Fiber Laser Applications (FILAS)

February 16-17 2011, Ceylan Intercontinental Istanbul Hotel, Istanbul, Turkey

FILAS - a new topical meeting focusing on fiber laser technologies and applications. Learn more.

We look forward to seeing you in Istanbul!

Istanbul Tour

Agenda of Session Now Available!

- Abstracts (1.3 MB)
- Agenda of Sessions (84 KB)
- Key to Authors and Presiders (109 KB)

Take advantage of all FILAS has to offer:

- Access to technical sessions
- Tabletop exhibit
- Short courses for professional development
- Renowned experts presenting invited talks
- Poster sessions providing one-on-one discussion time with presenters
- Post Deadline Session reporting critical breakthroughs
- Networking events

Proceedings from OSA conferences are archived in Optics InfoBase, OSA's online library for OSA flagship journals and partnered and copublished journals.

This event is part of the Lasers, Sources and Related Photonic Devices Congress, allowing attendees to access to all meetings within the Congress for the price of one and to collaborate on topics of mutual interest.

View the conference program and plan your itinerary for the conference

- Browse speakers and the agenda of sessions
- Browse sessions by type or day.
- Search by author, title, OCIS code and more.
- Plan and print your personal itinerary before coming to the conference
- Key to Authors and Presiders
- Abstracts

Lasers, Sources and Related Photonic Devices: OSA Optics & Photonics Congress

- Advanced Solid-State Photonics (ASSP)
- Advances in Optical Materials (AION)
- Fiber Laser Applications (FILAS)
- High-Intensity Lasers and High-Field Phenomena (HILAS)
Fiber Laser Applications (FILAS)

February 16-17 2011, Ceylan Intercontinental Istanbul Hotel, Istanbul, Turkey

Program

Itinerary Planner
Invited Speakers
Tour
Special Events

Schedule at a Glance

The Fiber Laser Applications meeting brings together industry and research experts to present and discuss the latest advances on fiber laser technology and how they impact on numerous application areas, from both classical and novel industrial applications to environmental monitoring and medicine.

Successful laser applications depend on bringing together industrial and scientific competencies, and FILAS 2011 will provide such a forum. This conference is being articulated with ASSP - Advanced Solid State Photonics - fundamental scientific aspects are primarily covered by ASSP and applications are primarily covered by FILAS. The bridging between fundamental scientific aspects and applications will also be covered by FILAS 2011.

Topics to be covered by FILAS 2011 include:

- Fiber laser technologies
  - High power cw, pulsed, IR, visible and UV fiber lasers
- Fiber laser applications
  - Cutting and welding
  - Scintering and powder deposition
  - Photovoltaic materials processing
  - Microelectronics and flat panel displays
  - Micromachining and precision marking
  - Femtosecond laser micromachining
  - Environmental monitoring
  - Medical
  - Novel applications (e.g. optical clockworks, etc.)
  - Sensing

A number of distinguished invited speakers have been invited to present at the meeting. In addition, the organizers have planned a number of special events to make your meeting experience more enjoyable!

Invited Speakers

The program for Fiber Laser Applications (FILAS) will be held Wednesday, February 16 through Thursday, February 17.

View the conference program and plan your itinerary for the conference

View My Schedule
Customize your program

- Browse speakers and the agenda of sessions
- Browse sessions by type or day.
Tour

Explore the main cultural highlights of Istanbul’s opulent past - the elegant Blue Mosque and ancient Hippodrome, the magnificent Hagia Sophia, the grandiose Topkapi Palace and the glittering Grand Bazaar.

These are full-day tours offered during the Laser, Sources and Related Photonic Devices Congress. Admission to the sites, an English speaking guide, and lunch is included in the price.

Seating is limited so reserve your space now!

Tour at a Glance:
- Blue Mosque – Hippodrome
- Hagia Sophia
- Topkapi Palace
- Lunch break at a local restaurant
- Topkapi Palace
- Grand Bazaar
- Return to the Hotel

Two Options:

Tuesday, February 15, 2011 • 9:00-15:45
Tour Price per Person $70 USD
Detailed Itinerary

Friday, February 18, 2011 • 9:00-16:30
Tour Price per Person $80 USD
Detailed Itinerary

To reserve your seat

1. Complete the Reservation Form (be sure to select the day and number of people)
2. Email your completed reservation form to reservation@gazella.com

Any incomplete information will delay or prevent the processing of your reservation. Once your reservation request has been processed Gazella Tours will email you a confirmation.

Special Events
Congress Banquet
Wednesday, 16 February 2011
18:30 – 21:00
Location: Binbirdirek Cistern

The 1001 Columns Cistern, also called the ‘Philoxenus Cistern’ or ‘Binbirdirek Cistern’ in Turkish, is the oldest known cistern in Istanbul. Thought to have been constructed in 330 AD by the Roman Senator Philoxenus during the reign of the Byzantine Emperor Constantine, its original purpose was to serve the Lavsus Palace. Later it was converted into a silk manufacturing warehouse during Ottoman times until falling into disrepair. Closed for decades, it was restored a few years ago and functions as a cafe and venue for exhibitions, functions and concerts. — mydestinationinfo.com & Lonely Planet

Banquet Speaker:

Optical Fibres: The Untold Story, David Payne, Univ. of Southampton, UK
A global internet of 100 million kilometres and the prospect of megawatt fibre lasers? Personal reflections and untold stories.

D. Payne obtained a PhD in 1976 from the University of Southampton, and is now a professor of photonics and Director of the Optoelectronics Research Centre (ORC). He has published over 600 Conference and Journal papers and is co-inventor on over 20 patents. Over the last forty years, he has made several key contributions in optical fibre communications and laser technology. His work in fibre fabrication in the 1970s resulted in many of the special fibres used today, including the revolutionary erbium-doped fibre amplifier (EDFA) and kilowatt-class fibre lasers for manufacturing and defence. He has received the UK Rank Prize for Optics, the 2001 Mountbatten Medal, the 2004 Kelvin Medal for the application of science to engineering, the 2007 IEEE Photonics Award, the 1991 IEEE/LEOS Tyndall Award, the 1998 Benjamin Franklin Medal for Engineering, and is Laureate of the 2008 Millennium Technology Prize. He is also an Eduard Rhein Laureate and a foreign member of the Norwegian and the Russian Academies of Sciences. He is a Fellow of the Royal Society and of the Royal Academy of Engineering. As an entrepreneur, he founded York Technologies, (now PK Technology Inc.) and SPI Lasers plc (now part of the Trumpf Gruppe).

One conference banquet ticket is included in the Full Technical Fee. Guest tickets may be purchased for US$ 95 per person.

IPG Reception & Dinner
Thursday, 17 February 2011
18:30 – 21:30
Location: Esma Sultan
Invitation Only
More information will be available closer to the event. Event details are subject to change.
Fiber Laser Applications (FILAS)

February 16-17 2011, Ceylan Intercontinental Istanbul Hotel, Istanbul, Turkey

Chairs & Committee Members

The Technical Program Chairs and Committee Members are integral to the success of the meeting. These volunteers dedicate countless hours to planning, including such critical activities as raising funds to support the event, securing invited speakers, reaching out to colleagues to encourage submissions, reviewing papers, and scheduling sessions. On behalf of OSA, its Board, and its entire staff, we extend enormous gratitude to the following members of the Fiber Laser Applications (FILAS) Technical Program Committee.

On this page:

Program Committee
Information for Conference Chairs and Committee Members
Information for Session Chairs/Presiders

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Andreas Tüfnermann, Univ. Jena, Germany

If you are a member of the committee and have any questions or concerns at any point along the way, please refer to the information below or contact your program manager.
Information for Conference Chairs and Committee Members

- View the Calendar of Deadlines for the Meeting
- View the Chairs’ Manual
- View the Call for Papers (coming soon)
- View Fundraising Information
- View Exhibit and Sponsorship Information (coming soon)
- View Author/Presenter Information
- View Peer Review Instructions
- View Scheduling Instructions
- View Student Travel Grant Information
- View Registration Information (coming soon)
- View Housing Information (coming soon)

Information for Session Chairs/Presiders

Presiders are requested to identify themselves at least 20 minutes before the session begins to the audiovisual personnel for a quick review of equipment and procedures.

Guidelines

Remember to introduce yourself as the presider and announce the session. The total amount of time allotted for each paper will be listed in the online program as well as in the conference program book. Generally, invited talks are allowed 25 minutes for presentation and 5 minutes for discussion. Generally, contributed talks are allowed 12 minutes for presentation and 3 minutes for discussion. Generally, tutorials are allotted 45 minutes to 1 hour, with 5 minutes for discussion. A 60-minute mechanical timer will be available for your use. We recommend that the timer is set two minutes prior to the end of the presentation time in order to provide a warning to wrap up the talk and start the discussion period. Notify the authors of this warning system. It is also important to remind the speaker to repeat the questions asked from the audience.

