders,*** J.E.Hastie, C.W.Jeon, J.-M.Hopkins, D.Burns, M.D. Dawson, *Univ. of Strathclyde, UK.* High conductivity intra-cavity crystalline heat-spreaders are used to control the pump-induced temperature increase limiting the power scaling of VECSELs. Output powers of greater than 100mW were achieved at room temperature using both sapphire and SiC.	**QWE5 · 12:15** ***Transverse pattern size and multistability in a photorefractive feedback system,*** Ph.Jander, O.Kamps, C.Denz, *Westfälische Wilhelms-Univ., Germany.* We report on a discrepancy between experimental results for the transverse patterns size in a photorefractive feedback system and predictions based on a linear stability analysis. The impact on observations of non-hexagonal patterns is discussed.		**LWE6 · 12:15** ***Combined continuos-microscopic study of the expansion dynamics of laser plasma,*** T.E.Itina, J.Hermann, Ph.Delaporte, M.Sentis, *CNRS, France.* New efficient model is developed to study the expansion of laser-generated plasma plume. High-rate ablation events are investigated for a wide range of background pressure by using a combination of continuos and microscopic numerical approaches.

12:30–14:00 LUNCH (on your own)

Hall 5	Hall 6 LAT	Room 1 IQEC		
11:00–12:30 **QWF · Phase Transitions and Nanostructuring—Continued**	**11:00–12:30** **LWF · Magnetooptical and Liquid Crystal Schemes—Continued**	**11:00–12:30** **QWG · Symposium on Light-Induced Phase Transitions and Optical Switching—Continued**		
QWF3 · 11:45 ***Spatially localized morphology dependant resonance in a micro-cavity under two-photon excitation,*** D.Morrish, Xiaosong Gan, Min Gu, *Swinburne Univ. of Technology, Australia.* We present two-photon excitation of morphology dependent resonance (MDR) within a doped polymer micro-sphere. The MDR peaks are polarized and can be controlled by the location and polarization of the illumination spot.	**LWF4 · 11:45** ***Nonlinear two-beam coupling in azo-containing polymer with liquid crystalline properties,*** M.S.Andreeva, V.I.Shmal'gauzen, *Moscow State Univ., Russia.* Differently inclined beams energy coupling in the film of azocontaining LC polymer has been studied theoretically. The approximate equation for light induced refractive index is derived from the accurate microscopic expression for trans-isomer concentration.			
QWF4 · 12:00 ***Kinetics of "stripes" and energy "pseudogap" in transient four-photon spectroscopy of HTSC materials,*** V.M.Petnikova, V.V.Shuvalov, A.V.Voronov, *Moscow State Univ., Russia.* Kinetics of spatially-non-uniform distributions of holes ("stripes") and energy "pseudogap" in HTSC films after their ultra-fast "heating" will be considered. Interpretation of the data, obtained by picosecond nonlinear spectroscopy of optimally-doped Y-Ba-Cu-O samples, will be performed.	**LWF5 · 12:00** ***Switching waves in bistable all-epitaxial GaAs interferometers as a base for realization of a shift register,*** A.M.Goncharenko, G.V.Sinitsyn, S.P.Apanasevich, A.V.Lyakhnovich, A.S.Yasukevich, M.A. Khodasevich, Yu.A.Varaksa, *Div. for Optical Problems in Inform. Technologies, Belarus.* All-optical data shift operation in a planar array based on transverse effects in optical bistability in an all-epitaxial GaAs/GaAlAs Fabry-Perot interferometer is reported. Transfer of information bit along a shift register takes about 6 ns.	**QWG3 · 12:00 · INVITED** ***Photonics of structural transformations in Ga nanoparticles,*** K.F.MacDonald, V.A.Fedotov, S.Pochon, W.S.Brocklesby, N.I.Zheludev, *Univ. of Southampton, UK.* Gallium nanoparticles show a substantial optical nonlinearity as the result of a light-induced structural transition. Reversible reflectivity changes of several percent can be induced in response to low intensity (~ $kWcm^{-2}$) optical excitation.		
QWF5 · 12:15 ***Hopping conduction in arrays of self-assembled quantum dots,*** I.P.Zvyagin, *Moscow State Univ., Russia.* We show that the involvement of intermediate virtual states can strongly affect hopping conduction in arrays of self-assembled quantum dots. The effect is related to substantial reduction in tunneling distance compared to direct inter-dot transitions.	**LWF6 · 12:15** ***Laser complex for investigation of all-optical basic devices for information processing,*** G.V.Sinitsyn, S.P.Apanasevich, A.V.Lyakhnovich, A.S.Yasukevich, M.A.Khodasevich, Yu.A.Varaksa, *Div. for Optical Problems in Inform. Technologies, Belarus.* Technical parameters and main experimental features of laser complex for investigation of bistable phenomena in GaAs/GaAlAs interferometers and for modeling basic digital devices for optical signal processing (logical elements, switching devices, etc.) are reported.			

12:30–14:00 LUNCH (on your own)

Conference Hall — IQEC/LAT-YS

14:00–16:00
YWA · IQEC/LAT-YS Keynote Lectures VIII
V.A.Makarov, *Moscow State Univ., Russia, Presider*

YWA1 · 14:00 · KEYNOTE LECTURE
Quantum imaging, L.Lugiato, *Univ. dell'Insubria, Italy.* We provide an overview of the newly born field of quantum imaging. By tailoring the local quantum fluctuations and the spatial quantum correlations of light beams, one may improve the quality of different functions important for optical information.

Hall 1 — LAT

14:00–16:00
LWG · Gas Lasers and Ultrashort Pulse Lasers I
V.N.Ochkin, *Lebedev Physics Inst., Russia, Presider*

LWG1 · 14:00 · INVITED
Tunable diode laser gain measurements of the HF(2–0) overtone transitions in a small scale HF laser, G.D.Hager, *Air Force Res. Lab., USA.*

LWG2 · 14:30 · INVITED
Excimer lasers for refractive surgery, S.K.Vartapetov, *General Phys.s Inst., Russia.* A novel excimer lasers for refractive surgery is offered for small aberration treatment. The excimer laser with a full aperture Gaussian beam and fly spot system are described. The comparison of different systems of laser correction is reviewed.

Hall 2 — IQEC

14:00–16:00
QWH · Nonlinear Optics of Guided Waves
W.Wadsworth, *Univ. Bath, UK, Presider*

QWH1 · 14:00
Temporally overlapped two colored femtosecond twin pulse generation in birefringent optical fiber, N.Nishizawa, T.Goto, *Nagoya Univ., Japan.* A novel phenomenon of trapped pulse generation by femtosecond soliton pulse is analyzed both experimentally and numerically. The stable temporal overlapping is confirmed by observing the sum frequency signals generated between the twin pulses.

QWH2 · 14:15
Synchronization between optical waveguides in finite arrays of Kerr fibers, C.L.Pando, *Univ. Autonoma de Puebla, Mexico.* We report new quasiperiodic solutions for the discrete nonlinear Schroedinger Equation, which describes an array of Kerr fibers. Partial synchronization arises between the fields of some waveguides as light propages in the array.

QWH3 · 14:30
Transmission control of dispersion-managed solitons using guiding filters and synchronous modulation, M.F.S.Ferreira, M.H.Sousa, *Univ. of Aveiro, Portugal.* Using a variational analysis, we analytically study the soliton dynamics and timing jitter in optical transmission systems with periodic variations of power, chromatic dispersion and the periodic insertion of synchronous amplitude modulators and lumped narrow-band filters.

Hall 3 — JOINT

14:00–16:00
JWD · Single Ion Optical Frequency Standards II
N.Beverini, *Univ. of Pisa, Italy, Presider*

JWD1 · 14:00 · INVITED
Accurate absolute frequency measurements across the optical spectrum using a single ion, A.A.Madej, J.E.Bernard, A.Czajkowski, P.Dube, L.Marmet, K.J.Siemsen, *Natl Res. Council of Canada, Canada.* We report on precision measurements across the mid-IR, 1.5 μm, and visible spectral regions using a single, trapped and laser cooled atomic ion of $^{88}Sr^{+}$ whose 445 THz (674 nm) as an ultra-accurate frequency reference.

JWD2 · 14:30 · INVITED
Optical frequency standard based on a trapped $^{171}Yb^{+}$ ion, Chr.Tamm, T.Schneider, E.Peik, *Physikalisch-Technische Bundesanstalt, Germany.* The 435.5 nm electric-quadrupole transition of a single trapped $^{171}Yb^{+}$ ion has been resolved with a FWHM linewidth of 30 Hz. The transition frequency has been measured with a relative uncertainty of $1{\cdot}10^{-14}$.

Hall 4 — JOINT

14:00–16:00
JWE · Laser-Cell Interaction
J.Rodriguez, *Centenary College of Louisiana, USA,* and T.Karu, *IPLIT, Russia, Presiders*

JWE1 · 14:00 · INVITED
Photon-mediated nitric oxide biology, J.Rodriguez, *Centenary College of Louisiana, USA,* R.Maloney, T.Rassaf, M.Feelisch, *Louisiana State Univ. USA.* This talk addresses the question of whether light sources commonly used for many biomedical optics applications merely behave as a probe that do not alter tissue function or whether they elicit a biological response.

JWE2 · 14:30 · INVITED
To the problem of biological activity of laser-light: imporance of spatial gradients, A.N.Rubinov, A.A.Afanas'ev, *Stepanov Inst. of Phys., Belarus.* Theoretical and experimental studies of interference laser field interaction with lymphocytes, erythrocites and other particles as well as it's influence on genetic and functional properties of living cells: proliferration, apoptosis, membrane structure are presented

Hall 5 IQEC

14:00–16:15
QWI · Nanoengineering
J.Knight, *Univ. of Bath, UK, Presider*

QWI1 · 14:00 · INVITED
Concepts of photonic structure generation by atomic nanofabrication, D.Meschede, M.Mützel, D.Haubrich, U.Rasbach, S.Sidarenka, J.Wang, *Univ. Bonn, Germany.* The intensity distribution of atomic beams can be modulated by the methods of atom optics. Application of this method with growth process of III-V-compounds promises creation of 3d photonic materials at visible wavelengths.

QWI2 · 14:30 · INVITED
Engineering of photonic crystal heterostructures from opaline films, C.M.Sotomayor Torres, S.G.Romanov, V.Soloviev, T.Maka, D.Chigrin, P.Ferrand, *Univ. of Wuppertal, Germany,* N.Gaponik, A.Rogachev, A.Eychmueller, *Univ. of Hamburg, Germany,* R.Zentel, B.Griesebock, *Univ. of Mainz, Germany,* J.Ahopelto, *VTT Electronics, Finland.* Heterostructures based on opaline films of different thickness are demonstrated to form photonic heterostructures with well-defined emission and transmission properties. This approach helps to confine further the light, thus enhancing the emission properties.

Hall 6 LAT

14:00–16:00
LWH · Holography Methods
TBA, *Presider*

LWH1 · 14:00 · INVITED
Multiwave holography based on the nonlinear optical transformations, D.I. Staselko, Yu.N.Denisyuk, *Vavilov State Optical Inst., Russia.* It is proven that holograms recorded with the substantial use of the second-order nonlinearity of a nonlinear material are capable of forming the images when the wavelengths of object and reference waves are different.

LWH2 · 14:30
Linear and nonlinear hologram based cryptography, P.V.Polyanskii, *Chernivtsi Natl Univ., Ukraine.* Ghost-image hologram-based cryptography using transmitting and reflecting referenceless holograms is discussed. Novel approach for implementation of highly reliable cryptography using a nonlinear hologram with the combined reference wave is developed and implemented.

Room 1 IQEC

14:00–16:00
QWJ · Symposium on Light-Induced Phase Transitions and Optical Switching
V.Emel'yanov, *Moscow State Univ., Russia, Presider*

QWJ1 · 14:00 · INVITED
Dynamics of cold and dense electron-hole ensemble in direct- and indirect-gap semiconductors, M.Kuwata-Gonokami, *Univ. of Tokyo, Japan.* We discuss dynamics of photo excited electron-hole ensemble at high density and low temperature state in diamond and CuCl. In diamond, the electron-hole liquid critical temperature is found to be 165 K. In CuCl, we observe the condensed phase of electron-hole ensemble by the excitation via exciton Mott transition.

QWJ2 · 14:30 · INVITED
Light-induced transient band gap collapse in semiconductors for all-optical switching, J.Kono, *Rice Univ., USA.* This talk will describe our recent observation of coherent band gap distortion in semiconductors induced by ultrashort pulses of mid-infrared radiation. I will discuss the possible application of the effect to all-optical switching.

Conference Hall IQEC/LAT-YS	Hall 1 LAT	Hall 2 IQEC	Hall 3 JOINT	Hall 4 JOINT
14:00–16:00 **YWA · IQEC/LAT-YS Keynote Lectures VIII—Continued**	**14:00–16:00** **LWG · Gas Lasers and Ultrashort Pulse Lasers I—Continued**	**14:00–16:00** **QWH · Nonlinear Optics of Guided Waves —Continued**	**14:00–16:00** **JWD · Single Ion Optical Frequency Standards II—Continued**	**14:00–16:00** **JWE · Laser-Cell Interaction—Continued**
		QWH4 · 14:45 ***Stable dark solitons in dispersion-managed fibers,*** M.Strattmann, M.Böhm, F.Mitschke, *Univ. Rostock, Germany.* We show that dark solitons in dispersion-managed fibers propagate stably for both normal and anomalous path-average dispersion, and that a bound state of dark and bright solitons exists.		
YWA2 · 15:00 **IQEC/LAT-YS CLOSING REMARKS**	**LWG3 · 15:00** ***Xe laser pumped by electron beam generated in barrier discharge,*** A.V.Azarov, S.V.Mitko, V.N.Ochkin, *Lebedev Physical Inst., Russia.* The pulsed open barrier discharge is provided as a source of fast electron beams for gas laser pumping. The usage of nonequipotential dielectric cathode improves th discharge stability at elevated pressure. The Xe atomic laser at 2.03 mkm was studied.	**QWH5 · 15:00** ***Enhanced nonlinear optics with subnanojoule femtosecond Cr: forsterite laser pulses in tapered fibers,*** D.A.Akimov, A.B.Fedotov, A.A.Podshivalov, A.M.Zheltikov, *Moscow State Univ., Russia,* A.A.Ivanov, M.V.Alfimov, A.N.Petrov, *Center of Photochemistry, Russia,* T.A.Birks, W.J. Wadsworth, P.St.J.Russell, *Univ. of Bath, UK,* S.N.Bagayev, V.S.Pivtsov, *Inst. of Laser Phys., Russia.*	**JWD3 · 15:00 · INVITED** ***Octupole frequency standard in a single ^{171}Yb ion,*** S.A.Webster, P.J.Blythe, S.-K.Choi, P.Gill, *Natl Physical Lab., UK.* The octupole transition in $^{171}Yb^{+}$ is being developed as a frequency standard. For operation at a low magnetic field the polarisation state of the Doppler cooling radiation is modulated in order to destabilise dark states.	**JWE3 · 15:00 · INVITED** ***Cellular mechanisms of low-power laser therapy,*** T.I.Karu, *IPLIT, Russia.*
	LWG4 · 15:15 ***Development of next generation excimer lasers for industrial applications,*** V.M.Borisov, A.I.Demin, A.V.Eltsov, O.B.Khristoforov, Y.B.Kiryukhin, A.V.Prokofiev, A.Y.Vinokhodov, V.A.Vodchits, *TRINITI, Russia.* This paper describes the prototypes of high power (up to 500 W), high repetition rate (up to 5 kHz) XeCl (308 nm), KrF (248nm), ArF (193 nm) excimer lasers, that can meet an expanded requirements of industry, mainly for micromachining, fabrication of thin-film-transistor and DUV lithography.	**QWH6 · 15:15** ***Theoretical description of the spectral broadening of a femtosecond pulse train in tapered fiber,*** S.N.Bagayev, S.V.Chepurov, V.I.Denisov, V.M.Klementyev, D.B.Kolker, I.I.Korel, S.A.Kuznetsov, Yu.A.Matyugin, V.S.Pivtsov, V.F.Zakharyash, *Inst. of Laser Phys., Russia.* We propose theoretical description and experimental results of the ulthort pulse train spectral broadening in tapered fibers. Multi-peak spectral structure due to the effect of self-phase modulation was obtained. Phase and amplitude fluctuations were investigated.		

Hall 5 IQEC	Hall 6 LAT	Room 1 IQEC		
14:00–16:15 **QWI · Nanoengineering — Continued**	**14:00–16:00** **LWH · Holography Methods— Continued**	**14:00–16:00** **QWJ · Symposium on Light-Induced Phase Transitions and Optocal Switching—Continued**		
	LWH3 · 14:45 ***Dynamic hologram recording in fullerene-containing nano-size porous glasses,*** O.V.Andreeva, V.G.Bespalov, Yu.N.Efimov, A.S.Cherkasov, V.N.Sizov, *Vavilov State Optical Inst., Russia,* A.L.Pyajt, *St-Petersburg State Inst. of Fine Mechanics and Optics, Russia.* Experimental results of dynamic hologram recording and reconstruction by second harmonic radiation of Nd:YAG laser (532 nm) in nano-size porous glasses containing fullerene C_{60} or fullerene solution in toluene are presented at this paper.			
QWI3 · 15:00 ***Large enhancement of spontaneous emission rates of InAs quantum dots in GaAs microdisks,*** H.Cao, W.Fang, J.Y.Xu, Y.Ma, S.T.Ho, *Northwestern Univ., USA,* G.S.Solomon, *Stanford Univ., USA.* We measured the distribution of spontaneous emission rates for InAs quantum dots embedded in GaAs microdisks in a time-resolved photoluminescence experiment. The maximum spontaneous emission enhancement factor exceeds 10.	**LWH4 · 15:00** ***On transformation of information structure of reading field by the "thin superimposed hologram–phase conjugating mirror" system,*** A.S.Rubanov, L.M.Serebryakova, *Stepanov Inst. of Phys., Belarus.* Transformation of spatial structure of reading field and possibilities of information processing by a system, composed of a thin linear superimposed off-axis lensless Fourier-hologram and a phase conjugating mirror, are theoretically investigated. New methods of associative data reconstruction in the system are suggested.	**QWJ3 · 15:00 · INVITED** ***Photoinduced cooperative phenomena in organic and inorganic semiconductors,*** Shin-ya Koshihara, *Tokyo Inst. of Technology, Japan.* We report experimental results, which show the occurrence of a new class of photo-effect in organic and inorganic semiconductors so called as photo-induced phase transition. We demonstrate the role of cooperative interactions in the observed exotic photo-induced effects.		
QWI4 · 15:15 ***Anisotropic micro-reflectors in glass by femtosecond laser machining,*** J.D.Mills, P.G.Kazansky, E.Bricchi, J.J.Baumberg, *Univ. of Southampton, UK.* Directly-written structures created within glass by femtosecond Ti:Sapphire laser machining are observed to strongly reflect light in a direction parallel to the polarization axis of the writing laser indicating highly anisotropic and selforganized nanostructuring.	**LWH5 · 15:15** ***Tunable optical filters based on photorefractive holographic gratings,*** V.M.Petrov, A.V.Chamrai, M.P.Petrov, *Ioffe Phys.-Tech. Inst., Russia,* J.Petter, T.Tschudi, *Inst. of Appl. Phys., DUT, Germany.* Two types of tunable and reconfigurable holographic filters based on photorefractive crystals were experimentally demonstrated. The filters exhibit an extremely narrow bandwidth (better than 0.1 nm) and allow reconfiguration or switching in a broad range of wavelengths and precise frequency trimming.			

