ASSP

20th Anniversary Meeting
Advanced Solid-State Photonics

January 29-February 1, 2006

Hyatt Regency Lake Tahoe Resort
Incline Village, Nevada

Sponsored by:

Optical Society of America
Technical Cosponsor: IEEE/Lasers and Electro-Optics Society

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University of Rochester Lab. For Laser Energetics

Committees

Program Committee

General Chairs

Craig Denman, *AFRL, USA*
Irina Sorokina, *Vienna Univ. of Technology, Austria*

Program Chair

Timothy Carrig, *Coherent Technology, Inc., USA*

Committee Members

Gerard Aka, *Ecole Natl. Superieure de Chimie de Paris, France*
Christopher Ebbers, *LLNL, USA*
Jason Eichenholz, *Newport, Inc., USA, SEC Representative **
Ingmar Hartl, *IMRA America, Inc., USA*
Guenter Huber, *Univ. Hamburg, Germany*
Franz Kaertner, *MIT, USA*
Rüdiger Paschotta, *RP Photonics Consulting GmbH , Switzerland*
Gregory J. Quarles, *VLOC-A Subdivision of II-VI, USA*
Robert R. Rice, *Northrop Grumman, USA*
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Anne Christine Tropper, *Univ. of Southhampton, UK*
Jirong Yu, *NASA Langley Res. Ctr., USA*
Jonathan D. Zuegel, *Univ. of Rochester, USA*

About ASSP

January 29 – February 1, 2006

Advances in solid-state lasers, parametric devices and nonlinear frequency conversion provide powerful tools for an increasingly broad range of applications including spectroscopy, metrology, remote sensing, communications, material processing, medicine and entertainment. Now in its 21st year, the Advanced Solid-State Photonics Topical Meeting remains the world's premier forum for discussion of new developments in laser and nonlinear optical materials and devices. The upcoming meeting, at Lake Tahoe, will provide a spectacular setting for learning about these advances. Take this opportunity to be part of the year's most significant meeting on advanced solid-state laser sources. Plan to attend Advanced Solid-State Photonics 2006!

Meeting Topics

- Tunable and New Wavelength Solid-State Lasers
- Diode-Pumped Lasers
- Fiber Lasers
- Photonic-Crystal Lasers
- High-Power Lasers
- Short-Pulse Lasers
- Frequency-Stable Lasers
- Microlasers
- Optically-Pumped Semiconductor Lasers
- High Brightness Diodes
- Optical Sources Based on Nonlinear Frequency Conversion
- Frequency Conversion Techniques, Including OPO, OPA, OPG, SHG, SFG, DFG and Raman
- Developments in Laser Media
- Developments in Nonlinear Optical Materials
- Developments in Engineered Optical Materials
- Laser Sources and Their Applications in Science, Medicine, Remote Sensing, Industry or Entertainment

Invited Speakers

- **ME1 High Pulse Energy and High Peak Power Fiber Amplifiers**, *Mark Bowers, Aculight, USA*
- **TuA1 Overview of Progress on DARPA's SHEDS and ADHELS Programs**, *Martin Stickley, DARPA, USA*
- **TuC1 THz-Wave Frequency-Agile Parametric Oscillator and Future Applications,** *Hiroaki Minamide, Tohoku Univ., Japan*
- **WE1 High Power Single-Frequency Laser for Gravitational Wave Detection**, *Dietmar Kracht, Laser Zentrum Hannover, Germany*

Plenary Speakers

- **MA1 Inertial Confinement Fusion: First Light from the National Ignition Facility and Future Plans**, *Ed Moses, LLNL, USA*
- **WA1 Keeping Light Behind Bars**, *Philip St. John Russell, Univ. of Bath, UK*

Banquet Speaker

- **Quo Vadis Solid-State Lasers**, *Bill Krupke, WFK Lasers, LLC, USA*

ASSP Short Courses

Short Courses

With a strong commitment to continuing technical education, ASSP short courses are designed to increase your knowledge of a specific subject, while offering you the experience of expert teachers. Top-quality instructors stay current with the subject matter required to advance your research and career goals. An added benefit of attending a short course is the availability of continuing education units (CEUs).

Continuing Education Units (CEUs)

Short Course attendees who successfully complete a course are eligible to receive continuing education units (CEUs). The CEU is a nationally recognized unit of measure for continuing education and training programs that meet established criteria. CEUs will be calculated and certificates will be mailed to participants after the conference.

Registration

Tuition for the short course is a separate fee. Advance registration is recommended, as the number of seats in each course is limited. Short courses sell out quickly! There will not be a waiting list for short courses. Short course materials are not available for purchase.

Click here for registration information.

Short Course Schedule

Sunday, January 29, 2006

8:00 a.m. –12:00 p.m.

- **SC256: Lasers for Ultrashort Pulse Generation**
  Rüdiger Paschotta, RP Photonics Consulting GmbH, Switzerland

1:00 p.m.–5:00 p.m.

- **SC257: Designing Crystal Nonlinear Optical Devices Using SNLO Models**
  Arlee Smith, Sandia Natl. Labs, USA

- **SC258: Optical Crystals for Advanced Solid-State Photonic Applications**
  David Sumida, HRL Laboratories, LLC, USA

Publications

Conference Program

The printed ASSP 2006 Conference Program and Technical Digest will contain general program information, abstracts of the paper summaries, and the 3-page summaries of all papers presented during the meeting as they were submitted by the authors. At the meeting, each registrant will receive a copy of the printed Conference Program and Technical Digest. Extra copies can be purchased at the meeting for a special price of US$ 100.

Technical Digest

The ASSP 2006 Technical Digest on CD-ROM will contain PDFs of paper summaries presented during the meeting as they were submitted by the authors. At the meeting, each registrant will receive a copy of the Technical Digest on CD-ROM. Extra copies can be purchased at the meeting for a special price of US$ 100.

ASSP Exhibitors

Visit a state-of-the-art exhibit of tabletop displays featuring the latest technological advances of the industry's hottest companies. Connect with the most innovative leaders in the field of Fourier transform spectrometry and hyperspectral imaging and sounding instruments in the atmospheric, land and coastal-ocean disciplinary areas.

For more information contact Cathryn Wanders at +1 202.416.1972 or topicalexhibits@osa.org.

Alpine Research Optics
Cleveland Crystals, Inc.
Cristal Laser
Crystal Fibre A/S
Del Mar Photonics
Deltronic Crystal / Isowave
DILAS Diodenlaser GmbH
EKSPLA
ELS Electronic Laser System
KOHERAS A/S
Laser Focus World
LINOS Photonics
Menlo Systems GmbH
nLight Corporation
Northrop Grumman Cutting Edge Optronics
Northrop Grumman Synoptics
Nufern
Nuvonyx Inc.
Onyx Optics
Oxide Corp.
Photonics Spectra
Precision Photonics Corporation
Princeton Scientific, an IMPEX company
Quintessence Photonics Corp.
RPMC Lasers, Inc.
Scientific Materials Corporation
Spectra Physics
Sydor Instruments
Thorlabs Inc.
Time-Bandwidth Products
VLOC

Advanced Solid-State Photonics
Hyatt Regency Lake Tahoe Resort, Incline Village, Nevada

Welcome to Lake Tahoe and to the **Advanced Solid-State Photonics** Topical Meeting and Tabletop Exhibit. As you can see from the program, this year's event brings together a multidisciplinary group sharing a common interest in the experimentation, development, and generation of solid-state photonics. Scientists and researchers in the field of lasers, physics, chemistry, material science, photonics, electronics, biology, engineering and medical applications have joined together to present their latest research, discoveries and applications for solid-state photonics.

This year you will be exposed to over 120 presentations of the highest caliber. We have scheduled 54 oral presentations and over 70 poster presentations for you to consider over the next three days. The program is exceptional. There are also opportunities to participate in short courses, plenary sessions, and networking that will allow you to spend time with colleagues from all over the world.

We hope that you enjoy your time with us this week and the unique opportunity to explore Lake Tahoe.

Sincerely,

Craig Denman, *AFRL, USA*
Irina Sorokina, *Vienna Univ. of Technology, Austria*
General Chairs

Timothy J. Carrig, *Lockheed Martin Coherent Technologies, USA*
Program Chair

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Jirong Yu, *NASA Langley Res. Ctr., USA*
Jonathan D. Zuegel, *Univ. of Rochester, USA*

*Representative to OSA's Science and Engineering Council

Agenda of Sessions

Sunday, January 29, 2006		
Time	**Event**	**Location**
7:00 a.m. - 5:00 p.m.	Registration	*Lakeside Foyer*
8:00 a.m. - 12:00 p.m.	SC256: Lasers for Ultrashort Pulse Generation	
9:00 a.m. - 12:00 p.m.	Industrial Symposium – Photonics Meets Industry (free of charge)	*Martis Peak B*
12:00 p.m. - 1:00 p.m.	Lunch (on your own)	
1:00 p.m. - 5:00 p.m.	SC257: Designing Crystal Nonlinear Optical Devices Using SNLO Models	
1:00 p.m. - 5:00 p.m.	SC258: Optical Crystals for Advanced Solid-State Photonic Applications	

Monday, January 30, 2006		
Time	**Event**	**Location**
7:00 a.m. - 5:00 p.m.	Registration	*Lakeside Foyer*
8:00 a.m. - 8:30 a.m.	Opening Remarks	*Lakeside Ballroom*
8:30 a.m. - 10:00 a.m.	**MA**: High Power Solid-State Lasers	*Lakeside Ballroom*
10:00 a.m. - 4:00 p.m.	Exhibits	*Regency Ballroom*
10:00 a.m. - 11:00 a.m.	**MB**: Poster Session I, Coffee Break & Exhibits	*Regency Ballroom*
11:00 a.m. - 12:30 p.m.	**MC**: Nonlinear Conversion	*Lakeside Ballroom*
12:30 p.m. - 2:00 p.m.	Lunch (on your own)	
2:00 p.m. - 3:30 p.m.	**MD**: UV to Mid-IR Solid-State Lasers	*Lakeside Ballroom*
3:30 p.m. - 4:00 p.m.	Coffee Break & Exhibits	*Regency Ballroom*
4:00 p.m. - 5:30 p.m.	**ME**: Pulsed Fiber Amplifiers	*Lakeside Ballroom*
5:30 p.m. - 7:30 p.m.	Dinner (on your own)	
7:30 p.m. - 8:30 p.m.	**MF**: Postdeadline Paper Session	*Lakeside Ballroom*

Tuesday, January 31, 2006		
Time	**Event**	**Location**
7:30 a.m. - 1:00 p.m.	Registration	*Lakeside Foyer*
8:00 a.m. - 10:00 a.m.	**TuA**: Mode-Locked Solid-State Lasers	*Lakeside Ballroom*
10:00 a.m. - 1:00 p.m.	Exhibits	*Regency Ballroom*
10:00 a.m. - 11:00 a.m.	**TuB**: Poster Session II, Coffee Break & Exhibits	*Regency Ballroom*
11:00 a.m. - 1:00 p.m.	**TuC**: THz and Optical Parametric Oscillators	*Lakeside Ballroom*
7:00 p.m. - 10:00 p.m.	Conference Banquet	*Lakeside Ballroom*

Wednesday, February 1, 2006		
Time	**Event**	**Location**
7:30 a.m. - 5:00 p.m.	Registration	*Lakeside Foyer*
8:00 a.m. - 10:00 a.m.	**WA**: Microstructured Fibers	*Lakeside Ballroom*
10:00 a.m. - 4:00 p.m.	Exhibits	*Regency Ballroom*
10:00 a.m. - 11:00 a.m.	**WB**: Poster Session III, Coffee Break & Exhibits	*Regency Ballroom*
11:00 a.m. - 12:30 p.m.	**WC**: Ultrashort Pulse Generation and Amplification	*Lakeside Ballroom*
12:30 p.m. - 2:00 p.m.	Lunch (on your own)	
2:00 p.m. - 3:30 p.m.	**WD**: Novel Laser Architectures	*Lakeside Ballroom*
3:30 p.m. - 4:00 p.m.	Coffee Break & Exhibits	*Regency Ballroom*
4:00 p.m. - 6:00 p.m.	**WE**: Ceramic Lasers	*Lakeside Ballroom*
6:00 p.m. - 6:30 p.m.	Closing Remarks and Presentation of Best Student Paper Prize	*Lakeside Ballroom*

Conference Highlights

► ASSP Industrial Symposium: Photonics Meets Industry

Sunday, January 29, 2006: 8:00 a.m. – 11:00 a.m.
Moderator: Jason Eichenholz, *Newport, Inc., USA*
Martis Peak B

This programming is free of charge and open to all conference participants. Do not miss this opportunity to become acquainted with the leading photonics companies' most recent developments in research and technology.

► Poster Sessions

Monday, January 30, 2006: 10:00 a.m. – 11:00 a.m.
Regency Ballroom

Tuesday, January 31, 2006: 10:00 a.m. – 11:00 a.m.
Regency Ballroom

Wednesday, February 1, 2006: 10:00 a.m. – 11:00 a.m.
Regency Ballroom

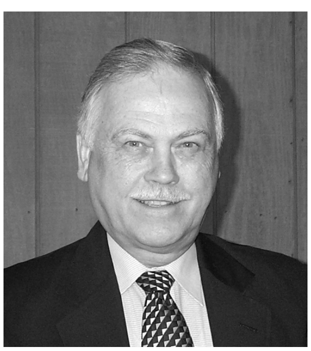
Poster presentations will be displayed during these times. Poster authors will be present to discuss their work with attendees.

