

Controlling Light with Light: Photorefractive Effects, Photosensitivity, Fiber Gratings, Photonic Materials and More (PR)

Topical Meeting

October 14 – 16, 2007

[Resort at Squaw Creek](#)

Olympic Valley, California, USA

[Postdeadline Paper Submission Deadline](#): September 27, 2007, 12:00 p.m. noon EDT (16.00 GMT)

[Hotel Reservation Deadline](#): September 14, 2007

[Pre-Registration Deadline](#): September 20, 2007

[NEW for 2007! Awards for Best Paper and Best Student Paper](#)

Due to increasing delays in securing visas to the US, we strongly encourage international attendees to begin this process as early as possible (but no later than three months before the meeting) to ensure timely processing. Please refer to the [Letters of Invitation](#) section of this website for additional information.



About Controlling Light with Light (PR)

October 14 – 16, 2007

Controlling Light with Light is an outgrowth of the traditional bi-annual meeting on Photorefractive Effects and Devices, which this year has been expanded to include Fiber Gratings and Photonic Materials.

The upcoming meeting in Squaw Valley, Lake Tahoe, California will provide a spectacular setting to hear the latest developments in non-linear optical materials and devices and also to celebrate 30 years of applications of the band-transport equations. Topics will range from light-induced Bragg gratings to photorefractive conjugators, acoustic flaw detectors to laser resonators and wavefront restoration to optical data storage.

Enjoy the clear mountain air and spectacular autumn scenery with old friends and rising stars while cruising around Lake Tahoe on a relaxing paddle steamer. Plan to attend Controlling Light with Light (PR) 2007!

Meeting Topics to Be Considered

Fundamentals of Photosensitivity

- Controlling light with light
- Light-media interactions
- Photosensitivity modeling and experiments
- Light-induced gratings
- Reducing the photorefractive effect

Photosensitive Media

- Photorefractive inorganic and organic media
- Photorefractive polymers
- Structured materials
- Light-sensitive glasses
- Crystal growth
- Media characterization
- Nonlinear light-induced effects

Applications

- Optical data storage
- Photorefractive sensors
- Phase conjugators
- Bragg gratings in fiber and waveguides
- Periodically poled media
- Novel devices and medical applications

Controlling Light with Light (PR) Program Committee

Lambertus Hesselink; *Stanford Univ., USA*, **Chair**
Jack Feinberg; *Univ. of Southern California, USA*, **Chair**

Dana Anderson; *Univ. of Colorado at Boulder, USA*.
Karsten Buse; *Rheinische Friedrich Wilhems Univ Bonn, Germany*.
Mark Cronin-Golomb; *Tufts Univ., USA*.
Cornelia Denz; *Univ Münster, Germany*.
Robert Eason; *Univ. of Southampton, UK*.
Martin M. Fejer; *Stanford Univ., USA*.
Ludwig Galambos; *Stanford Univ., USA*.
Peter Gunter; *Swiss Federal Inst. of Technology, Switzerland*.
Jean-Pierre Huignard; *Thales Res. and Technology, France*.
Marvin Klein; *Intelligent Optical Systems, USA*.
Denise M. Krol; *Univ. of California at Davis, USA*.
Nickolai V. Kukhtarev; *Alabama A&M Univ., USA*.
David D. Nolte; *Purdue Univ., USA*.
Serguey G. Odoulov; *Inst. of Physics, Ukraine*.
Gilles Pauliat; *Inst. d'Optique, France*.
Mikhail P. Petrov; *Ioffe Physico-Technical Inst., Russian Federation*.
Nasser Peyghambarian; *Univ. of Arizona, USA*.
Demetri Psaltis; *Ecole Polytechnique Federale de Lausanne, Switzerland*.
Gerald Roosen; *Inst. d'Optique, France*.
Serguei Stepanov; *CICESE, Mexico*.
George C. Valley; *Aerospace Corp, USA*.

PR Invited Speakers

SuA1, Photorefractive Photonic Lattices, Cornelia Denz, B. Terhalle, S. Koke, Ph Jander, D. Träger, J. Imbrock; *Inst. für Angewandte Physik and Ctr. for Nonlinear Science, Westfälische Wilhelms-Univ Münster, Germany.*

SuA2, Nonlinear Optical Applications of Photorefractive Liquid Crystal Light-Valves, Jean-Pierre Huignard¹, U. Bortolozzo², S. Residori³; ¹Thales Res. and Technology, France, ²Lab de Physique Statistique de l'ENS, France, ³INLN, Univ. de Nice Sophia-Antipolis, CNRS, France.

SuB1, Suppression of Optical Damage in Lithium Niobate Crystals by Thermo-Electric Oxidization, Karsten Buse¹, Matthias Falk¹, Theo Woike²; ¹Rheinische Friedrich Wilhelms Univ Bonn, Germany, ²Univ. of Cologne, Germany.

SuB7, Frozen Ferroelectrics to Mobile Ferroelectrics: New Views of LiNbO₃ Domain Engineering, Kenji Kitamura, Xiaoyan Liu, Kazuya Terabe; *Natl. Inst. for Materials Science, Japan.*

SuC1, Tetravalent Ions Doped Lithium Niobate Crystals, Jingjun Xu; *Photonics Res. Ctr., Nankai Univ., China.*

SuC6, Recent Advances in Photorefractive Polymers, Nasser Peyghambarian; *College of Optical Sciences, Univ. of Arizona, USA.*

SuD5, Fabrication and Applications of Holographic Optical Filters, Demetri Psaltis^{1,2}, Christophe Moser³; ¹Caltech, USA, ²EPFL, Switzerland, ³Ondax, USA.

MA1, 4WM Analysis of Third Order Nonlinearities at the Band Edge of Photonic Crystals, Gerald Roosen, Magali Astic, Philippe Delaye, Robert Frey; *Lab Charles Fabry de l'Inst. d'Optique, CNRS, Univ. Paris-Sud, France.*

MA6, Optical Trapping and the Photorefractive Effect, Mark Cronin-Golomb; *Tufts Univ., USA.*

MC1, Retro-Reflections on Mutually Pumped Phase Conjugation: An Incoherent Reappraisal of this Surprising Behaviour, Robert Eason; *Univ. of Southampton, UK.*

MC2, Crystal Accelerators: Generation of Focused Electron Beams, X-Rays and Neutrons, Nikolai V. Kukhtarev, Tatiana Kukhtareva, Phillip Land, Jai Wang; *Alabama A&M Univ., USA.*

MC3, Holographic Information Processing, Dana Anderson; *Univ. of Colorado at Boulder, USA.*

TuA6, Manipulating Light Pulses with Photorefractive Crystals, Serguey G. Odoulov¹, A. Shumelyuk¹, B. Sturman², E. Podivilov², M. Gorkunov³; ¹Inst. of Physics, Natl. Acad. of Sciences, Ukraine, ²Inst. of Automation and Electrometry of Russian Acad. of Sciences, Russian Federation, ³Inst. of Crystallography of Russian Acad. of Sciences, Russian Federation.

TuB6, Bandwidth Compression Optical Processor Using Chirped Fiber Bragg Gratings, George C. Valley¹, Josh Conway¹, Jason Chou¹, George A. Sefler¹, Shalabh Gupta², Bahram Jalali²; ¹Aerospace Corp, USA, ²Univ. of California at Los Angeles, USA.

TuC7, Latest Developments in Photorefractive Self-Organized Laser Cavities, Gilles Pauliat, Nicolas Dubreuil, Gérald Roosen; *Lab Charles Fabry de l'Inst. d'Optique, CNRS, Univ. Paris-Sud, France.*

TuD1, Dynamic Population Gratings in Rare-Earth Doped Fibers: Properties and Possible Applications, Serguei Stepanov; *CICESE, Mexico.*

TuD2, Digital Holographic Optical Coherence Imaging: 3D Motility Assays of the Effect of Anticancer Drugs, *David D. Nolte, Kwan Jeong, John J. Turek; Purdue Univ., USA.*

TuD3, Self-Adaptive Wavefront Holography Technique Applied to Acousto-Optic Imaging of Thick Biological Tissues Using the Photorefractive Effect, *François Ramaz¹, Max Lesaffre¹, Albert-Claude Boccara¹, Michel Gross², Philippe Delaye³, Gérald Roosen³; ¹Lab d'Optique, Ecole Supérieure de Physique et de Chimie Industrielles de la Ville de Paris, Univ. Pierre et Marie Curie, France, ²Lab Kastler-Brossel, Ecole Normal Supérieure, France, ³Lab Charles Fabry de l'Inst. d'Optique, CNRS, Univ. Paris-Sud, France.*

TuD4, The Casimir Force and Light Pressure, *Mikhail P. Petrov; Ioffe Physico-Technical Inst., Russian Federation.*

Special Events

Boat Cruise on Lake Tahoe: The Tahoe Queen is an authentic Mississippi River boat with many magnificent features including a classic paddle-wheel. The Tahoe Queen will be awaiting your arrival at a private drop-off point dock and you will enjoy a buffet lunch as the Tahoe Queen cruises along Tahoe's magnificent shore line of white sandy beaches, boulder fields and historic homes. At the conclusion of the cruise, the Tahoe Queen will return to the dock for a bus ride back to the Resort at Squaw Valley.

One ticket is included in each technical registration. Additional tickets may be purchased for \$110.