Conference Hall — IQEC/LAT-YS

14:00–16:00
YWA · IQEC/LAT-YS Keynote Lectures VIII—Continued

Hall 1 — LAT

14:00–16:00
LWG · Gas Lasers and Ultrashort Pulse Lasers I—Continued

LWG5 · 15:30
Multi-kilowatt class CO_2 lasers with high-quality radiation output for industrial applications, M.G.Galushkin, V.S. Golubev, V.Y.Panchenko, V.V.Vasiltsov, A.M.Zabelin, Y.N.Zavalov, V.P.Yakunin, *IPLIT, Russia.* The peculiarities of using of principles and methods of increasing laser quality for concrete type of CO_2 lasers are discussed. The particular attention paid compromising of optical schemes with indicated output power and with dimensions of gas-discharge camber.

LWG6 · 15:45
Problems of development of oxygen-iodine laser with electric discharge production of singlet delta oxygen, A.A.Ionin, N.N.Yuryshev, *Lebedev Physical Inst., Russia,* A.A.Napartovich, *TRINITI, Russia.* E-beam sustained discharge has been theoretically and experimentally demonstrated to be a reasonable means for singlet delta oxygen production with high yield and gas pressures adequate to modern chemical oxygen-iodine laser technology.

Hall 2 — IQEC

14:00–16:00
QWH · Nonlinear Optics of Guided Waves —Continued

QWH7 · 15:30
Generation of polarized supercontinuum in air-clad dual tapered fiber, S.M.Kobtsev, S.V.Kukarin, N.V.Fateev, *Novosibirsk State Univ., Russia.* The generation of polarized supercontinuum using a silica/air-clad nearly elliptic tapered fiber is reported for the first time in this work. Output spectra cover the range 500-1200 nm at the -50-dB at femtosecond Ti:Sapphire laser pump with the 1.5 nJ pulse energy.

QWH8 · 15:45
Ultra-short pulse propagation in waveguides with spatially distributed Kerr-like non-linearity, E.A.Romanova, L.A.Melnikov, *Saratov State Univ., Russia,* E.V.Bekker, *Joint-Stock Comp. TEGS, Russia,* T.M.Benson, Ph.Sewell, *Univ. of Nottingham, UK.* Ultra-short pulse propagation in optical waveguides with non-linear discontinuities is simulated by the finite-difference alternating-direction implicit method. Pulse envelope evolution is studied depending on joint action of material dispersion and non-linearity.

Hall 3 — JOINT

14:00–16:00
JWD · Single Ion Optical Frequency Standards II—Continued

JWD4 · 15:30 · INVITED
Light interference from single atoms and their mirror images, J.Eschner, C.Raab, P.Bouchev, A.Wilson, F.Schmidt-Kaler, R.Blatt, *Univ. Innsbruck, Austria.* Single photon resonance fluorescence of a single trapped and laser cooled Ba^+ ion is partially collected with a high speed lens (f#/1.1) and back reflected onto the ion using a mirror about 30 cm away from the ion. Observation of the resonance fluorescence and its superimposed image reveals interference fringes when the mirror position is shifted. Thus, the single photon source fields interfere with itself and this leads to enhancement and inhibition of the observed resonance fluorescence. Within the observed solid angle, a fringe visibility of up to 72% is achieved, limited primarily by the residual motion of the trapped ion and the power of the incident driving field. Direct backaction of the reflected field was proved by a direct measurement of the excited state population, which reveals inhibition and enhancement due to the delayed source field.

Hall 4 — JOINT

14:00–16:00
JWE · Laser-Cell Interaction—Continued

JWE4 · 15:30
Investigation of photoaggregation of proteins irradiatied by XeCl laser light, L.V.Soustov, E.V.Chelnokov, N.M.Bityurin, *Inst. of Appl. Phys., Russia,* M.A.Ostrovsky, *Inst. of Biochem. Phys., Russia,* V.V.Nemov, *N.Novgorod Res. Inst. for Epidemiology and Microbiology, Russia,* Yu.V.Sergeev, *Natl Inst. of Health, USA.* Kinetics of increase of light scattering in protein solution irradiated by XeCl laser is investigated for different fluences and repetition rates. Nonreciprocal response was observed.

JWE5 · 15:45
The effect of non-ablative IR laser irradiation on state of adipose tissue components, N.Yu.Ignatieva, V.V.Lunin, T.E.Grokhovskaja, *Moscow State Univ., Russia,* V.N.Bagratashvili, A.P.Sviridov, G.Sh.Shakh, *IPLIT, Russia.* Protein and triglyceride structure and chemical alterations in adipose tissue after IR laser treatment were investigated by thermal and FTIR spectral analysis. Disordering, denaturation and oxidation consequently proceed as intensity and duration of irradiation increases.

16:00–16:30 COFFEE BREAK

Hall 5 IQEC	Hall 6 LAT	Room 1 IQEC		
14:00–16:15 **QWI · Nanoengineering—Continued**	**14:00–16:00** **LWH · Holography Methods—Continued**	**14:00–16:00** **QWJ · Symposium on Light-Induced Phase Transitions and Optical Switching—Continued**		
QWI5 · 15:30 ***Light-controlled extraordinary optical transmittance and photonic circuits in plasmonic nanomaterials,*** A.M.Dykhne, *MIPT, Russia,* A.K.Sarychev, V.M.Shalaev, *Purdue Univ., USA,* V.A.Podolskiy, *New Mexico State Univ., USA.* Plasmon excitation can increases optical transmittance through subwavelength hole arrays in optically thick metal films by three-five orders of magnitude. The extraordinary optical transmittance is expected to result in novel applications in the emerging area of nanophotonics.	**LWH6 · 15:30** ***Optical record on thin films of chalcogenide glasses under continous and pulse laser exposure,*** V.Vlasov, *Uzhgorod Nat. Univ., Ukraine.* In the present work different levels of optical memory in thin films of chalcogenide glasses are discussed. Efficiency of holographic record for continuous and pulse laser influence upon photoresists based on such media is shown.	**QWJ4 · 15:30 · INVITED** ***Microscopic analysis of laser induced phase transitions in carbon andsilicon,*** H.O.Jeschke, *Rutgers Univ., USA.* We present a theoretical study of ultrafast phase transitions induced by femtosecond laser pulses of arbitrary form and duration. We discuss different examples of laser induced nonequilibrium structural changes in carbon and silicon.		
QWI6 · 15:45 ***Observation of nonspecular peaks of giant third-harmonic generation in all-silicon microcavities,*** A.A.Fedyanin, M.G.Martemyanov, T.V.Dolgova, O.A. Aktsipetrov, *Moscow State Univ., Russia.* Third-harmonic generation in microcavities grown from photonic crystals of nanostructured silicon demonstrates multiple satellite peaks in nonspecular directions under resonance of fundamental field with the cavity mode.	**LWH7 · 15:45** ***Fiber quality testing by holography methods,*** V.A.Babenko, V.B.Konstantinov, *Ioffe Phys.-Tech. Inst., Russia.* Presents simple way for determination different defects in fiber with using simultaneously principle of holographic interferometry and holographic correlator. Method gives the possibility to fixing fiber seams and quality of fiber in the laboratory condition.			
QWI7 · 16:00 ***Carrier transport in regimented quantum dot arrays,*** A.A.Balandin, O.L.Lazarenkova, *Univ. of California – Riverside, USA.* Regimented quantum dot arrays attracted significant attention owing to proposed applications in optoelectronic devices. Our paper present theoretical investigation of phonon spectrum and electron mini-band transport in regimented arrays of semiconductor quantum dots.				

16:00–16:30 COFFEE BREAK

Conference Hall	Hall 1 LAT	Hall 2 IQEC	Hall 3 JOINT	Hall 4 LAT
	16:30–18:30 **LWI · Gas Lasers and Ultrashort Pulse Lasers II** V.A.Orlovich, *Stepanov Physics Inst., Belarus, Presider*	**16:30–18:15** **QWK · Few-Cycles Optical Pulses** S.V.Garnov, *General Physical Inst., Russia, Presider*	**16:30–18:45** **JWF · Optical Standards and Precision Measurements** P.Gill, *Nat. Physics Lab, UK, Presider*	**16:30–18:00** **LWJ · PDT and Other Oncological Applications** R.Wang, *Keele Univ., UK,* and M.Hamblin, *Wellman Labs of Photomedicine, USA, Presiders*
	LWI1 · 16:30 ***Optimization of discrete Raman amplifiers for different kinds of fibers,*** J.D.Ania-Castanon, S.K.Turitsyn, *Aston Univ., UK.* An accurate analysis of backward-pumped discrete Raman amplifiers using different kinds of fibers is presented. Optimal amplifier lengths and gains are determined within a realistic range of pump and signal powers.	**QWK1 · 16:30 · INVITED** ***Generation of intense sub-4 fs pulses in the visible using molecular modulation,*** N.Zhavoronkov, G. Korn, *Max-Born-Inst., Germany.* Single, nearly transform limited 3.8 fs pulses with energies after compression up to 1.5 μJ at 400 nm have been generated using impulsively driven SF_6-gas in a hollow waveguide as an ultrafast phase modulator.	**JWF1 · 16:30 · INVITED** ***High-resolution spectroscopy of magnesium atoms: towards frequency standard at 457 nm,*** S.N.Bagayev, V.I.Baraulya, A.E.Bonert, A.N.Goncharov, *Inst. of Laser Phys., Russia.* The level scheme of magnesium is promising to build up a frequency standard based on narrow $^1S_0$–$^3P_1$ transition of cooled atoms. This paper presents experimental results on high-resolution spectroscopy of Mg atoms and laser cooling of Mg beam. Applications of Mg frequency standard and magnesium atom interferometer for precision measurements are discussed.	**LWJ1 · 16:30 · INVITED** ***Use of genetically engineered bioluminescent bacteria to develop animal models of localized infections suitable for photodynamic therapy,*** M.R.Hamblin, T.Zahra, T.Hasan, K.P.Francis, *Wellman Labs of Photomedicine, USA.* Bioluminescent pathogenic bacteria emit low levels of visible light that can be imaged with a sensitive camera in mouse models. Wound and soft-tissue infections together with abscesses and urinary-tract infections can be treated with PDT.
	LWI2 · 16:45 ***An explosive photo-dissociation iodine laser with phase conjugation of super-high quality: modeling and experiment***, F.A.Starikov, Yu.V.Dolgopolov, A.M.Dudov, G.A.Kirillov, G.G.Kochemasov, S.M.Kulikov, V.K.Ladagin, A.N.Manachinsky, S.N.Pevny, A.F.Shkapa, S.P.Smyshlyaev, S.A.Sukharev, L.I.Zykov, *Russian Federal Nuclear Center, Russia.* Physical and 3D numerical model has been developed for modeling and optimization of a powerful explosive photo-dissociation iodine laser with phase conjugation in RFNC-VNIIEF.			
	LWI3 · 17:00 ***New trend in laser crystals for femtosecond laser systems,*** E.V.Pestryakov, *Inst. of Laser Phys., Russia,* A.I.Alimpiev, *Techn. Inst. of Monocrystals, Russia,* V.N.Matrosov, *Belarusian State Polytechnical Academy, Belarus.* The physical concepts of creature of ultra broad bands of gain in femtosecond solid state lasers on Jahn-Teller ions have been considered. The investigations demonstrated that wide bands of gain can be accomplished on ions with $3d^4$–Cr(II) and $3d^9$–Cu(II) configurations of electron shells.	**QWK2 · 17:00** ***Attosecond control of molecular photoionization,*** A.D.Bandrauk, H.S. Nguyen, *Univ. de Sherbrooke, Canada.* Exact numerical solution of the time-dependent Schroedinger equation for H^{2+} with moving nuclei is used to investigate control of electron ionization in the presence of intense attosecond UV pulses and 800 nm short intense pulses. Left-right asymmetries are shown to be controllable.	**JWF2 · 17:00 · INVITED** ***Atom interferometry with ultracold calcium atoms,*** U.Sterr, G.Wilpers, C.Degenhardt, T.Binnewies, J.Helmcke, F.Riehle, *Physikalisch-Technische Bundesanstalt, Germany.* Using ultracold atoms for interferometry, now nearly perfect beam-splitting pulses can be applied to the whole atomic sample. This leads to dramatic improvements of interferometers for optical frequency standards as well as to new types of interferometers like e.g. matter-wave shearing interferometers.	**LWJ2 · 17:00** ***The improvement of photodynamic activity of aluminium sulphophthalocyanine due to biotinylation,*** I.G.Meerovich, V.V.Jerdeva, A.P.Savitsky, *Bach Inst. of Biochemistry, Russia,* V.M.Derkacheva, E.A.Luk'anets, *State Res. Center "NIOPIK", Russia*, G.A.Meerovich, *General Phys. Inst., Russia,* E.A.Kogan, *Moscow Medical Academy, Russia.* The investigations of photodynamic activity of dibiotinylated aluminium sulphphthalocyanines in vitro and in vivo were conducted.

Hall 5 IQEC	Hall 6 LAT	Room 1 IQEC		
16:30–18:45 **QWL · Nanoparticles and Quantum dots** V.V.Shuvalov, *Moscow State Univ., Russia, Presider*	**16:30–18:30** **LWK · Fiber Solitons and Ultrafast Processing** TBA, *Presider*	**16:30–17:30** **QWM · Symposium on Light-Induced Phase Transitions and Optical Switching** J.Kono, *Rice Univ., USA, Presider*		
QWL1 · 16:30 · INVITED ***Photon correlation spectroscopy of single quantum dots,*** A.Kiraz, B.Gayral, L.Zhang, E.Hu, W.Schoenfeld, P.Petroff, A.Imamoglu, *Univ. of California, USA.* Photon correlation measurements show unique signatures of biexcitons in a single self-assembled InAs quantum dot. Cross-correlation between biexciton and single-exciton emission reveals highly asymmetric features, demonstrating that these spectral lines arise from cascaded emission.	**LWK1 · 16:30 · INVITED** ***Ultrafast nonlinear optical processing using femtosecond laser pulses,*** Y.Fainman, D.Panasenko, R.Rokitski, D.Marom, K.Oba, Y.Mazurenko, P.C.Sun, *Univ. of California, USA.* Temporal optical information carried by femtosecond laser pulses can be manipulated via linear and nonlinear processes. We will review the activities in spatio-temporal optical processing techniques for ultrafast waveform synthesis and detection.	**QWM1 · 16:30 · INVITED** ***The destruction of magnetism in $FeBO_3$ by ultrafast laser excitation,*** A.V.Kimel, R.V.Pisarev, *Ioffe Phys. Tech.I Inst., Russia,* J.Hohlfeld, Th.Rasing, *Univ. of Nijmegen, The Netherlands.* The dynamics of the phase transition in $FeBO_3$ from antiferromagnetic to paramagnetic state is studied with subpicosecond resolution. The rate of the order parameter relaxation in this material is conditioned by the phonon-magnon interaction.		
QWL2 · 17:00 · INVITED ***Plasmonic nanophotonics: manipulating light and sensing molecules,*** V.M.Shalaev, A.K.Sarychev, V.P.Drachev, D.Genov, E.N.Khaliullin, *Purdue Univ., USA,* V.A.Podolskiy, R.L.Armstrong, *New Mexico State Univ., USA,* V.P.Safonov, S.G.Rautian, *Inst. of Automation and Electrometry, Russia,* P.Gadenne, *Univ. de Versailles, France.* Metal-dielectric nanostructured materials supporting plasmons allow one to focus light in sub-wavelength areas and manipulate it through localization and guiding, with exceptionally high performance. Such plasmonic nanomaterials	**LWK2 · 17:00** ***Single-shot generation of ultrashort pulse sonogram with silicon CCD,*** D.Panasenko, Y.Fainman, *Univ. of California, USA.* Two-photon absorption in a commercial CCD camera is used for single-shot phase-sensitive diagnostics of ultrashort laser pulses via generation of the sonogram. The method is demonstrated experimentally using 100 fsec pulses at 1.4 microns.	**QWM2 · 17:00 · INVITED** ***Photo-induced effect of quantum paraelectric system in perovskite oxides,*** M.Takesada, *Hokkaido Univ., Japan.* In the present study we investigate the photo-induced effect in the quantum dielectric system under rather small external electric field. The dielectric measurement was performed under laser excitation combined with a DC electric field. The gigantic photo-induced effects of dielectric properties have been first observed in the perovskite-type materials as a new exotic phenomenon in the quantum paraelectric systems.		

Conference Hall	Hall 1 LAT	Hall 2 IQEC	Hall 3 JOINT	Hall 4 LAT
	16:30–18:30 **LWI · Gas Lasers and Ultrashort Pulse Lasers II—Continued**	**16:30–18:15** **QWK · Few-Cycles Optical Pulses—Continued**	**16:30–18:45** **JWF · Optical Standards and Precision Measurements—Continued**	**16:30–18:00** **LWJ · PDT and Other Oncological Applications—Continued**
	LWI4 · 17:15 ***Femtosecond SESAM lasers with short length cavity,*** V.I.Trunov, A.V.Kirpichnikov, E.V.Pestryakov, V.V.Petrov, *Inst. of Laser Phys., Russia,* V.V.Preobrazhenskii, M.A Putyato, B.R.Semyagin, *Inst. of Semicond. Phys., Russia.* Femtosecond pulse generation in Al_2O_3:Ti^{3+} laser with different type of short length cavity configuration with SESAM, based on semiconductor quantum well LT GaAs/AlAs, $Ga_xIn_{1-x}As/Al_xIn_{1-x}As$ saturated absorbers and metal mirrors has been investigated.	**QWK3 · 17:15** ***Single-cycle optical pulses synchronized with molecular oscillations,*** A.V.Sokolov, *Texas A&M Univ., USA.* We demonstrate a collinear Raman generator, which produces a wide spectrum of mutually coherent sidebands. We use this source to show coherent control of multiphoton ionization on a few-femtosecond time scale.		**LWJ3 · 17:15** ***Endogenic porphyrins of plasmatic membranes of erythrocytes as primary acceptors of photons at an intravenous laser therapy,*** V.E.Prokop`ev, *Inst. of High Current Electronics, Russia,* V.V.Udut, *Inst. of Pharmacology, Russia.* Results of investigation of absorption spectra, fluorescence, resonant Raman effect and excitation of a fluorescence of an integral blood and its components in area 200-1300 nm are submitted.
	LWI5 · 17:30 ***Efficient conversion of Gr:Forsterite femtosecond laser radiation,*** V.M.Gordienko, S.S.Grechin, V.I.Pryalkin, *Moscow State Univ., Russia.* The results of theoretical and experimental optimization of nonlinear converter parameters are presented. A lot of crystals are proposed for efficient optical parametric conversion and harmonic generation.	**QWK4 · 17:30** ***Short pulse generation in a coherently prepared Raman medium,*** R.Kolesov, *Texas A&M Univ., USA.* A possibility of generating ulthort optical pulses in a coherently prepared Raman medium is described. Experimental technique for realisation of this possibility is proposed.	**JWF3 · 17:30 · INVITED** ***Trapping and confinement of cold Yb and Cs atoms for precise measurement of atomic EDM,*** T. Yabuzaki, *Kyoto Univ., Japan.* The trapping of laser cooled Yb atoms and the confinement of alkali-metal atoms (Rb and Cs) in a cell coated with liquid helium film are reported, which are toward atomic EDM measurement.	**LWJ4 · 17:30** ***Red laser light delivery system for use in photodynamic therapy,*** I.Charamisinau, G.Happawana, A.Rosen, G.Evans, R.A. Hsi, D.Horton, *Southern Methodist Univ., USA.* This paper presents the design of a self-contained red laser light delivery system for use in photodynamic therapy of Barrett's esophagus, a pre-cancerous lesion of the esophagus lining. The system uses 20 edge-emitting red lasers activated inside the human body to uniformly illuminate the esophagus and activate the drug in the patient's blood.
	LWI6 · 17:45 ***Automatic transverse mode optimisation of an all-solid-state laser using an intracavity adaptive-optic mirror,*** W.Lubeigt, G.J.Valentine, D.Burns, *Univ. of Strathclyde, UK.* A deformable membrane mirror has been incorporated within a Nd:YVO_4 laser cavity. Using a computer algorithm, automatic optimisation of the mirror shape has been demonstrated to improve the oscillating mode quality and increase output power.	**QWK5 · 17:45** ***Parametric amplification and squeezing of ulthort laser pulse with biexciton waves in CuCl,*** R.Shimano, *Univ. of Tokyo, Japan,* Yu.P.Svirko, *Univ. of Joensuu, Finland,* A.Mysyrowicz, *ENSTA, École Polytechnique, France,* M.Kuwata-Gonokami, *Univ. of Tokyo, Japan.* Efficient parametric amplification of ulthort laser pulses is demonstrated in CuCl. The parametric gain of 350 cm^{-1} is nearly 100 times higher than in conventional nonlinear crystals. Pulse de-amplification and light squeezing is also observed.		**LWJ5 · 17:45** ***Efficient generation of singlet oxygen by two-photon excited porphyrins,*** M.Drobizhev, A.Karotki, A.Rebane, C.W.Spangler, *Montana State Univ., USA,* M.Kruk, *Inst. of Molec. Atomic Phys., Belarus,* N.V. Chizhova, G.M.Mamardashvili, *Inst. of Solution Chemistry, Russia,* E.Nickel, *Synar Technologies, Inc., USA.* We demonstrate for the first time an efficient singlet oxygen generation upon two-photon excitation of porphyrins with 780-nm pulses. This wavelength falls into the tissue transparency window, making this effect very promising for photodynamic therapy.