► Conference Banquet

Tuesday, January 31, 2006: 7:00 p.m. – 10:00 p.m.
Lakeside Ballroom

Join your fellow ASSP attendees for dinner and a special presentation at the Conference Banquet.

Banquet Speaker:
Quo Vadis Solid-State Lasers, Bill Krupke, *WFK Lasers, LLC, USA*. A materials-centric, 40-year perspective on solid state lasers will be presented: historical highlights and a speculative look forward.



William (Bill) Krupke received the B. S. degree in physics from Rensselaer Polytechnic Institute (1958), and M. A. and Ph.D. degrees in physics from the University of California at Los Angeles in 1961 and 1966. He has held technical and management positions at the Hughes Aircraft, Minneapolis Honeywell, and Aerospace Corporation. In 1972, he co-founded the Laser Directorate at the Lawrence Livermore National Laboratory (LLNL), and served variously as Program Leader, Chief Scientist, and Deputy Associate Directorate during his 27-year LLNL tenure. Through the early 1980s, he participated in the design, development, and construction of evermore powerful Nd:glass lasers, and led R&D efforts on solid-state, excimer, copper-vapor, and dye lasers. Since 1985, he has been engaged in development of diode-pumped high-average-power solid-state lasers. In 1999, Bill left LLNL to form WFK Lasers, LLC to consult for start-up high technology companies. Krupke is an OSA Fellow and a member of IEEE LEOS. He has served on the Board of Directors of the OSA, and as chairperson of the Quantum Electronics Division of the OSA Technical Council. He has authored or co-authored over 50 scientific publications in the field of quantum electronics, has published several book chapters, and holds 21 patents.

► Postdeadline Paper Session

Monday, January 30, 2006: 7:30 p.m. – 8:30 p.m.
Lakeside Ballroom

ASSP 2006 Short Courses

► SC256 Lasers for Ultrashort Pulse Generation

Rüdiger Paschotta, *RP Photonics Consulting GmbH, Germany*

Course Description

This course gives an introduction to the field of ultrashort pulse generation with various kinds of mode-locked lasers. It begins with essential information on laser gain media, techniques for dispersion compensation, and relevant optical nonlinearities, and continues with an overview of the physics of mode-locking in various situations. The latter topic includes the starting of the mode-locking process, an overview of different types of saturable absorbers, soliton mode-locking, harmonic mode-locking, Q-switching instabilities and other destabilizing effects. Finally, different types of mode-locked lasers will be discussed, including various kinds of picosecond and femtosecond diode-pumped solid-state lasers, Ti:sapphire lasers, fiber lasers, diode lasers (very briefly), and optically pumped surface-emitting semiconductor lasers. Some emphasis will be put on mode-locked lasers for operation in extreme parameter ranges, such as Ti:sapphire lasers generating sub-10-fs pulses, thin disk lasers for sub-picosecond pulses with extremely high average power, and miniature lasers for pulse repetition rates of tens of GHz and more. It will become apparent that the kinds of lasers discussed differ greatly, not only concerning the magnitude of various parameters, but also in terms of the important physical mechanisms.

Benefits and Learning Objectives

This course should enable you to:

- Compare different laser gain media in terms of suitability for mode-locking in different parameter ranges;
- List different techniques for dispersion compensation;
- Explain the role of nonlinearities in different kinds of mode-locked lasers;
- Explain the essentials of active and passive mode-locking;
- Identify limiting parameters for pulse durations, output powers and pulse repetition rates; and
- Compare the potential of different kinds of mode-locked lasers in different operation regimes.

Intended Audience

This course should be useful for researchers at universities, as well as R&D staff in the industry who want to get an introduction to the field of ultrashort pulse generation with lasers and an overview of different types of mode-locked lasers, in order to either develop mode-locked lasers themselves or select suitable lasers for particular applications. A general background in lasers and optics (principle of lasers, etc.) is required to understand the course, but no specific knowledge of pulse generation is necessary.

Instructor Biography

Rüdiger Paschotta received the Ph.D. degree in Konstanz, Germany, for achievements in the fields of quantum optics and nonlinear optics. From 1994 to 1997, he worked on fiber lasers and amplifiers at the Optoelectronics Research Centre in Southampton, United Kingdom. After a short stay in Paderborn, Germany, he supervised a research team at ETH Zurich, Switzerland, from 1997 to 2005, who worked on nonlinear integrated optics, within the group of Ursula Keller, developing diode-pumped mode-locked lasers. His work concentrated on the physics of mode-locking, mode-locked lasers for high powers or high repetition rates, mode-locked surface-emitting semiconductor lasers, and high-power nonlinear frequency conversion. He is now offering technical consultancy to the industry via his company RP Photonics Consulting GmbH.

► SC257 Designing Crystal Nonlinear Optical Devices Using SNLO Models
Arlee Smith, *Sandia Natl. Labs, USA*

Course Description
SNLO is a free, Windows-based software package comprising 17 functions relating to crystal nonlinear optics. It is intended as a convenient aid in the selecting of the best crystal for a particular application and in quantitatively modeling the crystal's performance. For example, the crystal selection functions compute phase-matching properties for angle-tuned crystals or quasi-phase matching properties for periodically-poled crystals. The device performance models cover the time range from fs to cw, and they can be applied to crystals inside or outside of optical cavities. They are physically realistic because they rigorously account for nonlinear interactions, as well as linear propagation of beams with realistic spatial and temporal profiles. Linear propagation includes diffraction and dispersion to account for spatial and temporal walk off, focusing, etc.

The course will cover all of the SNLO modules but it will emphasize the use of the numerical models of nonlinear crystal performance. Each modeling function will be described in detail and numerous examples will be presented in live demonstrations. The mathematics will be minimal. Instead, the emphasis will be on developing intuition regarding the physical principles that determine crystal performance. Attendees will receive notes that explain each of the models and that present a wide variety of illustrative examples with descriptions of each modeled device and the physical principles highlighted by each example. These examples are preloaded in SNLO so running them yourself is quick and easy. There will be ample time allotted to modeling devices suggested by the course participants.

Benefits and Learning Objectives
This course should enable you to:

- Speed the design of nonlinear optical devices by the use of well-benchmarked quantitative models;
- Save dollars spent on optical components and nonlinear crystals by bypassing the trial and error steps in device design;
- Quickly and quantitatively test the feasibility of novel device concepts; and
- Develop a better intuition of crystal nonlinear optics.

Intended Audience
Anyone who uses nonlinear optical crystals or designs devices based on nonlinear optical crystals, including spectroscopists who use crystals to generate tunable laser light across the optical spectrum, optical engineers who design devices such as optical parametric oscillators or laser frequency multipliers, and students who would like to learn the principles of crystal nonlinear optics. No previous experience in numerical modeling or in the use of SNLO is needed.

Instructor Biography
Arlee Smith (Ph.D., physics, University of Michigan) is a staff scientist in the Lasers, Optics and Remote Sensing Department at Sandia National Labs in Albuquerque, New Mexico. He is an OSA fellow with 30

years of experience in the laboratory use of lasers and nonlinear optical devices, as well as in numerical modeling of nonlinear optical processes. He is the author of SNLO.

► SC258 Optical Crystals for Advanced Solid-State Photonic Applications

David Sumida, *HRL Labs, LLC, USA*

Course Description

The selection of an optical crystal for a particular photonics application involves the consideration of numerous properties of the host crystalline material. In this short course, I focus extensively on the physical, optical, and thermo-mechanical properties of such crystals for laser and other optical elements, leaving a detailed discussion of spectroscopy and laser properties of dopant ions aside for now. The various intrinsic material properties (e.g., crystal structure, refractive index, dn/dT, thermal expansion, thermal conductivity, fracture toughness, etc.) of a wide range of crystalline materials are discussed, including their measurement and relevance to device operation. Existing data on oxide and fluoride crystals is presented in order to provide a comparison of the properties of available crystals. Important optical design issues (e.g., thermally-induced distortions and thermal stress resistance) are evaluated in light of these properties. Finally, we discuss the impact of these properties on solid-state laser and other optical applications.

Benefits and Learning Objectives

This course will enable you to:

- Understand the physical basis of optical and thermo-mechanical crystalline properties;
- Develop familiarity with conventional nomenclature and units of doped and undoped crystalline media;
- Compare the properties of approximately 100 laser host crystals;
- Assess the relative strengths and weaknesses of various solid-state laser crystals; and
- Evaluate the impact of crystalline properties on solid-state laser and photonic devices.

Intended Audience

This course is tailored to help scientists, engineers, students, and managers become more comfortable with making a design decision given the usual ”real-world” conflict between what the intended photonics application calls for, and what the material can actually do given its crystalline-material properties. This course is intended to provide attendees the tools with which to evaluate the relative merits of particular crystals for specific laser and photonic applications.

Instructor Biography

David S. Sumida (Senior Research Project Engineer, HRL Laboratories LLC, Malibu, California) has over 20 years of professional experience in advanced solid-state lasers. He received his Ph.D. in physics at the University of Southern California in 1984. He currently manages several advanced solid-state laser research projects involving diode-pumped solid-state laser media, architectures and applications. He has authored or co-authored over 100 technical papers and presentations, co-authored a book chapter on laser host crystals, and he holds 14 U.S. patents. He is a member of the Optical Society of America and, for nearly ten years, he has co-taught a CLEO short course similar in scope to this one.

ASSP 2006 Abstracts

Sunday, January 29, 2006

► **7:00 a.m. – 5:00 p.m.**
Registration
Lakeside Foyer

► **8:00 a.m. – 12:00 p.m.**
SC256: Lasers for Ultrashort Pulse Generation
Martis Peak A

► **9:00 a.m. – 12:00 p.m.**
Industrial Symposium – Photonics Meets Industry (free of charge)
Martis Peak B

► **12:00 p.m. – 1:00 p.m.**
Lunch (on your own)

► **1:00 p.m. – 5:00 p.m.**
SC257: Designing Crystal Nonlinear Optical Devices Using SNLO Models
Martis Peak A

► **1:00 p.m. – 5:00 p.m.**
SC258: Optical Crystals for Advanced Solid-State Photonic Applications
Martis Peak B

Monday, January 30, 2006

► **7:00 a.m. – 5:00 p.m.**
Registration
Lakeside Foyer

► **8:00 a.m. – 8:30 a.m.**
Opening Remarks
Lakeside Ballroom

MA • High Power Solid-State Lasers

Lakeside Ballroom
8:30 a.m. – 10:00 a.m.
MA • High Power Solid-State Lasers
Jonathan D. Zuegel; Univ. of Rochester, USA, Presider

MA1 • 8:30 a.m. **Plenary**
The National Ignition Facility: The World's Most Complex and Energetic Laser System, *Edward I. Moses; LLNL, USA.* NIF, the 192-beam Nd:glass laser facility being built at Lawrence Livermore National Laboratory, will deliver 1.8 Megajoules of ultraviolet energy. The goal is to demonstrate thermonuclear burn and study materials at extreme temperature and pressure conditions.

Edward I. Moses is the Associated Director for National Ignition Facility (NIF) Programs at the Lawrence Livermore National Laboratory and the Director for the National Ignition Campaign to achieve thermonuclear burn in the laboratory. Moses leads the program responsible for completing construction and activation of the NIF, transforming it into a national user facility with the goals of supporting the Stockpile Stewardship Program, furthering basic science at extreme conditions and studying the potential for inertial fusion energy. He is also responsible for leading the development of advance photon sources. Moses earned his B.S. in electrical engineering from Cornell University in 1972 and his Ph.D. from Cornell University in 1977. Moses holds patents in laser technology and computational physics.

MA2 • 9:15 a.m.
19-kW Phase-Locked MOPA Laser Array, *Gregory D. Goodno, Hiroshi Komine, Stuart J. McNaught, Ben Weiss, Shawn Redmond, William Long, Randy Simpson, Eric Cheung, Donna Howland, Paul Epp, Mark Weber, Michael McClellan, Jeff Sollee, Hagop Injeyan; Northrop Grumman, USA.* We have developed a scalable architecture of phase-locked Nd:YAG master oscillator power amplifiers. In cw operation a 2x1 array emitted 19.0 kW with 30% optical efficiency and 1.73 x diffraction-limited beam quality.

MA3 • 9:30 a.m.
Toward Petawatt Laser Based on Optical Parametrical Amplification: Status Quo and Perspectives, *Vladimir V. Lozhkarev[1], Gennady I. Freidman[1], Vladislav N. Ginzburg[1], Eugeny V. Katin[1], Efim A. Khazanov[1], Alexey V. Kirsanov[1], Anatoly N. Mal'shakov[1], Grigory A. Luchinin[1], Michail A. Martyanov[1], Oleg V. Palashov[1], Anatoly K. Poteomkin[1], Alexander M. Sergeev[1], Andrey A. Shaykin[1], Ivan V. Yakovlev[1], Sergey G. Garanin[2], Nikolay N. Rukavishnikov[2], Stanislav A. Sukharev[2], Alexander V. Charukhchev[3], Rudolf R. Gerke[4], Vladimir E. Yashin[5]; [1]Inst. of Applied Physics, Russian Federation, [2]Russian Federal Nuclear Ctr., Russian Federation, [3]Res. Inst. for Comprehensive Tests of Opto-Electronic Devices and Systems, Russian Federation, [4]HoloGrate JSC, Russian Federation, [5]Inst. for Laser Physics, Russian Federation.* Laser power of more than 100TW (70fs, 10J) has been achieved in experiments on optical parametric amplification of femtosecond pulses in KD*P crystals. Energy conversion efficiency of optical parametric amplifier is 27%.