Best Paper Award: This award will be presented to the best contributed paper, oral or poster at PR 2007. The winner will be presented with this award during the closing session and highlighted on the meeting website. (Invited speakers not eligible.)

Best Student Paper: A cash prize of \$200 will be awarded to the best contributed paper (oral or poster), presented by a student submitter. The winner will be presented with this award during the closing session and highlighted on the meeting website.

Agenda of Sessions

Saturday, October 13, 2007		
4:00 p.m.–6:00 p.m.	Registration Open	<i>Alpine Ballroom Foyer</i>
Sunday, October 14, 2007		
7:30 a.m.–3:30 p.m.	Registration Open	<i>Alpine Ballroom Foyer</i>
8:30 a.m.–8:45 a.m.	Opening Remarks	<i>Alpine Ballroom</i>
8:45 a.m.–9:45 a.m.	SuA • Keynote Session I	<i>Alpine Ballroom</i>
9:45 a.m.–10:15 a.m.	Coffee Break	<i>Alpine Ballroom Foyer</i>
10:15 a.m.–12:30 p.m.	SuB • Materials-Crystals	<i>Alpine Ballroom</i>
12:30 p.m.–1:30 p.m.	Lunch (on your own)	
1:30 p.m.–3:30 p.m.	SuC • Materials	<i>Alpine Ballroom</i>
3:30 p.m.– 6:30 p.m.	Afternoon Free	
6:30 p.m.–7:30 p.m.	Welcome Reception	<i>Cascades</i>
7:30 p.m.–9:00 p.m.	SuD • Applications I	<i>Alpine Ballroom</i>
Monday, October 15, 2007		
7:30 a.m.–5:00 p.m.	Registration Open	<i>Alpine Ballroom Foyer</i>
8:00 a.m.–10:00 a.m.	MA • Nonlinear Optics	<i>Alpine Ballroom</i>
10:00 a.m.–3:00 p.m.	Lake Tahoe Boat Tour	
3:30 p.m.–5:30 p.m.	MB • Poster Session	<i>Grand Sierra C&D</i>
5:30 p.m.–7:30 p.m.	Dinner (on your own)	
7:30 p.m.–9:00 p.m.	MC • Celebrating 30 Years of Applications of Band Transport Equations	<i>Alpine Ballroom</i>
Tuesday, October 16, 2007		
7:30 a.m.–5:00 p.m.	Registration Open	<i>Alpine Ballroom Foyer</i>
8:00 a.m.–9:45 a.m.	TuA • Beam Propagation and Coupling	<i>Alpine Ballroom</i>
9:45 a.m.–10:15 a.m.	Coffee Break	<i>Grand Sierra C&D</i>
10:15 a.m.–12:00 p.m.	TuB • Applications II	<i>Alpine Ballroom</i>
12:00 p.m.–1:00 p.m.	Lunch (on your own)	
1:00 p.m.–3:00 p.m.	TuC • Applications III	<i>Alpine Ballroom</i>
3:00 p.m.–3:30 p.m.	Coffee Break	<i>Alpine Ballroom Foyer</i>
3:30 p.m.–5:30 p.m.	TuD • Keynote Session II	<i>Alpine Ballroom</i>
5:30 p.m.–5:45 p.m.	Closing Remarks	<i>Alpine Ballroom</i>

• Saturday, October 13, 2007 •

Alpine Ballroom Foyer

4:00 p.m.–6:00 p.m.

Registration Open

• Sunday, October 14, 2007 •

Alpine Ballroom Foyer

7:30 a.m.–3:30 p.m.

Registration Open

Alpine Ballroom

8:30 a.m.–8:45 a.m.

Opening Remarks

SuA • Keynote Session I

Alpine Ballroom

8:45 a.m.–9:45 a.m.

SuA • Keynote Session I

Jack Feinberg; Univ. of Southern California, USA, Presider

SuA1 • 8:45 a.m.

Invited

Photorefractive Photonic Lattices, Cornelia Denz, B. Terhalle, S. Koke, Ph Jander, D. Träger, J. Imbrock; Inst. für Angewandte Physik and Ctr. for Nonlinear Science, Westfälische Wilhelms-Univ. Münster, Germany. We realize photonic lattices exploiting the strong nonlinearity and anisotropy of the photorefractive response. Stable one- and two-dimensional lattices and anisotropic mobility in these lattices is demonstrated. Moreover, they allow stabilizing dynamics of counter-propagating solitons.

SuA2 • 9:15 a.m.

Invited

Nonlinear Optical Applications of Photorefractive Liquid Crystal Light-Valves, Jean-Pierre Huignard¹, U. Bortolozzo², S. Residori³; ¹Thales Res. and Technology, France, ²Lab de Physique Statistique de l'ENS, France, ³INLN, Univ. de Nice Sophia-Antipolis, CNRS, France. We present a novel optical medium formed by a liquid crystal layer coupled to a thin photorefractive crystal, allowing a dynamical control of the liquid crystal birefringence. We show two-wave mixing amplification, optical pattern formation and self-pumped phase conjugation.

Alpine Ballroom Foyer

9:45 a.m.–10:15 a.m.

Coffee Break

SuB • Materials-Crystals

Alpine Ballroom

10:15 a.m.–12:30 p.m.

SuB • Materials-Crystals

Karsten Buse; Rheinische Friedrich-Wilhelms-Univ. Bonn, Germany, Presider

SuB1 • 10:15 a.m.

Invited

Suppression of Optical Damage in Lithium Niobate Crystals by Thermo-Electric Oxidization, Karsten Buse¹, Matthias Falk¹, Theo Woike²; ¹Rheinische Friedrich-Wilhelms-Univ. Bonn, Germany, ²Univ. of Cologne, Germany. Thermo-electric treatment of lithium niobate crystals causes a strong oxidization of the material by removal of Li⁺ ions that take electrons with them. Consequently optical damage is suppressed because of lack of photo-excitabile charge carriers.

SuB2 • 10:45 a.m.

Permanent Modification of Material Parameters in LiNbO₃ Crystals by Irradiation with Low-Mass, High-Energy Ions, Konrad Peithmann, Mohammad-Reza Zamani-Meymian, Hilke Hattermann, Matz Haaks, Karl Maier, Birk Andreas, Michael Koesters, Ingo Breunig; Univ. Bonn, Germany. LiNbO₃ is irradiated with lowmass, highenergy ions which cause strong modulations of the refractive index and coercive field. This effect and it's long-term stability is investigated; the application for permanent gratings is outlined.

SuB3 • 11:00 a.m.

Impedance Spectroscopy of Highly Iron-Doped Lithium Niobate Crystals, Katharina Brands¹, Daniel Haertle¹, Matthias Falk¹, Theo Woike², Karsten Buse¹; ¹Univ. of Bonn, Germany, ²Inst. of Mineralogy, Univ. of Cologne, Germany. We analyze iron-doped lithium niobate crystals by impedance spectroscopy, and compare as-grown with oxidized crystals. The activation energies for the DC conductivity and the degree of oxidization of thermo-electrically oxidized crystals are obtained.

SuB4 • 11:15 a.m.

Photorefractive Properties and Applications of Doped Sn₂P₂S₆ Crystals in the Near Infrared, Tobias Bach¹, Mojca Jazbinsek¹, Peter Günter¹, Alexander A. Grabar²; ¹ETH Zurich, Switzerland, ²Uzhgorod Natl. Univ., Ukraine. We show that by doping Sn₂P₂S₆ crystals, near-infrared photorefractive sensitivity can be enhanced or suppressed. With Te-Sn₂P₂S₆, fast self-pumped optical phase conjugation with a rise time below 100ms at 1.06µm is demonstrated.

SuB5 • 11:30 a.m.

Tuning of Polaronic Light-Induced Absorption in Nominally Pure LiNbO₃ by Chemical Reduction, Christoph Merschjann, Bettina Schoke, Daniela Conradi, Mirco Imlau; Univ. Osnabrück, Germany. Polaronic light-induced absorption $\alpha_{ii}(t)$ is investigated in nominally pure, congruently melting LiNbO₃ via ESA spectroscopy. Chemical reduction affects the amplitudes of $\alpha_{ii}(t)$, i.e. the number densities of electron and hole polarons, leaving their lifetimes unchanged.

SuB6 • 11:45 a.m.

Paper Withdrawn

SuB7 • 12:00 p.m.

Invited

Frozen Ferroelectrics to Mobile Ferroelectrics: New Views of LiNbO₃ Domain Engineering, Kenji Kitamura, Xiaoyan Liu, Kazuya Terabe; Natl. Inst. for Materials Science, Japan. Ferroelectric polarization inversion kinetics strongly depends on defect density in LN and LT crystals. Some new phenomena related to domain morphology and stability were observed in the defect controlled crystals by nano-domain engineering using SPMs.

12:30 p.m.–1:30 p.m.

Lunch (on your own)

SuC • Materials

Alpine Ballroom

1:30 p.m.–3:30 p.m.

SuC • Materials

Presider to be Announced

SuC1 • 1:30 p.m.**Invited**

Tetravalent Ions Doped Lithium Niobate Crystals, Jingjun Xu; *Photonics Res. Ctr., Nankai Univ., China*. LN:Hf crystals using tetravalent ions have similar optical damage resistance as LN:Mg, but LN:Zr is much better. LN:Fe:Hf crystals have both a fast photorefractive response speed and high saturation diffraction efficiency. We discuss recent experiments.

SuC2 • 2:00 p.m.