Hall 5 IQEC	Hall 6 LAT	Room 1 IQEC		
16:30–18:45 **QWL · Nanoparticles and Quantum dots—Continued**	**16:30–18:30** **LWK · Fiber Solitons and Ultrafast Processing—Continued**	**16:30–17:30** **QWM · Symposium on Light-Induced Phase Transitions and Optical Switching—Continued**		
also make possible surface-enhanced spectroscopy with unsurpassed sensitivity.	**LWK3 · 17:15** ***Spectral space-time coding for multimode fiber communications,*** A.Alonso, *Tech. Univ. of Eindhoven, The Netherlands,* S.B.Colak, *Philips Res. Labs, The Netherlands.* We describe how the data carrying capacity of a multimode fiber can be increased by spectrally modulated space-time encoding of its spatial mode structure. The operation of such an optical communication system is demonstrated by experiments and simulations.			
QWL3 · 17:30 ***Single photon tunneling,*** I.I.Smolyaninov, C.C.Davis, *Univ. of Maryland, USA,* A.V.Zayats, *Queen's Univ. of Belfast, UK,* A.Gungor, *Fatih Univ., Turkey.* Strong evidence of a single-photon tunneling effect, a direct analog of single-electron tunneling, has been obtained in our measurements of light tunneling through individual subwavelength pinholes in a thick gold film covered with a layer of polydiacetylene.	**LWK4 · 17:30** ***Dispersion reduction in optical fiber communication lines with directly modulated lasers,*** N.K.Sabinin, M.A.Gladychevskii, K.G.Leontiev, D.D.Scherbatkin, *Optictelecom Ltd., Russia,* O.E.Nanii, K.N.Belov, I.A.Savochkin, *Moscow State Univ., Russia.* We have shown theoretically that the optimization of the current shape allows for a strong reduction of the optical signal dispersion in communication lines with a directly modulated laser.			
QWL4 · 17:45 ***Two-photon excited localized surface plasmon luminescence: a tool to characterize inhomogeneous ensembles of supported metal nanoparticles,*** A.M.Bonch-Bruevich, V.V.Khromov, S.D. Nikolaev, S.G.Przhibel'skii, I.O.Starobogatov, T.A.Vartanyan, *Vavilov State Optical Inst., Russia.* Localized surface plasmons have been selectively excited via two-photon absorption in metal nanoparticles of resonant shape. The dephasing times of collective electronic excitations were extracted from the spectral widths of the plasmons luminescence.	**LWK5 · 17:45** ***Nonlinear-dispersion feedback control of fiber dissipative solitons,*** A.K.Komarov, K.P.Komarov, *Inst. of Automation and Electrometry, Russia.* The condition of stabilization of dissipative chirp soliton sequences in fibers with amplification and saturable absorption is analyzed. The application of obtained results to optical communications and information processing is discussed.			

Conference Hall	Hall 1 LAT	Hall 2 IQEC	Hall 3 JOINT	
	16:30–18:30 **LWI · Gas Lasers and Ultrashort Pulse Lasers II—Continued**	**16:30–18:15** **QWK · Few-Cycles Optical Pulses—Continued**	**16:30–18:45** **JWF · Optical Standards and Precision Measurements—Continued**	
	LWI7 · 18:00 ***Generation of 100 kW-level pulses at 1.53 mkm in the diode-pumped Er-Yb:glass laser–PPKTP optical parametric amplifier system,*** G.Karlsson, V.Pasiskevicius, A.Fragemann, F.Laurell, *Royal Inst. of Technology, Sweden.* We report on a compact diode-pumped Er-Yb:glass laser Q-switched by an acousto-optical modulator. This laser was used to seed a Nd:YAG laser-pumped PPKTP OPA, which generated 3 ns, 0.5 mJ pulses.	**QWK6 · 18:00** ***Spatial beam profile of the femtosecond X-ray pulses,*** A.Endo, *The Femtosecond Techn. Res. Association, Japan,* M.Yorozu, Jinfeng Yang, F.Sakai, *Sumotomo Heavy Industries, Ltd., Japan.* A femtosecond X-ray pulse was generated with 280 fs, 2.3 keV and 30,000 photons/pulse from a laser-Compton scattering through interaction between a 3 ps electron beam and a 100 fs Ti:Sapphire laser pulse in a 90 degree scattering configuration.	**JWF4 · 18:00 · INVITED** ***Multiple wavelength interferometry for absolute distance measurement,*** R.Dandliker, Y.Salvade, *Univ. of Neuchatel, Switzerland.* Multiple-wavelength interferometry enables to increase the range of unambiguity and to reduce the sensitivity of classical interferometry. The accuracy depends on the stability and the calibration of the different wavelengths. Applications in industry and astronomy will be presented.	
	LWI8 · 18:15 ***Directly diode-pomped, multi-millijoule, short pulse CPA laser,*** X.Ribeyre, V.Bagnoud, L.Videau, C.Rouyer, *CEA CESTA, France,* M.Mullot, R.Mercier, *Univ. Paris XI Orsay, France,* C.Le Blanc, *Univ. Paris 6, France.* We present a directly diode pumped laser regenerative amplifier capable of amplifying short pulse to several tens of millijoules. We amphasis on intracavity mode shaping for energy extraction and spectral filtering for broad-band operation.	**QWK7 · 18:15** ***Dynamics of femtosecond lasers with intracavity Raman active medium,*** V.I.Trunov, A.V.Kirpichnikov, E.V.Pestryakov, V.V.Petrov, *Inst. of Laser Phys., Russia,* A.K.Komarov, K.P.Komarov, *Inst. of Automation and Electrometry, Russia.* The dynamics of considerable additional shortening of pulse duration in ultrabroadband laser with intracavity Raman active medium under different Raman gain and a frequency shift parameters have been investigated.		
			JWF5 · 18:30 ***Effect of scattered fields interference in a two-mode (? ?-Ne)/CH_4 frequency standard,*** E.Petrukhin, D.Krylova, A.Shelkovnikov, M.Gubin, *Lebedev Physical Inst., Russia,* R.Felder, *Bureau Inter. des Poids et Mesures, France.* A dependence of the stabilized frequency on the position of optical elements inside an anisotropic resonator of the two-mode (He-Ne)/CH_4 laser was investigated. These interference like effects are based on interaction (linear and nonlinear) between carrier and weak scattered waves arising inside the resonator.	

19:00–22:00 CONFERENCE RECEPTION

Hall 5 IQEC	Hall 6 LAT			
16:30–18:45 **QWL · Nanoparticles and Quantum dots —Continued**	**16:30–18:30** **LWK · Fiber Solitons and Ultrafast Processing—Continued**			
QWL5 · 18:00 ***Coherency control of semiconductor quantum dots by spontaneous secondary radiation,*** A.V.Fedorov, A.V.Baranov, *Vavilov State Optical Inst., Russia,* Y.Masumoto, *Univ. of Tsukuba, Japan.* Theory of spontaneous secondary radiation excited by two phase-locked pulses shows that the coherent control technique offers the challenges for determination of resonant optical transition dephasing rates of a single quantum dot and its inhomogeneously broadened ensembles.	**LWK6 · 18:00** ***Long-period fibre grating formation with 264 nm femtosecond radiation,*** A.Dragomir, D.N.Nikogosyan, A.A.Ruth, K.A.Zagorulko, P.G.Kryukov, *Univ. College Cork, Ireland.* We have recorded long-period fibre gratings at high-intensity femtosecond UV irradiation. It was found that strong attenuation peaks (16-28 dB) could be induced in hydrogen-loaded fibres.			
QWL6 · 18:15 ***Spontaneous emission of an atom placed near nanobodies,*** V.V.Klimov, *Lebedev Physical Inst., Russia.* The influence of nanonobodies of different shapes (sphere, cylinder, cone, spheroid) and made of different materials (dielectric, metal, 'left-handed') on decay rate of an atom is considered. The analytical results are obtained in all cases. The results obtained are applied to describe the operation of scanning nanoscope with a single molecule as object.	**LWK7 · 18:15** ***Looking inside the focus of light,*** R.Dorn, S.Quabis, G.Leuchs, *Univ. of Erlangen, Germany.* We measured the effect of the polarization on the shape and width of the focal spot. A radially polarized input field yields the smallest spot and shows a strong longitudinal field component.			
QWL7 · 18:30 ***Second-Harmonic Generation from spheroidal Ag nanoparticles embedded in silica glass,*** I.V.Kravetsky, A.V.Podlipensky, G.Seifert, H.Graener, *Martin-Luther-Univ. Halle-Wittenberg, Germany.* SHG in transmission was demonstrated from spheroidal Ag nanoparticles in silica-glass. Angular and polarization dependences of SH were measured and were discussed in terms of the local surface plasmon oscillations of spheroidal Ag-nanoparticles.				

19:00–22:00 CONFERENCE RECEPTION

Conference Hall — JOINT

8:30–9:30
JThB · IQEC/LAT Tutorials VI
V.I.Konov, *General Physics Inst., Russia, Presider*

JThB1 · 8:30 · TUTORIAL LECTURE
Laser processing of dielectrics and polymers by a high repetition-rate, ultrashort-pulse, tunable mid-infrared laser, R.F.Haglund, *Vanderbilt Univ., USA.* Ultrashort-pulse, tunable laser processing at high pulse-repetition frequencies shows significant potential for novel deposition, structuring and surface modification schemes based on high local densities of vibrational excitation, in dielectrics and especially in polymers.

Hall 1 — LAT

8:30–10:30
LThA · Laser and Atmospheric Spectroscopy
G.G.Matvienko, *Inst. of Atmospheric Optics, Russia*, and V.M.Gordienko, *Moscow State Univ., Russia, Presiders*

LThA1 · 8:30 · INVITED
Femtosecond-LIDAR: new perspectives of atmospheric remote sensing, L.Wöste, *Freie Univ. Berlin, Germany.* The extreme field strengths of powerful femtosecond lasers can lead – when interacting with air – to the formation of extended plasma channels. The phenomenon opens fascinating perspectives in LIDAR technology, atmospheric research and lightning prevention.

LThA2 · 9:00
Combined difference-frequency and optical parametric generation laser system for photoacoustic gas sensing, C.Fischer, M.W.Sigrist, *ETH Zurich, Switzerland.* A novel gas sensor is presented particularly suited for multicomponent analyses. It involves a combination of two nonlinear optical sources and enables the recording of fast broadband (6.4 cm^{-1}) survey spectra and of highly resolved (154 MHz) accurate spectra.

Hall 2 — IQEC

8:30–10:30
QThA · Laser Control of Ultrafast Phenomena I
Yu.Matveets, *Inst. of Spectroscopy, Russia, Presider*

QThA1 · 8:30 · INVITED
Control of the carrier-envelope phase shift of few-cycle pulses, A.Apolonski, *Univ. of Technology, Austria.* Progress in generation of phase-stabilized pulses and demonstration of phase-sensitive experiments will be described.

QThA2 · 9:00
Using entangled pairs for sub-femtosecond wavepacket measurements, D.M.Villeneuve, H.Niikura, F.Légaré, R.Hasbani, M.Yu.Ivanov, P.B.Corkum, *Natl Res. Council, Canada.* Entangled electronic and nuclear wavepackets are created during tunnel ionization of a molecule. Electron recollision is used to probe the nuclear wavepacket motion in H_2^+ with a pump-probe delay of 1.8–4.5 fs. This is the fastest motion ever resolved.

Hall 3 — LAT

8:30–10:15
LThB · Laser systems for Precision Measurements I
V.I.Denisov, *Inst. of Laser Physics, Russia, Presider*

LThB1 · 8:30 · INVITED
Development of borehole laser strainmeter, S.Sakata, *Natl Res. Inst. for Earth Sci. and Disaster Prevention, Japan,* M.A.Gubin, *Lebedev Physical Inst., Russia,* A.Araya, *Univ. of Tokyo, Japan.* A borehole laser strainmeter in which Fabry-Perot interferometers are adopted has been in the process of development. The first instrument has revealed problems. The second instrument on an improved design is being constructed.

LThB2 · 9:00 · INVITED
Photoelectronic imaging with femtosecond precision in laser research, M.Ya.Schelev, *General Phys. Inst., Russia.* Presented are some recent experimental results on femtosecond streak cameras application for recording far and near field distribution in femtosecond Ti:sapphire laser radiation and for imaging of ultrafast phenomena initiated by a such radiation.

Hall 4 — JOINT

8:30–10:30
JThA · Laser-Tissue Interaction I
E.Sobol, *IPLIT, Russia, Presider*

JThA1 · 8:30 · INVITED
New laser applications for reshaping and medical treatment of cartilages, E.Sobol, *Inst. of Laser and Inform. Technologies, Russia.* Physical, chemical and biological processes and mechanisms are discussed that are involved in reshaping and regeneration of deformed and diseased cartilage under moderate laser heating.

JThA2 · 9:00 · INVITED
Laser destruction of hard dental tissue, G.B.Altshuler, A.V.Belikov, *State Inst. of Fine Mechanics and Optics, Russia.* The paper discusses modern technologies of hard dental tissue laser treatment. The results of studies of tooth enamel and dentine laser destruction mechanisms are given.

Hall 5
IQEC

8:30–10:30
QThB · Special Symposium on Photonic Crystals I
J.W.Haus, *Univ. Dayton, USA, Presider*

QThB1 · 8:30 · INVITED
Linear dispersive and nonlinear optical properties of one-dimensional photonic band-gap materials: finite structures, C.M.Bowden, M.Scalora, M.J.Bloemer, *U.S.Army Aviation & Missile Res., USA,* J.W.Haus, *Univ. of Dayton, USA,* G.D'Aguanno, M.Centini, C.Sibilia, M.Betolotti, *Univ. di Roma "La Sapienza", Italy.* Effective medium theory is presented and used to predict effective phase matching conditions and high conversion efficiencies for quadratic interactions and simultaneous phase matched second and third harmonic generation. Extensions to parametric processes are discussed.

QThB2 · 9:00 · INVITED
2D planar photonic crystals as nonlinear resonant cavities, M.Banaee, A.R.Cowan, J.F.Young, *Univ. of British Columbia, Canada.* Planar semiconductor waveguides with high-contrast two dimensional periodic texture behave as resonant nonlinear cavities with a rich in-plane dispersion of both energy and quality factor. The features that distinguish these cavities from nonlinear Fabry-Perots are emphasized.

Hall 6
IQEC

8:30–10:30
QThC · Gas Lasers
S.Yakovlenko, *General Physics Inst., Russia, Presider*

QThC1 · 8:30 · INVITED
Laser action in space: FeII in the gas condensations in vicinity of Eta Carinae, S.Johansson, *Lund Univ., Sweden,* V.S.Letokhov, *Inst. of Spectroscopy, Russia.* First evidence of laser action in optical range by means of high-spatial and spectral resolution observation with Hubble Space Telescope (FeII spectral lines in gas condensations in vicinity of Eta Carinae - most luminous star of our Galaxy) will be presented.

QThC2 · 9:00 · INVITED
Discharge pumped krypton excimer laser in the vacuum ultraviolet spectral region, T.Shirai, T.Higashiguchi, S.Kubodera, W.Sasaki, *Miyazaki Univ., Japan,* J.Kawanaka, *Japan Atomic Energy Res. Inst., Japan,* T.Igahi, *Gigaphoton Inc., Japan.* We describe several oscillation characteristics of the recently developed vacuum-ultraviolet krypton excimer laser excited by a compact self-sustained discharge device.