Maintaining the scheduled timing of papers is very important. In cases where the paper is withdrawn or the speaker does not show, use the time for an extended question period for authors of previously presented papers or call a break. PLEASE DO NOT START TALKS EARLIER THAN THEY ARE SCHEDULED. All requests to modify the program schedule should be directed to the program chair.

We encourage you to watch a short podcast featuring Dr. Ben Eggleton (CUDOS, Univ. of Sydney, Australia) giving tips on how to be a great presider. Or download notes from the podcast.

Speaker Check-in Sheet

Once you arrive at your session room, you'll find a folder at the podium or on the table at the front of the room. This folder will contain a sheet for each session in that room. Please be sure to remove only your session sheet. The check-in sheet will list the talks within your session, the order in which they will be given, and the name of the author giving the presentation. Please be sure to check the box to indicate which speakers presented during the session. Make note of any no-show speakers or replacement speakers. Also, please try to estimate the number of attendees at the session at the start of the session, about halfway into the session, and at the end of the session; note these counts where indicated in the upper right corner. Leave the completed sheet in the folder in the pocket marked “Completed” and leave the folder on the podium or table for the next session presider. The check-in sheet serves two purposes: 1) to assist you in running an effective session and 2) to help us ensure that the appropriate speakers’ files are archived on OSA Optics InfoBase after the meeting. Only those authors who attend and present are included in the InfoBase, so it’s important that you make note of any presenters who are absent.

View a sample check-in sheet.

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Nufern is a leading U.S. manufacturer of specialty optical fibers, precision wound optical fiber coils, fiber lasers and amplifiers. Our integrated team has the experience, resources, and facilities required to design, manufacture, test and qualify highly-engineered optical fibers and fiber-based products for diverse applications and industries.

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ASSP, AIOM, FILAS & HILAS
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No photography is permitted in the exhibit hall.

Thank you!
Lasers, Sources and Related Photonic Devices

OSA Optics & Photonics Congress 2011

Update Sheet

Withdrawals

AITHB02  AIFB3
AITHB03  AIFB6
AITHB11  HWC13
AITHB13  HFB3
AITHB17

Presider Updates

Kent E. Mattsson, Technical Univ. of Denmark, Denmark, will preside over the session, AITHD, Crystal and Glass Fibers II

Author Block Update

The author block for HWA3 should read: Xiaowei Chen, Aurelien Ricci, Arnaud Malvache, Aurelie Jullien, Rodrigo Lopez-Martens; Lab d’Optique Appliquee, Palaiseau Cedex, France.

Presenter Changes

HWB5 will be presented by Paraskevas Tzallas, IESL, FORTH, Heraklion, Greece.

AMB10, ATuD4, and FWB3 will be presented by Lawrence Shah, CREOL College of Optics and Photonics, Univ. of Central Florida, USA.

HThE3 will be presented by P. D. Mason, STFC Rutherford Appleton Laby, Central Laser Facility, UK

HThC5 will be presented by Rainer Hoerlein, Ultrafast Innovations, Germany

Session Changes

AITHF • AIOM Postdeadline Session ends at 19.15.

Special Events

Please join the HILAS and FILAS chairs for an informal “rump” session to discuss the 2011 inaugural offerings of these two meetings and to brainstorm for how to improve in 2012.

FILAS Rump Session

Wednesday, 16 February 2011
13.00–14.00
Marmara

HILAS Rump Session

Thursday, 17 February 2011
20.00–21.00
Citronelle

Welcome Event

Please join the ASSP Chairs on Sunday at the City Lights Bar within the hotel from 18.00–19.00.

Student Awards

The ASSP Student Award sponsored by Lockheed Martin will be presented following session AWB on Wednesday, 16 February.

The FILAS Student Award sponsored by Multiwave Photonics will be presented during the IPG dinner on Thursday, 17 February.

Additional Support provided by:

Postdeadline Paper Programs

Postdeadline Paper Programs are available at Registration.
Invited Speakers

Keynote Speakers

Wednesday, 16 February 2011

FWA1 • 11:30 a.m., Title to Be Announced, Valentin Gapontsev, IPG Photonics Corp., USA

Thursday, 17 February 2011

FThA1 • 8:00 a.m., Fibre Lasers: Current Research and Future Products, David Payne, Univ. of Southampton, UK

Invited Speakers

Wednesday, 16 February 2011

Joint with ASSP JWA1 • 8:15 a.m., Advanced Specialty Fibers for Applications in Fiber Lasers, L. Dong, IMRA America Inc., USA

Joint with ASSP, JWA4 • 9:15 a.m., Compact, Highly Coherent Fiber Lasers and Amplifiers for Sensing and Oil and Gas Exploration, A. Chavez-Pirson, NP Photonics, Inc., USA

FWA3 • 12:00 p.m., Compact Fiber Laser Light Sources for Linear and Nonlinear Microscopy, A. Leitenstorfer, Fachbereich Physik, Univ. Konstanz Germany, Germany

FWA4 • 12:30 p.m., High Power Thulium Fiber Lasers, M. Richardson, Univ. of Central Florida, USA

FWB1 • 2:30 p.m., Ultralow Phase Noise RF Generation Using a Fiber-Frequency Comb, Y. Le Coq, Observatoire de Paris, France

FWB4 • 3:30 p.m., High Power Fiber Laser Frequency Combs for XUV Spectroscopy, I. Hartl, IMRA America Inc., USA

FWC1 • 4:30 p.m., Fiber-Based Coherent Doppler Lidar for Precision Landing on the Moon and Mars, F. Amzajerdian, L. Petway, B. Barnes, G. Hines, NASA, Hampton, VA; D. Pierrottet, G. Lockard, Coherent Applications, Inc., USA
FWC4 • 5:30 p.m., Tm:Fiber Pumped Solid-State Ho:YLF 2-µm Coherent Laser Transmitter for Air and Space-based CO2 Measurements, Upendra Singh1, Yingxin Bai2, Jirong Yu1; 1NASA Langley Res. Ctr., Hampton, VA, USA, 2Science Systems and Applications, Inc., Hampton, VA, USA.

Thursday, 17 February 2011

FThA5 • 9:30 a.m., Distributed Feedback Lasers in Phosphate Glass Active Fiber, A. Schulzgen1, P. Hofmann1, P. Hofmann2, L. Li2, N. Peyghambarian2, L. Xiong3, A. Laronche3, J. Albert3, 1CREOL, College of Optics and Photonics, Univ. of Central Florida, USA, 2College of Optical Sciences, Univ. of Arizona, USA, 3Carleton Univ., Canada

FThB1 • 10:30 a.m., Recent Progress on the ALPINE (Advanced Lasers for Photovoltaic INdustrial processing Enhancement ) FP7 Integrated Project, Y. Hernandez, Multitel, Belgium

FThB4 • 11:30 a.m., ns and fs Fiber Lasers, J. Liu1, P. Wan1, L. Yang1, F. Amzajerdian2, 1PolarOnyx Inc., USA, 2NASA Langley Res. Ctr., USA

FThB5 • 12:00 p.m., Photovoltaics Applications of High Power Green and UV Fiber Lasers, J. Saby, Eolite Systems, France

FThC1 • 2:00 p.m., High Repetition Rate Short Pulse Micromachining with Fiber Lasers, S. Nolte, Friedrich-Schiller-Univ. Jena, Germany

FThC4 • 3:00 p.m., Influence of Peak Power and ns Pulse Duration on Micromachining, S. Hendow, Multiwave Photonics, Portugal

FThC5 • 3:30 p.m., 488 nm Fiber Laser and Applications, N. Traynor, Azur Light Systems, France
### Lasers, Sources and Related Photonics Devices Optics & Photonics Congress Agenda of Sessions

<table>
<thead>
<tr>
<th>Day</th>
<th>Time</th>
<th>Session Details</th>
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</thead>
<tbody>
<tr>
<td><strong>Sunday, 13 February</strong></td>
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<td>AMB • ASSP Student Paper Session</td>
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<td>AMD • Ultrafast Sources I</td>
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<td>ATuA • Mid-Infrared Lasers</td>
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<td>ATuB • ASSP Poster Session I</td>
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<td>ATuC • Ultrafast Oscillators</td>
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<td>AWA • ASSP Poster Session II</td>
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<td>JWB • Joint ASSP/AIOM Session</td>
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### Venue Information
- **Bosphorus, P Floor**: Dolmabahce Foyer, R Floor
- **Anadolu, P Floor**: Citronelle, N Floor
- **Marmara, P Floor**:
### Wednesday, 16 February (continued from previous page)

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<tr>
<td>14.30–16.00</td>
<td>JWC • Joint ASSP/HILAS Session</td>
<td>AIWB • Crystal and Glass Fibers I</td>
<td>FWB • Fiber Laser Frequency Combs</td>
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<td>16.30–18.00</td>
<td>AWB • Ultrafast Sources II (ends at 17:45)</td>
<td>HWC • HILAS Poster Session</td>
<td>AIWC • Nonlinear Crystals and Processes I</td>
<td>FWC • Fiber Lasers in LIDAR and Space</td>
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<td>18.30–21.00</td>
<td>Joint Conference Banquet</td>
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### Thursday, 17 February