MA4 • 9:45 a.m.
The Mercury Project: A High Average Power, Gas-Cooled Laser with Frequency Conversion and Wavefront Correction, *Andy J. Bayramian; LLNL, USA.* The Mercury laser operated continuously for several hours at 55J and 10Hz with fourteen 4x6cm^2 Yb:S-FAP amplifier slabs pumped by eight 100kW

diode arrays. The average power frequency conversion employing YCOB yielded 50% conversion efficiency.

MB • Poster Session I

Regency Ballroom
10:00 a.m. – 11:00 a.m.
MB • Poster Session I

MB1
High Average Power Frequency Conversion on the Mercury Laser, *A. J. Bayramian[1], R. J. Beach[1], C. Bibeau[1], R. Campbell[1], C. A. Ebbers[1], B. L. Freitas[1], R. Kent[1], D. Van Lue[1], Z. Liao[1], T. Ladran[1], S. A. Payne[1], K. I. Schaffers[1], S. Sutton[1], B. Chai[2], Y. Fei[2]; [1]LLNL, USA, [2]Crystal Photonics, Inc., USA.* We have frequency doubled the Mercury laser using a single plate of yttrium calcium oxyborate (YCOB), producing 225 W (22.5 J, 10 Hz) of 523.5 nm light.

MB2
Growth and Characterisation of Nonlinear Optical Crystals: $BaNaB_9O_{15}$ (BaNaBO) and $BaCaBO_3F$ (BCBF), *Ke Xu, P. Loiseau, G. Aka; ENSCP, France.* Single crystals of $BaNaB_9O_{15}$ and $BaCaBO_3F$ have been grown by the Czochralski. The refractive indices were measured by the minimum deviation technique and fitted to the Sellmeier equations. SHG phase matching angle calculations are presented.

MB3
Study of RTP Crystal Used as Electro-Optic Modulator, *Hervé Albrecht, Philippe Villeval, Christophe Bonnin; Cristal Laser, France.* The purpose of this work is to highlight behaviour of RTP crystal in electro-optic configuration. We will review main features of interest, such as extinction ratio, voltage applied, lifetime and damage threshold.

MB4
Optical Parametric Chirped Pulse Amplifier and Spatiotemporal Shaping for Petawatt Laser, *Emmanuel Hugonnot, Jacques Luce, Hervé Coïc; CEA/CESTA, France.* We present a degenerate non-collinear optical parametric chirped pulse amplifier pumped by a high-energy and diode-pumped Nd:Glass regenerative amplifier. Spatiotemporal mode shaping of the amplified signal is demonstrated.

MB5
High Power Yellow Light Generation for Laser Guide Star, *Satoshi Wada[1], Norihito Saito[1], Mayumi Kato[1], Kazuyuki Akagawa[2], Akira Takazawa[2], Yutaka Hayano[3], Hideaki Takami[3], Yoshihiko Saito[4], Masanori Iye[4]; [1]RIKEN, Japan, [2]Megaopto, Japan, [3]Natl. Astronomical Observatory of Japan, USA, [4]Natl. Astronomical Observatory of Japan, Japan.* 6.3W coherent yellow light generation at 589.159 nm was achieved by the sum frequency generation of two mode-locked lasers with wavelengths of 1064nm and 1319 nm for the laser guide star of the astronomical telescope.

MB6
Single-Frequency Fiber Amplifier Emitting 7.8 W at 1030 nm, *Matthias Hildebrandt[1], Maik Frede[1], Dietmar Kracht[1], Ingo Freitag[2], Peter Weßels[2]; [1]Laser Zentrum Hannover e.V., Germany, [2]Innolight GmbH, Germany.* We report on fiber power amplification with a single-frequency Yb:YAG nonplanar ring oscillator seed source. The system emits up to 7.8 W single-frequency radiation at 1030 nm with an $M^2 < 1.1$.

MB7
Optical Isolator for Unpolarized Laser Radiation at Multi-Kilowatt Average Power, *Kolja Nicklaus, Martin Daniels, Roman Hohn, Dieter Hoffmann; Fraunhofer ILT, Germany.* A fiber coupled birefringence compensated Faraday Isolator set-up has been developed. At 2 kW average power a transmission greater 93% and an isolation of 15 dB was achieved. No degradation in beam quality was observed.

MB8
$Nd:BaWO_4$ Raman Laser, *Jan Sulc[1], Helena Jelinkova[1], Maxim E. Doroshenko[2], Tasoltan T. Basiev[2], Lyudmila I. Ivleva[2], Vjatcheslav V. Osiko[2], Petr G. Zverev[2]; [1]Czech Technical Univ., FNSPE, Czech Republic, [2]General Physics Inst., Russian Federation.* Raman laser was constructed on the base of new $Nd:BaWO_4$ material Q-switched by $LiF:F_2$- crystal. Emission at 1169 nm was obtained in 1.3 ns long pulse with energy 0.8 mJ.

MB9
The Raman Effects in Supercontinuum Generation in Highly Nonlinear Microstructured Fibers at 1.5 µm, *Evgeni Sorokin, Valdimir V. Kalashnikov, Irina T. Sorokina; TU Vienna, Photonics Inst., Austria.* The influence of Raman scattering on spectral transformation and coherence of white light continuum generated in various highly nonlinear microstructured glass fibers at 1.5 µm were investigated both theoretically and experimentally.

MB10
Stimulated Raman Scattering in the Mid IR Range 2.31-2.75-3.7 µm in a $BaWO_4$ Crystal under 1.9 and 1.56 µm Pumping, *Tasoltan T. Basiev[1], Marina N. Basieva[1], Maxim E. Doroshenko[1], Vladimir V. Fedorov[1], Vyacheslav V. Osiko[1], Sergey B. Mirov[2]; [1]Laser Materials and Technology Res. Ctr. of GPI, Russian Federation, [2]Univ. of Alabama at Birmingham, USA.* The first Stokes component (2.31 µm) and four Stokes components up to 2.75 and 3.7-µm were obtained in a $BaWO_4$ crystal under 1.9-µm and 1.56-µm pumping, respectively. SRS and laser breakdown thresholds were measured.

MB11
Efficient and Broadband Picosecond Stimulated Raman Scattering in $KTiOPO_4$, *Valdas Pasiskevicius, Carlota Canalias, Fredrik Laurell; Royal Inst. of Technology, Sweden.* Picosecond SRS with single-pass efficiency exceeding 50% and 34 THz bandwidth was observed in $KTiOPO_4$. At peak intensities above 10 GW/cm2 the SRS character changes from narrowband to broadband showing substantial "softening" of polariton modes.

MB12

Nonlinear Spectroscopy and Laser Performance of PbS Quantum-Dot-Doped Glass as a Saturable Absorber for Passive Mode-Locking of 1-μm Lasers, *Alexander A. Lagatsky[1], C. T. Brown[1], W. Sibbett[1], A. M. Malyarevich[2], V. G. Savitski[2], M. S. Gaponenko[2], K. V. Yumashev[2], A. A. Zhilin[3]; [1]Univ. of St. Andrews, UK, [2]Res. Inst. for Optical Materials and Technologies, Belarus, [3]S.I. Vavilov State Optical Inst., Russian Federation.* Efficient passive mode-locking of a diode-pumped Yb^{3+}:$KY(WO_4)_2$ laser using a PbS quantum-dot-doped saturable absorber is described. A saturation fluence of 15μJ/cm^2 and a fast temporal decay of 6ps were measured in this quantum-dot-doped glass.

MB13

High Efficiency Cavity Dumped Operation of Yb:YAG Laser at Room Temperature, *Shinichi Matsubara, Tsutomu Ueda, Masahiro Inoue, Motoharu Tanaka, Kazunori Otani, Sakae Kawato, Takao Kobayashi; Fiber Amenity Engineering, Graduate School of Engineering, Univ. of Fukui, Japan.* Highly efficient cavity dumping of Yb:YAG laser has been realized at room temperature with the optical to optical conversion efficiency of 72 % for the absorbed pump power.

MB14

Development of Dual-Wavelength Injection-Locked Pulsed Laser and Its Application to Generation of an Ultrahigh-Repetition-Rate Train of Ultrashort Pulses, *Takashi Onose[1], Masayuki Katsuragawa[1], Kazuhiko Misawa[2]; [1]Univ. of Electro-Communications, Japan, [2]Tokyo Univ. of Agriculture & Technology, Japan.* An injection-locked pulsed Ti:sapphire laser oscillating at dual-wavelengths is shown. It is demonstrated based on this novel laser system that a 10-THz ultrahigh-repetition-train of short pulses is successfully generated with a duration of 20 fs.

MB15

Brightness Conversion Using a Raman Fiber Laser Based on a Multimode Fiber, *Nathan B. Terry, Thomas G. Alley, Won B. Roh; Air Force Inst. of Technology, USA.* The power and modal characteristics of a Raman Fiber Laser based on multimode fiber are investigated by varying reflectivities of output couplers. Brightness enhancement is observed and slope efficiencies as high as 62% are reported.

MB16

Thermo-Optical Behavior of Rare-Earth-Doped Low-NA Fibers in High Power Operation, *Steffen Hädrich[1], Thomas Schreiber[1], Thomas Pertsch[1], Jens Limpert[1], Thomas Peschel[2], R. Eberhardt[2], Andreas Tünnermann[2]; [1]Inst. of Applied Physics, Germany, [2]Fraunhofer Inst. for Applied Optics and Precision Engineering, Germany.* The influence of the internal temperature gradient in rare-earth-doped low-numerical-aperture fibers on modal properties is analyzed. We provide guidelines when a single-mode fiber turns into a multimode fiber and how the mode-field-diameter is affected.

MB17

Hot YAG:Yb^{3+}:Er^{3+} Crystal: A Potential Laser Medium for High Average Power 1.5 μm Lasers, *Boris I. Denker[1], Boris I. Galagan[1], Vyacheslav V. Osiko[1], Sergey E. Sverchkov[1], Anatoly M. Balbashov[2], Jonas E. Hellstrom[3], Valdas Pasiskevicius[3], Fredrik Laurell[3]; [1]General Physics Inst., Russian Federation, [2]Moscow Power Engeneering Inst., Russian Federation, [3]Royal Inst. of Technology, Sweden.* The near-IR spectroscopic properties of YAG:Yb:Er crystals were investigated at high temperatures. It is shown that at 600°-800°C temperatures they become close to their corresponding properties in Er,Yb: phosphate laser glasses.

MB18

Development of Broadband Light Source for OPCPA, *Ogawa Kanade[1], Takeuchi Yasuki[1], Yoshida Hidetsugu[1], Izawa Yasukazu[1], Fujita Masayuki[2]; [1]Inst. of Laser Engineering, Osaka Univ., Japan, [2]Inst. for Laser Technology, Japan.* Basic experiments of OPCPA with a Type I BBO crystal were conducted using the supercontinuum generated in a PCF. Tunable amplification bandwidth of 100nm was demonstrated.

MB19

Intracavity Frequency Doubling of CW Ti:Sapphire Laser Utilising BiBO Nonlinear Crystal, *Morten Thorhauge, Jesper L. Mortensen, Peter Tidemand-Lichtenberg, Preben Buchhave, Jesper R. Rasmussen; Technical Univ. of Denmark, Denmark.* Utilising BiBO nonlinear crystal frequency doubling a Ti:Sapphire CW laser gave 100 mW at 405 nm and 53 mW at 392 nm. Stability proved excellent without servo control. Broad tunability was shown around 392 nm.

MB20

Nd:YVO_4 Pumped Degenerate PPLN OPO, *Ian Elder, David Legge, James Beedell, Rob Marchington; SELEX Sensors and Airborne Systems Ltd., UK.* Conversion efficiencies of 44% and 56% are demonstrated in single and double-pass pump geometries respectively for a degenerate 1 micron pumped PPLN OPO. Pump feedback in the double-pass geometry acts as a pulse shortening mechanism.

MB21

Generation of a High-Energy Ultra-Wideband Chirped Source in Periodically Poled Crystals, *Gilad Marcus[1], Arie Zigler[1], David Eger[2], Ariel Bruner[2], Abraham Englander[2], Moti Katz[2], Yosi Ehrlich[2]; [1]Hebrew Univ., Israel, [2]Soreq NRC, Israel.* A method to generate chirped, ultra-wideband infrared source, by use of optical parametric generation in periodically poled crystals, pumped by a chirped Ti:sapphire, laser is described. Few hundredth of micro-Joule were measured.

MB22

Is the Sign of the Nonlinear Coefficient d_{22} Reversed in PPLN? *Ayelet Ganany[1], Ady Arie[1], Solomon Saltiel[2]; [1]Tel-Aviv Univ., Israel, [2]Univ. of Sofia, Bulgaria.* We have verified experimentally that the d_{22}=dYYY nonlinear coefficient of $LiNbO_3$ changes its sign as a result of periodic poling along the Z direction. This reversal enables the realization of all-optical polarization rotation in PPLN.