Conference Hall JOINT	Hall 1 LAT	Hall 2 IQEC	Hall 3 LAT	Hall 4 JOINT
8:30–10:30 **JThB · IQEC/LAT Tutorials VI—Continued**	**8:30–10:30** **LThA · Laser and Atmospheric Spectroscopy—Continued**	**8:30–10:30** **QThA · Laser Control of Ultrafast Phenomena I—Continued**	**8:30–10:15** **LThB · Laser systems for Precision Measurements I—Continued**	**8:30–10:30** **JThA · Laser-Tissue Interaction I—Continued**
	LThA3 · 9:15 ***Gas phase diagnostics using laser-induced gratings,*** D.N.Kozlov, *General Phys. Inst., Russia,* B.Hemmerling, *Paul Scherrer Inst., Switzerland.* The principles of the laser-induced gratings technique are outlined and the experimental arrangement for its realization is described. Examples are given of the experimental determination of gas temperatures and flow velocities, transport coefficients, collisional energy transfer rates, based on recording of temporal evolution of laser-induced gratings in neat gases and in mixtures.	**QThA3 · 9:15** ***Observation of molecular dissociation with an atomic wavepacket,*** A.A.Senin, Z.Lu, J.R.Allen, A.L.Oldenburg, J.G.Eden, *Univ. of Illinois, USA.* The production of excited atomic fragments from the dissociation of the diatomic rubidium molecule results in changes in the relative Rb state number densities, which are detected with an atomic wavepacket and four-wave mixing in femtosecond pump-probe experiments.		
	LThA4 · 9:30 ***Scaling to millijoule energies for laser induced breakdown spectroscopy of water samples,*** M.Taschuk, I.Cravetchi, Ying Tsui, R.Fedosejevs, *Univ. of Alberta, Canada.* Laser induced breakdown spectroscopy using millijoule pulses was investigated to determine limits of detection of several elements in water. Optimum spatial and temporal conditions are identified and noise sources have been carefully evaluated.	**QThA4 · 9:30** ***Electro-optic detection of ultrabroadband electromagnetic pulses in poled polymers,*** Hua Cao, *Princeton Univ., USA,* A.Nahata, *NEC Res. Inst., USA,* T.F.Heinz, *Columbia Univ., USA.* We have measured free-space electric field transients in a poled polymer using electro-optic sampling with femtosecond laser pulses. The detector displays a relatively flat spectral response that extends from the far-infrared ($\lambda \sim 100$ μm) to ~33 THz ($\lambda = 9$ μm).	**LThB3 · 9:30 · INVITED** ***Frequency metrology and precision spectroscopy in the infrared,*** P.De Natale, S.Borri, P.Cancio, G.Giusfredi, D.Mazzotti, *Istituto Nazionale di Ottica Applicata, Italy.* We report new experimental results concerning the application of a cw infrared source based on difference-frequency generation to precision spectroscopy of molecules. The use of enhancement cavities and optical frequency comb generators is discussed.	**JThA3 · 9:30 · INVITED** ***Transmyocardial laser revascularization,*** L.A.Bockeria, I.I.Berishvili, Yu.I.Buziashvili, I.Yu.Sigayev, I.P.Aslanidi, M.N.Vakhromeeva, *Bakoulev Sci. Center for Cardiovascular Surgery, Russia,* V.Ya.Panchenko, V.V.Vasiltzov, *IPLIT, Russia.* The experience of 176 TMLR operations in patients with end-stage CAD is summarized in the work. On latter 150 operations mortality was 0,66%. As evidenced by our experience the results of operations are good, and status of patients is improving significantly.
	LThA5 · 9:45 ***Gas sensing by the use of a wavelength tunable fiber ring laser,*** M.Zhang, Y.Zhang, D.N.Wang, W.Jin, M.S.Demokan, *Hong Kong Polytechnic Univ., China.* Intra-cavity spectroscopy is one of the high sensitivity absorption measurement techniques and is attractive for environmental monitoring. In this paper, a wavelength tunable fiber ring laser is used for intra-cavity gas (acetylene) absorption measurements.	**QThA5 · 9:45** ***Generation and detection of ultrabroadband THz radiation with photoconductive emitter and detector,*** M.Tani, M.Iida, K.Sakai, M.Watanabe, *Kansai Adv. Res. Center, Japan,* S.Kono, *NEC Corporation, Japan.* We demonstrated generation and detection of ultrabroad THz radiation, the spectrum distribution of which exceeded 15 THz, using low-temperature-grown GaAs photoconductive antennas as the emitter and detector triggered with short optical pulses (~20 fs).		

Hall 5 IQEC	Hall 6 IQEC			

8:30–10:30
QThB · Special Symposium on Photonic Crystals I—Continued

8:30–10:30
QThC · Gas Lasers—Continued

QThB3 · 9:30
All-optical AND gate in a parametric photonic crystal, P.D.Drummond, G.R. Collecutt, *Univ. of Queensland, Australia.* An all-optical boolean AND gate based on spatio-temporal soliton formation within a planar type II parametric crystal is demonstrated by numerical simulation. Performance enhancements due to the introduction of a Bragg grating are discussed.

QThB4 · 9:45
Stability and decay of gap 2p-pulses, B.I.Mantsyzov, R.A.Silnikov, *Moscow State Univ., Russia.* Different regimes of gap 2p-pulse dynamics in 1D resonantly absorbing photonic crystals are studied. A new vast family of stable oscillating and excited unstable gap 2p-pulses is described by analytical and numerical integration of two-wave Maxwell-Bloch equations.

QThC3 · 9:30 · INVITED
Pulse-periodic non-chain deuterium fluoride lasers, V.P.Borisov, S.D.Velikanov, S.L.Voronin, V.V.Voronov, A.F.Zapol'ski, G.A.Kirillov, E.V.Kovalev, B.E.Kodola, V.D.Selemir, S.N.Sin'kov, Yu.N.Frolov, V.P.Tziberev, *Russian Federal Nuclear Center (VNIIEF), Russia.* The paper concerns with fundamental investigations into the performance of electric-discharge lasers operating based on a non-chain reaction of fluorine and deuterium at a repletion rate from 10 to 1000 Hz. The acoustic perturbations were shown to affect upon the stability and homogeneity of electric discharge and emission power at high repetition rates.

Conference Hall JOINT	Hall 1 LAT	Hall 2 IQEC	Hall 3 LAT	Hall 4 JOINT
	8:30–10:30 **LThA · Laser and Atmospheric Spectroscopy—Continued**	**8:30–10:30** **QThA · Laser Control of Ultrafast Phenomena I—Continued**	**8:30–10:15** **LThB · Laser systems for Precision Measurements I—Continued**	**8:30–10:30** **JThA · Laser-Tissue Interaction I—Continued**
	LThA6 · 10:00 · INVITED ***Trace molecule detection using tunable diode lasers,*** A.I.Nadezhdinskii, *General Phys. Inst., Russia.* Recent progress in Diode Laser technology and detection technique developed introduce new generation of Tunable Diode Laser based systems. Examples of particular instruments will be considered, results of several monitoring campaigns will be presented.	**QThA6 · 10:00** ***Wave front reversal of a terahertz wave across a focal point,*** N.N.Zinov'ev, J.M.Chamberlain, *Univ. of Leeds, UK.* We report on the experimental study of the wave front distortion of a Terahertz (THz) beam and corresponding features influencing the responce and performance of THz tomographic and imaging systems.	**LThB4 · 10:00** ***Trace gas concentration measurements using quantum cascade lasers,*** A.A.Kosterev, F.K.Tittel, *Rice Univ., USA,* C.Gmachl, F.Capasso, *Bell Labs, Lucent Technologies, USA.* Quantum cascade lasers with distributed feedback were applied for the detection of different trace components in ambient air and other gas media. Several optical detection techniques including optical multipass cell, cavity ringdown and cavity enhanced spectroscopy were employed.	**JThA4 · 10:00** ***Physics of application of near-IR lasers in ophtalmology,*** G.I.Zheltov, A.S.Podol'tzev, G.V.Liachnovich, A.S.Rubanov, *Stepanov Inst. of Phys., Belarus.* Theoretical and experimental investigation of action of power near-IR laser beams onto eyes, including propagation (focusing, absorption, scattering, etc.), heating, denaturization and explosive evaporation of intraocular tissues, for some improved applications in the laser ophthalmosurgery.
		QThA7 · 10:15 ***A self–starting ultra low jitter optical pulse source,*** J.Lasri, A.Bilenca, D.Dahan, V.Sidorov, G.Eisenstein, D.Ritter, *Electr. Engin. Dept. Technion Haifa, Israel.* An ultra low noise self-starting mode-locked diode laser which injection locks a self oscillating photo-transistor is described. 15ps pulses at 10 GHz with 40fs jitter and 0.1% amplitude together with a low phase noise electrical signal are generated.		**JThA5 · 10:15** ***New method of herpetic keratitis treatment by UV excimer lasers radiation,*** S.N.Bagayev, A.M.Razhev, V.V.Chernikh, A.A.Zhupikov, E.S.Kargapoltsev, *Inst. of Laser Phys., Russia.* The results of the investigations of the influence of an UV excimer laser radiation wavelength on the herpetic keratitis treatment efficiency are presented. The new laser method of herpetic keratitis treatment is proposed.

10:30–11:00 COFFEE BREAK

Hall 5 IQEC	Hall 6 IQEC			

8:30–10:30
QThB · Special Symposium on Photonic Crystals I—Continued

QThB5 · 10:00
SHG in planar nonlinear waveguide reproducing a 1-D PBG: enhanced Cerenkov radiation, D.Pezzetta, C.Sibilia, M. Bertolotti, *Univ. di Roma "La Sapienza", Italy,* R.Ramponi, R.Osellame, M.Marangoni, *Politecnico di Milano, Italy,* J.W.Haus, *Univ. of Dayton, USA,* M.Scalora, M.J.Bloemer C.M.Bowden, *U.S. Army Aviation and Missile Command, Res. Dev. and Engin. Ctr, USA.* Second harmonic generation (SHG) in Cerenkov configuration is investigated under conditions for which the use of a linear grating fabricated on top of the waveguide reproduces a photonic band-gap structure.

QThB6 · 10:15
Parametric $\chi^{(2)}$ effects in finite one-dimensional, photonic band gap structures, G.D'Aguanno, M.Centini, C.Sibilia, M.Bertolotti, *Univ. di Roma "La Sapienza", Italy,* M.Scalora, C.M.Bowden, M.J.Bloemer, *U.S. Army Aviation and Missile Command, Res. Development and Engin. Ctr, USA.* Using a generalized coupled mode theory we study different nonlinear interaction regimes in finite, one-dimensional photonic band gap structures. We discuss two new effects: a) the suppression or the enhancement of the second harmonic generated by counter-propagating pump beams; b) parametric instabilities due to a two-wave mixing process.

8:30–10:30
QThC · Gas Lasers—Continued

QThC4 · 10:00
New concept of femtosecond optical pulse amplification up to petawatt power on the base of the photochemically driven XeF(C-A) active medium, G.A.Malinovskii, S.B.Mamaev, L.D.Mikheev, V.V.Mislavskii, T.Yu.Moskalev, V.I.Tcheremiskine, V.I.Yalovoi, *Lebedev Phys. Inst., Russia,* M.L.Sentis, *Univ. Aix-Marseille II, France.* We discuss physical principles of operation and design philosophy of a compact photolytically driven XeF(C-A) amplifier and present results of numerical and experimental studies of its gain characteristics including results of the fs optical pulse amplification.

QThC5 · 10:15
Optics of powerful e-beam-pumped KrF-lasers, V.G.Bakaev, E.V.Polyakov, G.V.Sychugov, A.P.Sergeev, P.B.Sergeev, V.D.Zvorykin, *Lebedev Phys. Inst., Russia.* The comprehensive results are presented on the behaviour of high purity synthetic CaF_2, MgF_2, quartz glass and Al_2O_3 under the action of intensive ionizing radiation (x-rays and energetic electrons) and UV laser radiation with 248-nm wavelength. They are concerned to the application of e-beam-pumped large-size KrF laser as a driver in the Inertial Fusion Energy.

10:30–11:00 COFFEE BREAK

Conference Hall JOINT	Hall 1 LAT	Hall 2 IQEC	Hall 3 LAT	Hall 4 LAT
	11:00–12:30 **LThC · Water and Vegetation** A.F.Bunkin, *General Physics Inst., Russia*, and S.M.Pershin, *General Physics Inst., Russia*, *Presiders*	**11:00–12:30** **QThD · Ultrafast Dynamics in Condensed Matter** G.Petite, *Ecole Polytechnique, France, Presider*	**11:00–12:30** **LThD · Laser systems for Precision Measurements II** TBA, *Presider*	**11:00–12:30** **LThE · Laser-Tissue Interaction II** A.Evseev, *IPLIT, Russia, Presider*
	LThC1 · 11:00 · INVITED ***Synoptic studies of the Antarctic Ross sea with the ENEA LIDAR fluorosensor,*** A.Palucci, *ENEA, FIS, Italy.* The ENEA Lidar fluororosensor apparatus take part to three marine campaigns in the South-western Ross Sea and along the Southern Ocean transects up-to New Zealand, revealing the bio-optical peculiarity of coastal zones and seasonal changes encountered.	**QThD1 · 11:00 · INVITED** ***Ultrafast condensate dynamics in the high-temperature superconductor $Bi_2Sr_2CaCu_2O_{8+d}$,*** R.A.Kaindl, M.A.Carnahan, J.Orenstein, D.S.Chemla, S.Oh, J.N.Eckstein, *Lawrence Berkeley Natl Lab., USA.* The ultrafast dynamics of the superconducting condensate in $Bi_2Sr_2CaCu_2O_{8+d}$ is directly probed via optical-pump terahertz-probe spectroscopy. We discuss the picosecond reformation kinetics of the condensate, whose rate strongly increases with both excitation density and temperature.	**LThD1 · 11:00 · INVITED** ***Nd:YAG/I_2 optical frequency standard and spectroscopy of I_2 near 532 nm,*** M.N.Skvortsov, M.V.Okhapkin, N.L.Kvashnin, S.N.Bagayev, *Inst. of Laser Phys., Russia.* We demonstrate the results of long-term frequency stability of our infrared/green tunable unidirectional traveling-wave Nd:YAG laser (green output up to 250 mW, tuning range up to 700 GHz) stabilized onto the hyperfine luminescent peaks of molecular iodine.	**LThE1 · 11:00** ***Effect of water mass transfer in the cartilage on the temperature field induced by the IR laser radiation,*** E.N.Sobol, M.S.Kitai, *IPLIT, Russia,* A.V.Zakharchenko, *Inter-industry Supercomputer Center, Russia,* Ya.M.Zhileikin, A.B.Kukarkin, *Moscow State Univ., Russia.* We developed a theoretical model of heat and water mass transfer in cartilage under laser pulse irradiation. The temperature and water concentration at the surface as well as water mass transfer determine the intensity of water evaporation.
				LThE2 · 11:15 ***Acoustic spectroscopy diagnostics of laser transmyocardial revascularization,*** A.P.Kubyshkin, V.V.Vasiltsov, V.Ya.Panchenko, *IPLIT, Russia.* Acoustic spectroscopy was applied for study of channel punching in the myocardium tissue by CO_2 laser pulse. Results shows that measurements of sound waves spectra time evolution can be used for diagnostics of the LTMR.
	LThC2 · 11:30 ***The use of the local laser ablation for investigation of transport of the organogenic elements in plants,*** G.S.Lazeeva, T.Yu.Mesheryakova, A.A.Petrov, *St.Petersburg State Univ., Russia.* Experiment includes the cultivation of plants in biological environment (soil, solution, atmosphere) enriched by heavy carbon (C^{13}) and nitrogen (N^{15}), the local (~ 1 mm^2) laser extraction CO_2 and N_2 from investigated plants in vacuum chamber and spectroscopic emissive analysis of their isotope components, excited in HF electrodless discharge.	**QThD2 · 11:30 · INVITED** ***Polariton spectroscopy of semiconductor microcavity,*** E.A.Vinogradov, *Inst. of Spectroscopy, Russia.* Optical properties of cavity structure like "vacuum–ZnSe films–metal substrate" were investigated by reflection-absorption and luminescence spectroscopy and by femtosecond pump-supercontinuum probe spectroscopy methods.	**LThD2 · 11:30 · INVITED** ***Applications of highly stable lasers in precision measurements,*** L.F.Vitushkin, *Bureau Inter. des Poids et Mesures, France.* The new generation of highly frequency-stable lasers opens up new possibilities in precision measurements in dimensional metrology and nanometrology, absolute gravimetry, and in the development of standards of physical units.	**LThE3 · 11:30** ***Opto-mechanical testing of hydrated biological tissues,*** A.I.Omel'chenko, V.N.Bagratashvili, E.N.Sobol, A.P.Sviridov, *IPLIT, Russia.* The mechanical behavior of biological tissues in dehydration process induced by moderate laser heating was studied. Optical polarization technique has been used in order to control hydration state of superficial layer of the irradiated tissue. Dynamics of dehydration of the tissue and its hydrodynamic permeability have been measured.

Hall 5 IQEC	Hall 6 JOINT			

11:00–12:30
QThE · Special Symposium on Photonic Crystals II
J.F.Young, *Univ. of British Columbia, Canada, Presider*

QThE1 · 11:00 · INVITED
Toward photonic crystals through nanostructuring of semiconductors, P.K.Kashkarov, *Moscow State Univ., Russia.* Multilayer structures made by electrochemical nanostructuring of semiconductors show photonic band gap tunable with the period of structure, nanocrystal sizes and their dielectric surroundings. Experiments demonstrate phase matching for second-harmonic generation in the multilayers.

QThE2 · 11:30 · INVITED
Nonlinear photonic crystal waveguides, Yu.S.Kivshar, S.F.Mingaleev, *Australian Natl Univ., Australia.* We overview the problems of light transmission in two-dimensional photonic crystal waveguides with embedded nonlinear defects. Based on the effective discrete equations with long-range interaction, we investigate the properties of straight waveguides, arrays of defects, and waveguide bends with embedded nonlinear defects and demonstrate the nonlinearity-induced bistable transmission and optical diode effect based on photonic crystals.

11:00–12:30
JThC · Postdeadline Papers II
TBA, *Presider*

Conference Hall JOINT	Hall 1 LAT	Hall 2 IQEC	Hall 3 LAT	Hall 4 LAT
	11:00–12:30 **LThC · Water and Vegetation—Continued**	**11:00–12:30** **QThD · Ultrafast Dynamics in Condensed Matter—Continued**	**11:00–12:30** **LThD · Laser systems for Precision Measurements II—Continued**	**11:00–12:30** **LThE · Laser-Tissue Interaction II—Continued**
	LThC3 · 11:45 ***Investigation marine water quality and monitoring phytoplancton by laser-induced breakdown spectroscopy,*** S.S.Golik, O.A.Bukin, A.A.Il'in, V.I.Tsarev, *Far Eastern State Univ., Russia.* The Laser-Induced Breakdown Spectroscopy (LIBS) method was applied for detection phytoplankton and marine water elemental composition. The results of the sea water quality monitoring and phytoplankton element composition measuring obtained in the Okhotsk coastal sea water during scientific research expedition in 2001 year are described.			**LThE4 · 11:45** ***Thermochemical processes in the fibrous connective tissue under IR laser irradiation,*** S.V.Averkiev, N.Y.Ignatyeva, A.N.Kharlanov, V.V.Lunin, *Moscow State Univ., Russia,* V.N.Bagratashvili, A.P.Sviridov, G.Sh.Shakh, E.N.Sobol, *IPLIT, Russia.* Step change of the supramolecular structure of the fibrous connective tissue under the laser treatment was found out by DSC, Raman-Spectroscopy and water sorption methods. The first step is a disordering of the collagen-proteoglycans network and the second step is collagen denaturation at higher laser power.
	LThC4 · 12:00 · INVITED ***Concept, methods, and tools for laser monitoring of coastal sea waters,*** V.V.Fadeev, T.A.Dolenko, *Moscow State Univ., Russia.* The report presents the concept, methods and means of laser monitoring of coastal sea water areas. The results of numerical modeling, laboratory and nature experiments, that confirm the perspective of the suggested approach, are presented.	**QThD3 · 12:00** ***Ultrafast quantum beats of exciton-polaritons in b-ZnP_2,*** O.Arimoto, M.Sakamoto, Y.Imai, *Okayama Univ., Japan,* S.Nakanishi, H.Itoh, *Kagawa Univ., Japan.* We have observed the ultrafast quantum beats of exciton-polaritons in β-ZnP_2 crystal by using the femtosecond four-wave mixing. The quantum beats are explained as the interference between two excitons in the crystal.	**LThD3 · 12:00** ***Ultra frequency stable Nd:YAG laser for an indium frequency standard,*** M.Eichenseer, A.Yu.Nevsky, J.von Zanthier, H.Walther, *Max-Planck-Inst. für Quantenoptik and LMU München, Germany.* Using an active vibration isolated high-finesse reference cavity the linewidth of a Nd:YAG laser was reduced to the Hertz level. This laser will be used as an oscillator for a single In^+ ion optical frequency standard.	**LThE5 · 12:00 · INVITED** ***Laser stereolithography for crania-maxillofacial surgery,*** A.V.Evseev, *IPLIT, Russia.*
		QThD4 · 12:15 ***Laser-induced "frozen spin waves" in ultra-thin ferromagnetic films revealed by picosecond degenerate four-photon spectroscopy,*** V.M.Petnikova, K.V.Rudenko, V.V.Shuvalov, A.V.Voronov, *Moscow State Univ., Russia.* Evolution of ultra-thin Ni film's domain structure under spatially uniform and non-uniform laser excitation will be considered. We will show that kinetics of the film's magnetization destruction in the first case is much faster than in the second one.	**LThD4 · 12:15** ***New Schottky diodes with very broad frequency band,*** E.Bava, G.Galzerano, C.Svelto, *Polytechnic of Milan, INFM, and CSTS-CNR, Italy,* N.Beverini, G.Carelli, M.Finotti, A.Moretti, *Univ. of Pisa, and INFM, Italy.* We present a new Schottky diode device that can be used as ultra-high speed heterodyne receivers, in order to detect mixing signals up to 1 THz. Preliminary results demonstrate a good detection efficiency.	