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<td>8.00–10.00</td>
<td>AIThA • Transparent Ceramics and Laser Crystals II</td>
<td>HThA • Particles in Intense Fields</td>
<td>FThA • Fiber Lasers and their Applications</td>
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<td>10.30–12.30</td>
<td>AIThB • AIOM Poster Session (ends at 11.30)</td>
<td>HThB • Enhanced Higher-Order Harmonic Generation</td>
<td>FThB • Short Pulse Fiber Lasers</td>
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<td>14.30–16.00</td>
<td>AIThC • Crystal and Glass Fibers II</td>
<td>HThC • Plasma Interactions</td>
<td>FThC • Fiber Lasers and Applications II (starts at 14.00)</td>
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<td>16.30–18.00</td>
<td>FThE • FILAS Poster Session</td>
<td>AIThE • Nonlinear Crystals and Processes II</td>
<td>HThD • CEP-controlled High-field Optical Parametric Sources</td>
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<td>18.30–20.00</td>
<td>AIThF • AIOM Postdeadline Session</td>
<td>HThE • Joule-class High-field Facilities</td>
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<td>18.15–21.30</td>
<td>IPG Reception &amp; Dinner (by invitation only)</td>
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### Friday, 18 February

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<td>8.00–10.00</td>
<td>AIFA • Nonlinear Crystals and Processes III (ends at 9.45)</td>
<td>HFA • Molecules in a Strong Field</td>
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<td>10.30–12.30</td>
<td>AIFB • Waveguides and Laser Patterning</td>
<td>HFb • Emerging Techniques</td>
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### Key to Shading
- ASSP
- AIOM
- FILAS
- HILAS
- Joint Sessions
• Sunday, 13 February 2011 •
7.00–18.00  
Registration Open

8.00–18.00  
Short Courses

• Monday, 14 February 2011 •  
Registration Open  
7.00–18.00  
Opening Remarks  
8.00–8.15  

AMA • Nonlinear Sources

Bosphorus, P Floor  
8.15–10.00  
Alphan Sennaroglu; Koç Univ., Turkey, Presider

AMA1 • 8.15  
Invited  
Quasi-Phasematched Nonlinear Optics: History and Prospects, Martin M. Fejer; E. L. Ginzton Lab, Stanford Univ., USA.  
Microstructured ferroelectrics and semiconductors have enabled quasiphasematching as a practical technique in nonlinear devices ranging from femtosecond chirped pulse parametric amplifiers to single-photon frequency converters. Development of materials and device applications will be reviewed, and future prospects discussed.

AMA2 • 9.00  
Twin-beam Optical Parametric Generation in Nonlinear Photonic Crystals, Katia Gallo1, Martin Levenius1, Fredrik Laurell1, Valdas Pasiskevicius1; 1Applied Physics, KTH - Royal Inst. of Technology, Sweden.  
We demonstrate dual-beam optical parametric generation in hexagonally poled LiTaO3. The experimental results indicate a coherent contribution to the parametric gain arising from multiple resonances in the nonlinear lattice.

AMA3 • 9.15  
VUV 193 nm emission from micro-twinned crystal quartz, Sunao Karimura1, Masaki Harada1,2, Ken-ichi Muramatsu2, Motoi Ueda2, Minayuki Adachi2,3, Tsuyoshi Yamade1, Tokio Leno1; 1Nat’l Inst. for Mat. Sci, Tsukuba, Japan; 2Nikon Corp., Sagamihara, Japan; 3Nidek Co., Ltd., Gamagori, Japan.  
VUV light at 193 nm was generated by second harmonic generation in quasi-phase-matched crystal quartz. Specially developed mechanical module stabilized a micron-scale twin structure realizing stable QPM wavelength converter to 193 nm.

AMA4 • 9.30  
VECSEL-Pumped Tunable CW Raman Laser, Daniele C. Parrotta1, Walter Lubeigt1, Alan J. Kemp1, David Burns1, Martin D. Dawson1, Jennifer E. Hastie1; 1Inst. of Photonics, Univ. of Strathclyde, Glasgow, UK.  
Intracavity pumping of a continuous-wave KGW Raman laser within an InGaAs VECSEL is reported. VECSEL tuning resulted in tunable Raman laser emission from 1136-1154 nm with total output power up to 120 mW.

AMA5 • 9.45  
1.6W Continuous-wave Diamond Raman Laser, Walter Lubeigt1, Vasili Saveltikis1, Gerald M. Bonner1,2, Jennifer E. Hastie1, Martin D. Dawson1, David Burns1, Alan J. Kemp1; 1Inst. of Photonics, Univ. of Strathclyde, Glasgow, UK; 2MQ Photonics, Macquarie Univ., Sydney, NSW, Australia.  
Low-birefringence, single-crystal, synthetic diamond is used as a Raman medium in a Nd:YVO4 laser. CW output powers of 1.6W at the Raman wavelength were recorded. In quasi-CW operation, on-time output powers of 2.8W were obtained.

Dolmabahce Foyer, R Floor  
10.00–10.30  
Coffee Break

AMB • ASSP Student Paper Session

Dolmabahce Foyer, R Floor  
10.00–11.30

AMB01  
Dispersion compensation schemes for femtosecond Kerr-lens mode-locked CrZnSe lasers, Melisa N. Cizmeciyan1, Huseyin Cankaya1, Adnan Kartı, Alphan Sennaroglu1; 1Koç Univ., Istanbul, Turkey; 2Teknofil, Inc., Istanbul, Turkey.  
By employing different dispersion compensation schemes, we obtained femtosecond pulses with duration as short as 92 fs and pulse energy as high as 0.45 nJ from a Kerr-lens mode-locked Cr:ZnSe laser operated near 2420 nm.

AMB02  
3D simulations for an OPCPA chain including nonlinear refractive index effects, Alexandre Thai1, Christoph Skrobel1,2, Philip K. Bates1, Gunnar Arisholm1, Zsuzsanna Major1,2, Ferenc Krausz1,2, Stefan Karsch1,2, Jens Biegert1,2, 1ICFO, Castelldefels (Barcelona), Spain; 2Max-Planck-Instit. für Quantenoptik, Garching, Germany; 3Ludwig-Maximilians-Univ. München, Garching, Germany; 4Forsvarets Forskningsinst.t (Norwegian Defence Res. Establishment), Kjeller, Norway; 5ICREA-Institucio Catalana de Recerca i Estudis Avançats, Barcelona, Spain.  
We present 3D OPCPA simulations for a PW system with 3.67 J, 4 fs transform limited pulses. We show that including nonlinear refractive index effects, the energy is reduced by ~11% and the Fourier limit increased by ~17.5%.

AMB03  
High pulse energy, picosecond MgO:PPLN optical parametric oscillator using a single-mode fiber for signal feedback, Florian Kienle1, Peh Siong Teh1, Shafiq-Ul Alam1, Corin B. E. Gawith1, David C. Hanna1, David J. Richardson1, David P. Shepherd1; 1Optoelectronics Res. Ctr., Univ. of Southampton, Southampton, UK; 2Covesson Ltd., Romsey, UK.  
We demonstrate a high-pulse-energy, synchronously-pumped (7.19MHz), 100ps, widely tunable MgO:PPLN OPO providing 0.49 μJ
pulses at 1.5µm and 0.19µJ pulses at 3.6µm. A single-mode fiber is employed in the OPO to keep the 42m-long cavity compact.

**AMB04**
Enhanced Mode-hop-free Idler Tuning Range with Frequency Stabilization of a Signal Resonant Optical Parametric Oscillator, Emeline Andreix1, Abdallah Rihan1, Thomas Zanovi, Malo Cadoret4, Jean-Jacques Zondy3; 1Length section, LNE-CNAM, La Plaine Saint Denis, France. A continuous-wave signal-resonant optical parametric oscillator is frequency stabilized at the kilohertz level to the transmission peak of an external high finesse Fabry-Perot cavity, allowing a widely tunable mode-hop-free operation over 500 GHz.

**AMB05**
Phase Locking Thousands of Laser, Micha Nixon1, Eitan Ronen1, Moti Fridman1, Asher A. Friesem1, Nir Davidson1; 1Weizmann Inst. of Science, Rehovot, Israel. Experimental realization for phase locking several thousands of lasers arranged in a variety of 2D geometries is presented. Coupling ranges and sign are easily controlled giving rise to a variety of intriguing phase structures.

**AMB06**
Coherent Beam Combining at 1064 nm Employing an Erbium Doped Fiber Amplifier for Phase Control, Henrik Tünnermann1,2, Jörg Neumann1,2, Dietmar Kracht1,2, Peter Wessels1,2; 1Laser Zentrum Hannover e.V., Hannover, Germany; 2Ctr. for Quantum Engineering and Space-Time Res. - QUEST, Hannover, Germany. We investigated the phase shift induced by a pumped erbium fiber on a 1064 nm signal. Our results were applied to demonstrate all fiber coherent beam combining with an erbium fiber as a phase actuator.