MB23

Efficient All-Solid-State Optical Parametric Oscillator for the Visible Based on Periodically-Poled Stoichiometric $LiTaO_3$, *Shih-Yu Tu[1], A. H. Kung[1,2], Z. D. Gao[3], S. N. Zhu[3]; [1]Inst. of Atomic and Molecular Sciences, Taiwan Republic of China, [2]Dept. of Photonics, Natl. Chiao Tung Univ., Taiwan Republic of China, [3]Natl.*

Lab of Solid State Microstructures, China. We report the first pulsed high average power visible optical parametric oscillator based on periodically-poled $LiTaO_3$. Stable operation indicates that the 370 mW visible output obtained should be scalable to much higher power.

MB24

Accurate Measurement of Second-Order Nonlinear-Optical Coefficients of Near-Stoichiometric $LiNbO_3$, *Ichiro Shoji[1], Akinori Arai[1], Makoto Takeda[1], Satoshi Nakajima[1], Akinori Neduka[2], Ryoichi Ito[2], Yasunori Furukawa[3]; [1]Chuo Univ., Japan, [2]Meiji Univ., Japan, [3]Oxide Corp., Japan.* Second-order nonlinear-optical coefficients of near-stoichiometric undoped and MgO-doped $LiNbO_3$ are measured at the fundamental wavelength of 1.31 microns. The values are found to be the same with those of congruent $LiNbO_3$ within the experimental accuracy.

MC • Nonlinear Conversion

Lakeside Ballroom
11:00 a.m. – 12:30 p.m.
MC • Nonlinear Conversion
Takunori Taira; Laser Res. Ctr. for Molecular Science, Japan, Presider

MC1 • 11:00 a.m.

An Injection-Seeded Narrow Linewidth Singly Resonant ZGP OPO, *Hyung R. Lee[1], Jirong Yu[2], Norman P. Barnes[2], Yingxin Bai[3]; [1]Hampton Univ., USA, [2]NASA Langley Res. Ctr., USA, [3]Science Applications Intl. Corp., USA.* Injection seeding of a singly resonant ZnGeP2 mid-infrared OPO using a CW 3.39 μm laser or tunable near-infrared laser has been demonstrated. The injection seeded OPO provides a narrow idler wavelength linewidth of ~1 nm.

MC2 • 11:15 a.m.

Compact Short Pulse Eyesafe Solid-State Raman Laser, *Keith M. Mahoney, David Hwang, AnnMarie L. Oien, Glenn T. Bennett, Mark J. Kukla, Kevin Burgio, Carl R. Anderson; Coherent Technologies, USA.* A compact diode pumped laser was built using a noncollinear geometry to Raman shift a 1338 nm Nd:YAG laser to 1522 nm. Innovative opto-mechanical design allows the entire laser head to be 0.28 ft^3 volume.

MC3 • 11:30 a.m.

High-Efficiency Raman Converter Generating 1.5W of Red-Orange Output, *Richard P. Mildren, Helen M. Pask, James A. Piper; Ctr. for Lasers and Applications, Australia.* We report record Stokes conversion efficiency and output power for a nanosecond pumped Raman laser. Using $KGd(WO_4)_2$ in an external cavity Raman laser configuration, we obtained 64% conversion efficiency of a 2.3W 532nm pump laser.

MC4 • 11:45 a.m.

3W CW Generation at 589nm with Narrow Line Linearly Polarized Raman Fibre Laser, *S. V. Popov[1], A. B. Rulkov[1], J. R. Taylor[1], A. G. Dronov[2], M. Y. Vyatkin[2], D. Georgiev[3], V. P. Gapontsev[3]; [1]Femtosecond Optics Group, Imperial College, UK, [2]NTO IRE Polus, Russian Federation, [3]IPG Laser GmbH, Germany.* 26W, 0.4nm linewidth CW Raman generation is achieved in linearly polarized single-mode fibre and applied to efficient, over 3W 589nm generation in MgO-PPLN. Watts level generation at any wavelength 550nm to 780nm is feasible.

MC5 • 12:00 p.m.

Generation of 491 nm Blue Pulses by Quasi-Intracavity Sum-Frequency Mixing of Q-Switched Diode Pumped Neodymium Lasers, *Emilie Herault, Francois Balembois, Patrick Georges; Lab Charles Fabry de l'Inst. d'Optique, France.* We report the generation of 491-nm laser pulses by quasi-intracavity sum-frequency mixing. 3-ns 1064-nm Q-switched pulses were injected in a 912-nm Q-switched laser. A blue average-power output of 279-mW and a 9.3-kW peak-power were obtained.

MC6 • 12:15 p.m.

High Power Single-Frequency Continuous-Wave and Pulsed $Nd:YVO_4$ Master Oscillator Power Amplifier, *Michael J. Yarrow, Ji Won Kim, William A. Clarkson; Optoelectronics Res. Ctr., UK.* An efficient single-frequency $Nd:YVO_4$ master-oscillator power-amplifier, which produces 79W of near-diffraction-limited continuous-wave output is described. In pulsed mode, pulses of peak power ~2kW and duration ~1 microsecond were obtained at a repetition frequency of 11kHz.

► 12:30 p.m. – 2:00 p.m.
Lunch (on your own)

MD • UV to Mid-IR Solid-State Lasers

Lakeside Ballroom
2:00 p.m. – 3:30 p.m.
MD • UV to Mid-IR Solid-State Lasers
Gregory Quarles; VLOC, Subsidiary of II-VI Inc., USA, Presider

MD1 • 2:00 p.m.

Low-Threshold Broadly Tunable Miniature Cerium Lasers, *Hua Liu[1], David J. Spence[1], David W. Coutts[1], H. Sato[2], T. Fukuda[2]; [1]Macquarie Univ., Australia, [2]Tohoku Univ., Japan.* We present all solid-state, ultra-low-threshold Ce:LiCAF and Ce:LiLuF lasers, that enable full wavelength coverage from 282 - 338 nm using a relatively inexpensive $Nd:YVO_4$ microchip pump laser.

MD2 • 2:15 p.m.

Polarization Stabilizing for Diode-Pumped Passively Q-Switched Nd:YAG Microchip Lasers, *Hiroshi Sakai[1], Akihiro Sone[1], Hirohumi Kan[1], Takunori Taira[2]; [1]Hamamatsu Photonics K.K., Japan, [2]Inst. of Molecular Science, Japan.* We have demonstrated the new way of the polarization stabilizing in the passively Q-switched laser by using a [110]-cut Cr^{4+}:YAG crystal. The 355-nm ultra-violet light was generated with 32% conversion efficiency from 1064 nm.

MD3 • 2:30 p.m.

450 nm Blue Laser Emission by Frequency Doubling of CW Oscillation of Neodymium Doped Strontium and Lanthanum

Aluminate (Nd:ASL), *Cyrille Varona[1,2], Pascal Loiseau[1], Gérard Aka[1], Bernard Ferrand[2], Voicu Lupei[3]; [1]ENSCP - LCAES, France, [2]CEA - LETI, France, [3]Inst. of Atomic Physics, Romania.* Nd:ASL crystals $Sr_{1-x}La_{x-y}Nd_yMg_xAl_{12-x}O_{19}$ (0.05 ≤x≤ 0.5; y=0.05) were grown by Czochralski. 1.67W of 900nm output power was obtained under Ti:sapphire pumping. Intracavity SHG experiments gave 320mW of 450nm blue power with BiB_3O_6 nonlinear crystal.

MD4 • 2:45 p.m.
Efficient Yellow Light Generation by Frequency Doubling an 1150-nm Yb:Silica Fiber System, *Supriyo Sinha, Karel E. Urbanek, Jonathan S. Alden, Carsten Langrock, Michel J. Digonnet, Martin M. Fejer, Robert L. Byer; Stanford Univ., USA.* An 89-mW, 1150-nm Yb-fiber oscillator was amplified to 310 mW. The oscillator output was frequency doubled to produce 40 mW of yellow. We also present our progress in long period grating design for ASE suppression.

MD5 • 3:00 p.m.
Power-Scalable Ho:YAG Slab Laser, Intracavity Side-Pumped by a Tm:YLF Slab Laser, *Sik So[1], Jacob I. Mackenzie[1], David P. Shepherd[1], William A. Clarkson[1], John G. Betterton[2], Eric K. Gorton[2], John A. Terry[2]; [1]Univ. of Southampton, UK, [2]QinetiQ Ltd., UK.* We report the first demonstration of an intracavity side-pumped Ho:YAG slab laser, delivering 13W at 2.09µm and discuss the advantages of this scheme as an approach for power scaling.

MD6 • 3:15 p.m.
Room Temperature 3.9-4.5 µm Gain-Switched Lasing of Fe:ZnSe, *John Kernal[1], Vladimir Fedorov[1], Andrew Gallian[1], Sergey Mirov[1], Valery Badikov[2]; [1]Univ. of Alabama at Birmingham, USA, [2]Kuban State Univ., Russian Federation.* Spectroscopic properties of Fe^{2+} in pure and Cr^{2+} co-doped ZnSe under $^5E \rightarrow {}^5T_2$ excitation, via Fe^{2+} ionization transitions, and Cr^{2+}=>Fe^{2+} energy transfer are studied. RT gain-switched lasing of Fe^{2+}:ZnSe tunable over 3.9-4.8µm spectral range is reported.

ME • Pulsed Fiber Amplifiers

Lakeside Ballroom
4:00 p.m. – 5:30 p.m.
ME • Pulsed Fiber Amplifiers
Anne Tropper; Univ. of Southampton, UK, Presider

ME1 • 4:00 p.m. **Invited**
High Pulse Energy and High Peak Power Fiber Amplifiers, *Mark Bowers; Aculight Corp., USA.* Advances in fiber designs, fiber handling, and amplifier architectures have led to the demonstration of unprecedented pulse energy and peak power from fiber amplifiers. Recent results from Yb and Er doped fiber sources are presented.

ME2 • 4:30 p.m.
High Repetition Rate Tunable Femtosecond Pulses from Fiber Laser Pumped Parametric Amplifier, *Thomas V. Andersen[1], Oliver Schmidt[1], Jens Limpert[1], Claude Aguergaray[2], Eric Cormier[2], Andreas Tünnermann[1]; [1]Inst. of Applied Physics, Germany, [2]CELIA, Univ., France.* High-energy femtosecond pulses at 1 MHz from a fiber-laser-pumped optical parametric amplifier are demonstrated. A broadband seed from a photonic crystal fiber enables tunability simply by adjusting the temporal delay between pump and signal.

ME3 • 4:45 p.m.
Harmonic Generation of an Yb-Doped Photonic-Crystal Fiber Amplifier to Obtain 1ns Pulses of 410, 160, and 190kW Peak-Power at 531, 354, and 265nm Wavelength, *Fabio Di Teodoro, Christopher D. Brooks; Aculight Corp., USA.* By frequency doubling, tripling, and quadrupling 1ns, ~10kHz-repetition-rate pulses from a 1062nm-wavelength Yb-doped photonic crystal fiber amplifier, we obtained pulse peak/average powers of 410kW/4W at 531nm, 160kW/1.5W at 354nm, and 190kW/1.8W at 265.5nm.

ME4 • 5:00 p.m.
Generation of 10-Cycle Pulses from a Yb Fiber Laser Using Cubic Phase Compensation, *Joel R. Buckley, Stephen W. Clark, Frank W. Wise; Cornell Univ., USA.* We demonstrate the use of a prism-grating sequence to reduce third-order dispersion inside a Yb fiber oscillator. Pulses as short as 33-fs, the shortest from a fiber laser, can be generated with extremely clean profiles.

ME5 • 5:15 p.m.
60-fs Pulses with 1 µJ Pulse Energy Generated by Nonlinear Compression of a Short-Pulse Fiber Laser, *Fabian Röser, Jan Rothhardt, Claudia Bruchmann, Thomas Schreiber, Andreas Liem, Jens Limpert, Andreas Tünnermann; Inst. of Applied Physics, Germany.* We report on the fiber laser based generation of 45 W average power of 60-fs pulses using nonlinear spectral broadening in a large-mode-area photonic crystal fiber followed by compression with chirped mirrors.

► 5:30 p.m. – 7:30 p.m.
Dinner (on your own)

MF • Postdeadline Paper Session

Lakeside Ballroom
7:30 p.m. – 8:30 p.m.
MF • Postdeadline Paper Session
Timothy J. Carrig; Lockheed Martin Coherent Technologies, USA, Presider

Tuesday, January 31, 2006

► 7:30 a.m. – 1:00 p.m.
Registration
Lakeside Foyer

TuA • Mode-Locked Solid-State Lasers

Lakeside Ballroom
8:00 a.m. – 10:00 a.m.
TuA • Mode-Locked Solid-State Lasers
Rüdiger Paschotta; RP Photonics Consulting GmbH, Switzerland, Presider

TuA1 • 8:00 a.m. Invited
Super High Efficiency Diode Sources (SHEDS) and Architecture for Diode High Energy Laser Systems (ADHELS): An Overview, *Martin Stickley[1], Mark E. Filipkowski[2], Enrique Parra[2], Edwin E. Hach[2]; [1]DARPA, USA, [2]Booz Allen Hamilton, USA.* We present a summary view of the DARPA SHEDS and ADHELS programs. The goal of these programs is development of a compact, field-deployable high energy laser (HEL) weapons system.

TuA2 • 8:30 a.m.
50-GHz Mode-Locked VECSELs: An Integrable Alternative to High-Repetition-Rate Solid-State Lasers, *Heiko J. Unold, Dirk Lorenser, Deran J. Maas, Benjamin Rudin, Aude-Reine Bellancourt, Ursula Keller, Emilio Gini, Dirk Ebling; ETH Zurich, Switzerland.* We present high-repetition-rate passively mode-locked vertical-external-cavity surface-emitting semiconductor lasers in a 1:1 mode ratio configuration, achieving a record repetition rate of 50 GHz in 3.1-ps pulses with 42 mW average output power.