Hybrid Liquid Crystal Nanomaterials with Improved Photorefractive Response, Malgosia Kaczmarek¹, A. Dyadyusha¹, Giampaolo D'Alessandro¹, Oleksandr Buchne²; ¹Univ. of Southampton, UK, ²Inst. of Physics, Natl. Acad. of Sciences of Ukraine, Ukraine. Hybrid materials, fabricated by combining liquid crystals with ferroelectric, inorganic nanoparticles, show improved photorefractive response. Three-fold increase in dielectric anisotropy and optical anisotropy was measured, as well as significant improvement in two-beam coupling gain.

SuC3 • 2:15 p.m.

Nanoparticle Doped Organic-Inorganic Hybrid Photorefractives, Gary Cook^{1,2}, Victor Reshetnyak³, Anatolii V. Glushchenko⁴, Mohammad A. Saleh⁵, Dean R. Evans¹; ¹AFRL, USA, ²Universal Technology Corp., USA, ³Natl. Taras Shevchenko Univ. of Kyiv, Ukraine, ⁴Univ. of Colorado at Colorado Springs, USA, ⁵UES Inc., USA. The gain characteristics of liquid crystal photorefractive cells doped with ferroelectric nanoparticles has been measured. Gain coefficients up to 1000 cm⁻¹ are obtained in the Bragg regime using the surface space-charge field from Ce:SBN windows.

SuC4 • 2:30 p.m.

Cholesteric-Inorganic Hybrid Photorefractives, Gary Cook^{1,2}, Eric Beckel³, Victor Reshetnyak⁴, Mohammad A. Saleh⁵, Dean R. Evans¹; ¹AFRL, USA, ²Universal Technology Corp., USA, ³General Dynamics Information Technology, USA, ⁴Natl. Taras Shevchenko Univ. of Kyiv, Ukraine, ⁵UES Inc., USA. The optical gain characteristics of hybrid cholesteric liquid crystal cells with inorganic photorefractive windows of Ce:SBN have been measured. Gain coefficients of up to 1400 cm⁻¹ have been measured in the Bragg regime.

SuC5 • 2:45 p.m.

Tuning Ability of Photosensitive ML₅NO-Molecules, Mirco Imlau¹, Volker Dieckmann¹, Thomas Weisemoeller¹, Dominik Schaniel^{2,1}, Theo Woike², Karl W. Krämer³, Hans-Ulrich Güdel³; ¹Dept. of Physics, Univ. of Osnabrück, Germany, ²Dept. of Physics, Univ. of Cologne, Germany, ³Dept. of Chemistry and Biochemistry, Univ. of Bern, Switzerland. We show that photosensitivity is a general property of linkage isomers in nitrosyl-containing [ML₅NO]^m-molecules (M: metal, L: ligand, m: formal charge). The benefit of this generality is reflected in the tailoring properties of the photosensitive response.

SuC6 • 3:00 p.m.**Invited**

Recent Advances in Photorefractive Polymers, Nasser Peyghambarian; *College of Optical Sciences, Univ. of Arizona, USA*. Photorefractive polymers show near 100% diffraction efficiency, millisecond response time and sensitivity to wavelengths from visible to near IR at 1500 nm. Thermal fixing has also been demonstrated in these materials that lengthen the persistency considerably.

3:30 p.m.–6:30 p.m.**Afternoon Free**

Cascades

6:30 p.m.–7:30 p.m.**Welcome Reception**

SuD • Applications I

Alpine Ballroom

7:30 p.m.–9:00 p.m.

SuD • Applications I

Presider to be Announced

SuD1 • 7:30 p.m.

Ultrafast Transient Grating in Transparent Dielectrics: Shaping of Ultrashort Pulses with Excellent Temporal and Spectral Characteristics and Ultrafast Pulse-Labeling, Reiner P. Schmid, Marc Hänel, Jürgen Reif; *Brandenburg Univ. of Technology Cottbus, Germany*. Ultrashort optical pulses with excellent temporal and spatial pulse profiles are obtained even at improper input conditions after the passage through an optical switching device based on an ultrafast transient refractive-index grating.

SuD2 • 7:45 p.m.

Broadband Frequency Doubling in Random Media, Robert Fischer¹, Solomon Saltiel², Dragomir Neshev¹, Wiesław Z. Krolikowski³, Yuri Kivshar¹; ¹Nonlinear Physics Ctr., Ctr. for Ultrahigh-Bandwidth Devices for Optical Systems (CUDOS), Res. School of Physical Sciences and Engineering, Australian Natl. Univ., Australia, ²Dept. of Quantum Electronics, Faculty of Physics, Bulgaria, ³Laser Physics Ctr., Ctr. for Ultrahigh-Bandwidth Devices for Optical Systems (CUDOS), Res. School of Physical Sciences and Engineering, Australian Natl. Univ., Australia. We demonstrate broadband noncollinear second-harmonic generation in Strontium Barium Niobate crystals with random ferroelectric domains. The process results in exact mapping of the spectrum of the fundamental field into the spectrum of the second harmonics.

SuD3 • 8:00 p.m.

Micro-Fluidic Velocimetry by Photorefractive Novelty Filtering, Frank Holtmann, Mike Woerdemann, Joerg Imbrock, Cornelia Denz; *Westfälische Wilhelms-Univ., Germany*. We present a velocimetry technique for micro-fluidic flow investigations based on trail formation of moving objects in photorefractive novelty filters. Measurements of trails are used for the determination of velocity fields in micro-tube flows.

SuD4 • 8:15 p.m.

Light-Induced Dynamic and Quasi-Fixed Waveguides in Mg-Doped Near-Stoichiometric LiTaO₃, *Flurin Juvalta¹, Mojca Jazbinsek¹, Peter Gunter¹, Germano Montemezzani², Kenji Kitamura³; ¹ETH Zurich, Switzerland, ²Univ. of Metz and Supelec, France, ³Optronics Materials Ctr., Japan.* We demonstrate photoinduced dynamic waveguides in Mg-doped near-stoichiometric LiTaO₃ by deep UV light at 257nm. The waveguides are reconfigurable in 10 ms at intensities of 0.1 W/cm² and can be also quasi-fixed for several days.

SuD5 • 8:30 p.m.

Invited

Fabrication and Applications of Holographic Optical Filters, *Demetri Psaltis^{1,2}, Christophe Moser³; ¹Caltech, USA, ²EPFL, Switzerland, ³Ondax, USA.* We review the fabrication methods and applications of glass volume holographic filters. During the last few years, such filters have found commercial success in fields such as laser wavelength control, beam combining, Raman and Astronomy filters.

NOTES

•Monday, October 15, 2007•

Alpine Ballroom Foyer

7:30 a.m.–5:00 p.m.

Registration Open

MA • Nonlinear Optics

Alpine Ballroom

8:00 a.m.–10:00 a.m.

MA • Nonlinear Optics

Serguey G. Odoulov; *Inst. of Physics, Ukraine, Presider*

MA1 • 8:00 a.m.

Invited

4WM Analysis of Third Order Nonlinearities at the Band Edge of Photonic Crystals, *Gérald Roosen, Magali Astic, Philippe Delaye, Robert Frey; Lab Charles Fabry de l'Inst. d'Optique, CNRS, Univ. Paris-Sud, France.* Photonic crystals show several properties that present great interest for the implementation of nonlinear optical functions. We will show how light localization in these structures will largely increase the efficiency of the nonlinear mechanism.

MA2 • 8:30 a.m.

Frequency Mixing of Photorefractive and Ferroelectric Gratings in Lithium Niobate Crystals, *Michael Kösters, Ulrich Hartwig, Theo Woike, Karsten Buse; Univ. of Bonn, Germany.* Photorefractive gratings in periodically-poled lithium niobate (PPLN) crystals are investigated. A strong interplay between the index structures and the ferroelectric domain grating is observed. The findings are of importance for applications combining holography and PPLN.

MA3 • 8:45 a.m.

2-D Periodically-Poled LiNbO₃ and Its Application to Broadband 2nd- and 3rd-Harmonic Generation, *Kazuo Kuroda¹, Nobuhide Fujioka¹, Satoshi Ashihara², Hidenobu Ono¹, Tsutomu Shimura¹; ¹Univ. of Tokyo, Japan, ²Tokyo Univ. of Agriculture and Technology, Japan.* We fabricated a two-dimensional quasi-phase-matching device. Efficient cascaded 2nd- and 3rd-harmonic generation of a 100-fs pulse at 1570 nm is demonstrated. Group velocity mismatch is compensated by pulse-front tilt technique with non-collinear geometry.

MA4 • 9:00 a.m.

Second Harmonic Generation in Crystallized Glass Fibers with Nano- and Oriented-Crystalline Structures, *Takumi Fujiwara¹, Naoki Iwafuchi¹, Yosuke Hane², Yoshiki Yamazaki¹, Hiroshi Mori¹, Takayuki Komatsu²; ¹Dept. of Applied Physics, Tohoku Univ., Japan, ²Dept. of Materials Science, Nagaoka Univ. of Technology, Japan.* Second harmonic generation (SHG) and propagation loss have been measured on nano-crystallized optical fibers from a tellurite based glass. Angular dependence of SHG intensity and low propagation loss (0.15 dB/cm) at 1.55 μm are reported.

MA5 • 9:15 a.m.