12:30–14:00 LUNCH (on your own)

Hall 5 IQEC	Hall 6 JOINT			
11:00–12:30 **QThE · Special Symposium on Photonic Crystals II—Continued**	**11:00–12:30** **JThC · Postdeadline Papers II—Continued**			

QThE3 · 12:00
2D and 3D macroporous silicon photonic crystals, J.Schilling, R.B.Wehrspohn, F.Müller, U.Gösele, *Max-Planck-Inst. of Microstructure Phys., Germany,* S.W.Leonard, H.M.van Driel, *Univ. of Toronto, Canada,* K.Busch, *Univ. Karlsruhe, Germany.* Optical tunable 2D photonic crystals based on macroporous silicon with a complete photonic bandgap in the near infrared are obtained. An extension to 3D photonic crystals by modulation of pore diameter is achieved. Introduction of a defect layer and omnidirectional total reflection is shown.

QThE4 · 12:15
Modeling of coupled waveguide systems, M.Thorhauge, A.Lavrinenko, Th.Sondergaard, *Tech. Univ. of Denmark, Denmark.* We have modeled coupled waveguides in triangular photonic crystal with an 3D FDTD method. The transmission spectra shows significant coupling taking place. The coupling is found to be dependent on frequency, length and waveguide separation.

12:30–14:00 LUNCH (on your own)

Conference Hall IQEC/LAT-YS	Hall 1 LAT	Hall 2 IQEC	Hall 3 IQEC	Hall 4 LAT
	14:00–16:00 **LThF · Aerosols** G.F.Tulinov, *Applied Geophysical Inst., Russia*, and O.Danilov, *Inst. for Laser Physics, St. Petersburg, Russia, Presiders*	**14:00–16:00** **QThF · Nonlinear Optics of Ultrafast Pulses** M.Y.Schelev, *General Physics Inst. Russia, Presider*	**14:00–16:00** **QThO · Quantum Information and Quantum Computing I** P.Zoller, *Univ. of Innsbruck, Austria, Presider*	**14:00–16:00** **LThG · Laser Processing of Advanced Materials and Laser Microtechnologies VII** F.Bachmann, *Rofin-Sinar Laser GmbH, Germany, Presider*
	LThF1 · 14:00 · INVITED ***Multiwavelength LIDAR sounding of atmospheric aerosols,*** A.P.Ivanov, A.P.Chaikovsky, *Stepanov Inst. of Phys., Belarus.* We review current achievements in lidar sounding methodologies by operating multi-frequency high-technology laser systems providing high spatial and temporal resolution of optical and microphysical aerosol properties. The lidar features are illustrated by sample measurements in different geophysical regions.	**QThF1 · 14:00 · INVITED** ***Coulomb explosion of clusters induced with intense femtosecond lasers,*** S.Sakabe, S.Shimizu, F.Sato, K.Nishihara, T.Iida, Y.Izawa, C.Tsuyukushi, S.Okihara, T.Kagawa, T.Yoshii, M.Sato, *Osaka Univ., Japan.* Characteristics and energy distributions of high-energy protons generated by Coulomb explosion of hydrogen clusters induced with intense femtosecond lasers have been experimentally and numerically studied with the model of a uniform spherical cluster.	**QThO1 · 14:00 · INVITED** ***Quantum information processing with trapped atomic ions,*** D.J.Wineland, *NIST, USA.* Quantum information processing techniques using trapped ions are discussed. Although constructing a large-scale quantum computer will be extremely difficult, simple applications of quantum processing may find practical application in the next few years.	**LThG1 · 14:00 · INVITED** ***Laser processing of aluminium alloys,*** H.Huegel, *Univ. of Stuttgart, Germany.* The physical impact of laser beam and material properties on deep penetration laser welding will be discussed. Process modifications like dual focus welding and the utilization of electromagnetic forces in the melt pool enhance the process stability and result in higher process quality and flexibility.
	LThF2 · 14:30 ***Vertical profiling of atmospheric particle properties with six-wavelength aerosol lidar,*** D.Müller, A.Ansmann, D.Althausen, U.Wandinger, K.Franke, *Inst. for Tropospheric Res., Germany.* This world-wide unique lidar for the first time provides particle backscatter and extinction coefficients at multiple wavelengths, and profiles of microphysical particle properties including the single-scattering albedo on a vertically resolved scale.	**QThF2 · 14:30** ***Connecting femtosecond laser filaments in air,*** S.Tzortzakis, G.Méchin, M.Franco, B.Prade, A.Mysyrowicz, *ENSTA, Ecole Polytechnique, France.* We connect two filaments created in air by two femtosecond laser pulses. A twofold increase of the total filament length is achieved. Improved air plasma conductivity and stronger continuum generation is observed.	**QThO2 · 14:30 · INVITED** ***Topologically protected quantum bits from Josephson junction arrays,*** L.B.Ioffe, M.V.Feigel'man, A.S.Ioselevich, D.A.Ivanov, M.Troyer, G.Blatter, *L.D.Landau Inst. for Theor. Phys., Russia.* First physical implementation of A.Kitaev's idea of topologically protected quantum computing is proposed. The system is based upon special type of Josephson junction array operating in the quantum limit.	**LThG2 · 14:30 · INVITED** ***Basic processes in deep penetration laser material interaction,*** R.Fabbro, *CLFA, France.* We discuss the common basic mechanisms to laser processes involved in deep penetration into material. Resulting modeling are shown and compared to relevant experiments.

Hall 5 IQEC	Hall 6 LAT			

14:00–16:00
QThH · Special Symposium on Photonic Crystals III

Y.Kivshar, *Australian National Univ., Australia, Presider*

QThH1 · 14:00 · INVITED

Properties and applications of photonic crystal fibres, W.J.Wadsworth, J.C.Knight, R.M.Percival, G.Bouwmans, A.Ortigosa-Blanch, W.H.Reeves, P.St.J.Russell, *Univ. of Bath, UK.* Photonic crystal fibres present great opportunities for widening the applications of optical fibres. In particular the control of mode size, dispersion and multiple cores and claddings offer advantages in fibre lasers and nonlinear devices.

QThH2 · 14:30 · INVITED

Supercontinuum generation in photonic crystal fibers using stimulated Raman scattering and four wave mixing, J.D.Harvey, A.H.L.Chau, S.Coen, R.Leonhardt, *Univ. of Auckland, New Zealand,* J.C.Knight, W.J.Wadsworth, P.St.J.Russell, *Univ. of Bath, UK.* Photonic crystal fibres with their high nonlinearity and adjustable GVD characteristics provide an ideal medium for the generation of an octave spanning supercontinuum, yielding new insights into the generation mechanisms of the white light.

14:00–16:00
LThH · Laser Technologies for Isotope Separation and Selective Photochemistry I

V.Baranov, *Res. Scient. Ctr "Kurchatov Inst.", Russia, Presider*

LThH1 · 14:00 · INVITED

Two-stage laser technology of carbon isotopes separation, V.Yu.Baranov, *RRC "Kurchatov Inst.", Russia,* A.P.Dyadkin, D.D.Malyuta, S.V.Pigulski, *TRINITI, Russia,* V.B.Laptev, V.S.Letokhov, E.A.Ryabov, *Inst. of Spectroscopy, Russia.* The two-stage laser technology of carbon-13 enrichment is described. The first stage is based on selective IR multiple-photon dissociation of freon-22 by CO_2-laser radiation. The final enrichment at the current plant is produced by centrifuge stage. The developed completely laser process of two-stage enrichment is described.

LThH2 · 14:30 · INVITED

The atomic vapor laser isotope separation (AVLIS) program in the United States and some applications of its component technology, J.T.Early, *Livermore Laurence Natl Lab., USA.* Uranium isotope separation using lasers to selectively ionize uranium atoms was investigated for twenty years in the United States before being discontinued for economic reasons. This paper will review the component technologies used in this program and discuss some efforts to use these technologies for other applications.

Conference Hall IQEC/LAT-YS	Hall 1 LAT	Hall 2 IQEC	Hall 3 IQEC	Hall 4 LAT
	14:00–16:00 **LThF · Aerosols—Continued**	**14:00–16:00** **QThF · Nonlinear Optics of Ultrafast Pulses—Continued**	**14:00–16:00** **QThO · Quantum Information and Quantum Computing I—Continued**	**14:00–16:00** **LThG · Laser Processing of Advanced Materials and Laser Microtechnologies VII —Continued**
	LThF3 · 14:45 ***Recognition of composition and of microphysical characteristics of aerosol impurities in multifrequency sounding,*** B.G.Bravy, G.K.Vasiliev, V.Ya.Agroskin, *Inst. of Problems of Chemical Phys., Russia,* A.N.Zhitov, I.P.Suprun, *Military Univ. of Atomic, Biological, and Chemical Protection, Russia.* Some approaches to the recognition of composition and microphysical characteristics of aerosol impurities in multifrequency sounding were considered. The comparative analysis of the different recognition methods was done.	**QThF3 · 14:45** ***Pulse shaping of IR femtosecond pulses propagating in air,*** S.Pershin, P.Caumes, E.Freysz, *Univ. Bordeaux, France, General Phys. Inst., Russia.* Time resolved visible-IR sum-frequency generation is used to evidence the pulse shaping of femtosecond IR pulses centered in 3400–4000 cm^{-1} range during their propagation in air due to absorption of water vapor.		
	LThF4 · 15:00 ***Measurements of molecular carbon radical concebtrations by saturated laser induced fluorescence in hydrocarbon flames at atmospheric pressure,*** M.Marrocco, M.Magaldi, M.D'Apice, S.Giammartini, G.P.Romano, *ENEA, Italy.* Molecular carbon radical concentrations were measured in acetylene/oxygen, methane/air, and liquid petroleum gas/air flames by detecting induced fluorescence from the main Swan band system. Measurements have been obtained after spectral data and image processing.	**QThF4 · 15:00** ***Ultrafast shadowgraphy and interferometry of the phase objects with high spatial resolution,*** A.A.Malyutin, S.N.Garnov, O.G.Tsarkova, V.I.Konov, F.Dausinger, *General Phys. Inst., Russia.* The report deals with problems taking place during the studies of plasma and other phase objects utilizing high-resolution shadowgraphic and interferometric techniques. Computer models and experimental data obtained using picosecond probe pulses are given.	**QThO3 · 15:00** ***Ultrafast NbN hot-electron single-photon detectors for visible and infrared radiation,*** O.Okunev, K.Smirnov, G.Chulkova, A.Korneev, A.Lipatov, G.Gol'tsman, *Moscow State Pedagogical Univ., Russia,* J.Zhang, W.Slysz, A.Verevkin, R.Sobolewski, *Univ. of Rochester, USA.* A new type of ultra-high-speed single-photon counter for visible and near infrared wavebands based on superconducting ultrathin NbN film has been developed. It exhibits an experimentally measured intrinsic quantum efficiency up to 20%, negligible dark counts and response time is less then 100ps.	**LThG3 · 15:00 · INVITED** ***Process stabilization by dual focus laser welding of aluminum alloys for car body,*** K.Shibata, T.Iwase, H.Sakamoto, *Nissan Motor Co., Ltd., Japan,* F.Dausinger, B.Hohenberger, M.Mueller, *Univ. Stuttgart, Germany,* A.Matsunawa, N.Seto, *Osaka Univ., Japan.* Aluminum alloys were welded using dual focus beam of Nd:YAG lasers. Beam distance affects the stability of the process. A real time X-ray observation was carried out to investigate the mechanism of process stability.
	LThF5 · 15:15 ***Incoherent spatial filtering of lidar signals and its technical potentialities,*** A.I.Abramotchkin, S.A.Abramotchkin, A.N.Aksenov, A.A.Tikhomirov, *Inst. for Optical Monitoring, Russia.* The potentialities and technical aspects of using the incoherent spatial filters are discussed for analysis of power density distribution of a lidar signal in the image plane of a scattering volume. This analysis makes a basis for estimate of microphysical characteristics of scattering particles when sounding optically dense aerosol objects.	**QThF5 · 15:15** ***Structural transitions in anisotropic solids under femtosecond laser excitation,*** V.V.Temnov, *Inst. of Appl. Phys., Russia,* K.Sokolowski-Tinten, P.Zhou, D. von der Linde, *Univ. of Essen, Germany,* S.I.Ashitkov, M.B.Agranat, V.E.Fortov, *Joint Inst. for High Temperatures, Russia.* Time-resolved polarization microscopy was used to study laser-induced structural transitions in anisotropic materials. For graphite the transition from an optically anisotropic to an isotropic state, indicating the loss of crystalline order, occurs on a subpicosecond time scale.	**QThO4 · 15:15** ***Characterization of a 1550 nm thermoelectrically cooled single-photon detector for efficient quantum key distribution,*** Y.Akio, Ts.Hidemi, *Natl Inst. of Adv. Industrial Sci. and Techn. (AIST), Japan.* To discuss the use of a 1550 nm thermoelectrically cooled single-photon detector for efficient quantum key distribution, the afterpulse is studied at 238 K. The results are applied to the simulation of a quantum cryptosystem.	

Hall 5 IQEC	Hall 6 LAT			
14:00–16:00 **QThH · Special Symposium on Photonic Crystals III—Continued**	**14:00–16:00** **LThH · Laser Technologies for Isotope Separation and Selective Photochemistry I—Continued**			
QThH3 · 15:00 ***Photonic band gap guiding in microstructured polymer optical fibres,*** M.A.van Eijkelenborg, M.C.J.Large, A.Argyros, I.Bassett, J.Zagari, *Australian Photonics Cooperative Res. Centre, Australia.* Experimental and theoretical investigation of photonic band gap guidance in an air-core microstructured polymer optical fibre will be presented. Both conventional hexagonal-symmetry band gap fibres and air-core Bragg-guiding ring structures will be discussed.	**LThH3 · 15:00 · INVITED** ***Molecular laser separation of isotopes of heavy elements. Problems and perspectives,*** Yu.A.Kolesnikov, *TRINITI, Russia.*			
QThH4 · 15:15 ***Phase-matched nonlinear interactions in a holey fiber induced by infrared supercontinuum generation,*** L.Tartara, I.Cristiani, V.Degiorgio, *Universitá degli Studi di Pavia, Italy,* F.Carbone, D.Faccio, M.Romagnoli, *Pirelli Labs-Optical Innovation, Italy,* W.Belardi, *Univ. of Southampton, UK.* In this work we investigate the nonlinear behaviour of a holey fiber. We find out that by varying the input polarization several phase-matched processes can be originated by the onset of a broad infrared supercontinuum.				

Conference Hall IQEC/LAT-YS	Hall 1 LAT	Hall 2 IQEC	Hall 3 IQEC	Hall 4 LAT
	14:00–16:00 **LThF · Aerosols—Continued**	**14:00–16:00** **QThF · Nonlinear Optics of Ultrafast Pulses—Continued**	**14:00–16:00** **QThO · Quantum Information and Quantum Computing I—Continued**	**14:00–16:00** **LThG · Laser Processing of Advanced Materials and Laser Microtechnologies VII—Continued**
	LThF6 · 15:30 · INVITED ***Man-portable eye-safe lidar for environmental monitoring,*** S.Pershin, *General Phys. Inst., Russia.* Series of eye-safe compact lidar with unique parameters is presented. Its application for environmental monitoring from a light autonomous platform which can operates in extremely low temperature/pressure or high humidity is discussed and demonstrated.	**QThF6 · 15:30** ***Femtosecond time-resolved optical studies of short pulse laser ablation,*** V.V.Temnov, *Inst. of Appl. Phys., Russia,* K.Sokolowski-Tinten, D.von der Linde, *Univ. of Essen, Germany.* The dynamics of femtosecond laser ablation of semiconductors is studied by femtosecond time-resolved optical interferomerty and dark-field microscopy. The expansion of the ablation front and strong scattering signal from the ablating layer are observed.	**QThO5 · 15:30** ***Frequency hopping of qubits and ebits,*** P.Mataloni, G.Giorgi, F.De Martini, *Università di Roma "La Sapienza", Italy.* We present a novel single-photon Mach-Zehnder interferometer terminated at two different frequencies which realizes the nonlinear frequency conversion of optical quantum superposition states. This scheme can find important applications in quantum information technology	**LThG4 · 15:30** ***Double focus technique—influence of focal distance on the welding process,*** A.Russ, W.Gref, M.Leimser, F.Dausinger, H.Hügel, *Univ. Stuttgart, Germany.* Double focus welding is a proven technique to improve the welding process of aluminium. The contribution will discuss the influence of the spot distance on the welding result such as porosity, blowholes, depth and efficiency.
		QThF7 · 15:45 ***Detection of weak optical signals without photocounts,*** V.P.Bykov, *General Phys. Inst., Russia.* It is shown that electron state degeneration in photodetectors is source of instability of their motion in cathode-anode gap leading to photocounts. Detectors founded on usage of electrons, bound in ions or atoms are proposed. Their basic parameters are determined.	**QThO6 · 15:45** ***Quantum cryptography with qubit pairs encoded as qutrits and ququarts,*** D.B.Horoshko, S.Ya.Kilin, *Stepanov Inst. of Phys., Belarus.* We show that non-entangled pair of qubits can be encoded as qutrit or ququart for improvement of security of cryptographic scheme on the cost of key generation rate.	**LThG5 · 15:45** ***A powerful optical pulsating discharge in a supersonic gas flow and its applications,*** G.N.Grachev, A.G.Ponomarenko, A.L.Smirnov, V.N.Tischenko, *Inst. of Laser Phys., Russia,* V.N.Demin, *Inst. of Inorganic Chemistry, Russia,* P.K.Tretyakov, *Inst. of Theor. and Appl. Mechanics, Russia.* The results of investigations on properties of the plasma of a powerful optical pulsating discharge in high-velocity (including supersonic) flows of gas (argon, helium) initiated by pulse-periodic radiation of a CO_2 laser and its application in gas-dynamics, plasma-chemical synthesis, control over the combustion processes and other fields are reported.

16:00–16:30 COFFEE BREAK

Hall 5 IQEC	Hall 6 LAT			

14:00–16:00
QThH · Special Symposium on Photonic Crystals III—Continued

QThH5 · 15:30
Enhanced $c^{(3)}$ interactions of unamplified femtosecond Cr:forsterite laser pulses in photonic-crystal fibers, A.B.Fedotov, A.N.Naumov, A.M.Zheltikov, *Moscow State Univ., Russia,* V.V.Yakovlev, *Univ. of Wisconsin–Milwaukee, USA,* V.I. Beloglazov, N.B.Skibina, A.V.Shcherbakov, L.A.Mel'nikov, *Techn. and Equipm. for Glass Struct. Inst., Russia.* Several $c^{(3)}$ interactions of unamplified Cr:forsterite laser pulses are enhanced in a photonic-crystal fiber, allowing the third harmonic of laser radiation to be generated, simultaneously offering the possibility to control the chirp of the third-harmonic pulse through cross-phase modulation.