TuA3 • 8:45 a.m.
Pushing the High-Pulse-Repetition-Rate Frontier Using a New Regime of Inverse Saturable Absorption and Novel Low Saturation Fluence SESAMs, *Ursula Keller[1], Rachel Grange[1], Markus Haiml[1], Gabriel J. Spühler[1], Lukas Krainer[1], Olivier Ostinelli[1], Matthias Golling[1], Kurt J. Weingarten[2]; [1]ETH Zurich, Switzerland, [2]Time-Bandwidth Products Inc., Switzerland.* During the last few years we have demonstrated unprecedented performance in high-repetition rate diode-pumped solid-state lasers. Here we explain the two key SESAM design improvements which were necessary to achieve these results.

TuA4 • 9:00 a.m.
A SESAM Passively Mode-Locked Cr:ZnS Laser, *Irina T. Sorokina[1], Evgeni Sorokin[1], Timothy J. Carrig[2], Kathleen I. Schaffers[3]; [1]Photonics Inst. TU Vienna, Austria, [2]Coherent Technologies, USA, [3]LLNL, USA.* We report the first mode-locked continuous-wave Cr:ZnS laser, passively mode-locked by an InAs/GaSb based SESAM, operating around 2.45 µm and generating ~1 psec pulses and provide a comparison between the mode-locked Cr:ZnS and Cr:ZnSe lasers.

TuA5 • 9:15 a.m.
914-nm Diode-Pumped Passively-Mode-Locked Laser Based on Nd:YVO_4, *Pierre Blandin[1], Frédéric P. Druon[1], François Balembois[1], Patrick Georges[1], Sandrine Leveque-Fort[2], Maire-Pierre Fontaine-Aupart[2]; [1]Lab Charles Fabry, France, [2]Lab de Photophysique Moléculaire, France.* We demonstrate the first diode-pumped passively-mode-locked Nd:YVO_4 laser, operating on the $^4F_{3/2}$-$^4I_{9/2}$ transition of the neodymium ion at 914 nm. Pulses of 8.8 ps at 913.8 nm have been produced.

TuA6 • 9:30 a.m.
A Low-Loss Buried Resonant GaInNAs SESAM for 1.3-µm Nd:YLF Laser at 1.4 GHz, *Simon C. Zeller[1], Rachel Grange[1], Valeria Liverini[1], Andreas Rutz[1], Silke Schön[1], Markus Haiml[1], Ursula Keller[1], Susanne Pawlik[2], Berthold Schmidt[2]; [1]ETH Zürich, Switzerland, [2]Bookham AG, Switzerland.* We propose a new design for a semiconductor saturable absorber mirror with customized inverse saturable absorption. This design was applied for passively mode-locking a diode-pumped 1.3-µm Nd:YLF laser with a repetition rate of 1.4 GHz.

TuA7 • 9:45 a.m.
Antimonide Semiconductor Saturable Absorber for Passive Mode-locking of a 1.5-µm Er:Yb:Glass Laser at 10 GHz, *Simon C. Zeller[1], Rachel Grange[1], Silke Schön[1], Markus Haiml[1], Ursula Keller[1], Oliver Ostinelli[2], Martin Ebnöter[3], Emilio Gini[3]; [1]ETH Zürich, Switzerland, [2]Avalon Photonics, Switzerland, [3]ETH Zürich - FIRST Ctr. for Micro- and Nanoscience, Switzerland.* We demonstrate the first antimonide (AlGaAsSb) semiconductor saturable absorber mirror (SESAM) for passive mode-locking of an Er:Yb:glass laser at 1535 nm and 10 GHz. The SESAM is InP-based and grown by MOVPE.

TuB • Poster Session II

Regency Ballroom
10:00 a.m. – 11:00 a.m.
TuB • Poster Session II

TuB1
Random Nature of Thermally Induced Depolarization in Polycrystalline Laser Ceramics, *Ivan B. Mukhin[1], Oleg V. Palashov[1], Efim A. Khazanov[1], Akio Ikesue[2], Yan L. Aung[2]; [1]Inst. of Applied Physics, Russian Federation, [2]Poly-Techno Co., Japan.* Spatial modulation of a laser beam is experimentally found at thermal depolarization in Nd:YAG ceramics. This effect, which was theoretically predicted earlier, is inherent in ceramics only and has no analogue in single crystals.

TuB2
Transmitter Technologies for Space Born Water Vapor DIAL Systems in the 940 nm Region, *Frank Kallmeyer[1], Stephan G. Strohmaier[1], Hanjo Rhee[1], Andreas Hermerschmidt[1], Thomas Riesbeck[1], Hans J. Eichler[1], Susanne Nikolov[2], Rainer Treichel[2]; [1]Technical Univ. Berlin, Germany, [2]EADS Astrium GmbH, Germany.* A Titanium Sapphire laser, a Raman laser and a garnet laser are investigated and compared concerning the performance as a laser transmitter for a space born water vapor DIAL in the 940 nm wavelength region.

TuB3
Spectroscopic Properties and Laser Emission in Layer-by-Layer Type Nd:$Y_3ScAl_4O_{12}$ / Nd:$Y_3Al_5O_{12}$ Composite Ceramics, *Yoichi Sato[1], Takunori Taira[1], Akio Ikesue[2]; [1]Laser Res. Ctr. for Molecular Science, Inst. for Molecular Science, Japan, [2]Res.*

and Development Lab, Poly-Techno, Japan. We have demonstrated laser oscillation in a ceramic layered composite $Nd:Y_3Al_5O_{12}/Nd:Y_3ScAl_4O_{12}$. The slope efficiency was 39% even if uncoted material. After the investigation of spectroscopic property, the possibility of tailored fluorescence spectral profile was discussed.

TuB4

Spectroscopy and Laser Performance of a Pulsed Tm:Germanate Fiber Laser, *Norman P. Barnes[1], Brian M. Walsh[1], Donald J. Reichle[1], Shibin Jiang[2]; [1]NASA Langley Res. Ctr., USA, [2]NP Photonics, USA.* Tm:germanate, a novel fiber laser, was predicted to make efficient lasers when pumped with 0.792 μm diodes because of their low phonon energies. Spectroscopic and pulsed laser performance showing quantum efficiency of 1.5 is presented.

TuB5

High Power 2.3 μm Yb:Tm:YLF Laser, Simultaneously Diode-Pumped at 685 nm and 960 nm, *Paulo Sergio de Matos, Niklaus Ursus Wetter; Ctr. de Lasers e Aplicações, Brazil.* Simultaneous pumping of the 2.3μm Yb:Tm:YLF laser at 685 nm and 960 nm is demonstrated, showing higher slope efficiency than 960 nm alone. The output power of 620 mW is the highest reported so far.

TuB6

Multi-Watt and Tunable Diode-Pumped Operation of $Tm:GdVO_4$ Crystal Grown by a Floating Zone Method, *Pavel Cerny[1], Jiri Oswald[1], Jan Sulc[2], Helena Jelinkova[2], Yoshiharu Urata[3], Mikio Higuchi[4]; [1]Inst. of Physics, Czech Republic, [2]Czech Technical Univ., Czech Republic, [3]Megaopto Co., Ltd., Japan, [4]Hokkaido Univ., Japan.* Improved diode-pumped laser performance is reported with a floating-zone grown $Tm:GdVO_4$ crystal. Up to 2.6 W output with 31% slope efficiency was obtained. Continuous tuning under diode pumping from 1840 to 1970 nm is demonstrated.

TuB7

Highly Efficient Operation of Tm:Fiber Laser Pumped Ho:YLF Laser, *Yingxin Bai[1], Mulugeta Petros[2], Jirong Yu[3], Paul Petzar[1], Bo Trieu[3], Songsheng Chen[1], Hyung Lee[4], Upendra Singh[3]; [1]Science Applications Intl. Corp., USA, [2]Science and Technology Corp., USA, [3]NASA Langley Res. Ctr., USA, [4]Dept. of Physics, Hampton Univ., USA.* A 19 W, TEM_{00} mode, Ho:YLF laser pumped by continuous wave Tm:fiber laser has been demonstrated at the room temperature. The slope efficiency and optical-to-optical efficiency are 65% and 55%, respectively.

TuB8

Tunable Single Mode ErYb:Glass Laser Locked by a Bulk Glass Bragg Grating, *Bjorn Jacobsson, Valdas Pasiskevicius, Fredrik Laurell; Royal Inst. of Technology, Sweden.* We demonstrate single mode-locking of an ErYb:glass laser at 1552.6 nm using feedback from a bulk glass Bragg grating, tunable over 0.25 nm (31 GHz) in steps of 17 pm (2.1 GHz).

TuB9

Soliton Self-Frequency Shift from 1.03 μm to 1.55 μm, *Jian Chen, Fatih O. Ilday, Franz X. Kaertner; MIT, USA.* Soliton self-frequency shift over 520 nm from 1.03 μm to 1.55 μm is demonstrated. Potential applications such as seeding of parametric amplifiers and optical frequency metrology are discussed.

TuB10

Efficient Ho:YAG Laser Resonantly Pumped by Tm-Fiber Laser, *Igor Moskalev[1], Vladimir Fedorov[1], Sergey Mirov[1], Andrei Babushkin[2], Valentin Gapontsev[2], Denis Gapontsev[2], Nikolai Platonov[2]; [1]Univ. of Alabama at Birmingham, USA, [2]IPG Photonics Corp., USA.* We report an efficient, Ho:YAG laser system pumped by 22W Tm-fiber laser producing 10 W of CW power and 15 mJ of pulse energy in the Q-switched regime with a pulse duration of 17 ns.

TuB11

High Repetition Rate Ti:Sapphire Laser System with Nanosecond Pulses and a Tunability from the UV to the NIR, *Bernd Jungbluth[1], Jochen Wueppen[1], Marcel Vierkoetter[1], Jens Geiger[1], Dieter Hoffmann[1], Reinhart Poprawe[1], Juergen Ortmann[2]; [1]Fraunhofer Inst. for Lasertechnology, Germany, [2]Ortmann Digitaltechnik, Germany.* A kilohertz repetition rate Ti:Sapphire laser system provides a nearly continuous tuning range from 210 to 1020 nm. A breadboard prototype with fully automated wavelength tuning has been developed.

TuB12

Novel Design of Powerful Femtosecond Laser at 800nm Wavelength, *Efim A. Khazanov; Inst. of Applied Physics, Russian Federation.* A simple and reliable femtosecond laser design is suggested, which comprises a Er:fiber laser at 1550nm, a fiber stretcher, a BBO optical parametric amplifier with wavelength conversion to 800nm, Ti:Sa/BBO amplifiers, and a usual compressor.

TuB13

Athermal, Diode-Pumped Nd:YLF Regenerative Amplifier, *Andrey V. Okishev, Jonathan D. Zuegel; Univ. of Rochester, USA.* A new athermal, highly-stable, diode-pumped Nd:YLF regenerative amplifier has been developed that can amplify shaped pulses with durations of up to 10 ns.

TuB14

Compact, High Efficiency, Passively Q-Switched Nd:YAG MOPA for Spaceborne Laser-Altimetry, *Sven Hahn[1], Rafael Huß[1], Joerg Neumann[1], Ralf Wilhelm[1], Maik Frede[1], Dietmar Kracht[1], Peter Peuser[2]; [1]Laserzentrum Hannover, Germany, [2]European Aeronautic Defense and Space Co., Germany.* An high efficiency passively Q-switched Nd:YAG MOPA with 62 mJ of pulse energy, 2.8 ns pulse duration and high temperature stability, suitable for space application was demonstrated.

TuB15

1003 nm Single-Frequency High-Power Optically Pumped Semiconductor Laser, *Manuela Domenech[1], Mathieu Jacquemet[1], Gaelle Lucas-Leclin[1], Patrick Georges[1], Julie Dion[2], Martin Strassner[1], Isabelle Sagnes[2], Arnaud Garnache[3]; [1]Lab Charles Fabry, France, [2]Lab de Photonique et de Nanostructures, France, [3]Ctr. d'Electronique et de Micro optoelectronique de Montpellier, France.* We report high power single-frequency laser operation at λ =

1003 nm of an optically pumped external-cavity semiconductor laser in which the gain structure is bonded to a SiC heatspreader. Intracavity frequency-doubling is also demonstrated.

TuB16
High-Average-Power, Highly-Efficient Operation of Q-Switched Cryogenic Yb:YAG Laser, *Shigeki Tokita[1], Junji Kawanaka[1], Yasukazu Izawa[1], Masayuki Fujita[2], Toshiyuki Kawashima[3]; [1]Inst. of Laser Engineering, Osaka Univ., Japan, [2]Inst. for Laser Technology, Japan, [3]Ctrl. Res. Lab, Hamamatsu Photonics K. K., Japan.* We have demonstrated a cryogenically-cooled Q-switched Yb:YAG laser oscillator with diode pumping. 74-W average power was obtained with pulse energy of several milli-joules, optical-optical efficiency of 60%, and M^2 factor of less than 1.4.