Control of SHG Generation Efficiency with Carrier-Envelope-Phase of Ultrashort Pulse, *Takayoshi Kobayashi¹, Shunsuke Adachi²; ¹Univ. of Electro-Communications, Japan, ²Univ. of Tokyo, Japan.* The efficiency of optical poling process was controlled by the self-stabilized carrier-envelope phase (CEP) of the idler output from our noncollinear optical parametric amplifier system. This phenomenon was verified to provide a novel CEP measurement method.

MA6 • 9:30 a.m.

Invited

Optical Trapping and the Photorefractive Effect, *Mark Cronin-Golomb; Tufts Univ., USA.* A rate equation approach is used to analyse four-wave mixing based on the optical gradient forces normally associated with optical tweezers.

10:00 a.m.–3:00 p.m.

Lake Tahoe Boat Tour

MB • Poster Session

Grand Sierra C&D

3:30 p.m.–5:30 p.m.

MB • Poster Session

MB1

Photorefractive Effect and Photochromism in Fe-Doped GaN, *Haruki Kiyama, Ryushi Fujimura, Tsutomu Shimura, Kazuo Kuroda; Inst. of Industrial Science, Univ. of Tokyo, Japan.* Two-wave-mixing gain coefficient and time constant are measured at a wavelength of 457.8 nm. To avoid the effect of photochromism, we employed a polarization modulated interferometer. The origin of photochromism is assigned to Fe-ion-related transition.

MB2

Photorefractive Response and Optical Damage Control in Proton Exchanged LiNbO₃ Waveguides via Pronton Exchange Time, *Javier Villarroel, Mercedes Carrascosa, Jesus Carnicero, Olga Caballero, Ángel García-Cabañes, José M. Cabrera; Univ. Autonoma de Madrid, Spain.* Measurements in proton exchanged LiNbO₃ waveguides show that the duration of the exchange markedly affects the [Fe²⁺]/[Fe³⁺] ratio and, as a consequence, the waveguide photorefractive response. Optical damage resistance dramatically increases with the exchange time.

MB3

Influence of Mg-Doping on the Polaronic Light-Induced Absorption in LiNbO₃, *Daniela Conradi, Christoph Merschjann, Bettina Schoke, Mirco Imlau; Univ. of Osnabrück, Germany.* The polaronic light-induced absorption $\alpha_{ii}(t)$ is investigated in LiNbO₃:Mg via ESA spectroscopy. In comparison with nominally pure LiNbO₃, changes in the lifetime of $\alpha_{ii}(t)$ are found and attributed to changes in the intrinsic defect structure.

MB4

V-Shaped Stark Effect in Stoichiometric Photorefractive LiNbO₃ *S. A. Basun¹, V. E. Bursian¹, A. A. Kaplyanski¹, A. G. Razdobarin¹, L. S. Sochava¹, S. K. Kapphan², D. R. Evans³; ¹A.F. Ioffe Physico-Technical Inst., Russian Federation, ²Univ. Osnabrück, Germany, ³AFRL, USA.* With a goal to directly measure the electric fields in photorefractive gratings, Stark effect with novel manifestations caused by the repolarization of the sample under the electric field was found on Fe centers in LiNbO₃:Fe.

MB5

Synthetic Strategies for Nonlinear Photonic Devices Using β -BBO, *Robert H. Lipson, Cheng Lu, Stamen S. Dimov; Univ. of Western Ontario, Canada.* New synthetic methods to make high quality nonlinear BBO thin films are described which are amenable to contact lithography. Reoriented BBO thin films are made by seeding with an organic molecule prior to thermal treatment.

MB6

Two-Photon Recording of the Microholograms in Undoped Lithium Tantalate Crystals with Different Compositions, *Ilya Sh. Steinberg¹, Ivan E. Kalabin²*; ¹ *Inst. of Automation and Electrometry, Siberian Branch of the Russian Acad. of Science, Russian Federation*, ² *Inst. of Semiconductor Physics, Siberian Branch of the Russian Acad. of Science, Russian Federation*. Two-photon recording of the microholograms and nonvolatile heterodyne readout were demonstrated in undoped lithium tantalate crystals with high holographic sensitivity, large refractive index change, and fast hologram writing time. Holographic characteristics strongly depend on composition.

MB7

UV-Assisted Activation of LiB₃O₅-Surfaces Studied by Low-Coherence Microscopy and XPS, *Änne Andresen, Stefan Möller, Mirco Imlau*; *Univ. of Osnabrück, Germany*. We report on the possibility to activate LiB₃O₅-surfaces by exposure to Q-switched ultraviolet laser light via sum-frequency mixing. Investigations with low-coherence microscopy and XPS reveal that the activation initiates parasitic SiO₂ layer-growth.

MB8

Holographic Recording in Doped Bismuth Tellurite Crystals, *Wolfgang Horn¹, Jörg Imbrock¹, Cornelia Denz², Istvan Földvári²*; ¹ *Inst. fuer Angewandte Physik, Westfaelische Wilhelms-Univ. Muenster, Germany*, ² *Res. Lab for Crystal Physics, Hungarian Acad. of Sciences, Hungary*. Bismuth tellurite is a material for holographic data storage that accomplishes non-volatile readout of holograms. New dopants have been introduced to enhance the photorefractivity. Build-up and decay of the gratings are examined under continuous illumination.

MB9

Sillenite Optical Waveguides and Their Application Prospects, *Valery Abusev*; *Ioffe Physico-Technical Inst., Russian Federation*. Optical waveguides Bi₁₂GeO₂₀, Bi₁₂TiO₂₀, Bi₁₂Ti_{1-x}Si_xO₂₀ were made by liquid epitaxy on Bi₁₂SiO₂₀ and Bi₁₂GeO₂₀ crystals. Photo-induced absorption has been studied in Bi₁₂TiO₂₀ films. Opto-optical modulation and non-linear light transmission in Bi₁₂TiO₂₀ waveguides has been described.

MB10

Organic Photorefractive Materials Based on Mesophase Photoconductive Polymers, *O-Pil Kwon¹, Mojca Jazbinsek¹, Seong-Ji Kwon¹, Peter Günter¹, Suck-Hyun Lee²*; ¹ *ETH Zurich, Switzerland*, ² *Ajou Univ., Republic of Korea*. We investigated the relations between the mesophase structure and the photorefractive performance in transmission and reflection grating geometries of the photorefractive composites based on highly-ordered layered and less-ordered nematic-like photoconductive polymers.

MB11

Improvement of PVK Based Photorefractive Polymer Materials by Modifying the Nonlinear Chromophore for the Vibration Measurements, *Kazuyoshi Yamazaki, Tsutomu Shimura, Takayuki Akazawa, Toshiki Mutai, Ryushi Fujimura, Koji Araki, Kazuo Kuroda*; *Univ. of Tokyo, Japan*. We improved the photorefractive polymer with mixing two kinds of nonlinear chromophores. Diffraction efficiency of 16 % with 0.1 mm thick sample, and shelf lifetime of more than 2 months were obtained.

MB12

Paper Withdrawn

MB13

Holographic Volume Absorption Grating in Glass-Like Polymer Recording Material, *Elena Tolstik¹, Leonid Krup², Vladislav Matusevich¹, Dominik Hoff³, Andrew Matusevich¹, Richard Kovarschik¹, Yuri Matusevich², Oleg A. Kashin¹*; ¹ *Friedric-Schiller-Univ. Jena, Inst. of Applied Optics, Germany*, ² *Belarusian State Univ., Inst. of Physical and Chemical Problems, Belarus*. Contribution of the phase and absorption gratings into the total diffraction efficiency has been analysed in polymer recording materials based on poly(methyl methacrylate) containing phenanthrenequinone.

MB14

Holographic Kinetics of Bacteriorhodopsin Films under Auxiliary of Violet Light, *Baoli Yao, Junhe Han, Peng Gao, Liju Chen, Yingli Wang, Ming Lei*; *Xian Inst. of Optics and Precision Mechanics, Chinese Acad. of Sciences, China*. The distinct effects of the auxiliary violet light on the holographic kinetics in BR-films were investigated at low and high recording light intensities, respectively. The theoretical model gives a good explanation to the experiment.

MB15

Nonlinear Light-Induced Effects in Bacteriorhodopsin Film for Photonics Applications, *Elena Korchemskaya^{1,2}, Dmitrij Stepanchikov³, Svitlana Bugaychuk¹, Nikolai Burykin²*; ¹ *Inst. of Physics, Natl. Acad. of Sciences, Ukraine*, ² *Inst. of Applied Optics, Natl. Acad. of Sciences, Ukraine*, ³ *Zhytomir State Univ., Ukraine*. We study dependences of absorption, anisotropy and dynamic holography recording in bacteriorhodopsin (BR) films on light intensity. A combination of the photoinduced anisotropy with low-saturable absorption in BR films opens new possibilities for photonics applications.

MB16

Programmable Wavefront Control with Photopolymers, *Lawrence H. Sverdrup, Jeff Chomyn, Goma Abdelsadek, Jagdish Jethmalani, Andreas Dreher*; *Ophthonix, Inc., USA*. By controlling the photocuring of polymer systems between optical substrates it is possible to accurately program a wide variety of wavefront patterns. Two distinct methods are described, and examples of programmed wavefront elements are presented.