QThH6 · 15:45
Supercontinuum-generating photonic-molecule modes of a microstructure fiber, A.B.Fedotov, A.N.Naumov, D.A.Sidorov-Biryukov, A.M.Zheltikov, *Moscow State Univ., Russia,* I.Bugar, D.Chorvat, Jr., D.Chorvat, *Intern. Laser Center, Slovak Republik,* V.I.Beloglazov, L.A.Mel'nikov, N.B.Skibina, A.V.Shcherbakov, *Techn. and Equip. for Glass Struct. Inst., Russia.* A microstructure fiber with a core in the form of a cyclic polyatomic photonic molecule is created. This fiber can guide the light through total internal reflection, providing a high light confinement degree due to the large refractive index step and allowing the properties of supercontinuum emission to be controlled.

14:00–16:00
LThH · Laser Technologies for Isotope Separation and Selective Photochemistry I—Continued

LThH4 · 15:30 · INVITED
Producing of rare isotopes of weighable amounts by AVLIS method, S.I. Yakovlenko, *General Phys. Inst., Russia.* AVLIS process for Yb has been studied theoretically and experimentally. Installations to produce highly enriched ^{168}Yb in industrial scales were created. The way to get highly enriched ^{102}Pd is discussed.

16:00–16:30 COFFEE BREAK

Conference Hall	Hall 1 LAT	Hall 2 IQEC	Hall 3 IQEC	Hall 4 LAT
	16:30–18:30 **LThI · Atmosphere** A.P.Ivanov, *Inst. of Physics, Belarus, Presider*	**16:30–18:45** **QThI · Laser Control of Ultrafast Phenomena II** A.Mysyrowicz, Ecole Polytechnique, *France, Presider*	**16:30–18:30** **QThJ · Quantum Information and Quantum Computing II** K.A.Valiev, *Physical-Technical Inst., Russia, Presider*	**16:30–18:30** **LThJ · Laser Processing of Advanced Materials and Laser Microtechnologies VIII** TBA, *Presider*
	LThI1 · 16:30 · INVITED ***Advance in laser sensing of the middle atmosphere,*** V.Zuev, *Inst. of Atmospheric Optics, Russia.*	**QThI1 · 16:30** ***Quantum control in femtobiology,*** W.Wohlleben, M.Motzkus, Max-Planck-Inst. für Quantenoptik, Germany, J.L.Herek, *Lund Univ., Sweden.* We present coherent control of biological function. Feedback optimisation of the excitation pulse envelope and carrier phase pattern exploits molecular quantum interferences to steer the energy flow in the light-harvesting complex LH2 from Rhodopseudomonas acidophila.	**QThJ1 · 16:30 · INVITED** ***Information in quantum world: An insight into fundamental problems of physics,*** B.A.Grishanin, V.N.Zadkov, *Moscow State Univ., Russia.* A review of the quantitative measures of quantum information is given and their applications to physics are discussed. It is shown that quantum information is a versatile tool for analysis and optimization of experiments in quantum physics.	**LThJ1 · 16:30 · INVITED** ***Polymer welding with lasers,*** F.Bachmann, *ROFIN-SINAR Laser GmbH, Germany.* Polymer welding with lasers became an attractive joining method by the appearance of the new high power diode lasers. Tools, configurations, chances, hurdles and limitations of this new technology will be explained. Examples will be presented.
		QThI2 · 16:45 ***Ultrafast vibrational kinetics of 4-nitroaniline after internal conversion,*** V.Kozich, W.Werncke, J.Dreyer, T.Elsaesser, *Max-Born-Inst., Germany.* Vibrational excitation and subsequent energy redistribution after energy dissipation from the excited charge transfer state in 4-nitroaniline molecules is investigated by time-resolved anti-Stokes Raman spectroscopy. The main accepting mode is identified.		
	LThI2 · 17:00 · INVITED ***Lidar investigations of the atmosphere from the space station "MIR" (project "ALISSA")***, G.Ph.Tulinov, V.A.Smerkalov, S.G.Tulinov, *Fedorov Inst. of Appl. Geophysics, Russia*, V.E.Melnikov, E.N.Laletina, *Rocket and Space Corp. Energia, Russia*, A.A.Kazakov, V.L.Pavlovich, *FGUP "NII Polyus", Russia*, M-L.Chanin, C.Malique, A.Hauchecorne, *Service d'Aeronomie, France.* In the period 1996-99 from the space station "MIR" atmospheric investigations with the "ALISSA" lidar developed jointly by Russian and French sides have been carried out. Small-size	**QThI3 · 17:00** ***Polarization control of visible harmonic generation in microstructured fiber,*** F.G.Omenetto, *Los Alamos Natl Lab., USA,* A.Efimov, A.J.Taylor, *MST-10, USA,* J.C.Knight, W.Wadsworth, Ph.St.J.Russell, *Univ. of Bath, UK.* The input polarization state of the pulses to a segment of microstructured fiber controls harmonic generation yielding specific and distinct frequencies.	**QThJ2 · 17:00** ***Measuring quantum states and channels,*** Th.Hannemann, D.Reiss, Ch.Balzer, W.Neuhauser, P.E.Toschek, Ch.Wunderlich, *Univ. of Hamburg, Germany.* We estimate impure qubit states with a self-learning strategy employing N successive measurements on a single trapped Yb ion. Secondly, we experimentally characterize the parameters of a general quantum channel under different controlled disturbances.	**LThJ2 · 17:00 · INVITED** ***Rapid prototyping with lasers using metal powder jets,*** G.Liedl, D.Schuöcker, *Vienna Univ. of Technology, Austria,* E.Kny, *Austrian Res. Centre Seibersdorf, Austria.* The Blown Powder Process offers the possibility for the production of very dense 3D structures with strengths comparable to the unpowderized metal. Powder is delivered by a nozzle into the focus of a laser beam.

Hall 5 IQEC	Hall 6 LAT			
16:30–18:30 **QThK · Special Symposium on Photonic Crystals IV** P.K.Kashkarov, *Moscow State Univ., Russia, Presider*	**16:30–18:30** **LThK · Laser Technologies for Isotope Separation and Selective Photochemistry II** TBA, *Presider*			
QThK1 · 16:30 · INVITED ***Photonic crystals, nanostructures and microstructures,*** R.M. De La Rue, A.S.Jugessur, B.M.Treble, Iraklis, *Univ. of Glasgow, UK*. This presentation will survey recent work on a number of different topics within the area covered by the above title, including work carried out in the University of Glasgow and in the PICCO and COST268 European programmes.	**LThK1 · 16:30 · INVITED** ***Excited triplet states and multiphoton processes of the photoionization in laser-activ molecule,*** A.E.Obukhov, *Russian Peoples' Friendship Univ., Russia.* Physical principles of the simulating of electron-vibrational structure excited singlet and triplet states, photoionization, spectral-luminescence, and lasing properties of complex N, O, S heteroaromatic molecules by means of the quantum-chemical approximation models LCAO MO SCF CI CNDO/S and INDO/S (complete and intermediate neglect of differential overlap, sp-valence basis) approaches are considered.			
QThK2 · 17:00 · INVITED ***Photon density of states effects on spontaneous Raman scattering in mesoscopic structures,*** S.V.Gaponenko, *Inst. of Molec. and Atomic Phys., Belarus.* Photon density of states (DOS) effects on spontaneous Raman scattering in certain mesoscopic structures is outlined. Similar to spontaneous emission, spontaneous Raman scattering should experience modification if DOS redistribution over frequency and solid angle occurs.	**LThK2 · 17:00** ***Evanescent-wave stimulated surface-processes,*** V.G.Bordo, L.Jozefowski, V.V.Petrunin, H.-G.Rubahn, *SDU-Odense Univ., Denmark.* Resonant laser excitation in the close neighbourhood of a potentially catalytic surface is used to control interface reactions. This new laser chemistry approach helps to avoid optical decay and pumping and allows high reagent densities.			

Conference Hall	Hall 1 LAT	Hall 2 IQEC	Hall 3 IQEC	Hall 4 LAT
	16:30–18:30 **LThI · Atmosphere—Continued**	**16:30–18:45** **QThI · Laser Control of Ultrafast Phenomena II—Continued**	**16:30–18:30** **QThJ · Quantum Information and Quantum Computing II—Continued**	**16:30–18:30** **LThJ · Laser Processing of Advanced Materials and Laser Microtechnologies VIII—Continued**
	lasers ILTI–403 and LT–9 (Nd:YAG at 532 nm) were used in the lidar. Important technological and scientific information was obtained.	**QThI4 · 17:15** ***Soliton generation and steering in an all-solid-state laser,*** I.V.Melnikov, I.D. Melnikova, N.-C.Panoiu, C.Etrich, *General Phys. Inst., Russia.* The analytical model and numerical simulations are presented for a solid-state laser which modelocking is provided by an external nonlinear medium.	**QThJ3 · 17:15** ***Atom in a Rydberg state—a tool for quantum measurements and entanglement,*** I.I.Ryabtsev, D.B.Tretyakov, I.I.Beterov, *Inst. of Semicond. Phys., Russia.* Atoms in Rydberg states have unique spectroscopic properties and allow the realization of a model of qubit for quantum computing. Our recent experiments on quantum interference in Rydberg atoms of sodium showed the possibility of coherent control of the interaction of atoms with electromagnetic field.	
	LThI3 · 17:30 ***Laser sensing of the upper and lower boundaries of stratiform cloudiness,*** V.Shamanaev, G.Kokhanenko, I.Penner, *Inst. of Atmospheric Optics, Russia.* Makrel-2 laser radar was used for airborne, ground-based and shipboard sensing of apper and lower cloud boundaries (UCB and LCB). LCB and UCB altitude and scattering coefficient distributions were retrievaled of laser sensing data. The ratio between the dimensions of horisontal and vertical inhomogeneities of the UCB altitude was measured.	**QThI5 · 17:30** ***Theory of the nonlinear active mode locking,*** V.Yakovlev, A.Apolonski, *Inst. of Automation and Electrometry, Russia,* V.L.Kalashnikov, *TU Wien, Austria.* A purely analytical generalization of the theory of active mode locking is presented. The nonvanishing contribution of the dynamical gain saturation causes the pronounced asymmetry of the laser detuning characteristics, which agrees with the experimental and numerical data.	**QThJ4 · 17:30** ***Quantum computer with fixed interaction,*** Yu.Ozhigov, *Inst. of Phys. and Technology, Russia.* It is proposed an easy model of quantum computer with fixed and permanent two qubits interaction of diagonal type. It is controlled only by one-qubit transformations.	**LThJ3 · 17:30 · INVITED** ***Industrial applications of high power CO_2 lasers,*** V.G.Naumov, *TRINITI, Russia.* The high power CO_2 lasers were used for laser welding and cutting of different elements of nuclear reactors and for deactivation of surfaces. Experience- industrial technology for laser welding of reactor suspension components has been developed. Possibility of remote separating cutting of spent assembly elements and fuel elements itself has been demonstrated. Possibility of usage of laser radiation for deactivation of metal and building construction surface has been investigated.
	LThI4 · 17:45 ***Retrieval of optical turbulence spectrum from temporal spectrum of a laser beam propagating through atmosphere,*** Ruizhong Rao, *Anhui Inst. of Optics and Fine Mechanics, China.* The optical turbulence spectrum at rather high spatial wavenumber, most in the dissipation range, can be retrieved rather accurately by an algorithm from the temporal spectrum of a laser beam propagating through the atmosphere.	**QThI6 · 17:45** ***"SPRINT" technique for fs-pulse retrieval,*** A.Masalov, *Sci. Center 'Ultratekh', Russia,* S.Nikitin, Qiang Fu, *Quantronix Corporation, USA.* Spectrally resolved interferometric ("SPRINT") patterns formed by non-collinear SHG-autocorrelator were successfully used to fully characterize femtosecond pulses from Ti:Sapphire laser. This technique eliminates time-direction ambiguity and allows accelerated spectrum-based pulse retrieval procedure.	**QThJ5 · 17:45** ***Continuous feedback control of single and entangled qubits,*** R.Ruskov, A.N.Korotkov, *Univ. of California, USA.* We have studied theoretically the operation of a quantum feedback loop designed to maintain a desired phase of Rabi oscillations in a single solid-state qubit (or in a system of entangled qubits) and thus suppress the environment-induced decoherence.	

Hall 5 IQEC	Hall 6 LAT			
16:30–18:30 **QThK · Special Symposium on Photonic Crystals IV—Continued**	**16:30–18:30** **LThK · Laser Technologies for Isotope Separation and Selective Photochemistry II—Continued**			
	LThK3 · 17:15 ***Estimation of possible productivity of laser isotope separation of silicon,*** V.V. Buchanov, SKB "Lazust", Russia, M.A. Kazaryan, *Lebedev Physical Inst., Russia,* M.M.Kalugin, *Enterprise "Scanning lasers", Russia,* A.M.Prokhorov, *General Phys. Inst., Russia.* The isotopically selective photoionization of silicon atoms with the usage of the tunable dye lasers is examined. The level of maximal productivity of obtaining highly enriched isotope ^{28}Si nearby 0,1 g/hour can be evaluated. The selectivity of excitation is determined by conditions of the extraction of ions.			
QThK3 · 17:30 ***3D chiral photonic crystals,*** E.R.Dedman, D.N.Sharp, J.Scrimgeour, A.J.Turberfield, C.F.Blanford, K.Saravanamuttu, R.G.Denning, *Univ. of Oxford, UK.* We report the fabrication of 3D chiral photonic crystals in a face-centred cubic lattice (cube side 566 nm) by holographic lithography. Left- and right-handed structures have been characterised by scanning electron microscopy and optical transmission measurements.	**LThK4 · 17:30** ***Collisional effects after selective laser excitation of polyatomic molecules,*** G.A.Zalesskaya, D.L.Yakovlev, E.G.Sambor, Inst. of Molec. and Atomic Physics, Belarus. The dependences of vibrational energy transfer efficiencies on the properties of excited molecules and bath gases as well as on vibrational energy and temperature have been studied using multistep laser excitation of complex molecules.			
QThK4 · 17:45 **2D photonic crystals for semiconductor devices,** A.Forchel, *Univ. Wuerzburg, Germany.*	**LThK5 · 17:45** ***AVLIS of neodymium,*** I.S.Grigoriev, A.B. Diachkov, S.K.Kovalevich, V.P.Labosin, S.M.Mironov, S.A.Nikulin, A.V.Pesnia, V.A.Firsov, G.G.Shatalova, G.O.Tsvetkov, *RRC "Kurchatov Inst.", Russia.* A new step of neodymium AVLIS was carried out with a narrow band dye-laser on the first stage of a three step photoionization scheme. The enrichment of Nd-150 isotope in the separation installation achieved 67%.			

Conference Hall	Hall 1 LAT	Hall 2 IQEC	Hall 3 JOINT	Hall 4 LAT
	16:30–18:30 **LThI · Atmosphere—Continued**	**16:30–18:45** **QThI · Laser Control of Ultrafast Phenomena II—Continued**	**16:30–18:30** **QThJ · Quantum Information and Quantum Computing II—Continued**	**16:30–18:30** **LThJ · Laser Processing of Advanced Materials and Laser Microtechnologies VIII—Continued**
	LThI5 · 18:00 · INVITED ***Feasible lidar technologies for unmanned space platforms,*** G.G.Matvienko, *Inst. of Atmospheric Optics, Russia.* Lidar methods of atmospheric sensing from unmanned space platforms are analyzed. Technologies most suitable for determining the profiles of parameters of aerosol formations and some gaseous constituents are selected; they are elastic multifrequency backscattering for aerosols and resonance absorption for gases.	**QThI7 · 18:00** ***Ultrashort light pulses characterization in wide spectral range by method of two-photon absorption cross-correlation in neutral diamond,*** S.V.Gagarsky, *Inst. of Fine Mech. and Opt., Russia,* H.A.Iglev, E.W.Schlag, *Techn. Univ. of München, Germany.* The results are presented for the temporal structure characterization of femtosecond pulses in a spectral range from 230 nm to infrared in the same crystal of neurtal diamond. This technique based on two-photon absorption cross-correlation measurements enhanced with a spatial filtration procedure.	**QThJ6 · 18:00** ***Efficient classical simulation of continuous variable quantum information processes,*** S.D.Bartlett, B.C.Sanders, *Macquarie Univ., Australia,* S.L.Braunstein, K.Nemoto, *Bangor Univ., UK.* We present sufficient conditions for the efficient simulation of a continuous- variable quantum information process on a classical computer. Transformations conditioned on measurements of photon number can go beyond the constraints of this theorem.	**LThJ4 · 18:00 · INVITED** ***Laser assisted and hybrid deposition process for nanocomposite material synthesis,*** A.A.Voevodin, J.S.Zabinski, *MLBT, Air Force Res. Lab., USA.* Recent advances in hybrid technologies combining pulsed laser ablation, magnetron sputtering, and ion beam for production of nanocomposite and nanostructured materials are reviewed. Examples of process developments and nanostructured material synthesis are provided.
		QThI8 · 18:15 ***Axial spatial selectivity control of excitation and photoconversion of quantum systems in crystals under femtosecond light pulses,*** E.F.Martynovich, *Inst. of Laser Phys., Russia.* The capabilities of control of spatial selectivity of femtosecond laser pulses action on crystalline mediums with the help of effects of a induced anisotropy, change of a ratio of quantum systems concentrations in separate orientation groups, application of coherent pairs of exciting counter and overtaking one another pulses and other means was studied.	**QThJ7 · 18:15** ***Quantum entanglement and the two-photon Stokes parameters,*** A.F.Abouraddy, A.V.Sergienko, B.E.A.Saleh, M.C.Teich, *Boston Univ., USA.* A formalism for two-photon Stokes parameters is introduced to describe the polarization entanglement of photon pairs. This leads to the definition of a degree of two-photon polarization.	

18:30–20:00 IQEC/LAT POSTER SESSIONS IV

Hall 5 IQEC	Hall 6 LAT			
16:30–18:30 **QThK · Special Symposium on Photonic Crystals IV—Continued**	**16:30–18:30** **LThK · Laser Technologies for Isotope Separation and Selective Photochemistry II—Continued**			
QThK5 · 18:00 ***Stimulated Raman scattering of femtosecond pulses,*** R.G.Zaporozhchenko, S.Ya.Kilin, *Stepanov Inst. of Phys., Belarus.* The result of numerical calculations of stimulated Raman scattering of femtosecond pulses in one-dimensional photonic crystal consisting of fused silica and Nd:KGW alternating layers are presented. The analysis shows that efficient SRS conversion of pump can be obtained.	**LThK6 · 18:00** ***Photochemical isotope separation of Zn and Rb atoms under one-photon excitation,*** P.A.Bokhan, D.E.Zakrevskii, N.V. Fateev, *Inst. of Semicond. Phys., Russia.* It has been experimentally realized the laser isotope separation of Zn and Rb in the flow of atoms with inert gas and reagent–gas, using chemical reactions of one-photon excitation.			
QThK6 · 18:15 ***Optical bistability using interface conductivity on one-dimensional photonic crystals,*** K.Mehrany, B.Rashidian, *Sharif Univ. of Techn., Iran,* S.Khorasani, *Georgia Inst. of Technology, USA.* Layered waveguide structures with conducting interfaces have been discussed recently. Here, surface wave excitation at the presence of interface conductivity on one-dimensional photonic crystals has been used and a novel bistable optical device is proposed.	**LThK7 · 18:15** ***Stabilized single mode dye laser,*** I.S.Grigoriev, A.B.Dyachkov, V.A.Kuznetzov, V.P.Labozin, V.A.Firsov, *RRC "Kurchatov Inst.", Russia.* Stabilized single mode dye laser (DL) pumped with copper vapor laser (CVL) has been developed. Maximum conversion efficiency is 32% for single mode operation regime and nearly diffraction divergence of DL generation. DL linewidth is 100-150 MHz, amplified spontaneous emission (ASE) not higher than 0.2%. Wavelength stability ±50 MHz.			