**AMB07**
All-fiber isolator at multi-watt level operation, Chunte A. Lu1, Gerry T. Moore1; 1Air Force Res. Lab, Kirtland AFB, NM, USA. We experimentally demonstrated an all-fiber optical isolator at 1064nm with 0.5dB insertion loss and 14dB isolation operating at input power of 8W. This result shows that magnetic quasi-phase matching technique is feasible for multi-watt level.

**AMB08**
Inhibition of stimulated Raman scattering using long period gratings in double clad fiber amplifiers, Dirk Nodop1, Cesar Jauregui1, Florian Jansen1, Jens Limpert1, Andreas Tünnermann1; 1Inst. of Applied Physics, Univ. of Jena, Jena, Germany. Inhibition of SRS in doublecladd fiber amplifiers using LPPs is reported. Three LPPs couple the Stokes wavelength from core to cladding and double the extractable Raman free output power of a test pulse amplifier.

**AMB09**
Influence of pump noise and modulation on in-fiber amplification of broadband pulses, Kutlu Gurel1, Ibrahim L. Budunoglu1, Cagri Senel1, Pumya P. Paltani1, F. Oemer Ilday1; 1Physics Dept., Bilkent Univ., Ankara, Turkey. We investigate experimentally and theoretically the coupling of pump laser modulation and noise fluctuations to the output power of a fiber amplifier for broadband pulse trains using the modulation transfer function approach.

**AMB10**
Monolithic Polarization Maintaining Thulium Fiber Laser using High and Low Reflectivity FBGs, Christina C. Willis1, Joshua Bradford1, Robert Sims1, Lawrence Shibli1, Martin Richardson1, Jens Thomas1, Ria Becker1, Christian Voigtlander1, Andreas Tünnermann1,2, Stefan Nolte1,2; 1CREOL, Univ. of Central Florida, Orlando, FL, USA; 2Inst. of Applied Physics, Friedrich-Schiller-Univ., Jena, Germany; 3Fraunhofer Inst. for Applied Optics and Precision Engineering, Jena, Germany. A monolithic thulium laser consisting of polarization maintaining single-mode fiber and integrated high and low reflectivity fiber Bragg gratings is demonstrated with an output power of 16 W at a wavelength of 2054 nm.

**AMB11**
Robust Single-Mode High Average Power Very Large Mode Area Fiber Amplifiers, Fabian Stutzki1, Florian Jansen1, Tina Eidam1,2, Cesar Jauregui1, Jens Limpert1,2, Andreas Tünnermann1,2; 1Inst. for Applied Physics, FSU Jena, Jena, Germany; 2Heilmohltz-Inst. Jena, Germany; 3Fraunhofer Inst. for Applied Optics and Precision Engineering (IOF), Jena, Germany. Ytterbium-doped Large Pitch Fibers with very large mode area are investigated in a high power fiber amplifier. An average output power of 294W is demonstrated, maintaining robust single-mode operation with a mode field diameter of 62µm.

**AMB12**
0.5 µJ femtosecond pulses from a giant-chirp ytterbium fiber oscillator, Nikolai Chichkov1,2, Christian Hapke1,2, Katharina Hausmann1,2, Thomas Theeg1,2, Dieter Wondt1,2, Uwe Morgner1,2, Jörg Neumann1,2, Dietmar Kracht1,2; 1Laser Development, Laser Zentrum Hannover e.V., Hannover, Germany; 2Ctr. for Quantum-Engineering and Space-Time Res. - QUEST, Hannover, Germany; 3Inst. für Quantenoptik, Leibniz Univ. Hannover, Hannover, Germany. We present a modelocked ytterbium fiber oscillator with output pulse energies of 537 nJ. The oscillator operates at a repetition rate of 4.3 MHz and the output pulses are compressed to durations of 760 fs.

**AMB13**
All-Fiber Regenerative Amplifier for Nanosecond Optical Pulses at 1053 nm, Ran Xia1, Jonathan Zuegel1; 1Lab for Laser Energetics, Univ. of Rochester, Rochester, NY, USA. An all-fiber regenerative amplifier employing amplified spontaneous emission suppression techniques amplifies 2.5-ns, 1053-nm, 180-pJ pulses to 118 nJ, achieving a gain of 28 dB, 23 nm off the gain peak of Yb-doped fiber.

**AMB14**
Chirped-Pulsed Yb 3+:YAG Regenerative Amplifier using a Total-Reflection Active-Mirror, Yasuki Takeuchi1, Hiroaki Furuse1, Akira Yoshida1, Takuya Nakamishi1, Toshiyuki Kanazawa1, Hirofumi Kan1, Takayoshi Norimatsu1, Noriaki Miyazaki1, Junji Kawamura1; 1Inst. of Laser Engineering, Osaka Univ., Osaka, Japan; 2Inst. for Laser Technology, Osaka, Japan; 3Hamamatsu Photonics K.K., Shizuoka, Japan. The first
chirped-pulse regenerative amplifier using a total-reflection active-mirror with a cryogenic Yb:YAG/ YAG monolithic composite ceramic was demonstrated. 3.6 mJ of output pulse energy was obtained at 100 Hz repetition rate.

AMB15
Efficient Resonantly Inband Pumped Er:YVO₄ Laser Emitting around 1.6 μm, Christian Brandt¹, V. N. Matrossov², Klaus Petermann³, Günter Huber¹; ¹Inst. of Laser-Physics, Univ. of Hamburg, Hamburg, Germany; ²SOLIX LTD., Minsk, Belarus. Efficient resonantly inband pumped laser operation around 1.6 μm wavelength is demonstrated in Er(1 at.%):YVO₄. The maximum slope efficiency obtained is 57.9% and the maximum output power was 2.3 W.

AMB16
Broadband, diode-pumped Yb:SiO₂: multicomponent glass laser, Markus Loeser¹, Fabian Roesser¹, Alin Reichelt¹, Franziska Kroll¹, Mathias Siebold¹, Ulrich Schramm¹, Stephan Grimm², Johannes Kirchhof², Doris Litzendorf²; ¹Res. Ctr. Dresden-Rossendorf, Dresden, Germany; ²IPHT, Jena, Germany. We successfully demonstrated cw lasing of ytterbium-doped silica multicomponent glass bulk material. A slope efficiency of 43% and a tuning range from 1010-1080 nm have been achieved.

AMB17
Generation of an Azimuthally Polarized Laser Beam from an End-pumped Laser Cavity with a c-cut Nd:YVO₄ Crystal, Kazufumi Yamagishi¹, Yuichi Kozawa¹, Shunichi Sato²; ¹Inst. of Multidisciplinary Res. for Advanced Materials, Tohoku Univ., Sendai, Japan. An azimuthally polarized beam with the output power of 750 mW was demonstrated by a new generation scheme from an end-pumped c-cut Nd:YVO₄ crystal using a soft aperture effect of the pump beam.

AMB18
On the potential of 914 nm pumping of Nd:YVO₄ for laser operation at 1064 nm, Xavier Délens¹, François Balenbois¹, Olivier Masset², Patrick Georges³; ¹Laboratoire Charles Fabry, Palaiseau, France; ²Laboratoire Interdisciplinaire Carnot de Bourgogne, Dijon, France. 1064 nm-Nd:YVO₄ lasers were pumped at 808 nm and 914 nm. The comparative study shows that 914 nm-pumping is adapted for cw operation whereas 808 nm-pumping provides higher population inversion interesting for Q-switched operation.

AMB19
Spectroscopy and Laser Action of the Nd-Doped Mixed Sesquioxide Lu₂ScO₄, Fabian Reichert¹, Klaus Petermann², Günter Huber², Philipp Koopmann², Matthias Fechner²; ¹Inst. of Laser Physics, Univ. of Hamburg, Hamburg, Germany. Efficient cw laser action of a Nd-doped mixed sesquioxide is shown at 952.7 nm. The maximum output power and slope efficiency of the quasi three-level-transition 4F₉/₂→4I₁₁/₂ are 356mW and 49 %, respectively.

AMB20
Determination of the thermo-optic coefficient and thermal conductivity of ytterbium doped sesquioxides ceramics at cryogenic temperature, Vanessa Cardinalli¹,²; Emilie Marmois², Bruno Le Garrec³, Gilbert Bourdet³; ¹Dept. of Power Lasers, C.E.A., Le Barp, France; ²LULI, Ecole Polytechnique, Palaiseau Cedex, France. This paper presents thermo-mechanical measurements of ytterbium doped sesquioxides of yttrium, scandium and lutetium ceramics at cryogenic temperature. Measurements are also done on ytterbium doped CaF₂ and YAG.