MB17

Interactions of Space-Charge Waves with Magnetic Fields in the Semiconductor InP:Fe, *Burkhard Hilling¹, Michaela Lemmer¹, Manfred Wöhlecke¹, Mirco Imlau¹, Mikhail Petrov², Valery Bryksin²*; ¹ *Univ. of Osnabrück, Germany*, ² *Russian Acad. of Sciences, Russian Federation*. An interaction of optically induced space-charge waves with a magnetic field has been observed in the semi-insulating single crystal InP:Fe. This interaction is attributed to the effect of magneto-resistance.

MB18

Efficient Coupling of Counter-Propagated Waves in CdTe:Ge at 1.064 μm and 1.55 μm, *Konstantin Shcherbin¹, Zinaida I. Zakharuk², Illariy M. Rarenko²*; ¹ *Inst. of Physics, Natl. Acad. of Sciences, Ukraine*, ² *Chernivtsy Natl. Univ., Ukraine*. Recording of efficient reflection holograms is achieved in CdTe:Ge at 1.064 μm and 1.55 μm. The gain factor at both wavelengths exceeds all values previously reported for any semiconductor with no external field.

MB19

Analysis of Stimulated Photorefractive Backscatter during Six-Wave Mixing in Lithium Niobate, Partha P. Banerjee¹, Mohammad A. Saleh^{2,3}, Gary Cook^{2,4}, Jennifer L. Carns^{2,5}, Dean R. Evans²; ¹Univ. of Dayton, USA, ²AFRL, Materials and Manufacturing Directorate, USA, ³UES, Inc., USA, ⁴Universal Technology Corp., USA, ⁵General Dynamics Information Technology, USA. Oblique incidence of a weakly focused 532 nm laser beam on LiNbO₃:Fe generates stimulated photorefractive backscatter (SPBS) from six-wave mixing in a reflection geometry. SPBS is analyzed through image restoration, interference experiments, and visibility measurements.

MB20

Controlled Release of Stored Optical Pulses into Two Different Wavelengths in a Three-Level Atomic System, Xiao-Li Song^{1,2}, Lei Wang^{1,2}, Zhi-Hui Kang^{1,2}, Rui-Zhu Lin^{1,2}, Xin Li^{1,2}, Yun Jiang^{1,2}, Jin-Yue Gao^{1,2}; ¹College of Physics, Jilin Univ., China, ²Key Lab of Coherent Light and Atomic and Molecular Spectroscopy of Ministry of Education, Jilin Univ., China. We report an experiment in which optical pulses are stored in Rb atomic system, and then selectively released at one of the two different wavelengths by turning on the retrieve control pulse.

MB21

Anisotropic Nonlinear Coupling of Two Counter-Propagating Waves in Photorefractive Fe:KNbO₃, Gary Cook^{1,2}, Mohammad Saleh³, Dean Evans¹; ¹AFRL, USA, ²Universal Technology Corp., USA, ³UES Inc, USA. The dependence of self-pumped photorefractive two-beam coupling in Fe:KNbO₃ with crystal angle has been calculated and measured at 532 nm for the a-c and b-c crystal planes using a combination of oil-immersion and relay imaging.

MB22

Running Gratings in Photoconductive Materials: Ten Years Later and New Opportunities, Sergei F. Lyuksyutov¹, Michael A. Reagan¹, Nikolai V. Kukhtarev²; ¹Univ. of Akron, USA, ²Alabama A&M Univ., USA. Review of running grating configurations in photoconductive materials is provided. Analysis of Kukhtarev's equations indicates that holographic current may be generated by running gratings without electric field. Experimental proof is provided to support our analysis.

MB23

Evolution of Optical Vortices in Nonconventionally Biased Photorefractive Crystals, Xuetao Gan, Peng Zhang, Sheng Liu, Fajun Xiao, Jianlin Zhao; School of Science, Northwestern Polytechnical Univ., China. The vortex dynamics embedded in Gaussian beams and on plane wave backgrounds in a nonconventionally biased photorefractive crystal are numerically simulated. And the decay of high order vortices is also observed under different biased conditions.

MB24

Analysis of All-Optical Switching in PPLN Waveguide with Homocentric Semicircle Domain Structure, Zhongxiang Zhou, Jinren Wang, Xiaoyan Lin; Dept. of Physics, Harbin Inst. of Technology, China. All-optical switching characterization is analyzed based on second-order nonlinear and photorefractive two-wave mixing in the periodically poled LiNbO₃ waveguide. Considering two-wave mixing, all-optical switching needs shorter interactional length and lower input gate power.

MB25

Temporal Behavior of Photorefractive Self-Focusing in InP:Fe Crystals at Infrared Wavelengths, Cristian Dan¹, Naïma Khelfaoui¹, Delphine Wolfersberger¹, Nicolas Fressengeas¹, Hervé Leblond²; ¹Lab Matériaux Optiques, Photonique et Systèmes, Unité de Recherche Commune à l'Univ. Paul Verlaine et Supélec, France, ²Lab Propriétés Optiques des Matériaux et Applications, France. Temporal and spatial dependency of photorefractive self focusing in InP:Fe from intensity and temperature is compared to a theoretical model; self focusing and bending occur on a microseconds timescale for low beam intensities.

MB26

Paper Withdrawn

MB27

A Novel Algorithm for Self-Pumped Contra-Directional Gaussian Beam Coupling in Photorefractive Media, Mohammad Saleh^{1,2}, Partha Banerjee³, Gary Cook^{1,4}, Dean Evans¹; ¹AFRL, USA, ²UES Inc., USA, ³Univ. of Dayton, USA, ⁴Universal Technology Corp., USA. Self-pumped contra-directional two-beam coupling is simulated in a photorefractive medium for a Gaussian beam using the split-step beam propagation method. The simulation correctly shows the beam-coupling properties of gratings due to diffusion and photovoltaic field.

MB28

Hologram Recording and Reading in Resonant Ring Cavity, Hyunsung Kim, Seung-Dae Sohn, Yeon H. Lee; School of Information and Communication Engineering, Sungkyunkwan Univ., Republic of Korea. We report hologram recording and reading in a resonant ring cavity. Discrete Resonance Ring Cavity is proposed to maintain the optical resonance of the ring cavity. The experimental data is compared with the conventional system.

MB29

Energy Exchange in Thick Photorefractive Crystals of BTO with Optical Activity at High Modulation Depth, Isabel Casar¹, J.G. Murillo², J. Rurik Farias², Fernando Magaña¹; ¹Inst. de Física, Univ. Nacional Autónoma de Mexico, Mexico, ²Ctr. de Investigación en Materiales Avanzados, Mexico. The effect of the spatial non-uniformity of the photorefractive grating and the polarization angle of the recording light beams on the gain in thick crystals of BTO with optical activity were obtained.

MB30

Study on Optical Parametric Oscillator Based on Periodically Poled MgO:LiNbO₃ Crystal, Jiang-Hong Yao, Zhi-Wei Liu, Cai-Fan Yan, Guo-Quan Zhang, Jing-Jun Xu, Guang-Yin Zhang; Nankai Univ., China. The signal-resonated quasi-phase matched optical parametric oscillator based on periodically poled MgO:LiNbO₃ was studied, widely wavelength tunable outputs have been obtained by using temperature and grating period tuning.

MB31

Beam Self-Trapping Dynamics in a SBN Crystal, Katerina Pismennaya, Oleg A. Kashin, Vladislav Matusevich, Armin Kiefling, Richard Kowarschik; Inst. of Applied Optics, Friedrich-Schiller-Univ., Germany. In this paper we investigate the self-trapping of a laser beam in a photorefractive SBN-crystal and show that the self-trapping is independently on the input diameter between 18 μm up to 40 μm.

MB32

Dynamical and Spectral Characteristics of the Photo-Induced Absorption in the BTO Crystal, *Andrew Matusevich¹, Alexey Tolstik², Vladislav Matusevich¹, Armin Kiefling¹, Richard Kowarschik¹, Oleg A. Kashin¹; ¹Friedrich-Schiller-Univ. Jena, Inst. of Applied Optics, Germany, ²Belarusian State Univ., Inst. of Physical and Chemical Problems, Belarus.* We investigate the dynamical and spectral characteristics of the photo-induced absorption in BTO. The photo-induced centres of the absorption are located 1.4 eV below the conduction band and have life times more than 10⁴s.

MB33

Holographic Formation of Inharmonic 3-D Photonic Structures in Photopolymeric Composite Materials, *Eugene A. Dovolnov, Vaycheclav G. Mirgorod, Sergey N. Sharangovich; Tomsk State Univ. of Automatic Control Systems and Radioelectronics, Russian Federation.* Analytical model of parallel holographic formation of inharmonic diffraction structures in photopolymeric composite materials are presented. Dynamics of 3-D spatial profiles of refractive index and influence of interconnection between harmonics are investigated numerically.

MB34

Influence of the Spatial Non-Uniformity of the Grating on the Beam Energy Exchange of Thick Sillenite Crystals, *Isabel Casar¹, Jose Murillo², Rurik Farias², Fernando Magaña¹; ¹Inst. de Física, Univ. Nacional Autónoma de Mexico, Mexico, ²Ctr. de Investigación en Materiales Avanzados, Mexico.* The influence of the variation of the phase and magnitude of the complex light modulation along sample thickness on the gain in a thick crystal of BTO in two-wave mixing was obtained.

MB35

Chaotic Control and Cancellation Using a Micro Ring Resonator Incorporating an Optical Add/Drop Multiplexer, *P. P. Yupapin, W. Suwancharoen; King Mongkut's Inst. of Technology Ladkrabang, Thailand.* We propose a system of the signal security by light using a fiber optic micro ring resonator, where the secured information can be performed by using the chaotic noise generation and cancellation.