TuB17
Diode Pumped 18W Long Nd: Glass Waveguide Laser, *Xin Ye, Tao Fang, Jianqiu Xu; Shanghai Inst. of Optics and Fine Mechanics, Chinese Acad. of Sciences, China.* A long Nd-doped phosphate glass waveguide laser pumped by laser diodes is demonstrated, which is air-cooled to provide around 18 W CW output power. Influence of the thermal lensing and pump distribution is discussed.

TuB18
Explanation for Beam Quality Deterioration of Lasers for Operation near Frequency Degeneracy of Transverse Cavity Modes, *Rüdiger Paschotta; RP Photonics Consulting GmbH, Switzerland.* A simple resonant mode coupling model explains why the beam quality of a laser is strongly deteriorated near resonator frequency degeneracy points, and leads to important conclusions concerning laser beam quality in more general cases.

TuB19
Pulsed, All Solid-State Light Source in the Visible Spectral Region Based on Nonlinear Cavity Dumping, *Peter Tidemand-Lichtenberg[1], Martin Andersen[1], Sandra Johansson[2], Jirí Janousek[1], Preben Buchhave[1], Fredrik Laurell[2]; [1]Technical Univ. of Denmark, Denmark, [2]Laser Physics and Quantum Optics, KTH, AlbaNova, Sweden.* We propose a novel generic approach for generation of pulsed light in the visible spectrum, based on SFG between the high circulating intra-cavity power of a high finesse CW laser and a single-passed pulsed laser.

TuB20
Continuous-Wave Lasing of $Yb:LuVO_4$, *Junhai Liu[1], Valentin Petrov[1], Xavier Mateos[1], Uwe Griebner[1], Huaijin Zhang[2], Jiyang Wang[2], Minhua Jiang[2], Christian Kränkel[3], Klaus Petermann[3]; [1]Max-Born-Inst., Germany, [2]Shandong Univ., China, [3]Univ. of Hamburg, Germany.* We report on the crystal growth, spectroscopy and laser operation of $Yb:LuVO_4$ achieving an output power of 0.36 W at 1041 nm with Ti:sapphire and 2.85 W (slope efficiency of 51.3%) with diode laser pumping.

TuB21
Laser Oscillations and Self-Raman Frequency Conversion in $PbMoO_4:Nd^{3+}$ and $SrMoO_4:Nd^{3+}$ Crystals under Laser Diode Pumping, *Tasoltan T. Basiev, Sergey V. Vassiliev, Maxim E. Doroshenko, Vyacheslav V. Osiko; General Physics Inst., Russian Federation.* Laser and self-Raman laser characteristics of LD pumped $PbMoO_4:Nd^{3+}$ and $SrMoO_4:Nd^{3+}$ crystals have been investigated. Competitive efficiency in free-running, Q-switched, and self-Raman modes for molibdate crystals is demonstrated.

TuB22
Spectroscopy and Continuous-Wave Diode-Pumped Laser Operation of $Er^{3+},Yb^{3+}:YVO_4$ Single Crystal, *Nikolai A. Tolstik[1], Andrei E. Troshin[1], Victor E. Kisel[1], Nikolai V. Kuleshov[1], V. N. Matrosov[2], T. A. Matrosova[2], M. I. Kupchenko[2]; [1]Inst. of Optical Materials and Technologies BNTU, Belarus, [2]Solix Ltd., Belarus.* We report on the spectroscopic properties, energy transfer and CW laser operation of a diode-pumped $Er,Yb:YVO_4$ laser. Output power of 170 mW with slope efficiency of 8% with respect to absorbed pump power was demonstrated.

TuB23
Compact, High-Repetition-Rate 336nm Source Based on a Frequency Quadrupled, Diode-Pumped $Nd:YVO_4$ Laser, *Hamish Ogilvy, James A. Piper; Macquarie Univ., Australia.* Intracavity nonlinear second harmonic generation from a Q-switched, diode-end-pumped $Nd:YVO_4$ laser (1342nm) and subsequent external fourth harmonic generation in BBO have been used to demonstrate up to 20mW average power at 336nm at multi-kilohertz repetition-rates.

TuB24
Thermal Effects on the Scalability of High Power Third Harmonic Generation at 355 nm in LBO, *Jens Löhring, Marco Höfer, Rolf Wester, Hans-Dieter Hoffmann, Reinhart Poprawe; Fraunhofer Inst. für Lasertechnik, Germany.* Numerical calculations with an experimentally evaluated model show drop of the conversion efficiency above 100W UV caused by thermal effects. With an optimized experimental setup 36W@355nm with M2 <1.5 at 100W fundamental power are demonstrated.

TuC • THz and Optical Parametric Oscillators

Lakeside Ballroom
11:00 a.m. – 1:00 p.m.
TuC • THz and Optical Parametric Oscillators
Christopher A. Ebbers; LLNL, USA, Presider

TuC1 • 11:00 a.m. Invited
THz-Wave Frequency-Agile Parametric Oscillator and Future Applications, *Hiroaki Minamide[1], Koichi Akiyama[1], Hiromasa Ito[1,2]; [1]RIKEN PDC, Japan, [2]Res. Inst. of Electrical Communication, Tohoku Univ., Japan.* We have developed frequency-agile THz-wave parametric oscillators (TPO). The random-frequency access and the rapid tunability provide promising THz-wave applications in various industrial and research fields. The THz-wave source and its applications will be discussed.

TuC2 • 11:30 a.m.
High-Power Source of THz Radiation Based on Orientation-Patterned GaAs Pumped by a Fiber Laser, *G. Imeshev[1], M. E. Fermann[1], K. L. Vodopyanov[2], M. M. Fejer[2], X. Yu[3], J. S. Harris[3], D. Bliss[4], D. Weyburne[4]; [1]IMRA America, Inc, USA, [2]E. L. Ginzton Lab, Stanford Univ., USA, [3]Solid State Photonics Lab, Stanford Univ., USA, [4]Hanscom AFRL, USA.* We demonstrate a μW-level, 100-MHz repetition rate THz source based on parametric down-conversion in orientation-patterned GaAs pumped by a femtosecond all-fiber laser at 2 μm. The demonstrated source should be suitable for imaging and spectroscopy.

TuC3 • 11:45 a.m.
100mJ Output Optical Parametric Oscillation Using Periodically Poled MgO:$LiNbO_3$, *Hideki Ishizuki, Jiro Saikawa, Takunori Taira; Laser Res. Ctr., Inst. for Molecular Science, Japan.* Quasi phase-matched optical parametric oscillation using periodically poled MgO-doped congruent $LiNbO_3$ with 5 mm thickness and 32.3 μm period was demonstrated. We achieved the total output of ~ 100 mJ at ~ 2 μm wavelength.

TuC4 • 12:00 p.m.
Narrow Linewidth Near-Degenerate Optical Parametric Oscillation in Periodically Poled $LiNbO_3$ with Volume Bragg Grating Output Coupler, *Markus Henriksson[1,2], Lars Sjöqvist[1], Valdas Pasiskevicius[2], Fredrik Laurell[2]; [1]FOI, Sweden, [2]Royal Inst. of Technology, Sweden.* A periodically poled $LiNbO_3$ (PPLN) OPO with Volume Bragg Grating output coupler and signal wavelength of 2008 nm pumped by a Nd:YVO_4-laser is presented. A signal linewidth of approximately 0.5 nm was achieved.

TuC5 • 12:15 p.m.
Frequency Locking in a Degenerate Polarization Mixing Optical Parametric Oscillator, *Pinhas Blau[1], Shaul Pearl[1], Gal Kalmani[2], Ady Arie[2], Arlee V. Smith[3]; [1]SOREQ NRC, Israel, [2]Dept. of Physical Electronics, School of Electrical Engineering, Tel-Aviv Univ., Israel, [3]Sandia Natl. Labs, USA.* A polarization mixing OPO was demonstrated, that emits a single, linearly polarized narrow linewidth beam, fixed at degeneracy, independent of crystal temperature. The frequency locking is explained in terms of balanced roundtrip phase-matching condition.

TuC6 • 12:30 p.m.
Tunable fs Laser Pulses from OPA with MHz Repetition Rate, *Andy Steinmann[1], Alexander Killi[1], Guido Palmer[1], Uwe Morgner[1], Hartmut Bartelt[2], Jens Kobelke[2]; [1]Inst. für Quantenoptik, Univ. Hannover, Germany, [2]Inst. für Physikalische Hochtechnologie e.V., Germany.* We demonstrate an optical parametric amplifier with 1 MHz repetition frequency and 30 nJ, 16 fs pulses. It is tunable from 0.65 to 0.85 μm (signal) and 1.4 to 2.5 μm (idler) respectively.

TuC7 • 12:45 p.m.
High-Performance OPCPA Laser System, *Jonathan D. Zuegel[1], V. Bagnoud[2], J. Bromage[1], I. A. Begishev[1], J. Puth[1]; [1]Univ. of Rochester, USA, [2]GSI, Germany.* A high-performance optical parametric chirped-pulse amplifier (OPCPA) system that delivers 530-mJ chirped pulses at a 5-Hz repetition rate has been demonstrated.

Wednesday, February 1, 2006

► 7:30 a.m. – 5:00 p.m.
Registration
Lakeside Foyer

WA • Microstructured Fibers

Lakeside Ballroom
8:00 a.m. – 10:00 a.m.
WA • Microstructured Fibers
Ingmar Hartl; IMRA America, Inc., USA, Presider

WA1 • 8:00 a.m. Plenary
Keeping Light Behind Bars, *Philip Russell; Univ. of Erlangen, Germany.* Two-dimensional arrays of nano/microscopic cylinders with raised or lowered refractive index can be used "to keep light behind bars." By judicious structural control, resonance and anti-resonance can be used to play new tricks with light.

Philip Russell is the Alfried Krupp von Bohlen und Halbach Professor, and Director of the Max-Planck Research Group for Optics at the University of Erlangen, Germany. From 1996 to 2005 he was a professor in the department of physics at the University of Bath, where he founded and led the Photonics & Photonic Materials Group. He obtained his D.Phil. (1979) degree at the University of Oxford, subsequently working in Europe and the USA. Since 1977, he has specialised in the behaviour of light in periodic structures, as well as nonlinear optics, waveguides and optical fibres. In 2001, he founded BlazePhotonics Ltd., with the commercial aim of exploiting photonic crystal fibre (PCF). He has over 600 publications and a substantial number of patents. A Fellow of the Optical Society of America, in 2000, he won its Joseph Fraunhofer Award/Robert M. Burley Prize for the invention of PCF. He won the Applied Optics Division Prize (2002) and the Thomas Young Prize (2005) of the UK Institute of Physics. In 2004, he received a Royal Society/Wolfson Research Merit Award and in 2005 he was elected Fellow of the Royal Society and received the Körber Prize for European Science. He is currently an IEEE-LEOS Distinguished Lecturer.

WA2 • 8:45 a.m.
Extension of Supercontinuum Generation to the Blue in Cascaded Holey Fibers, *J. C. Travers, S. V. Popov, J. R. Taylor; Femtosecond Optics Group, Imperial College, UK.* Combining holey-fibers with sequentially decreasing zero dispersion wavelengths, pumped with an all-fiber picosecond ytterbium laser, produced a 1.2W average power white light continuum 0.44-1.89μm. Enhancement of short wavelength generation is associated with optimized phase-matched four-wave-mixing.

WA3 • 9:00 a.m.
High Power Operation of a Low-Nonlinearity Single Polarization Photonic Crystal Fiber, *Thomas Schreiber, Oliver Schmidt, Fabian Röser, Jan Rothhardt, Jens Limpert, Andreas Tünnermann; Inst. of Applied Physics, Germany.* We report on the design and high power operation (147 W) of a single-polarization single-transverse mode large-mode-area photonic crystal fiber, which is realized by including index-matched stress-applying elements in the photonic cladding.

WA4 • 9:15 a.m.
1-mJ Energy, 1-MW Peak-Power, 10-W Average-Power, Diffraction-Limited Pulses from an Yb-Doped Photonic-Crystal Fiber Amplifier, *Fabio Di Teodoro, Christopher D. Brooks; Aculight Corp., USA.* A dual-stage amplifier seeded by a pulsed micro-laser and featuring an Yb-doped photonic crystal fiber generated 1062nm-wavelength, 1ns, ~10kHz repetition-rate, diffraction-limited (M2 ~ 1.05) pulses of energy >1mJ, peak/average power >1MW/>10W, and spectral linewidth <9GHz.

WA5 • 9:30 a.m.
High Energy and High Average Power Q-Switched Photonic Crystal Fiber Laser, *Oliver Schmidt[1], Fabian Röser[1], Sebastian Linke[1], Thomas Schreiber[1], Jens Limpert[1], S. Ermeneux[2], P. Yvernault[2], F. Salin[2], Andreas Tünnermann[1]; [1]Inst. of Applied Physics, Germany, [2]FEMLIGHT, France.* We report on the generation of sub-10-ns pulses with 2.5 mJ energy at low repetition rates and up to 100-W average power at 100-kHz from a Q-switched fiber laser with a 60 µm single-transverse-mode core.

WA6 • 9:45 a.m.
µJ-Level All-Polarization-Maintaining Femtosecond Fiber Laser, *Thomas Schreiber, Carsten K. Nielsen, Bülend Ortac, Jens Limpert, Andreas Tünnermann; Inst. of Applied Physics, Germany.* A compact mode-locked fiber laser delivering 21-W of linear-polarized average power at 17 MHz repetition rate and 240-fs pulse duration is reported. Using ytterbium-doped polarization-maintaining and single-polarization fibers ensures environmental stability of the short-pulse laser.