AMB21
Negative Thermooptic Coefficients and Athermal Directions in Pure and Yb-doped Multicomposite KY(WO₄)₂, Pavel A. Loiko¹, Konstantin V. Yumashev⁴, Nikolai V. Kuleshov⁵, Anatoly A. Parlevlikt⁶; ¹Ctr. for Optical Materials and Technologies, Belarusian National Technical Univ., Minsk, Belarus; ²Inst. of Inorganic Chemistry, Siberian Branch of Russian Acad. of Sciences, Novosibirsk, Russian Federation. Thermooptic coefficients were measured in pure and Yb(20 at.%)-doped multicomposite KY(WO₄)₂: crystal by a beam deviation method in the visible and near-IR. Athermal propagation directions were calculated in KY(WO₄)₂ at the wavelength of 1.06 μm.

AMB22
Fabrication of composite Yb:YAG lasers by use of the room-temperature-bonding technique, Kousuke Takayanagi¹, Kenjiro Hara¹, Takuya Ishikawa¹, Ken Iinuma¹, Ichiro Shoji¹; ¹Dept. of Electrical, Electronic, and Communication Engineering, Chuo Univ., Tokyo, Japan. We have succeeded in fabricating composite Yb:YAG lasers using the roomtemperature-bonding technique. YAG/Yb:YAG/YAG showed better slope efficiency than YAG/Yb:YAG, which indicates the efficient heat removal through the bonded interfaces.

AMB23
Thermal lensing effects of edge-pumped Yb:YAG/YAG thin disk laser with crisscross edges, Mustafa Yedegari¹,², Hamed Aminpour¹; ¹Physics, Univ. of Guilan, Rasht, Islamic Republic of Iran; ²Physics, Iranian Ctr. of Laser Science and Technology, Tehran, Islamic Republic of Iran. Thermal behavior in an edge-pumped Yb:YAG thin disk laser is presented. Ray tracing method is used to calculate absorbed power through the disk. Temperature distribution, stress, displacement in crystal and optical path differences are calculated.

AMC • Coherent Beam Combining

Bosphorus, P Floor
11.30–12.45
Benoit Boulanger; Univ. de Grenoble, France, Presider

AMC1 • 11.30
120 mJ Pulses from Coherently Coupled Femtosecond Fiber Laser Systems, Enrico Seise¹,²; Arno Klekner¹, Sven Breitkopf³, Marco Plötner³, Jens Limpert¹,²; Andreas Tünnermann¹,²; ¹Inst. of Applied Physics, Friedrich Schiller Univ. Jena, Jena, Germany; ²Helmholtz Inst. Jena, Jena, Germany. We present the coherent combination of high-energy
ultrashort pulses from two fiber CPA channels. We achieved a combining efficiency of 91% with a compressed pulse duration of 800 fs and 120 μJ pulse energy.

AMC2 • 11.45  
Coherent combining of two femtosecond fiber chirped pulse amplifiers, Louis Danzauti1, Marc Hanna1, Laurent Lombard1, Didier Goulard1, Pierre Bourdon1, Frédéric Drau1, Patrick Georges1; 1Laboratoire Charles Fabry de l’Inst. d’Optique, Palaiseau, France; 2ONERA, Palaiseau, France. We demonstrate coherent combining of two fiber chirped pulse amplifiers seeded by a common oscillator. A phase stability of Δ/20 is obtained using a fiber electro-optic phase modulator, and the recombined pulsewidth is 485 fs.

AMC3 • 12.00  
All-Fiber Phase-locked Multi-core Photonic Crystal Fiber Laser, Michio Matsumoto1, Tetsuya Kobayashi2, Akira Shirakawa3, Ken-ichi Ueda4; 1Inst. for laser science, UEC, Chaofu, Japan. We propose and demonstrated all-fiber in-phase mode selection in an Yb-doped multi-core photonic crystal fiber laser. A high slope efficiency of 71% and significantly improved beam profile by fill-factor enlargement were achieved.

AMC4 • 12.15  
Coherent Combining with Imperfect Beams, Gregory Goodno1, Chun-Ching Shih1, Joshua Rothenberg1; 1Northrop Grumman Aerospace Systems, Redondo Beach, CA, USA. Coherent combining efficiency losses from spatially and temporally mismatched input fields are quantified in terms of normalized variances of the field parameters. We derive expressions for Gaussian beams relevant for coherent fiber arrays.

AMC5 • 12.30  
CEP Stable, High Repetition Rate, Two-cycle Pulses from an OPCPA System with μJ Pulse Energies, Marcel Schultz1, Thomas Binhammer1, Guido Palmer1, Moritz Emons1, Tino Lang1, Uwe Morgner1,2; 1Inst. of Quantum Optics, Leibniz Univ. Hannover, Hannover, Germany; 2VENTEON Laser Technologies GmbH, Garbsen, Germany; 3Ctr. for Quantum Engineering and Space-Time Res. (QUEST), Hannover, Germany. We present a compact two-stage OPCPA system producing CEP-stabilized pulses with compressed pulse energies of more than 3 μJ and durations of less than 6 fs at high repetition rates between 100 and 500 kHz.

12.45–14.15  
Lunch Break (on your own)
leads to 35 fs, 380 μJ (19 W), 5.7 GW pulses.

**AMD6 • 15.45**

**Generation of ultrafast visible and mid-IR pulses via adiabatic frequency conversion**, Barry D. Brister¹, Haim Suchorski¹, Ayelet Ganany-Padovicz², Irina Juvalier³, Ady Arie³, Yaron Silberberg⁴; ¹Dept. of Physics of Complex Systems, Weizmann Inst. of Science, Rehovot, Israel; ²Dept. of Physical Electronics, Faculty of Engineering, Tel Aviv Univ., Tel Aviv, Israel; ³Dept. of Electrical and Electronics Engineering, Sami Shamoon College of Engineering, Ashkelon, Israel. A method for efficient, broadband sum and difference frequency generation of ultrafast pulses is demonstrated. Using aperiodically poled nonlinear crystals and a single step nonlinear mixing process, conversion efficiencies up to 50% are reported.

Dolmabahce Foyer, R Floor
16.00–16.30
Coffee Break

**AME • Frequency Combs**

Bosphorus, P Floor
16.30–18.00
Izse Griebner; Max Born Inst., Germany, Presider

**AME1 • 16.30**

*Invited*

**Rapid, High Resolution Frequency Comb Measurements**, Ian R. Coddington, Fabrizio R. Giorgetta, Esther Baumann, William C. Swann, Nathan R. Newbury; Optoelectronics Division (815.00), NIST, Boulder, CO, USA. Frequency combs serve as an extremely high accuracy reference across broad portions of the optical spectrum. Dual frequency combs harness this accuracy and allow for fast and highly flexible measurements of passive and active sources.

**AME2 • 17.00**

*4.4-5.4 μm frequency comb from a subharmonic OP-GaAs OPO pumped by a femtosecond Cr:ZnSe laser*, Konstantin Vidoplyanov¹, Evgeni Sorokin¹, Peter Schunemann¹, Irina Sorokin¹; ¹Photonics Inst., TU Vienna, Vienna, Austria; ²Physics Dept., NTNU, Trondheim, Norway; ³BAE Systems, Nashua, NH, USA; ⁴Stanford Univ., Stanford, CA, USA. More than 1000-nm-wide frequency comb centered at 4.9 μm was produced in an OPO based on orientation-patterned GaAs (OP-GaAs), synchronously pumped at 182 MHz repetition rate by femtosecond Cr:ZnSe laser pulses at 2.45 μm.

**AME3 • 17.15**

**Development and characterization of all-normal dispersion fiber laser for frequency comb generation**, Cagri Senel¹, F Omer Ilday¹, Oguzhan Kara², Ramiz Hamid², Cihanbir Erdogar²; ¹Physics, Bilkent Univ., Ankara, Turkey; ²Physics Engineering, Hacettepe Univ., Ankara, Turkey; ³National Metrology Inst. (UME), Kocaeli, Turkey. Development of an all-normal-dispersion Yb-doped fiber laser-based frequency comb is reported. Repetition-frequency stabilization to the cesium standard, amplitude and phase noise measurements indicate low-noise performance.

**AME4 • 17.30**

**Broadband Phase-Noise Suppression in a Yb-based Optical Frequency Comb**, Dylan C. Yost¹, Arman Cingoz¹, Thomas K. Allison¹,

Jun Ye², Axel Ruehl³, Ingmar Hartl², Martin E. Fernow²; ¹JILA- Univ. of Colorado Boulder, Boulder, CO, USA; ²IMRA America Inc., Ann Arbor, MI, USA. We achieve 10dB suppression of phase-noise in a Yb-based frequency comb with 300kHz bandwidth by implementing robust intensity servo. The results are important for precision comb applications including femtosecond enhancement cavities.

**AME5 • 17.45**

**Lab Demonstration and Characterization of a Green Astro-comb**, Chih-Hao Li¹, Guoqing Chang², Li-Jun Chen³, David F. Phillips⁴, Franz Kärtner⁵, Ronald L. Walsworth⁶; ¹Harvard-Smithsonian Ctr. for Astrophysics, Cambridge, MA, USA; ²MIT, Cambridge, MA, USA. A green astro-comb, generated from a Ti:Sa comb laser, broaden by a photonic crystal fiber and filtered by a Fabry-Perot cavity, is demonstrated. We characterized the unwanted mode suppression with a quick and broadband method.