MB36

The Center-of-Mass Motion-Induced Quantum Collapse and Revival, *Young-Tak Chough¹, Kyungwon An²; ¹Gwangju Univ., Republic of Korea, ²Seoul Natl. Univ., Republic of Korea.* We report a novel type of "quantum collapse and revival" behavior which is originated from the quantized center-of-mass motion of a two-state atom interacting with a standing wave field.

MB37

Drift Motion Control of Solitary Structures Using Parameter Gradients, *Björn Gütlich, Carsten Cleff, Cornelia Denz; Inst. für Angewandte Physik and Ctr. for Nonlinear Science, Westfälische Wilhelms-Univ. Münster, Germany.* We study the drift motion control of solitary structures with parameter gradients. The dependence of drift velocity on gradient slope and spatial dimensions of the gradient is determined and guiding of drifting solitons is demonstrated.

MB38

Anisotropic Spatial Solitons in Optically-Induced Photonic Lattices of Different Symmetries, *Bernd Terhalle¹, Patrick Rose¹, Jörg Imbrock¹, Cornelia Denz¹, Tobias Richter², Friedemann Kaiser², Anton S. Desyatnikov³, Yuri S. Kivshar³; ¹Inst. für Angewandte Physik, Westfälische Wilhelms-Univ., Germany, ²Inst. für Angewandte Physik, Technische Univ. Darmstadt, Germany, ³Nonlinear Physics Ctr., Res. School of Physical Sciences and Engineering, Australian Natl. Univ., Australia.* We explore the symmetry reduction of spatial solitons supported by photonic lattices of three- and four-fold symmetries due to the photorefractive orientational anisotropy. Influences of anisotropy to more complex vortex and multi-vortex solitons are discussed.

MB39

Suppression of Discrete Diffraction and Formation of Mini-Gap Solitons in Double-Periodic Nonlinear Photonic Lattices, *Eugene Smirnov, Christian E. Rüter, Ksenia Shandarova, Vladimir M. Shandarov, Detlef Kip; Clausthal Univ. of Technology, Germany.* We investigate band structures and diffraction properties of double-periodic photonic lattices formed in photorefractive LiNbO₃ and observe decreased discrete diffraction with increasing additional second-grating modulation. In weakly-modulated superlattices formation of discrete mini-gap solitons is observed.

MB40

Interactions of Discrete-Soliton Trains in Two-Dimensional Light-Induced Photonic Lattices, *Fajun Xiao, Peng Zhang, Sheng Liu, Jianlin Zhao; School of Science, Northwestern Polytechnical Univ., China.* The discrete-soliton trains in two-dimensional light-induced photonic lattices are numerically derived. And then their interactions are simulated. Both the attractive (in-phase and incoherent) and repulsive (out-of-phase) forces are observed.

MB41

Spatial Solitons and their Interactions in Nonconventionally Biased Photorefractive Crystals, *Peng Zhang¹, Jianlin Zhao¹, Cibo Lou², Qian Liu¹, Yuhua Gao¹, Sheng Liu¹, Dexing Yang¹; ¹School of Science, Northwestern Polytechnical Univ., China, ²TEDA Applied Physics School, Nankai Univ., China.* We present our experimental results on one- and two-dimensional bright solitons along with their coherent and incoherent interactions in a nonconventionally biased photorefractive crystal. Soliton stripes with different orientations and elliptical solitons are experimentally demonstrated.

MB42

Observation of Discrete Solitons in Light-Induced Photonic Lattices in Nonconventionally Biased SBN Crystals, *Peng Zhang¹, Cibo Lou², Fajun Xiao¹, Sheng Liu¹, Jianlin Zhao¹; ¹School of Science, Northwestern Polytechnical Univ., China, ²TEDA Applied Physics School, Nankai Univ., China.* We present experimental and numerical results on one- and two-dimensional discrete solitons in light-induced photonic lattices in a nonconventionally biased SBN crystal. One-dimensional discrete solitons with different orientations and elliptical discrete solitons are both demonstrated.

MB43

Interactions of Gap Solitons in One-Dimensional Optically Induced Photonic Lattices, Sheng Liu, Peng Zhang, Fajun Xiao, Jianlin Zhao; School of Science, Northwestern Polytechnical Univ., China. We study the interactions of gap solitons in one-dimensional light-induced photonic lattices. Anomalous interactions of gap solitons due to self-focusing are revealed, while the interaction forces for gap solitons due to self-defocusing are relatively weak.

MB44

Interaction of (2+D) Photorefractive Coherent Solitons in a Photorefractive SBN Crystal, Oleg A. Kashin, Dmitry Khmelnskiy, Vladislav Matusevich, Armin Kiefling, Richard Kowarschik; Inst. of Applied Optics, Friedrich-Schiller-Univ., Germany. We present theoretical and experimental investigations of the interaction of two-dimensional bright photorefractive coherent solitons in a photorefractive SBN crystal. The minimal distances for observing the independent states of solitons for different geometries are studied.

MB45

Deterministic Non-Orthogonal Phase-Code Multiplexing, Gernot Berger, Mathias Dietz, Xinzheng Zhang, Cornelia Denz; Westfaelische Wilhelms-Univ., Germany. Phase-code multiplexing is used to index the reference wave in volume holographic data storage. We present unitary and deterministic non-orthogonal multilevel phase-codes that facilitate increased storage capacities.

MB46

Information Content of Microscopic Holograms, Marko Zgonik; J. Stefan Inst., Slovenia. In plate-like materials the smallest volume of holograms is achieved by confocally focusing the reference beam. With nonoverlapping records the information content in page-oriented monochromatic recording scales as the square root of the plate thickness.

MB47

Enhanced Control on Group Velocity of Light through Stratified and Phase-Shifted Volume Index Gratings, Guoquan Zhang, Weiyue Che, Bin Han, Yiling Qi, Ningning Xu; Photonics Ctr., Nankai Univ., China. Stratified and phase-shifted volume index gratings are designed to significantly enhance the control on group velocity of light by several orders of magnitude while keeping high transmittance.

MB48

Phase Control for the Stabilization of a Photorefractive Holographic Camera in Perturbed Environments, Cédric Thizy, Marc P. Georges, Philippe C. Lemaire; Ctr. Spatial de Liège, Univ. de Liège, Belgium. We present different phase control strategies applied to a photorefractive holographic camera in order to render it less sensitive to external perturbations. Techniques external and internal to the device are described and performances compared.

MB49

Photorefractive Holographic Interferometry for Movable Artwork Assessment, Cédric Thizy¹, Marc P. Georges¹, Eleni Kouloump², Tim Green³, Stephen Hackney³, Vivi Tornari⁴; ¹Ctr. Spatial de Liège, Univ. de Liège, Belgium, ²Natl. Gallery, Alexandro Soutzos Museum, Greece, ³Tate, UK, ⁴Foundation for Res. and Technology-Hellas, Inst. of Electronic Structure and Laser, Greece. Photorefractive holographic interferometry is applied to assessment of movable artworks. Its role is to observe tiny signatures resulting from internal artwork characteristics. In the future, the system will be used for both antifraud and restoration.

MB50

Speckle Imaging in Coherence Domain Biomedical Imaging Using Photorefractive Multiple Quantum Wells, Haibo Lin, Ping Yu; Dept. of Physics and Astronomy, Univ. of Missouri-Columbia, USA. We studied speckle imaging through a turbid medium in holographic OCI systems using photorefractive multiple quantum wells. Results show a strong relation between the system resolution and the mean free path of the turbid medium.

MB51

Characteristics and Some Applications of the Laser with Dynamic Hologram Coupled Cavities, Vladimir Markov¹, Anatoliy Khizhnyak¹, Shiang Liu², Roberta Ewrat³; ¹MetroLaser, Inc., USA, ²Aerospace Corp., USA, ³Air Force Space and Missile Systems Ctr., USA. Real-time holography methods are studied as the efficacious technique for coupling laser cavities. The approach is shown to be effective for tracking remote target through turbulent atmosphere and coherent combining multiple laser beams.

MB52

Beam Cleanup of a Pulsed Multimode Fiber Master-Oscillator Power-Amplifier at 1.55 μm Using Stimulated Brillouin Scattering, Bastien Steinhauser¹, A. Brignon¹, E. Lallier¹, J. P. Huignard¹, P. Georges²; ¹Thales Res. and Technology, France, ²Lab Charles Fabry de l'Inst. d'Optique, CNRS, Univ. Paris Sud, France. We present a large core Er:Yb co-doped fiber amplifier followed by a beam quality recovery system. The multimode output (220 μJ , M²-6) is converted in a good quality beam (M²=1.6, 110 μJ) through SBS beam cleanup.

MB53

Nondestructive Readout of the Volume Hologram by Use of Polychromatic Light, Ryushi Fujimura, Tsutomu Shimura, Kazuo Kuroda; Univ. of Tokyo, Japan. We propose a method to read the volume hologram at a wavelength different from the recording one. Whole the image can be reconstructed using a spectrally broad but spatially coherent light source.