WB • Poster Session III

Regency Ballroom
10:00 a.m. – 11:00 a.m.
WB • Poster Session III

WB1
Polarized Z-Scan Measurements of Nonlinear Refractive Index for Yb^{3+}-Doped $KY(WO_4)_2$ and YVO_4 Laser Crystals, *Konstantin Yumashev, Andrey Selivanov, Igor Denisov, Nikolai Kuleshov; Inst. for Optical Materials and Technologies, Belarus.* The nonlinear refractive indices of the Yb^{3+}:$KY(WO_4)_2$ and Yb^{3+}:YVO_4 laser crystals are characterized using a z-scan technique at wavelength of 1.08 µm for different polarizations.

WB2
Crystal Growth of $Gd_{1-x}R_xCa_4O(BO_3)_3$ (R = Sc or Lu) for Non Critical Phase Matched (NCPM) Second Harmonic Generation (SHG) at 800 nm, *Lucian Gheorghe[1], Voicu Lupei[1], Pascal Loiseau[2], Gerard Aka[2], Takunori Taira[3]; [1]Inst. of Atomic Physics, Lab of Solid-State Quantum Electronics, Romania, [2]ENSCP, Lab de Chimie Appliquée de l' Etat Solide, France, [3]Laser Res. Ctr. for Molecular Science, Inst. for Molecular Science, Japan.* We have grown $Gd_{1-x}Sc_xCa_4O(BO_3)_3$ (x = 0.10) and $Gd_{1-x}Lu_xCa_4O(BO_3)_3$ (x = 0.07, 0.13) nonlinear crystals and succeeded in generating a SHG of Ti:sapphire laser at almost 800 nm under non-critical phase matching conditions.

WB3
Recent Progress in X_3-Related Optical Process Experimental Technique: Raman Lasing, *Andrey Matsko, Anatoliy Savchenkov, Dmitriy Strekalov, Lute Maleki; JPL/NASA, USA.* We describe theoretically and demonstrate experimentally a simple single-scan technique for analyzing conversion efficiency and threshold of intracavity Raman lasers. The method uses dependence of the ring-down time of the mode on the mode energy.

WB4
Optical Properties of the Yb-Doped Vanadates for Ultra Short Pulse Application, *Takayo Ogawa[1], Yoshiharu Urata[1], Satoshi Wada[1], Mikio Higuchi[2], Jun-ichi Takahashi[2]; [1]RIKEN, Japan, [2]Hokkaido Univ., Japan.* We grew high-quality Yb:YVO_4, Yb:$GdVO_4$ and Yb:$LuVO_4$ by the floating zone method. Favorable optical properties were measured with these crystals. Maximum absorption coefficient and fluorescence bandwidth of 27cm-1 and 20nm (FWHM) were observed for Yb:$LuVO_4$.

WB5
Experimental Investigation of the Athermal Orientation in Yb:KGW, *Jonas E. Hellström, Stefan Bjurshagen, Valdas Pasiskevicius, Fredrik Laurell; Kungliga Tekniska Högskolan, Sweden.* A comparative, experimental study between b-cut Yb:KGW and Yb:KGW cut along a proposed athermal direction is presented. The athermal direction gives a significantly weaker thermal lens, lower astigmatism and higher beam quality under lasing conditions.

WB6
Heat Generation Following Direct Pumping of Nd:YVO_4 with and in the Absence of Stimulated Emission, *Raphy Lavi, Sharone Goldring; Soreq NRC, Israel.* Measurements of heat generated in Nd:YVO_4 following pumping at 880nm is reported. Two different mechanisms govern the heat creation while lasing and during the fluorescence stage - reabsorption of the lasing photon and cross-relaxation, respectively.

WB7
Long-Pulse Q-Switched Operation of Tunable Micro-Rod Yb:YAG Laser, *Rakesh Bhandari[1], Toshikazu Kamiya[1], Takunori Taira[2]; [1]SUNX Ltd., Japan, [2]Inst. for Molecular Science, Japan.* A new method for generating microsecond-long pulses is proposed. Using this method, a micro-rod Yb:YAG laser,

tunable over 27 nm, has been developed, which can generate 3.6 microsecond-long pulses in single axial mode.

WB8

Efficient Active-Mirror Laser Oscillator with a Cooled Yb:YAG Ceramics, *Junji Kawanaka[1], Shigeki Tokita[1], Hajime Nishioka[2], Ken-ichi Ueda[2], Masayuki Fujita[3], Toshiyuki Kawashima[4], Hideki Yagi[5], Takagimi Yanagitani[5]; [1]Inst. of Laser Engineering, Japan, [2]Inst. for Laser Science, Japan, [3]Inst. of Laser Technology, Japan, [4]Hamamatsu Photonics K. K., Japan, [5]Konoshima Chemical Co. Ltd., Japan.* 30W active-mirror oscillator with a liquid-nitrogen-cooled Yb:YAG ceramics has been demonstrated in quasi-cw diode pump. The optical efficiency and slope efficiency were high at 62% and 71%, respectively, in both of free-running and Q-switching operation.

WB9

High Average Power LD Pumped Yb:YAG Regenerative Amplifier at High Repetition Rates, *Keiichi Sueda[1], Sakae Kawato[2], Shinichi Matsubara[2], Akira Takazawa[3], Kazuyuki Akagawa[3], Satoshi Wada[3], Takao Kobayashi[2]; [1]Res. Ctr. for Industrial Science and Technology, Japan, [2]Univ. of Fukui, Japan, [3]Megaopto Corp., Japan.* A diode pumped Yb:YAG regenerative amplifier has been developed. 10 W average output power was achieved at a repetition rate of 100 kHz with a pulse width of 6.2 ps.

WB10

Efficient Dual-Wavelength Laser Performance of Yb:YAG Crystal Grown by Temperature Gradient Technique, *Jun Dong[1], Akira Shirakawa[1], Ken-ichi Ueda[1], Jun Xu[2], Peizhen Deng[2]; [1]Inst. for Laser Science, Univ. of Electro-Communications, Japan, [2]Shanghai Inst. of Optics and Fine Mechanics, Chinese Acad. of Sciences, China.* Efficient dual-wavelength laser performance of Yb:YAG crystal grown by temperature gradient technique was achieved at room temperature. Slope efficiencies of 57%, 68% at 1049 nm and 1030 nm were achieved for 10 at.% Yb:YAG sample.

WB11

Compact, Diode Side-Pumped Nd:YVO_4 cw Laser with 74% Slope Efficiency and 22 W Output Power, *Fabíola Almeida Camargo[1], Niklaus Ursus Wetter[2]; [1]Ctr. de Lasers e Aplicações - IPEN/SP, Brazil, [2]Ctr. de Lasers e Aplicações, Brazil.* We demonstrate 63% optical-to-optical conversion efficiency and 22 W of multi-mode output power in a compact, 8 cm long Nd:YVO_4 oscillator. The slope efficiency of 74% is to our knowledge the highest so far reported.

WB12

OPCPA Output Wavelength Tuning by Adjusting Time Delay between Seed and Pump Pulses, *Ildar A. Begishev, Vincent Bagnoud, Mark J. Guardalben, Jonathan D. Zuegel; Lab for Laser Energetics, Univ. of Rochester, USA.* Fine-tuning of LBO-OPCPA output wavelength has been demonstrated by adjusting time delay between the seed and pump pulses. Because of the saturation of amplification, the output spectrum has a rectangular shape over a tuning range.

WB13

Passively Q-Switched Diode-Pumped Nd^{3+}:YVO_4 Laser with an Output Mirror of a Polymeric Saturable-Absorber, *Azusa Inoue, Junpei Hayashi, Toshiyuki Komikado, Shinsuke Umegaki; Keio Univ., Japan.* A polymeric saturable-absorber was used as an output mirror of a laser-diode-pumped Nd^{3+}:YVO_4 microchip laser. The intensity-dependent reflectivity of the polymeric saturable-absorber yielded passive Q-switching of the microchip laser.

WB14

Acousto-Optic Q-Switching and Mode-locking in Diode Pumped Nd:YVO_4 Laser, *Jan K. Jabczynski, Waldemar Zendzian, Jacek Kwiatkowski; Inst. of Optoelectronics, Poland.* Q-Switching and Mode-locking applying acousto-optic modulator was demonstrated in Nd:YVO_4 laser end pumped by 20- laser diode. 3-W average power, 0.13 mJ of the envelope energy with 5-8 mode locked pulses were achieved.

WB15

High Power End-Pumped Nd:YVO_4 Amplifier, *Bastian Schulz, Maik Frede, Ralf Wilhelm, Dietmar Kracht; Laser Zentrum Hannover e. V., Germany.* An end-pumped Nd:YVO_4-amplifier for efficient amplification of laser sources at 1064 nm will be presented with an optical efficiency > 37%. With an input of 12 W an output power of 47.2 W was achieved.

WB16

Hybrid Mode-Locking of a Nd:YVO_4 Laser with a Partially Poled KTP Crystal, *Stefan J. Holmgren, Anna Fragemann, Valdas Pasiskevicius, Fredrik Laurell; Royal Inst. of Technology, Sweden.* A Nd:YVO_4 laser is mode-locked with a hybrid active and passive modulator incorporated in a single PPKTP crystal. A periodically poled part provides negative cascaded Kerr-lensing and a bulk part with electrodes provides phase modulation.

WB17

Measuring Small Intracavity Phase Changes in a Bidirectional Ring Diode Pumped Mode-Locked Nd:YVO_4 Laser, *Vaclav Kubecek[1], Miroslav Cech[1], Petr Hirsl[1], Jean-Claude Diels[2], Vaclav Skoda[3]; [1]Czech Technical Univ., Czech Republic, [2]Univ. of New Mexico, USA, [3]CRYTUR s.r.o., Czech Republic.* Application of bidirectional passively mode-locked Nd:vanadate ring laser pumped by low power laser diode for measuring of small intracavity phase changes is reported.

WB18

Comparative Study of Nd:$GdVO_4$ and Nd:YVO_4, and Test of a Composite Nd:YVO_4/YVO_4 Rod Using a New Method of Bonding, *Julien Didierjean[1], François Balembois[1], Frédéric P. Druon[1], Patrick Georges[1], Johan Petit[2], Philippe Goldner[2], Bruno Viana[2]; [1]Lab Charles Fabry, France, [2]Lab de Chimie Appliquée de l'Etat Solide - Ecole Superieure de Chimie Paris, France.* We demonstrate by a systematical study that Nd:$GdVO_4$ has no better thermal management than Nd:YVO_4. Complementary, we present a new method of bonding that effectively reduces temperature elevation in vanadate lasers.

WB19

New Nd-Doped Crystals Designed for Laser Operation around 900 nm along the $^4F_{3/2}\rightarrow^4I_{9/2}$ Channel, *Cyrille Varona[1], Pascal Loiseau[1], Gérard Aka[1], Bernard Ferrand[2]; [1]Lab de Chimie Appliquee de l'Eat Solide, France, [2]CEA - LETI, France.* The study of neodymium ions emission following the channel $^4F_{3/2}\rightarrow^4I_{9/2}$ leads us to select several crystalline hosts for short wavelength laser operation among three series of oxide compounds.

WB20

Tm:LuVO$_4$: A New Material for 2 µm Diode-Pumped Lasers, *Pavel Cerny[1], Jiri Oswald[1], Jan Sulc[2], Helena Jelinkova[2], Yoshiharu Urata[3], Mikio Higuchi[4]; [1]Inst. of Physics, Czech Republic, [2]Czech Technical Univ., Czech Republic, [3]Megaopto Co., Ltd., Japan, [4]Hokkaido Univ., Japan.* Novel 2-µm laser material Tm:LuVO$_4$ was developed. Spectroscopic investigation revealed peak absorption cross-section of $6.2\cdot10^{-20}$ cm^2 and broad luminescence centered at 1810 nm. Laser action was achieved under quasi-continuous-wave diode pumping with 19% slope efficiency.

WB21

Mid-Infrared Electroluminescence of Cr^{2+} Ions in ZnSe Crystals, *Vladimir V. Fedorov, Igor Moskalev, Lawrence Luke, Andrew Gallian, Sergey B. Mirov; Univ. of Alabama at Birmingham, USA.* We report the first observation of the room-temperature middle-infrared electroluminescence of n-type Cr doped bulk ZnSe crystals in the spectral range of 1800-2800 nm.

WB22

Luminescence Characteristics of Nd^{3+}-Doped Silicone-Urea Copolymers, *Umit Demirbas, Adnan Kurt, Alphan Sennaroglu, Emel Yilgor, Iskender Yilgor; Koc Univ., Turkey.* We describe the synthesis and spectroscopic investigation of neodymium-doped silicone-urea copolymers. Absorption and luminescence analysis show that neodymium-doped silicone-urea copolymers are promising candidates for the development of polymer-based active photonic devices in the near infrared.

WB23

Cooperative Luminescence in TeO$_2$-ZnO Glasses Doped with Yb^{3+}, *Jonas Jakutis[1], Niklaus Ursus Wetter[1], Márcio Alencar[2], Luciana Reyes Kassab[3], Renata Andrade Kobayashi[4]; [1]Ctr. de Lasers e Aplicações - IPEN/SP, Brazil, [2]Univ. Federal de Alagoas, Brazil, [3]Faculdade de Tecnologia de São Paulo, Brazil, [4]Facudade de Tecnologia de São Paulo, Brazil.* For the first time, characteristics of Yb^{3+} doped binary TeO$_2$-ZnO glasses are presented, such as cooperative luminescence, high refractive index (2.1), high absorption coefficient (3.3 cm^{-1}) and large transmission window (0.36- 6.50 µm).