**AMF • Postdeadline Paper Session**

Bosphorus, P Floor
20.00–21.30
• Tuesday, February 15, 2011 •

7.30–18.30
Registration Open

| ATuA • Mid-Infrared Lasers |

Bosphorus, P Floor
8.00–10.00
Mark Dubinskii; US Army Res. Lab, USA, Presider

ATuA1 • 8.00
Invited
Progress in mid-IR Cr<sup>3+</sup> and Fe<sup>3+</sup> doped II-VI Materials and Lasers,
Sergey Mirov<sup>1</sup>; "Dept. of Physics, Univ. of Alabama at Birmingham, Birmingham, USA. Recent advances in Cr<sup>3+</sup> and Fe<sup>3+</sup> doped mid-IR polycrystalline, hot-pressed ceramic, waveguides, powders, powders in the liquid suspension and polymer-film, and quantum dot laser materials fabrication and lasing under optical excitation are presented.

ATuA2 • 8.30
Broadly tunable high-power continuous-wave Cr<sup>3+</sup>:CdS laser,
Evgeni Sorokin<sup>1</sup>, Dmitry Klimentov<sup>2</sup>, Irina Sorokina<sup>1</sup>, Vladimir Kazlovskii<sup>1</sup>, Yu Korostel<sup>2</sup>, A. Landman<sup>3</sup>, Yuri Podnar<sup>4</sup>, Yan Skasyrskii<sup>1</sup>, Mikhail Frolov<sup>2</sup>; "TU Vienna, Vienna, Austria; "Physics Dept., NTNU, Trondheim, Norway; "P.N. Lebedev Physical Inst., Moscow, Russian Federation. We report spectroscopic and laser study of Cr<sup>3+</sup>:CdS laser - an attractive material for 3 μm room-temperature operation. 1.8 W of output power, continuously tunable over 1000 nm from 2240 nm to 3285 nm was demonstrated.

ATuA3 • 8.45
Femtosecond Tm-Ho codoped double tungstate lasers around 2060 nm,
Alexander Lagatsky<sup>1</sup>, Dolores Serrano<sup>1</sup>, Concepcion Cascales<sup>2</sup>, Carlos Zaldo<sup>3</sup>, Tom Brown<sup>1</sup>, Wilson Sibbett<sup>1</sup>; " Physics and Astronomy, Univ. of St Andrews, St Andrews, UK; "Inst. of Ciencia de Materiales de Madrid, Madrid, Spain. Femtosecond modelocking in Tm,Ho-codoped Na<sub>3</sub>Y(W<sub>2</sub>O<sub>19</sub>)<sup>2-</sup> and KY(WO<sub>4</sub>)<sup>2-</sup> lasers is reported. Transform-limited 191-fs pulses are produced at 2060 nm at a repetition frequency of 144 MHz. Output power exceeds 200 mW during femtosecond pulse generation.

ATuA4 • 9.00
330 mJ, 2 μm, Single Frequency, Ho:YLF Slab Amplifier, Henchari J. Strauss<sup>1</sup>, D. Preussler<sup>1</sup>, O. J. Collet<sup>1</sup>, M. J. Esser<sup>1</sup>, C. Jacobs<sup>1</sup>, C. Bollig<sup>2</sup>, W. Koen<sup>1</sup>, K. Nyangaza<sup>2</sup>; "National Laser Ctr., CSIR, Pretoria, South Africa. A single-frequency double pass Ho:YLF slab amplifier delivering pulses up to 330 mJ at 2064 nm was demonstrated. It was end-pumped with a Tm:YLF slab laser and seeded with 57 mJ of single frequency pulses.

ATuA5 • 9.15
Long Wavelength Laser Operation of Tm:Sc<sub>2</sub>O<sub>3</sub> at 2116 nm and Beyond, Philipp Koopmann<sup>1,2</sup>, Samir Lamrini<sup>2</sup>, Karsten Scholle<sup>1</sup>, Peter Fuhrberg<sup>1</sup>, Klaus Petermann<sup>1</sup>, Günter Huber<sup>1</sup>; "Inst. of Laser-Physics, Hamburg, Germany; "LISA laser products, Katlenburg-Lindau, Germany. We report on the high power laser operation of Tm:Sc<sub>2</sub>O<sub>3</sub> with a slope efficiency of 41% and an output power of 26 W at 2116 nm. A tunability from 1975 nm to 2168 nm is presented.

ATuA6 • 9.30
Generation and Stability Characterization of Fiber-Based Difference Frequency Generation Tuned Through Controlled Soliton Self-Frequency-Shifting, David Winters<sup>1</sup>, Phillip Schlupf<sup>1</sup>, Randy Bartels<sup>2</sup>; "Colorado State Univ., Fort Collins, CO, USA. We present a soliton-tuned source of mid-infrared (MIR) ultrafast laser pulses. Characterization of the source stability is presented through measurements of intensity noise and timing jitter of the pulses used for frequency conversion.

ATuA7 • 9.45
Yb-fiber MOPA Pumped Optical Parametric Oscillator for Frequency-Swept Broadband Mid-Infrared Spectroscopy, Alissa Silva<sup>1,2</sup>, Ian Lindsay<sup>1,2</sup>; "Univ. of Bristol, Bristol, UK; "Ctr. for Nanoscience and Quantum Information, Bristol, UK. A Ytterbium-fiber-pumped continuous wave optical parametric oscillator rapidly tunable in the 2.73-4.02μm region is described. The system is well-suited to applications requiring a high-brightness source for spectroscopy of solid and liquid samples.

Dolmabahce Foyer, R Floor
10.00–10.30
Coffee Break

Dolmabahce Ballroom, R Floor
10.00–16.45
Exhibits Open

| ATuB • ASSP Poster Session I |

Dolmabahce Foyer, R Floor
10.00–11.30

ATuB01
Novel Actively Cooled Split-Disk Nd:glass Laser Amplifier for High-Energy Applications with Improved Repetition Rate, Jonathan Zuegel<sup>1</sup>, Milton J. Shoup<sup>1</sup>, John H. Kelly<sup>1</sup>, Curt Frederickson<sup>2</sup>; "Univ. of Rochester/Lab for Laser Energetics, Rochester, NY, USA; "Continuum, Inc., Santa Clara, CA, USA. Design details and laser-performance simulations for a novel water-cooled, split-disk laser-amplifier concept are presented. The amplifier will produce high-energy laser pulses (>500 J) with shot rates faster than one shot per minute.

ATuB02
Ultrafast nonlinear refractivity of Lead Lanthum Zirconate Titanate Ceramics, Atsushi Sugita<sup>1</sup>, Yasunasa Kawata<sup>1</sup>, Naoki Wakiya<sup>1</sup>, Hisao Sazaki<sup>2</sup>; "Shizuoka Univ., Hamamatsu, Japan. Here we will report that nonlinear refractivity and its temporal response of Lead Lanthanum Zirconate Titanate ceramics were almost comparable to those of...
SrTiO3 single crystal, one of the most excellent solid-state optical Kerr materials.

**ATuB03**
Enhanced Detection of a Longitudinal Electric Field for a Linearly Polarized Gaussian Beam. Yuichi Kazama1, Shunichi Satoh1; 1Inst. of Multidisciplinary Res. for Advanced Materials, Tohoku Univ., Sendai, Japan. Enhanced detection of a weak longitudinal electric field produced by focused linearly and circularly polarized Gaussian beams through a second harmonic generation process is demonstrated by effectively utilizing a strong transverse electric field.

**ATuB04**
Spectroscopic properties and 2 μm laser operation of Ho:BaYLuF5 crystal. Yingxin Bai1, Jirong Yui1, Brian Walsh1, Songsheng Chen1, Maugeta Petrovi2, Norman Barnes2, Upondra Singh2, Arlete Cassando2, Hans Jessen2; 1Science and Systems Applications, Incorporation, Hampton, VA, USA; 2NASA Langley Res. Ctr., Hampton, VA, USA; 3STC, Hampton, VA, USA; 4AC material, Tarpon Springs, FL, USA. A novel 2μm laser crystal, Ho:BaYLuF5, has been grown. Spectra for the transition between 1I1 and 2F3/2 of this crystal are measured. Laser operations in both linear and ring cavity configuration are demonstrated.

**ATuB05**
Yb-free Er-doped 976 nm Pumped Large Mode Area Fiber Amplifier with 67 W of Output Power. Vincent Kuhn1,2, Dietmar Kracht1,2, Jörg Neumann1,2, Peter Wessels1,2; 1Laser Development Dept., Laser Zentrum Hannover e.V., Hannover, Germany; 2Ctr. for Quantum-Engineering and Space-Time Res. - QUEST, Hannover, Germany. We demonstrate for the first time the power-scaling of Yb-free Er-doped fiber amplifiers to levels of multiple 10W. The achieved output power of 67W is the highest value ever reported for an Yb-free Er-doped fiber-system.