MB54

Optical Tunability of Resonant Fabry-Perot Saturable Absorbers with Application to Optical Switching, Azad Siahmakoun, Yongan Tang, Sergio Granieri; Ctr. for Applied Optics Studies, Rose-Hulman Inst. of Technology, USA. We demonstrate optical switching in a Fabry-Perot saturable absorber (FPSA) using pump-probe technique at 5 MHz. The mechanism is based on controlling the reflectivity of the FPSA via the pump power under resonance conditions.

MB55

Adaptation of Photorefractive Holographic Camera for Observation of Micro-Mechanical Structures, Marc P. Georges¹, Cédric Thizy¹, Jerome Loicq¹, Serge Habraken¹, Vunfu Wong Kwan², Conor O'Mahony², Orla Slattery²; ¹Ctr. Spatial de Liège, Univ. de Liège, Belgium, ²Tyndall Natl. Inst., Ireland. The photorefractive holographic camera initially working on large scattering objects has been adapted to observe centimetric to micrometric objects. Application on micro-mechanical systems is presented.

MB56

Interference Filters Based on Photosensitive Materials, Weidong Shen^{1,2}, Michel Lequime², Michel Cathelinaud², Virginie Nazabal³, Cecile Aubert⁴; ¹State Key Lab for Modern Optical Instruments, China, ²Inst. Fresnel, France, ³Sciences Chimiques de Rennes, France, ⁴KLOE, France. First experimental demonstrations of the concept of photosensitive filters are reported. Two photosensitive materials are tried, organic-mineral material and Ge₁₅Sb₂₀S₆₅ chalcogenide material.

MB57

Multiplexing Holographic Patterns in a LiNbO₃:Ce:Cu Crystal, Zhuqing Jiang, Yanbin Sun, Xiong Li, Shiquan Tao; Beijing Univ. of Technology, China. We have performed the two-center holographic recordings of 50 images in a LiNbO₃:Ce:Cu crystal with gating light at 365nm and recording light at 633nm by using equal-time exposure schedule. The average efficiency reaches 7.64×10^{-6} .

MB58

Single Beam Dynamic Double (Optical and Electrical) Interferometer Based on Fast Ferroelectric Crystal Sn₂P₂S₆, Nikolai V. Kukhtarev¹, Tatiana Kukhtareva¹, Phillip Land Land¹, Jai Wang¹, Alexander Grabar²; ¹Alabama A&M Univ., USA, ²Uzhgorod Natl. Univ., Ukraine. Single beam dynamic double interferometer with optical (beam coupling) and electrical (holographic current) response rate in millisecond was realized using CW HeNe laser (P=15mW) with ferroelectric crystal Sn₂P₂S₆.

MB59

Serial Holographic Formation of Inharmonic Diffraction Structures in Photopolymeric Composite Materials, Eugene A. Dovolnov, Sergey N. Sharangovich; Tomsk State Univ. of Automatic Control Systems and Radioelectronics, Russian Federation. Analytical model of serial holographic formation of diffraction structures in photopolymeric composite materials. Kinetics of spatial profiles of refractive index and influence of interconnection between harmonics are investigated numerically.

MB60

PVDF Thin Film Used as an Auto-Oscillator, LaQuieta L. Huey¹, Michael Curley¹, J. C. Wang¹, Sergey Sarkisov²; ¹Alabama A&M Univ., USA, ²SSS Optical Technologies, LLC, USA. An all optical switch is a device that allows one optical signal to control another optical signal. Photonic switches in general use either mirror or refractive effects to redirect the stream of light.

MB61

Time Comb Pulses through Ultrafast Pulse Shaping, Karthick S. K. Kumar, Debabrata Goswami; Indian Inst. of Technology, Kanpur, India. Time-comb femtosecond pulses at 1560nm is demonstrated by coupling a pulse-shaper in one arm of Mach-Zehnder interferometer. Time-comb data for 5-pulses last 80ps. Such pulse-shaping technique is ideal in simultaneous time-wavelength multiplexing and coherent control.

5:30 p.m.–7:30 p.m.

Dinner (on your own)

MC • Celebrating 30 Years of Applications of Band Transport Equations

Alpine Ballroom

7:30 p.m.–9:00 p.m.

MC • Celebrating 30 Years of Applications of Band Transport Equations
George C. Valley; Aerospace Corp., USA, *President***MC1 • 7:30 p.m.****Invited**

Retro-Reflections on Mutually Pumped Phase Conjugation: An Incoherent Reappraisal of This Surprising Behaviour, Robert Eason; Univ. of Southampton, UK. After two decades, the discovery of mutually pumped phase conjugation continues to surprise and impress (me). How come such an unexpected and optically illegal phenomenon didn't make it big time and find applications in abundance?

MC2 • 8:00 p.m.**Invited**

Crystal Accelerators: Generation of Focused Electron Beams, X-Rays and Neutrons, Nikolai V. Kukhtarev, Tatiana Kukhtareva, Phillip Land, Jai Wang; Alabama A&M Univ., USA. Pyroelectric and photogalvanic contribution to ferroelectric crystals charging is considered. Crystal electrostatic accelerators, based on crystal's charging by pyroelectric and photogalvanic effects are discussed in relation to generation of self-focused electron beam, X-rays and neutrons.

MC3 • 8:30 p.m.**Invited**

Holographic Information Processing, Dana Anderson; Univ. of Colorado at Boulder, USA. No abstract available.

• Tuesday, October 16, 2007 •

Alpine Ballroom Foyer

7:30 a.m.–5:00 p.m.

Registration Open

TuA • Beam Propagation and Coupling

Alpine Ballroom

8:00 a.m.–9:45 a.m.

TuA • Beam Propagation and Coupling

Presider to be Announced

TuA1 • 8:00 a.m.

Photoexcitation and Charge Transport in Organic Molecular Crystals, Joshua C. May, Hikmat Najafov, Ivan Biaggio; Lehigh Univ., USA. By using short wavelength tunable optical pulses to excite a transient photoconductivity and to write a transient photorefractive grating we uncover the unique mechanisms of photocarrier generation in Rubrene and of charge transport in DAST.

TuA2 • 8:15 a.m.

Generation of Time Subharmonic by Two-Wave Mixing in CdTe under Low Frequency AC Field, Anatoli V. Khomenko¹, Konstantin V. Shcherbin², Marco A. Garcia-Zarate¹; ¹CICESE, Mexico, ²Inst. of Physics, Ukraine. Generation of time n/f -subharmonics, where n is the integer and f is the time frequency of applied electric field, in two-wave mixing experiment in CdTe:Ge with auxiliary incoherent illumination is reported.

TuA3 • 8:30 a.m.

Advances in Photorefractive Beam Coupling, Dean R. Evans¹, Gary Cook^{1,2}, Mohammad A. Saleh^{1,3}; ¹AFRL, USA, ²Universal Technology Corp., USA, ³UES, Inc., USA. Introducing impurities into the potassium site in photorefractive potassium niobate has proven to significantly enhance the optical and photorefractive properties. In addition, the trap density has been increased over a factor of thirty.

TuA4 • 8:45 a.m.

Effect of Incoherent Lighting on Contradirectional Interaction in BTO, Stanislav Shandarov¹, Alexey Kolegov¹, Nikolay Burimov¹, Valery Belikov¹, Viktor Prokofiev², Timo Jääskeläinen², Alexander Tolstik³, Petr Ropot³; ¹Tomsk State Univ. of Control Systems and Radio Electronics, Russian Federation, ²Dept. of Physics, Univ. of Joensuu, Finland, ³Physical Faculty, Belarusian State Univ., Belarus. The change in sign of gain coefficient at interaction of laser beams with $\lambda=633$ nm on a reflection photorefractive grating in BTO crystal in response to its lighting by green radiation was experimentally observed.

TuA5 • 9:00 a.m.

Control of Slow Light with Light in a Protein Complex, Chandra S. Yelleswarapu, Devulapalli V. G. L. N. Rao; Univ. of Massachusetts at Boston, USA. The group velocity in the biomaterial bacteriorhodopsin, both in thin film and solutions, is all-optically controlled by a second optical beam over a wide range of 0.1 mm/sec all the way to speed of light.

TuA6 • 9:15 a.m.

Invited

Manipulating Light Pulses with Photorefractive Crystals, Serguey G. Odoulov¹, A. Shumelyuk¹, B. Sturman², E. Podivilov², M. Gorkunov³; ¹Inst. of Physics, Natl. Acad. of Sciences, Ukraine, ²Inst. of Automation and Electrometry of Russian Acad. of Sciences, Russian Federation, ³Inst. of Crystallography of Russian Acad. of Sciences, Russian Federation. We show theoretically and experimentally that the photorefractive nonlinearity possesses a big potential for manipulating light pulses, including their slowing down, long term storage and release on demand. Particular examples are considered.

Grand Sierra C&D

9:45 a.m.–10:15 a.m.

Coffee Break

TuB • Applications II

Alpine Ballroom

10:15 a.m.–12:00 p.m.

TuB • Applications II

Cornelia Denz; Westfaelische Wilhelms-Univ. Münster, Germany, Presider

TuB1 • 10:15 a.m.

Holographic Blind Source Separation at Radio Frequencies, Martha Baylor, Dana Z. Anderson, Zoya Popovic; Univ. of Colorado, USA. A photorefractive optoelectronic system implements analog independent component analysis to achieve two-channel blind source separation of 10 MHz signals on a 200 MHz carrier. The system uses photorefractive carrier suppression and custom broadband electrooptic modulators.

TuB2 • 10:30 a.m.