18:30–20:00 IQEC/LAT POSTER SESSIONS IV

LThL · Laser Technologies for Environmental Monitoring and Ecological Applications

LThL1
Absorption of CO_2 laser emission by freon-12, Sh.Al-Hawat, M.D.Zidan, S.Saloum, *Atomic Energy Commission, Syria.* Infrared absorption spectra of CF_2Cl_2 were obtained using a tunable CW CO_2 Laser, with an outside cell at different pressures. The spectra show that CF_2Cl_2 absorbs CO_2 laser radiation, mainly in the ranges of 1073–1083 cm^{-1}, and 937–943 cm^{-1}, and the strongest absorption is at the line 10P(28).

LThL2
Laser-induced incandescence characterisation of gas turbine exhausts, J.D.Black, *Rolls-Royce plc, UK,* M.Hilton, M.P.Johnson, D.Waterman, *Univ. of Reading, UK.* Laser-Induced Incandescence studies of graphite aerosols and gas turbine exhausts show that, besides particle volume fraction, information on particle size, chemical composition, and physical and chemical properties of the exhaust gas is obtainable *in-situ*.

LThL3
Improved detectability of wavelength modulation diode laser absorption spectroscopy applied to window-equipped graphite furnances by 4th and 6th harmonic detection, J.Gustafsson, O.Axner, *Umeå Univ., Sweden,* N.Chekalin, *Vernadsky Inst. of Geochem. and Analytical Chem., Russia.* Wavelength Modulation-Diode Laser Absorption Spectrometry (WM-DLAS) is limited by background signals originating from multiple reflections in optical components. This work investigates the dependence of the detectability of the WM-DLAS on the order of the harmonic detected and shows that it is better to detect the 4th or the 6th harmonic than the 2nd when the background signal is dominated by multiple reflections.

LThL4
Spectral dynamics of a multimode Co:MgF_2 laser with intracavity absorption, M.P.Frolov, S.D.Khan-Magometova, V.S.Pazyuk, Yu.P.Podmar'kov, N.A.Raspopov, *Lebedev Physical Inst., Russia,* V.M.Baev, *Inst. für Laser-Physik, Germany.* Spectral dynamics of a cw Co:MgF_2 laser with intracavity absorption is recorded in the spectral range around 2 μm. Sensitivity to intracavity absorption corresponds to the absorption path length of 1200 km. New absorption lines of methane are detected.

LThL5
Effect of light pressure and elastic deformation of a dispersion medium under the action of a laser pulse, A.B.Gavrilovich, *Stepanov Inst. of Phys., Belarus.* An approximate analytical solution of the transfer equation describing the space-time distribution of the light pressure and elastic deformation of a dispersion medium of limited volume under the action of a laser pulse has been found. The solution is presented in the form of a limited series in terms of orthogonal functions on the basis of the system of g-polynomials derived with the use of the group theory.

LThL6
Principles of creation of "calibration-free" laser systems of environmental diagnostics, M.M.Kugeiko, A.V.Barkova, *Belarussian State Univ., Belarus.* Principles of creation of "calibration-free" laser systems of environmental diagnostics are considered which eliminate as much as possible methodical errors caused by instabilities in optical and electronic tracts of measuring system and along the route of sensing.

LThL7
Above-room-temperature mid-infrared (?=4.13 μm) optically pumped IV-VI lead-salt quantum well vertical-cavity surface-emitting laser, Z.Shi, F.Zhao, L.Jayasinghe, H.Wu, *Univ. of Oklahoma, USA.* We report the above-room-temperature pulsed operation of an optically pumped ? = 4.13 μm IV–VI lead-salt QW vertical-cavity surface-emitting laser. The lasing threshold was 200 kW/cm^2 and the maximum peak output power was 40 mW at 300 K.

LThL8
Determination of the sea water cases by laser induced fluorescense method, G.V.Skorokhod, V.A.Khovanets, *Nevelskoy's Marine State Univ., Russia,* O.A.Bukin, M.S.Permyakov, A.U.Mayor, *Pacific Oceanological Inst., Russia.* The features of the sea water laser induced fluorescence spectra were used to classification of the sea water cases. The correlation of the dissolved organic matter fluorescence and chlorophyll A fluorescence spectra was investigated. The analyzing spectra were obtained in scientific cruises around sea of Okhotsk during 2000–2001 years.

LThL9
Utilization of the optical chronograph for deep investigation of natural water reservoires, L.E.Arushanyan, V.G.Atanesyan, T.A.Gevorkyan, A.A.Nazaryan, A.A. Frangyan, A.A.Tsovyan, *"LT-PYRKAL" cjsc, Armenia.* The dependences of an image contrast and value of a signal, reflected from objects, on depth arrangements of objects, their reflection coefficient, angular sizes are obtained. The satisfactory consent with theoretical calculations is obtained.

LThL10
Manifestation of inhomogeneous broadening in laser-induced fluorescence spectra for natural organic fluorophores, V.Yuzhakov, S.Patsayeva, *Moscow State Univ., Russia,* R.Reuter, *Univ. of Oldenburg, Germany,* M.Lamotte, *Univ. of Bordeaux, France,* V.Varlamov, *Tallinn Pedagogical Univ., Estonia.* Changes in emission band-shape for some organic substances of natural origin were measured under conditions of laser-induced fluorescence saturation (excitation at 266 and 355 nm), and interpreted as manifestation of inhomogeneous broadening of the emission band.

LThL11
The application problems of high power IR radiation in a water matter under high pressure, B.A.Kuzyakov, Yu.V.Sorokin, *"SPA ASTROPHYSIKA", Russia.* The effects of laser damage in liquid and velocity and pressure dependences on the shock wave fronts are under an analysis in this paper. It is shown, that the correct estimations of the light deflagration values are possible for clean water under pressure up to 400 kg/cm^2.

LThL12
Using of laser radar for measurement of water turbidity, V.Shamanaev, G.Kokhanenko, I.Penner, *Inst. of Atmospheric Optics, Russia.* The aicraft laboratory with the multipurpose Makrel-2 lidar onboard flew above Lake Baikal as well as above the Atlantic Ocean. The mean extinction index of the upper (15–25 m) water layer was measured and spatial power spectra of the extinction index were estimated. Polarization properties of laser radar signals were used for more correct interpretation.

LThL13
Underwater irradiance fluctuations of a laser beam after transmission through a wavy sea surface, M.Tulldahl, *Swedish Defence Res. Agency, Sweden.* A submerged screen, filmed by an underwater video camera, is used to measure the downward horizontal irradiance in calm winds. The purpose is to obtain data for validation of propagation models applicable to laser sensing.

LThL14
Optical coherence tomography for visualization of plant tissues, V.V.Sapozhnikova, V.A.Kamensky, R.V.Kuranov, *Inst. of Appl. Physics, Russia.* In this paper we show the feasibility of Optical Coherence Tomography for visualization of internal structure of plants. The noninvasive OCT technique allows fast, intact acquisition of information on the internal structure of plant tissue.

LThL15
Enhancement of range resolution to 0.01 of LIDAR pulse length, S.Pershin, *General Phys. Inst., Russia,* A.Lyash, V.Makarov, *Space Res. Inst., Russia.* The 0.2-meter range resolution of diode micro-Joule lidar was achieved by calculation a gravity center of its pulse return (long 150 ns/25m). It has been realized using low time resolution (33 ns/5m) and only digital electronic circuits in lidar hardware.

LThL16
Distorted noisy interference fringes enhancement and evaluation by the nonlinear locally-adaptive method, M.Volkov, *Inst. of Fine Mechanics and Optics, Russia.* Noise-immune method of automatical enhancing, analysis, fringe extreme lines location and phase retrieval of single interference fringe pattern is presented. This method was successfully used for processing of distorted complicated fringe patterns.

LThL17
Using the artificial neural networks in laser diagnostics of sea medium, S.A.Dolenko, T.A.Dolenko, V.V.Fadeev, I.V.Gerdova, D.V.Maslov, *Moscow State Univ., Russia.* The report presents the results of solving inverse problems in laser diagnostics of sea medium for identification and measuring parameters of oil pollution, aquatic humic substance, and phytoplankton, using artificial neural networks.

LThL18
Laser monitoring of environment in conditions of a priori uncertainty, M.M.Kugeiko, D.M.Onoshko, *Belarussian State Univ., Belarus.* The method of determination of aerosol contamination in inhomogeneous scattering media in conditions of minimum use of a priori information about investigated object is considered. The method doesn't require additional independent measurements to obtain calibration values of determined characteristics.

LThL19
A clearing channel in a condensation trail in the frame of a turbulence model with one differential equation, A.N.Kucherov, *Central Aerohydrodynamic Inst., Russia.* The nonlinear process of clearing channel creation by a laser beam in a condensation trail (contrail) behind large civil aircraft (airbus) is investigated by using a single - parameter (one differential equation) turbulence model of the exhaust jet. An analytical description of contrail parameters are proposed and numerical calculations of the clearing channel parameters are made.

LThL20
Detection capabilities of different molecular lasers in infrared spectroscopic diagnostics of multicomponent gas mixtures, S.V.Ivanov, *IPLIT, Russia,* A.A.Ionin, A.A.Kotkov, A.Yu.Kozlov, L.V.Seleznev, *Lebedev Physical Inst., Russia,* O.G.Buzykin, *Central Aerohydrodynamic Inst., Russia.* The capabilities of different gas lasers (CO_2, HF, DF, NH_3, N_2O, CO) in infrared absorption diagnostics of multicomponent mixtures are evaluated and compared. CO laser has been shown to have the best potentialities in spectroscopic gas detection.

LThL21
Two-frequency solid-state radiation source for laser sounding of ozone in the troposphere, V.V.Ermolenkov, V.A.Lisinetskii, I.I.Mishkel', A.S.Grabtchikov, A.P.Chaikovski, V.A.Orlovich, *Stepanov Inst. of Phys., Belarus.* Laser source consisted of nanosecond Nd:YAG-laser and barium nitrate Raman laser with harmonic generators, provided the radiation at wavelengths of 281.5 and 355 nm available for ozone sounding in the troposphere is presented.

QThL · Ultrafast Phenomena

QThL1
Tight control of the carrier phase slip of 10 fs light pulses, W.Hogervorst, K.S.E. Eikema, *Vrije Univ., The Netherlands.* The carrier phase slip of a 10 fs Ti:Sapphire laser system is controlled by a nonlinear

interferometer at 480 nm. The phase locking techniques and sources of phase noise in the system will be discussed.

QThL2
Accumulative effects in coherent control with trains of ulthort pulses, D.Felinto, C.A.C.Bosco, L.H.Acioli, S.S.Vianna, *Universidade Federal de Pernambuco, Brazil.* We present a theory for the coherent control of three-level systems when the laser repetition period is smaller than the relaxation times of the medium. The results are compared to experiments in rubidium vapors.

QThL3
Nonlinear femtosecond optics of microparticles, A.A.Zemlyanov, Yu.E. Geints, *Inst. of Atmospheric Optics, Russia.* The problem on diffraction of a femtosecond pulse on spherical particles is numerically investigated. The existence of multimode excitation of WGM's is established. The opportunity of SRS and THG in a microparticles under femtosecond pumping is estimated.

QThL4
Extremely short electromagnetic pulse propagation in resonant medium with account of the permanent dipole effect, A.I.Maimistov, *Moscow Engin. Phys. Inst., Russia,* J.-G.Caputo, *INSA de Rouen, France.* It was considered the extremely short pulse of the electromagnetic wave propagation into resonant medium consisted of molecules that characterized by operator of the dipole transition between resonant energy levels that has both a non-diagonal and diagonal matrix elements. New kind of the steady state one-half cycle pulses were found.

QThL5
High efficiency second harmonic generation of femtosecond pulse. Possibility of cascade harmonic generation, V.A.Trofimov, T.M.Lysak, *Moscow State Univ., Russia.* The report is devoted to the problem of second harmonics generation (quadratic non-linearity) of femtosecond laser pulses under the condition of laser radiation self-action (cubic non-linearity). As it is known, a high effective femtosecond SHG is absent at the present time in physical experiment. The main reason of this situation concludes in an affection of self-action of laser pulse on the SHG process. We shown that there is possibility to achieve 60%–80% efficiency of generation.

QThL6
Femtosecond spectroscopy of a quasicrystaline order in molecular liquids, B.Ratajska-Gadomska, W.Gadomski, *Univ. of Warsaw, Poland.* We present the theoretical calculations of the temperature dependence of low-frequency spectra of liquid benzene detected in the femtosecond Optical Kerr Effect. The spectra are due to short-range quasicrystalline clusters existing in a liquid instantaneously.

QThL7
Femtosecond optical Kerr effect studies of the nonlinear responses of liquids, D.M.Dunaev, V.S.Lobkov, S.A.Moiseev, V.G.Nikiforov, *Zavoiski Phys.-Tech. Inst., Russia.* The time-resolved optical Kerr responses in a number of liquids have been obtained. Quantum chemistry methods have been used to theoretically calculate the molecular polarizability for the interpretation of the experimental data.

QThL8
Local heating effects on pump-probe spectra of pseudoisocyanine J-aggregates, E.Gaizauskas, *Vilnius Univ., Lithuania,* K.-H.Feller, *Univ. of Appl. Sci. Jena, Germany.* Intensity-dependent transmission spectra of the J-aggregate are discussed, taking into account exciton-exciton annihilation and subsequent energy degradation processes. Spectral shifts arising from additional disordering of the J-aggregate are predicted.

QThL9
Single-photon femtosecond spectroscopy of weak electron-vibrational transitions in diatomic molecules, S.A.Moiseev, M.I.Noskov, *Zavoisky Phys.-Tech. Inst., Russia,* R.M.Aminova, *Kazan State Univ., Russia.* Interaction of an ensemble of diatomic molecules with ultraweak light fields has been theoretically considered. A novel pump-probe femtosecond spectroscopy technique for detection of weak dipole moments of optical electron-vibrational transitions in such media has been proposed.

QThL10
Excited states dynamics in self-assembled nanoscale multiporphyrin biomimetic models, E.I.Zenkevich, A.M. Shulga, *Inst. of Molec. and Atomic Phys., Belarus,* C.von Borczyskowski, *Univ. of Technology Chemnitz, Germany.* Pathways and mechanisms of charge and energy transfer (within 600 fs—1240 ps) were elucidated by time-resolved fluorescence ($\Delta_{1/2}$≈30 ps) and pump-probe ($\Delta_{1/2}$≈280 fs) spectroscopy for structurally organized porphyrin triads with/without electron acceptors in solutions of various polarity at 77-295 K.

QThL11
Ultrafast photoinduced electron transfer via triplet states in Pd-porphyrin-NO_2 diads, E.I.Zenkevich, E.I.Sagun, V.N.Knyukshto, A.M.Shulga, *Inst. of Molec. and Atomic Phys., Belarus.* Nanosecond-picosecond pump-probe data reveal that the "through-space" non-adiabatic photoinduced electron transfer from T_1-state (14815cm^{-1}) to low-lying CT-state (14195cm^{-1}) in sterically hindered Pd-ortonitro-mesophenyl-octaethylporphyrin with the electron-accepting nitrogroup occurs within 60-70ps in liquid dimethylformamide at 295 K.

QThL12
Ultrafast control of quantum systems, P.A.Golovinski, V.M.Nazaroff, P.V.Ryasnoy, *Voronezh State Univ. of Architecture and Constr., Russia.* The concept of ultrafast optimal control based on Schrödinger equation is developed for quantum systems. General properties of optimal dynamics are illustrated by computer simulation for two-level system and Morse potential. A number of maximums for transition probability are realized for different contributions of laser pulse parameters.

QThL13
Multiphoton absorption at interelectronic collisions, V.N.Strekalov, *"STANKIN", Russia.* The effective mass of a quasielectron in a conduction band differs from the effective mass of a valency band electron. For this reason the collision of electrons can be accompanied by multiphoton absorption. It is one of superfast electronic processes. Its probability is found.

QThL14
Kinetics and dynamics of surface photothermal, surface photophysical and bulk photothermal ablation of polimer-like materials by ultra-short laser pulses, A.Yu.Malyshev, N.M.Bityurin, *Inst. of Appl. Phys., Russia.* Three developed models of USLP laser ablation of highly absorbing polymers are discussed. Relevance of each of models can be checked using combination of two-pulse ablation kinetic curve and pump-probe measuring the start time of ablation.

QThL15
New nonlinear mechanism of generation of terahertz radiation, P.I.Khadzhi, L.V.Arapan, *Inst. of Appl. Phys., Moldova.* New mechanism of terahertz radiation generation (amplification) based on the use of quantum transitions between two-exciton and biexciton states in semiconductors is proposed. The intensity of terahertz radiation increases exponentionally depending on the squared pump intensity, when pump pulse generates the excitons from ground stste of crystal.

QThL16
Terahertz autocorrelation function of a femtosecond laser pulse, A.S.Nikoghosyan, E.M.Laziev, R.M.Martirosyan, Yerevan State Univ., Armenia, A.A.Hakhoumian, *Inst. of Radiophys. & Electronics, Armenia,* N.N.Zinov'ev, J.M.Chamberlian, *Univ. of Leeds, UK.* A technique to measure the autocorrelation function of the intensity of ultrashort laser pulse is proposed. To determine the duration of ulthort light pulse, generation of the difference frequency in the THz range may be more convenient in those cases when no transparent nonlinear crystal is available at the fundamental frequency or at the frequencies of higher harmonics of IR and visible lasers, or when the phase-matching conditions are poorly met and highly sensitive fast-response apparatus is needed.

QThL17
Frequency modulated femtosecond laser pulse reflection from multilayer mirror, A.O.Vardanyan, *"LT-PYRKAL" cjsc, Armenia.* Results of numerical modeling of frequency modulated femtosecond laser pulse reflection from multilayer mirror are presented.

QThL18
Two-pulse transmission and reflection pecularities of thin semiconductor films, P.I.Khadzhi, A.V.Corovai, *Dniester State Univ., Moldova.* Pecularities of the nonlinear nonstationary transmission and reflection of two supershort laser pulses by a thin semiconductor film due to the processes of exciton-biexciton conversion, depending on intensities, envelope shapes, width and time delay are investigated.

QThL19
A new type of soliton, R.Avagyan, A.Daryan, E.Divanyan, A.Harutyunyan, D.Hovhannisyan, *Epygi Labs AM LLC, Armenia.* Analytically solving the modified Kortevegde-Vriez equation yields a new type of soliton whose pulse intensity is inversely proportional to the initial pulse duration $\tau_0^{3/2}$, and whose reconstruction period is proportional to the soliton duration τ_s^3.

QThL20
Ultrafast polarized pulse evolution, E.G. Kanetsyan, *"LT-PYRKAL" cjsc, Armenia.* The evolution of pulse circular components envelope at propagation of elliptically polarized pulse through two-level resonance medium with arbitrary angular momentum is considered in the adiabatic following approximation. Amplification and duration shortening of weak component occur.