**ATuB06**
2.5 mJ, sub-nanosecond pulses from single-crystal fiber amplifier in a kHz MOPA system. Igor Martial1,2, François Balembois1, Julien Didierjean1, Patrick Georges1; 1Laboratoire Chimie Fabric de l’Inst. d’Optique, Palaiseau cedex, France; 2Fibercryt, Lyon, France. A Master Oscillator Power Amplifier configuration using a Nd:YAG single-crystal fiber to amplify a passively Q-switched microcaser is presented. We achieved the amplification of 80 μJ, sub-nanosecond pulses to the multi-millijoule regime.

**ATuB07**
Gain switched laser diode based all-fiber ps laser source emitting simultaneously at 8 different wavelengths in the NIR region. Hakanzayan1,2, Sebastian Kanzelmayer1, Katharina Hausmann1,2, Thomas Thege1, Jörg Neumann1,2, Dietmar Kracht1,2; 1Laser Zentrum Hannover e.V., Hannover, Germany; 2Quantum Engineering and Space-Time Res. (QUEST), Hannover, Germany. In this contribution we demonstrate a gain switched laser diode based all-fiber ps laser source, capable of emitting pulses simultaneously at 8 different wavelengths in the region between 1.06 μm and 1.59 μm.

**ATuB08**
Review and evaluation of the nonlinear capabilities of RECOB (RE = Y, Gd) oxyborate crystals for SHG. Pascal Loiseau1,2, Takunori Taira1,2, Gerard Aka1; 1LCMCP, ENSCP, Paris, France; 2Laser Res. Ctr., IMS, Okazaki, Japan. NLO oxyborate crystals exhibit some outstanding properties that this work critically reviews. 50% SHG conversion efficiency was obtained at 0.23 and 0.37 MW IR peak power for YCOB (15 mm) and LBO (10 mm) respectively.

**ATuB09**
All-fiber Yb-doped CW and pulsed laser sources operating near 980 nm. Matthieu Laroche1, Celia Bartolacci1, Gilles Herve1, Girard Sylvestre1, Thierry Robin1, Benoît Cadier2; 1CIMAP, Caen, France; 2IXFIBER, Lannion, France. We present a CW/pulsed master oscillator-power amplifier (MOPA) fiber source operating near 980 nm and based on an Yb-doped fiber pumped by a Nd-doped fiber laser at 930 nm. Up to 2.1W was obtained in CW regime with a slope efficiency of 81%.

**ATuB10**
A 469 nm blue laser to pump Pr3+ doped fluoride crystals. Patrice Campy; 1CIMAP, Caen, France. We report CW visible laser operation of Pr3+ doped LiLuF4, LiYF4 and KYF2 crystals pumped with a compact, intracavity frequency-doubled diode-pumped Nd:YAG laser at 469.12 nm, thus opening another way for power scaling of Pr-lasers.

**ATuB11**
Mode-locked all-solid photonic bandgap fiber laser. Ammar Hideur1, Caroline Lecaplain1, Levamania Rasoloinaina1, Olga Egorova2, Evgeni Diamov3, Serge Jenonov1, Jérémy Michaud1; 1CNRS UMR 6614 CORIA, Saint etienne du Rouvray, France; 2Fiber Optics Res. Ctr., Moscow, Russian Federation. We report on a mode-locked Yb-doped solid photonic bandgap fiber operating in the all-normal dispersion regime. The laser delivers 4ps pulses with 21 nJ energy. These pulses are extra-cavity compressed down to 230 fs.

**ATuB12**
8 W Actively Mode-Locked Ytterbium Doped Fiber Laser Delivering 10 ps pulses at 40 MHz. Pierre Deslandes1, Damien Sangla1, Julien Saby1, Francois Salin1, Eric Freys2; 1Edite Systems, Pessac, France; 2Univ. de Bordeaux, CNRS, CPMOH, UMR 5798, Talence, France. We present an actively mode-locked laser based on an ytterbium doped single-mode double-clad photonic crystal fiber of 30-μm core diameter pumped with 13.5-W at 976-nm generating 8-W of average power and 10-ps pulses at 40-MHz.

**ATuB13**
Analysis of a high-energy, diode-pumped Yb:CaF2 disk laser. Markus Loeser1, Mathias Siebold1, Franziska Kroll1, Fabian Roesser1, Joerg Koerner1, Joachim Hein1, Ulrich Schramm1; 1Res. Ctr. Dresden-Rossendorf, Germany; 2Walter Schottky Institut, Munich, Germany; 3TUM, Munich, Germany; 4Max-Planck-Institut für Quantenoptik, Garching, Germany. A high-energy, high-repetition-rate disk laser is presented. The laser is diode-pumped at 975 nm with a laser diode delivering 1 kW at an efficiency of 78%. The laser is operated in a chirped-pulse-amplification mode with a pulse duration of 14 ps, a repetition rate of 250 kHz and an average power of 8 W.
Dresden, Germany; 'Inst. of Optics and Quantum Electronics, Jena, Germany. We present gain measurements and a time-resolved thermal lens analysis of a diode-pumped Yb:CaF₂ disk laser. A lens power of 0.05dpt and small-signal gain of 5.2 amplifier were achieved at full pump power.

ATuB14
Diode-pumped Tm:Lu₂O₃ thin disk laser, Martin Schellhorn¹, Philipp Koopmann¹,², Karsten Scholle¹, Peter Fuhrberg¹, Klaus Petermann¹, Günter Huber¹; 'ISL, French German Res. Inst., Saint-Louis, France; 'LISA laser products, Katlenburg-Lindau, Germany; 'ILP, Univ. of Hamburg, Hamburg, Germany. We report the first diode-pumped Tm:Lu₂O₃ laser operation in thin disk design. Average output powers of 1.4 W and slope efficiencies of 32 % with respect to incident pump power were achieved in quasi-CW pumping.

ATuB15
Sum Frequency Generation of High Energy, Low Divergence UV pulses, Oystein Farsund¹, Gunnar Arisholm¹, Gunnar Rustad³; 'FFI (Norwegian Defence Res. Establishment), Kjeller, Norway. A 295 nm nanosecond source with pulse energy exceeding 30 mJ and beam quality ~1 mm•mrad is demonstrated. A 1064 nm laser pumps an OPO whose signal beam is mixed with the laser’s third harmonic in a compact setup.

ATuB16
Multi-Watt Average Power Nanosecond Microchip Laser and Power Scalability Estimates, Oleg Konoplev², Alksey A. Vasil’ev³, Antonios A. S. S. Antsionis⁴, Athanassios W. Yu⁵, Steven X. Li⁶, George B. Shaw⁷, Mark A. Stephen⁷, Michael A. Krajinák⁸, 'Spectrum Corporation, Lanham, MD, USA; NASA GSFC, Greenbelt, MD, USA. We demonstrated up to 2 W average power, CW-pumped, passively-Q-switched, 1.5 ns monolithic microchip laser with single-longitudinal-mode-operation. We discuss various design approaches to bring the average power to 10 W and beyond.

ATuB17
Tm³⁺-doped CW fiber laser based on a highly GeO₂-doped dispersion shifted fiber, Vladislav Drozhdin⁹, Irina Sorokina⁹, Vladimir Kalashnikov⁹, Valery Mashinsky⁹, L. Ishakova⁹, Evgeni Dianov⁹, V. F. Khopin⁹, A. N. Guryanov⁹; 'Norwegian Univ. of Science & Technology, Trondheim, Norway; 'Inst. für Photonik, TU Wien, Vienna, Austria; 'Fiber Optics Res. Ctr., Russian Acad. of Sciences, Moscow, Russian Federation; 'Inst. of Chemistry of High-Purity Substances, Russian Acad. of Sciences, Nizhny Novgorod, Russian Federation. All-fiber Tm-laser with 55GeO₂:45SiO₂ core, pumped at 1560 nm with 37% slope efficiency was demonstrated at 1862 nm. Four-wave mixing owing to a high nonlinearity and shifted to 1.87 μm zero-dispersion-wavelength has been observed.

ATuB18
Dysprosium lead thigallate crystal resonantly pumped by Er:YLF laser radiation, Helena Jelinková¹, Maxim Doroshenko¹, Michal Jelinek², Jan Šulc¹, Tasoltan Basiev², Valerii V. Badikov³, Dmitrii V. Badikov⁴; 'Faculty of Nuclear Sciences and Physical Engineering, Czech Technical Univ. in Prague, Prague 1, Czech Republic; 'General Physics Inst., Moscow, Russian Federation; 'Kuban State Univ., Krasnodar, Russian Federation. The characteristics of room temperature Dy³⁺:PbGa₂S₄ resonantly pumped by the 1.74 μm Er:YLF laser radiation was investigated. The stable output energy and slope efficiency obtained at 4.3 μm was 3.1 mJ and 8%, respectively.