A High-Sensitive Holographic Interferometer for the Measurements of Weak Forces and Small Mechanical Displacements, V. M. Petrov^{1,2}, A. V. Khomenko³, T. Tschudi¹; ¹Inst. of Applied Physics, Darmstadt Univ. of Technology, Germany, ²A. F. Ioffe Physical Technical Inst., Russian Federation, ³CICESE, Mexico. We describe a high-sensitive adaptive interferometer based on BaTiO₃:Co designed for displacement measurements of the objects with high reflectivity. The linear regime of signal detection in crystal with nonlocal response is insured by polarization filtering.

TuB3 • 10:45 a.m.

Real-time Photoinduced Waveguides in Sn₂P₂S₆ Bulk Crystals with Visible or Near Infrared Light, Germano Montemezzani¹, Cristian Dan¹, Mohamed Gorram¹, Nicolas Fressengeas¹, Delphine Wolfersberger¹, Flurin Juvalta², Roger Mosimann², Mojca Jazbinsek², Peter Günter², Alexander A. Grabar³; ¹Lab Matériaux Optiques, Photonique et Systèmes, France, ²Inst. of Quantum Electronics, ETH Zurich, Switzerland, ³Uzhgorod Natl. Univ., Ukraine. Light induced waveguides are demonstrated in Sn₂P₂S₆ by two alternative methods allowing a waveguide formation time of the order of 1 ms. The techniques are based on shaped visible lateral illumination and near infrared self-focusing.

TuB4 • 11:00 a.m.

High Power Pico-Second Output from a Diode-Pumped Nd:YVO₄ Phase Conjugate Laser, Takashige Omatsu¹, Kouji Nawata¹, Kazuo Kuroda², Ara Minassian³, Michael J. Damzen³; ¹Dept. of Information and Image Science, Chiba Univ., Japan, ²Univ. of Tokyo, Japan, ³Imperial College, UK. We demonstrated a high power pico-second output from a diode pumped Nd:YVO₄ slab amplifier with a photorefractive phase conjugate mirror. Over 25W diffraction-limited output was obtained. This system could also produce MW ps pulses.

TuB5 • 11:15 a.m.

Photorefractive Interferometry Applied to Novel Laser Tapping Nondestructive Technique, Alain Blouin, Benjamin Campagne, Christian Néron, Jean-Pierre Monchalain; Natl. Res. Council Canada, Canada. Photorefractive interferometers are a key to detection of disbands in coatings and honeycomb structures. The technique is based on a pulsed laser excitation of a layer driven into vibration, and detection by a photorefractive interferometer.

TuB6 • 11:30 a.m.**Invited**

Bandwidth Compression Optical Processor Using Chirped Fiber Bragg Gratings, George C. Valley¹, Josh Conway¹, Jason Chou¹, George A. Sefler¹, Shalabh Gupta², Bahram Jalali²; ¹Aerospace Corp., USA, ²Univ. of California at Los Angeles, USA. Chirped fiber Bragg gratings are used as low-loss, dispersion compensation modules for telecommunications applications. We use them to make an optical processor that compresses the bandwidth of electronic signals before digitization by an analog-to-digital converter.

12:00 p.m.–1:00 p.m.

Lunch (on your own)

TuC • Applications III

Alpine Ballroom

1:00 p.m.–3:00 p.m.

TuC • Applications III

Presider to be Announced

TuC1 • 1:00 p.m.

Photocatalytic Nanoparticle Deposition on LiNbO₃ Engineered Nanodomain via Photovoltaic Effect, Kenji Kitamura, Xiaoyan Liu, Kazuya Terabe, Hideki Hatano; Optronics Materials Ctr., Natl. Inst. for Materials Science, Japan. Nanomaterials deposition on nanodomain patterns of the ferroelectric lithium niobate crystal has been approached by using the photovoltaic effect. This technique enables to realize the selective deposition of Ag particles on the inverted +Z surfaces.

TuC2 • 1:15 p.m.

3-D Micro-Optic Circuits in Holographic Photopolymers, Robert R. McLeod, Matthew S. Kirchner, Amy C. Sullivan; Univ. of Colorado, USA. Three-dimensional direct-write lithography into diffusion-mediated photopolymers developed for holography is shown to create 10 micron single-mode waveguides. We demonstrate low-loss waveguides, 90 degree bends off of encapsulated mirrors and fabrication of waveguides to embedded fibers.

TuC3 • 1:30 p.m.

Electrically Controlled Vortex-Producing Lenses and Axial Null-Producing Filters Made with Domain-Engineered LiNbO₃, Roger S. Cudney, H. M. Escamilla, L. A. Ríos; CICESE, Mexico. Electrically controlled spatial filters were made with domain-engineered LiNbO₃. These filters introduce a null in the center of a beam. The spatial extent of the null can be controlled by proper design of the filter.

TuC4 • 1:45 p.m.

Photorefractive-Based Adaptive Antenna Array Processing Using BEAMTAP, Gregory R. Kriehn¹, Kelvin Wagner²; ¹California State Univ., Fresno, USA, ²Univ. of Colorado, Boulder, USA. We present an experimental implementation of photorefractive-based adaptive antenna array processing using the BEAMTAP (Broadband Efficient Adaptive Method for True-time-delay Processing) algorithm. Measured antenna array patterns illustrate 60-dB of adaptive jammer nulling.

TuC5 • 2:00 p.m.

Integrated-Optical Add/Drop Multiplexer for Dense Wavelength Multiplexing in Lithium Niobate, Daniel Runde, Stephan Brunken, Stefan Breuer, Christian E. Rüter, Detlef Kip; Clausthal Univ. of Technology, Germany. An add/drop multiplexer using a holographically recorded Bragg grating in LiNbO₃ is experimentally demonstrated. Polarisation-independent operation, electrical wavelength tuning and on/off switching is achieved using the electro-optic effect of LiNbO₃.

TuC6 • 2:15 p.m.

Organic Photorefractive Polymers for Coherence Based Imaging, Sebastian Köber¹, Francisco Gallego-Gomez¹, Michael Salvador¹, Klaus Meerholz¹, Floris B. Kooistra², Jan C. Hummelen², Felix Mielke³, Oskar Nuyken³; ¹Physical Chemistry Dept., Univ. of Cologne, Germany, ²Stratingh Inst. for Organic Chemistry, Netherlands, ³Macromolecular Chemistry Dept., Germany. A decrease in response time of organic photorefractive polymers is demonstrated by means of decreasing the reduction potential of the incorporated sensitizer.

TuC7 • 2:30 p.m.**Invited**

Latest Developments in Photorefractive Self-Organized Laser Cavities, Gilles Pauliat, Nicolas Dubreuil, Gérald Roosen; Lab Charles Fabry de l'Inst. d'Optique, CNRS, Univ. Paris-Sud, France. We review the state of the art of photorefractive self-adapted filters inserted inside laser cavities. The main role of these filters is to induce a winner takes all competition among the laser modes.

Alpine Ballroom Foyer

3:00 p.m.–3:30 p.m.

Coffee Break

TuD • Keynote Session II

Alpine Ballroom

3:30 p.m.–5:30 p.m.

TuD • Keynote Session II

Lambertus Hesselink; Stanford Univ., USA, Presider

TuD1 • 3:30 p.m. Invited

Dynamic Population Gratings in Rare-Earth Doped Fibers: Properties and Possible Applications, *Serguei Stepanov; CICESE, Mexico*. Dynamic gratings in rare-earth-doped fibers are recorded via local saturation of optical absorption/gain in bright fringes of the interference pattern. Their principal properties and applications in tunable filters, fiber lasers, and adaptive interferometry are discussed.

TuD2 • 4:00 p.m. Invited

Digital Holographic Optical Coherence Imaging; 3-D Motility Assays of the Effect of Anticancer Drugs, *David D. Nolte, Kwan Jeong, John J. Turek; Purdue Univ., USA*. Digital off-axis holography with coherence-domain depth gating is a sensitive probe of living tissue, able to measure sub-cellular motion inside tumors responding to cytoskeletal anti-cancer drugs.

TuD3 • 4:30 p.m. Invited

Self-Adaptive Wavefront Holography Technique Applied to Acousto-Optic Imaging of Thick Biological Tissues Using the Photorefractive Effect, *François Ramaz¹, Max Lesaffre¹, Albert-Claude Boccara¹, Michel Gross², Philippe Delaye³, Gérald Roosen³; ¹Lab d'Optique, Ecole Supérieure de Physique et de Chimie Industrielles de la Ville de Paris, Univ. Pierre et Marie Curie, France, ²Lab Kastler-Brossel, Ecole Normal Supérieure, France, ³Lab Charles Fabry de l'Inst. d'Optique, CNRS, Univ. Paris-Sud, France*. Acousto-optic imaging combined with adaptive wavefront interferometry is used to reveal local optical properties of objects embedded within thick scattering media. We will present experimental configurations in connection with the requirements needed for *in vivo* imaging.

TuD4 • 5:00 p.m. Invited

The Casimir Force and Light Pressure, *Mikhail P. Petrov; Ioffe Physico-Technical Inst., Russian Federation*. A brief introduction into the Casimir force theory is presented. Original experimental investigations of the Casimir force performed with an adaptive dynamic holographic interferometer and theoretical analysis of the experiments are described.

Alpine Ballroom

5:30 p.m.–5:45 p.m.

Closing Remarks

NOTES

Key to Authors and Presiders

Bold denotes presenting author or presider

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