QThL21
Transient spectral shift accompanying ulthort pulse formation under the active mode locking, V.A.Zaporozhchenko, *Stepanov Inst. of Phys., Belarus.* Time-resolved measurements of autocorrelation function and spectrum of the actively mode-locked YAG:Nd laser have shown that the laser pulse shortening down to steady-state 62 ps duration is accompanied by 0.83 cm^{-1} red shift of laser spectrum.

QThM · Quantum Information and Quantum Computing

QThM1
Teleportation by a quantum channel of the W–class, V.N.Gorbachev, A.I.Trubilko, A.A.Rodichkina, *St-Petersburg State Univ. of Tehnology and Design, Russia.* Considering teleportation, based on the GHZ quantum channel, we find protocols in which the states of the W-class are used instead of the GHZ. It results in the nonlocal operators, which recover unknown state.

QThM2
Quantum entangle generated by OTDR for single photon use in quantum information study, S.Suchat, P.P.Yupapin, *King Mongkut's Inst. of Techn. Ladkrabang, Thailand.* A short pulse is generated using Optical Time Domain Reflectometer (OTDR), the output linearly polarized light is controlled and obtained before entering into the Mach-Zehnder interferometer. The single photon measurement is arranged for the use either in quantum information or measurement.

LThM · Optical Information, Data Processing and Storage, and Laser Communication Technologies

LThM1
$\chi^{(2)}$-Holographic instantaneous image formation using multifrequency object and reference beams, Y.N.Denisyuk, *Ioffe Phys.-Tech. Inst., Russia,* E.V.Miloglyadov, V.N.Sizov, D.I.Staselko, *Vavilov State Optical Inst., Russia.* Some new results of experimental study of multifrequency nonlinear dynamic hologram image formation are presented. These results are in a good agreement with previous theoretical and experimental data. This approach can be applied to the problem of ultrafast optical channels switching.

LThM2
The design and implementation of iSCSI technology in volume holographic storage system, Wu Ming, Xie Chang Sheng, *Huazhong Univ. of Sci. & Technology, China.* iSCSI builds on SCSI command for storage and TCP/IP protocols for networking. As a new storage technology, VHS has advantage of huge capacity and fast data transfer rate. This paper presents a detailed design, based on Intel's network processor and embedded Linux OS, to fulfill embedded VHS system, which unites iSCSI and VHS technology.

LThM3
770 Holographic protective elements: synthesis and analysis, L.V.Tanin, *"Holography industry", Belarus,* V.K.Erokhovets, *Inst. of Engin. Cybernetics, Belarus.* The report covers methods of analogue and computer synthesis of holographic protective elements. Diffraction model of latent image hologram is represented, estimation constructive theory of geometric and energetic parameters of holographic identificators is worked out.

LThM4
Photoreversible holographic recording in azo dye containing polymer films, D.V.Uraev, A.N.Simonov, V.I.Shmalgausen, V.P.Shibaev, *Moscow State Univ., Russia.* We present results of theoretical and experimental investigations of optical recording in the films of azo dye containing polymer with amorphous and LC properties. Polarization controlled recording of holograms has been demonstrated experimentally.

LThM5
28 Cyclic shifting: a two-dimentional interleaver for volume holographic memory, Li Wei, Xie Chang Sheng, Pei Xian Deng, *Huazhong Univ. of Sci. & Technology, China.* Cyclic shifting has been proposed as an efficient 2-D interleaving technique for volume holographic memory to spread cluster errors with circularly symmetric pattern. This technique is simple, and can reduce the complexity of error-correcting code with minimal cost.

LThM6
Radiated monopulse shaping of second harmonics with a reproductible spectrum in Nd:YAG laser for holography and time elapsed hologram interferometry, A.A.Kovalev, S.N.Zdanovich, *Inst. of Electronics, Belarus.* A stabilization method for the radiated monopulse spectrum of a Nd:YAG laser has been developed to use in holographic systems. The stabilization of the monopulse spectrum has been secured by using the seed radiation of quasi-steady lasing.

LThM7
Optical planar multiplexers/demultiplexers based on y-nodes in array of bistable pixels, A.M.Goncharenko, G.V.Sinitsyn, A.V.Lyakhnovich, S.P.Apanasevich, *Div. for Optical Problems in Inform. Technologies, Belarus.* Algorithms of designing planar shift optical arrays of hexagonal topology on the basis of 4-pixel switching Y-nodes are considered. Y-node of micrometer size is realized experimentally with the use of optically bistable vacuum deposited ZnS interferometer.

LThM8
Ultimate rate densities in optical transmission of information, M.A.Khodasevich, G.V.Sinitsyn, A.S.Yasukevich, *Div. for Optical Problems in Inform. Technologies, Belarus.* Ultimate values of information-rate densities of optical communication channels are investigated. It is shown that the quantum description should be applied for channels with bandwidths that are greater than 1 THz.

LThM9
Optimum wavelet-based encoding method for laser communications, M.A.Khodasevich, G.V.Sinitsyn, A.S.Yasukevich, *Div. for Optical Problems in Inform. Technologies, Belarus.* We investigate application of wavelets with ultimate time-frequency resolution for laser communications. The optimum encoding method for reaching the maximum rate of information transmission is shown to be based on WAVE-wavelets.

LThM10
Transverse localized structures in optical cavities, M.Tlidi, *Univ. Libre de Bruxelles, Belgium,* A.G.Vladimirov, *St. Petersburg State Univ., Russia.* We study analytically stability and interactions of localized structures in the transverse section of bistable passive optical device. We also present the results of relative stability analysis of localized solutions and spatially periodic solutions that arise above the modulational instability point.

LThM11
Statistical evaluation of performance of optical transmission systems with strong bit overlapping, E.G.Shapiro, *Inst. of Automation and Electrometry, Russia,* M.P.Fedoruk, *Inst. of Comput. Technologies, Russia,* S.K.Turitsyn, *Aston Univ., UK.* We present guidelines for statistical numerical evaluation of bit error rates in optical transmission systems with strong patterning effects. As an example, we apply developed method to a specific dispersion-managed WDM (40 Gb/s per channel) system using transmission with large bit overlapping.

LThM12
Dispersion-managed soliton for path-averaged model of optical fiber communication line, S.B.Medvedev, M.P.Fedoruk, *Inst. of Comput. Technologies, Russia,* O.V.Shtyrina, *Novosibirsk State Univ., Russia,* S.L.Musher, *Federation of Internet Education, Russia.* A path-averaged Gabitov-Turitsyn model governing optical signal propagation down the dispersion-managed (DM) transmission line is studied numerically. A fast numerical algorithm to find a soliton solution for an arbitrary periodic DM system is proposed. Applying developed technique we present soliton solutions for few important practical systems.

LThM13
Theoretical analysis of parameters mismatch influence on deciphering error in nonlinear optical cryptosystem, I.Izmailov, B.Poizner, *Tomsk State Univ., Russia.* Mismatches contributions of physical factors to deciphering error in cryptosystem are investigated analytically and numerically. Obtained expressions for amplitude and phase of the error allow to estimate power of keys set as a quality criterion.

LThM14
On the construction of a laser communication line «space-Earth», A.A.Golubenkov, Yu.D.Kolomnikov, B.V.Poller, Yu.I.Shchetinin, *Inst. of Laser Phys., Russia.* The structure of a laser communication line with multiwave transceivers scattered in space is investigated.

LThM15
The ultra-violet telecommunications with dispersion in the atmosphere, A.V.Britvin, B.V.Fyodorov, A.A.Golubenkov, S.I.Konyaev, B.V.Poller, K.S.Prokudin, *Inst. of Laser Phys., Russia.* To create ultraviolet telecommunications, various sources and receivers of UV radiation, the characteristics of the background and attenuation have been carried out. Experiments on the transfer of information through various traces were investigated.

LThM16
The principle of collection optical information from fiber-optical measuring network using 1-wire network standard, I.V.Denisov, V.A.Sedov, V.V. Vorobyev, A.V.Artemyev, R.S.Drozdov, *Far Eastern State Maritime Academy, Russia.* The principle of collection optical information from the fiber-optical measuring network, using 1-Wire network standard, is submitted. In the basis of the implemented method lays the principle of functioning 1-Wire network standard. The represented device is terminated function set, intended for collect optical information from 4 fiber-optical measuring line (FOML), convert optical information into digital signals and delivery digital information about intensity of laser radiation into FOML. The device has a very small amount of elements, that considerably makes more cheaply practical realization of such blocks, has a small overall dimensions and good operating performances.

LThM17
Some interference effects of ultrashort laser pulses in optical fiber, V.P.Minkovich, *Centro de Investigaciones en Optica, A.C., Mexico,* V.I.Lebedev, S.N. Perepechko, *Mogilev State Univ., Belarus.* New linear effects for the coherent ultrashort laser pulse trains are considered. The processes of envelope compression for two pulses and regular and irregular multiplying a number of pulses due to temporal interference are predicted.

LThM18
The application of WDM systems on installed optical lines, V.A.Andreev, M.V.Dashkov, *Volga State Academy of Telecommun. and Informatics, Russia.* The application of wavelength division multiplexing on installed fiber optical lines is considered. The estimation of nonlinear effects influence on system performance for standard single mode fiber line with different dispersion compensation schemes is carried out. The dependence of crosstalk values from transmission parameters.

LThM19
Contrast ratio of polymer dispersed ferroelectric liquid crystal film: interference quenching effect implementation, V.A.Loiko, A.V.Konkolovich, *Stepanov Inst. of Phys., Belarus,* S.Kumar, *Kent State Univ., USA.* Surface droplets of a ferroelectric liquid crystal film represents a monolayer polymer dispersed liquid crystal film. One of the main advantages of these films is a high-speed operation. Coherent and incoherent transmittance coefficients of surface droplets of a ferroelectric liquid crystal film were investigated.

LThM20
Resolution improvement of surface photorelief recording, U.V.Mahilny, Yu.V.Gritsai, A.I.Stankevich, A.L.Tolstik, *Belarusian State Univ., Belarus,* L.Wenke, *Friedrich-Schiller-Univ. Jena, Germany.* Approaches to the resolution raising up of the direct surface photorelief recording are considered. Experimental implementations of the approaches are given. The possibility of relief grating formation with the resolution about 1500 lines/mm is demonstrated.

LThM21
Self-formation of temporal dark soliton in the spectral compressor, T.G.Mansuryan, A.A.Kutuzyan, L.Kh.Mouradian, *Yerevan State Univ., Armenia.* The amplitude-phase mask placed in the dispersive delay line of spectral compressor serves as a generator of dark soliton. Spectral evolutions of generated dark soliton contain enough information about soliton character of the pulse.

LThM22
Reduction of timing jitter in the optoelectronic recirculation memory device, S.I.Chubarov, A.V.Poliakov, *Belarussian State Univ., Belarus.* The two different methods of a digital information sequence registration by the threshold device and application small synchronizing signal in the semiconductor laser for timing jitter reduction in the optoelectronic reciculation memory were analyzed. These threshold method and constant part of pulse method for the "return to zero" and "not return to zero" encoding formats were compared.

LThM23
Negative imaging by an opaque screen, A.A.Arkhelyuk, P.V.Polyanskii, *Chernivtsi Natl Univ., Ukraine.* Geometric-optical model of negative imaging of an extended polychromatic radiation source by an opaque screen is formulated. Digital post-processing of an optically obtained nega-

tive image, which provides image improving, is discussed and demonstrated.

LThM24
Higher-order associative memory using nonlinear holograms, Ch.V.Fel'de, P.V. Polyanskii, *Chernivtsi Natl Univ., Ukraine.* Original approach to implement error-correcting associative memory using static quadric (sec-ond-order) hologram is extended for the first time to the holograms of arbitrary orders. The structure of the higher-order associative responses is determined.

LThM25
Dispersive correlators for real time recognition of radiating objects, A.A. Markilov, V.G.Rodin, S.N.Starikov, *Moscow Engin, Phys. Inst., Russia*. The analysis of process of recognition signal formation in dispersive correlators was performed. In such correlators the light recognition signals are formed by radiation of analyzing object at its dispersion interaction with spatial filter-memory. The experimental results on objects recognition on their spatial and spectral characteristics in real time are reported.

LThM26
Fast method for parallel detecting optical signals based on the photonic echo and mathematical possibilities of simulation, P.E.Sterian, C.I.Toma, *Politehnica Univ., Romania.* This study presents a method for detecting optical signals based on the photonic echo; such a signal is generated only when the received signal possess certain properties. Simulations possibilities are also presented.

LThM27
Antiphase dynamics of unidirectionally selectively coupled multimode semiconductor lasers, I.V.Koryukin, *Inst. of Appl. Phys., Russia,* P.Mandel, *Univ. Libre de Bruxelles, Belgium.* We analyze synchronization of the chaotic antiphase dynamics in unidirectionally selectively coupled multimode semiconductor lasers. It is shown that only coupled modes are individually synchronized and the antiphase state of receiver laser does not coincide with the antiphase state of transmitter laser.

LThM28
Relative intensity noise for mode-locked lasers, N.Dogru, *Univ. of Gaziantep, Turkey*. The relative intensity noise (RIN) of strong external cavity lasers is analyzed by coupled-mode equations including spontaneous noise when it is mode-locked. Transform limited pulses are not generated because of noise. Linewidth enhancement factor, gain compression factor and spontaneous coupling factor are the most effective noise parameters and RIN increases with increasing these parameters.

QThN · Special Symposium on Photonic Crystals

QThN1
Multiwave mixing in thin 1D photonic crystals, V.A.Bushuev, B.I.Mantsyzov, E.V. Petrov, *Moscow State Univ., Russia.* We show theoretically that due to the noncollinear geometry of wave interaction in multilayer structure it is possible to optimize the processes of enhancement of sum-frequency generation and four-wave mixing realizing both exact quasi-phase-matching condition and non-phase matching enhancement simultaneously. An algorithm of the optimization is based on analytic expressions for the electric field energy in the structure.

QThN2
A photonic crystals model for computing the light propagation in densely packed biotissue, I.L.Maksimova, E.N. Didenko, *Saratov State Univ., Russia.* Some biological tissues, for example the optical tissues of eye – cornea and sclera, can be considered as natural photonic crystals. This paper deals with the problem of calculating the spatial and spectral characteristics of light scattered by such tissues. Effects of spatial correlations of optical fields are investigated.

QThN3
Enhanced second-harmonic generation of ultrashort pulses in one-dimensional coupled-cavity band gap structures, A.G.Smirnov, *Stepanov Inst. of Phys., Belarus.* The feasibility of simultaneous phase and group velocity matching at quadratic nonlinear interaction is tested for one-dimensional system of coupled defect microcavities. The effective second-harmonic generation seeded with ~100 fs light pulses is numerically proved.

QThN4
Peculiarities of laser beams transformation in magnetooptic structures, S.N. Kurilkina, M.V.Shuba, *Gomel State Univ., Belarus.* It has been studied peculiarities of laser beams transformation in multilayer magnetooptic structures as in the absence of impurity as in the presence of one. It has been grounded the opportunity of essential enhancement of Faraday effect with achievement of high transmission.

QThN5
Optical field in 1-D photonic crystals: quasi-normal-mode description, N.Mattiucci, S.Severini, C.Sibilia, G.D' Aguanno, M.Centini, M.Bertolotti, *Universitá di Roma "La Sapienza", Italy,* M.Scalora, M.Bloemer, C.M.Bowden, *U.S. Army Aviation and Missile Command, Res. Development and Engin. Center, USA.* The 1-D PC is treated as a particular configuration of an open cavity described by the quasinormal mode treatment. A discussion is presented on the complex eigenvalues, the corresponding field distribution and density of modes.

QThN6
Quasiperiodic fibonacci structures as a compressor of femtosecond laser pulses, L.N.Makarova, *Inst. of Molec. and Atomic Phys., Belarus,* A.V.Lavrinenko, S.V.Zhukovsky, *Belarusian State Univ., Belarus.* We have studied femtosecond light pulse compression in quasiperiodic non-symmetric and symmetric Fibonacci-like structures. The theoretical analysis has shown that non-symmetric Fibonacci structures are more promising for the compressor design than periodic stacks. One of such advantages is decrease of laser pulse compression length in quasiperiodic structure of the same size.

QThN7
Peculiarities of laser beams propagation in anisotropic layered periodic structures at the external electric field, S.N.Kurilkina, M.V.Shuba, *Gomel State Univ., Belarus.* It has been established that anisotropy of layers of periodic structure causes splitting photonic band gap, abrupt changes of transmitted (reflected) light polarization near boarders of "new" band gaps and the opportunity of creation of compact electro-controlled half-wave plates on the base of periodic structures.

QThN8
Formation of short optical pulses due to the non-stationary reflaction of electromagnetic waves from multilayer structures, A.V.Kozar', *Moscow State Univ., Russia.* Possibility of short optical pulses formation due to the non-stationary reflection of electromagnetic wave with variable amplitude from multilayer interference structures is demonstrated. Duration and amplitude of the formed short optical pulses from multilayer antireflection coating structures are analyzed versus parameters of the incident optical pulses.

QThN9
Coherent anti-Stokes Raman scattering of slow light in a hollow planar photonic band-gap waveguide, S.O.Konorov, D.A.Akimov, A.N.Naumov, A.B.Fedotov, A.M.Zheltikov, *Moscow State Univ., Russia,* R.B.Miles, *Princeton Univ., USA,* J.W.Haus, *Univ. of Daytone, USA.* Coherent anti-Stokes Raman scattering (CARS) by molecular nitrogen is enhanced in a hollow planar periodically corrugated waveguide. This CARS enhancement is shown to be, at least partially, due to the decrease in the group velocity of pump pulses around the photonic band gap.

LThN · Laser Technologies for Isotope Separation and Selective Photochemistry

LThN1
About use of Zeeman effect for increasing of selectivity of laser isotopes separation, A.N.Tkachev, S.I.Yakovlenko, *General Phys. Inst., Russia.* It is offered to use Zeeman effect for increasing of selectivity of the laser isotopes separation schemes. On the basics of available spectroscopic data it is shown, that the use of Zeeman effect allows one to increase essentially a selectivity of the laser separation scheme for 102 isotope.

LThN2
Improvement of the beam intensity cross-section distribution in poweful dye amplifier, V.I.Baraulya, S.M.Kobtsev, A.A.Pustovskikh, *Novosibirsk State Univ., Russia.* Demonstrated, that one-sided transversely pumping with cylindrical returning mirror scheme provides amplification in 1.17-1.42 times more in pump range 2-20 W with nearly Gaussian output beam than the traditional pumping schemes of the powerful dye amplifiers.

LThN3
Copper vapor laser with output power >150 W, I.S.Grigoriev, A.I.Grigoriev, A.P. Dorovsky, V.A.Kochetov, A.V.Matrakhov, N.I.Timofeev, V.A.Firsov, *RRC "Kurchatov Inst.", Russia.* Results of development of a copper vapor laser amplifier with output power >150 W are presented. Due to improvement of the device construction, technology and circuit design CVL efficiency factor was 1.9–2%, specific power gain was up to 50 mW/cm^3 while the laser discharge tube operated as an amplifier.

LThN4
Effective low-voltage electrostatic plasma ions extractors, I.I.Litvinov, *Altech, Itd., Russia.* The new law of similarity for electrostatic ions extractors is offered which explains an opportunity of their work in most important case of high initial concentrations at voltages in tens volts, instead of usual kilovolts.

KEY TO AUTHORS AND PRESIDERS