WB24

Amplified Spontaneous Emission in Organic Solids Composed of Excited-State Intramolecular Proton Transfer Molecules, *Hwan Hong Lim[1], Shanmugam Boomadevi[1], Oc-Yeub Jeon[1], Kwangseuk Kyhm[1], Myoungsik Cha[1], Sanghyuk Park[2], Sehoon Kim[2], Soo Young Park[2]; [1]Pusan Natl. Univ., Republic of Korea, [2]Seoul Natl. Univ., Republic of Korea.* Amplified spontaneous emission associated with excited-state intramolecular proton transfer was investigated in organic single crystals and glasses. The closely packed single crystals were shown to be a promising candidate for gain medium for pulsed excitation.

WC • Ultrashort Pulse Generation and Amplification

Lakeside Ballroom
11:00 a.m. – 12:30 p.m.
WC • Ultrashort Pulse Generation and Amplification
Franz X. Kaertner; MIT, USA, Presider

WC1 • 11:00 a.m.

Intense 5.1-fs Carrier-Envelope-Phase Controlled Pulse Generation through Filamentation, *Annalisa Guandalini, Petrissa Eckle, Marcel Anscombe, Philip Schlup, Jens Biegert, Ursula Keller; ETH Zurich, Switzerland.* Intense 5.1-fs pulses were generated through filamentation in argon. The CEO (carrier envelope offset) phase control is investigated of using the intense, octave-spanning spectrum generated during this process, directly for single shot f-2f spectral interferometry.

WC2 • 11:15 a.m.

Towards Ultrabroad Parametric Gain Bandwidth in Periodically Poled KTiOPO$_4$, *Mikael Tiihonen, Anna Fragemann, Carlota Canalias, Valdas Pasiskevicius, Fredrik Laurell; Royal Inst. of Technology, Sweden.* We present Ti:sapphire pumped degenerate parametric generator bandwidths exceeding 130 THz in 8mm-long PPKTP crystals. Collinear and noncollinear interaction schemes are investigated with the goal of obtaining ultrabroad gain bandwidth with zero-angular dispersion.

WC3 • 11:30 a.m.

Low Threshold and Efficient Kerr-Lens Mode-locking in a Diode-Pumped Femtosecond Yb^{3+}:YVO$_4$ Laser, *Alexander A. Lagatsky[1], A. R. Sarmani[1], C. T. Brown[1], W. Sibbett[1], V. E. Kisel[2], A. G. Selivanov[2], I. A. Denisov[2], A. E. Troshin[2], K. V. Yumashev[2], N. V. Kuleshov[2], V. N. Matrosov[3], T. A. Matrosova[3], M. I. Kupchenko[3]; [1]Univ. of St. Andrews, UK, [2]Res. Inst. for Optical Materials and Technologies, Belarus, [3]Solix Ltd., Belarus.* A new crystal, Yb^{3+}:YVO$_4$, is proposed for efficient Kerr-lens mode-locking in a diode-pumped femtosecond lasers. Near-transform-limited pulses of 61fs are generated at around of 1050nm. The nonlinear refractive indices of Yb^{3+}:YVO$_4$ are characterized.

WC4 • 11:45 a.m.

Diode-Pumped Yb:CaGdAlO$_4$ Femtosecond Laser, *Yoann Zaouter, Julien Didierjean, Gaëlle Lucas-Leclin, François Balembois, Frédéric P. Druon, Patrick Georges, Johan Petit, Philippe Goldner, Bruno Viana; Lab Charles Fabry, France.* We present the first demonstration in femtosecond regime of an Yb^{3+}:CaGdAlO$_4$ crystal. Pulses as short as 47 fs at 1050 nm have been produced.

WC5 • 12:00 p.m.

High Power Femtosecond Source Based on Passively Mode-Locked 1055-nm VECSEL and Yb-Fibre Power Amplifier, *Hannah D. Foreman[1], Keith G. Wilcox[1], Anne C. Tropper[1], Pascal Dupriez[2], Andrew Malinowski[2], Jayanta K. Sahu[2], Johan Nilsson[2], David J. Richardson[2], Francois Morier-Genoud[3], Ursula Keller[3], John*

S. Roberts[4]; [1]School of Physics and Astronomy, Univ. of Southampton, UK, [2]Optoelectronics Res. Ctr., Univ. of Southampton, UK, [3]Ultrafast Laser Physics, Inst. of Quantum Electronics, Swiss Federal Inst. of Technology, ETH Honggerberg HPT, Switzerland, [4]EPSRC Natl. Ctr. for III-V Technologies, Univ. of Sheffield, UK. We report 5-ps pulses at 160 W average power and 910 MHz repetition rate from a passively mode-locked VECSEL source seeding an Yb-doped fibre power amplifier. The amplified pulses were compressed to 291 fs duration.

WC6 • 12:15 p.m.
Acousto-Optically Q-Switched 300 kHz Femtosecond Yb:KGW Regenerative Amplifier, *Martin Delaigue[1], Inka Manek-Hönninger[1], François Salin[1], Clemens Hönninger[2], Pierre Rigail[2], Antoine Courjaud[2], Eric Mottay[2]; [1]Celia, France, [2]Amplitude Systèmes, France.* We report a diode-pumped high repetition rate chirped-pulse Yb:KGW regenerative amplifier delivering tens of microjoules pulse energy at repetition rates of up to 300 kHz.

► 12:30 p.m. – 2:00 p.m.
Lunch (on your own)

WD • Novel Laser Architectures

Lakeside Ballroom
2:00 p.m. – 3:30 p.m.
WD • Novel Laser Architectures
Robert Rice; Northrop Grumman, USA, Presider

WD1 • 2:00 p.m.
Quest of Athermal Solid-State Laser: Case of $Yb:CaGdAlO_4$, *Johan Petit[1], Philippe Goldner[1], Bruno Viana[1], Julien Didierjean[2], François Balembois[2], Frédéric P. Druon[2], Patrick Georges[2]; [1]Lab de Chimie Appliquée de l'Etat Solide - Ecole Superieure de Chimie Paris, France, [2]Lab Charles Fabry, France.* Yb:CALGO is a very promising crystal because of its broad emission spectrum and good thermal conductivity. Those properties enable us to demonstrate a laser with a quantum defect of 0.8%, the lowest ever measured.

WD2 • 2:15 p.m.
High-Power $Yb:LaSC_3(BO_3)_4$ Thin Disk Laser, *Christian Kränkel, Jens Johannsen, Michael Mond, Klaus Petermann, Günter Huber; Inst. of Laser-Physics, Germany.* We report on power scalability of $Yb:LaSC_3(BO_3)_4$ (Yb:LSB) using the thin-disk geometry. 16.6 W at ~1 μm with 39% slope efficiency was obtained from a 10% Yb:LSB under diode-pumping with 58 W at 974 nm.

WD3 • 2:30 p.m.
A High Energy Tm:YLF-Fiber-Laser (1.9μm) Pumped Ho:YAG MOPA (2.09μm) Laser System, *Gunther Renz[1], Manfred Klose[1], Christoph Reiter[2], Frank Massmann[2], Heike Voss[2]; [1]DLR, Germany, [2]Industrial Broad-Spectrum Laser AG (IB Laser), Germany.* A single mode Ho:YAG MOPA (2.09 μm) laser system with 80 mJ and 20 ns at 100 Hz which is end-pumped by Tm-fiber-lasers has been developed for countermeasure applications.

WD4 • 2:45 p.m.
Electro-Optically Q-Switched Er:YAG Laser In-Band Pumped by an Er,Yb Fiber Laser, *Deyuan Shen, Jayanta Sahu, William Clarkson; Univ. of Southampton, UK.* Electro-optically Q-switched operation of an Er:YAG laser at 1645 nm end-pumped by a cladding-pumped Er,Yb fiber laser is reported. Pulse energies up to 15 mJ have been generated at a pulse repetition frequency of 29Hz.

WD5 • 3:00 p.m.
242W Single-Mode CW Fiber Laser Operating at 1030nm Lasing Wavelength and with 0.35nm Spectral Width, *Victor Khitrov, Bryce Samson, David Machewirth, Kanishka Tankala; Nufern, USA.* Conventional high-power, single-mode CW fiber lasers typically have operating ranges limited to 1060-1110nm. Here we demonstrate a fiber laser with 242W output power, operating at 1030nm with narrow 0.35nm line-width and diffraction limited beam M2=1.05.

WD6 • 3:15 p.m.
2KHz Single Frequency 1083nm Ytterbium Doped MOPA Fiber Laser System, *Shenghong Huang, Guanshi Qin, Akira Shirakawa, Mitsura Musha, Ken-ichi Ueda; Inst. for Laser Science, Univ. of Electro-Communications, Japan.* 2 KHz single frequency 1083 nm ytterbium fiber MOPA system was demonstrated, the maximum output power was 177 mW. The laser oscillator was a linear fiber cavity with loop mirror filter and polarization controller.

WE • Ceramic Lasers

Lakeside Ballroom
4:00 p.m. – 6:00 p.m.
WE • Ceramic Lasers
Günter Huber; Inst. f. Laser-Physik, Germany, Presider

WE1 • 4:00 p.m. Invited
High Power Single-Frequency Laser for Gravitational Wave Detection, *Dietmar Kracht[1], Ralf Wilhelm[1], Maik Frede[1], Carsten Fallnich[2], Frank Seifert[3], Benno Willke[3], Karsten Danzmann[3]; [1]Laser Zentrum Hannover e.V., Germany, [2]Physikalisch-Technische Bundesanstalt, Germany, [3]Albert-Einstein-Inst., Germany.* In the field of gravitational wave detection linearly polarized fundamental mode laser sources in single-frequency operation with output power levels up to 200W are required. The current status of suitable solid-state lasers will be presented.

WE2 • 4:30 p.m.
A Fabry-Perot Cavity Used as a High-Extinction-Ratio Resonant Polarizer with Application to Quantum Optics Measurements, *Shailendhar Saraf, Karel Urbanek, Robert L. Byer; Stanford Univ., USA.* The use of Fabry-Perot ring cavities with an odd number of reflections as high-extinction-ratio resonant polarizers is shown. Experimental results from quantum-noise

measurements using cavities as spatial and spectral filters, and resonant polarizers are presented.

WE3 • 4:45 p.m.
Quasi-CW Yb^{3+}-Doped Y_2O_3 Ceramic Laser, *Mark Dubinskii[1], Jed Simmons[1], Arockiasamy Michael[1], Alex Newburgh[1], Larry Merkle[1], Vida Castillo[2], Greg Quarles[2]; [1]ARL, USA, [2]VLOC, Subsidiary of II-VI Inc., USA.* We present laser characterization results of a high-power longitudinally diode-pumped Yb^{3+}-doped Y_2O_3 ceramic laser. Slope efficiency as high as 44.5%, quasi-CW power in excess of 26 W and acousto-optically Q-switched operation are reported.

WE4 • 5:00 p.m.
300 W CW Operation of Diode Edge-Pumped, Composite Single Crystal Yb:YAG/Ceramic YAG Microchip Laser, *Masaki Tsunekane, Takunori Taira; Inst. for Molecular Science, Japan.* >300 W CW operation of a diode edge-pumped, hybrid Yb:YAG/YAG microchip, active mirror laser was demonstrated. The Au-Sn soldered microchip shows 17% drop of temperature rise compared to the thermally conductive glue bonded one.

WE5 • 5:15 p.m.
High Peak Power, High Repetition Rate, TEM_{00} Q-Switched Lasers in Yb-YAG and Nd-YAG Ceramic, *Santanu Basu, Arun K. Sridharan; Sparkle Optics Corp., USA.* We report recent results in power scaling of high repetition rate TEM_{00} Q-switched lasers in Yb-YAG and Nd-YAG ceramic. 72.8 W of Q-switched power was obtained at 50 kHz in 69 ns pulses in Yb-YAG.

WE6 • 5:30 p.m.
End-Pumped Nd:YAG Laser Applying a Novel Laser Crystal with Longitudinal Hyperbolic Dopant Distribution, *Denis Freiburg[1], Ralf Wilhelm[1], Maik Frede[1], Dietmar Kracht[1], Klaus Dupré[2], Lothar Ackermann[2]; [1]Laser Zentrum Hannover, Germany, [2]FEE GmbH, Germany.* An end-pumped Nd:YAG rod laser design with a longitudinal hyperbolic dopant distribution is presented and 77 W of output power are demonstated. Numerical calculations indicate a homogenization of the longitudinal temperature profile.

WE7 • 5:45 p.m.
High-Power Multi-Segmented End-Pumped Nd:YAG Laser, *Maik Frede[1], Ralf Wilhelm[1], Dietmar Kracht[1], Klaus Dupre[2], Lothar Ackermann[2]; [1]Laser Zentrum Hannover, Germany, [2]FEE GmbH, Germany.* The first results on power scaling of end-pumped Nd:YAG lasers by applying a multi-segmented-rod will be presented. A maximum laser output power of 407 W with an optical-to-optical efficiency of 54 % was demonstrated.

► 6:00 p.m. – 6:30 p.m.
Closing Remarks and Presentation of Best Student Paper Prize
Lakeside Ballroom

Key to Authors and Presiders

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Notes