ATuB19
Tunable erbium fiber laser using a low-cost, all-fiber multimode interference filter, Till Walbaum¹, Till Walbaum¹, Petra Gross⁵, Carsten Fallnich¹; 'Inst. of Applied Physics, Univ. of Muenster, Muenster, Germany. A low-cost tunable all-fiber filter in the telecommunication spectral region, based on multimode interference, is realized. We present a fiber laser with this filter that can be tuned by more than 15nm in operation.

ATuB20
Automated characterization of polarization within a passively mode-locked erbium-doped all-fiber laser, Tim Hellwig¹, Till Walbaum¹, Petra Gross⁵, Carsten Fallnich¹; 'Inst. of Applied Physics, Univ. of Muenster, Muenster, Germany. Automated characterization and alignment of fiber lasers based on nonlinear polarization rotation is presented. The obtained mode-locking maps allow reproducible selection of pulses with different characteristics by computerized polarization control.

ATuB21
Continuous-wave of Yb:CaGaAlO₃ thin disk laser, Sandrine Ricaud⁴, Bruno Viana⁴, Philippe Goldner⁴, Marwan Abdouh-Ahmed⁵, Birgit Weichelt⁶, Eric Mottay⁷, Patrick Georges⁸, Frédéric Draoui⁹; 'Laboratoire Charles Fabry de l’Inst. d’Optique, Palaiseau, France; 'Laboratoire de Chimie Appliquée de l’Ecole nationale Supérieure de Chimie de Paris, Paris, France; 'Inst fur Strahlwerkzeuge, Stuttgart, Germany; 'Amplitude Systems, Pessac, France. We report a continuous-wave Yb:CaGaAlO₃ thin disk laser, generating 18W of output power with a slope efficiency of 25% and an optical-to-optical efficiency of 20%.

ATuB22
Q-switching of a mode-controlled, diode-side-pumped Nd³⁺:YLiF₄ laser at 1053 nm with high efficiency and diffraction limited beam quality, Niklaus Wetter¹, Marco A. Ferrari², Eduardo C. Sousa², Izilda M. Ranieri², Sonia L. Baldocchi²; 'CLA-IPEM/SP_CNEN, Sao Paulo, Brazil. In this work we present passively Q-switched operation of a Nd³⁺:YLiF₄ slab laser that achieves 3.2 mJ per pulse and 500Hz rep rate with diffraction limited beam quality by mode-controlling in a simple, compact cavity.

ATuB23
Push contrast ratio to 10⁷ in femtosecond Ti:sapphire amplifier with a non-collinear optical parametric amplifier, Cheng Liu¹, Zhaohua Wang¹, Weichang Liu⁵, Qing Zhang⁵, Zhiyi Wei⁵; 'Lab of Optical Physics, Inst. of Physics, Beijing, China. We demonstrated a new
scheme to promise high contrast ratio in femtosecond Ti:sapphire amplifier. With a non-collinear optical parametric amplifier, contrast ratio up to $10^{10}$ was realized within the time scale of hundreds of picoseconds.

**ATuB24**

**Application of Frequency Stabilized Lasers for Precision Length Measurements, Ramiz Hamid1, Damla Sendogdu1,2, Changir Erdogan1,2; 1National Metrology Inst. (UME), Gebze-Kocaeli, Turkey; 2National Metrology Inst. (UME), Gebze, Turkey; 3National Metrology Inst. (UME), Gebze, Turkey.**

Measurements bursts achieved with 50-200 nm uncertainty using developed Köster’s interferometer and three frequency stabilized lasers. Absolute frequency of used stabilized He-Ne/I, Nd:YAG/I, ECDL/Cs are measured using Ti:Sa fs Comb.

**ATuB25**

**Fiber amplification of pulse bursts at low repetition rates via synchronous pulsed pumping, Hamit Kalaycioglu1, F Oemer Ilday2, Koray Eken1, Seydi Yavas1; 1Bilkent Univ., Ankara, Turkey; 2Fiberlast Ltd., Ankara, Turkey.**

We report, for the first time, amplification of pulse bursts in Yb-doped fiber at repetition rates as low as 200 Hz for applications to accelerators and material processing. Synchronous pulsed pumping allows suppression of ASE generation.

**ATuB26**

**Long-period gratings in photonic crystal fibers and their applications on Ytterbium-doped fiber lasers, Daniel E. Ceballos-Herrera1, Alejandro Martinez-Rios2, Oracio Barbosa-García; 1Universidad Politecnica de Valencia, Valencia, Spain; 2Centro de Investigaciones en Optica (CIO), Leon, Mexico.**

We present the resonance splitting of long-period fiber gratings induced mechanically in twisted photonic crystal fibers and their applications on the performance of tunable and switchable multiwavelength double-clad Ytterbium-doped fiber lasers.

**ATuB27**

**Crystalline-orientation dependent laser performance of Yb:YAG microchip lasers, Jian Ma1, Jun Dong2; 1Dept. of Electronics Engineering, Xiamen Univ., Xiamen, China.**

Manipulated polarized lasers were achieved in laser-diode pumped Yb:YAG microchip laser by controlling the crystalline-orientations in <111> Yb:YAG crystal. Effect of pump source on laser polarization states of Yb:YAG microchip lasers was addressed.

**ATuB28**

**Lamp-pumped and diode-pumped YAG:Nd<sup>3+</sup> laser systems with gain-grating phase conjugation and interchannel phase locking control by a passive LiF:F<sup>-</sup>- Q-switch, Tsalolton T. Basiev1, Alexander V. Fedin1, Andrei V. Gavrilov1, Sergey N. Smetanin1, Anatoly S. Boryshko1, Vyacheslav F. Lebedev1; 1Lasers Materials and Technology Res. Ctr., A.M. Prokhorov General Physics Inst., Moscow, Russian Federation; 2Laser Physics, Kovrov State Technological Acad., Kovrov, Russian Federation; 3Laser Systems LTD, St. Petersburg, Russian Federation.**

New lamp-pumped and diode-pumped YAG:Nd-laser systems with phase conjugation and interchannel phase locking are studied, in which only one laser channel has a LiF:F<sup>-</sup>- Q-switch, but it results in phase-locked oscillation of all the laser system.

**ATuB29**

**Pr:YAIo: microchip laser at 662 nm, Martin Fäbrich1, Helena Jelinková1, Jan Šulc1, Karel Nejezchleb1, Václav Škoda1; 1Czech Technical Univ. in Prague, FNSPE, Prague, Czech Republic; 2Crytur Ltd., Turnov, Czech Republic.**

A continuous-wave Pr:YAIo: microchip laser operation at 662 nm is reported. Microchip resonator was formed by dielectric mirrors directly coated on the Pr:YAIo: crystal surfaces. As a pumping source, 1-W GaN laser-diode was used.

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**ATuC** • Ultrafast Oscillators

**Bosphorus, P Floor**

**11.30 – 13.00**

**James Kafka; Newport Corp., USA, Presider**

**ATuCl • 11.30**

**Invited**

**Power-Scaleing of Femtosecond Thin Disk Lasers, Thomas Südmeyer1, Cyrill Roman Emmanuel Bae1, Christian Kräkel1,2, Clara J. Saraceno1, Oliver H. Heckl1, Matthias Golling1, Rigo Peters2, Klaus Petermann2, Günter Huber1, Ursula Keller1; 1Dept. of Physics, ETH Zurich, Zurich, Switzerland; 2Inst. of Laser-Physics, Univ. of Hamburg, Hamburg, Germany.**

Ultrafast thin disk lasers generate higher average powers (>140W) and pulse energies (>25μJ) than any other ultrafast oscillator technology. In this presentation, we discuss the current state-of-the-art and their potential for further power-scaling.

**ATuC2 • 12.00**

**Energies above 30 μJ and average power beyond 100 W directly from a mode-locked thin-disk oscillator, Dominik Bauer1,2, Farina Schättiger1, Jochen Kleinbauer1, Dirk H. Sutter1, Alexander Killi1, Thomas Dekorsy1; 1Dept. of Physics and Ctr. of Applied Photonics, Univ. of Konstanz, Konstanz, Germany; 2TRUMPF-Laser GmbH + Co. KG, Schramberg, Germany.**

We demonstrate pulses containing more than 30 μJ with a pulse length of 1040 fs directly out of a thin-disk laser in ambient atmosphere. The laser was operated at 3.5 MHz repetition rate and 108 W output power.

**ATuC3 • 12.15**

**Energy scalability of mode-locked oscillators: comparative analysis, Vladimir Kalashnikov1, Alexander Apolonoski1; 1Inst. fuer Photonik, TU Wien, Vienna, Austria; 2Dept. fuer Physik, Ludwig-Maximilians-Univ. Muenchen, Munich, Germany.**

A theory of energy scalability of modelocked oscillators is developed. An oscillator is characterized by a two-dimensional master diagram and by a simple scaling rule, which justifies sub-mJ femtosecond pulses feasible directly from an oscillator.
22 Watt Average Power Multi-MW fiber oscillator, Martin Baumgartl, Florian Jansen, Fabian Stutzki, Cesar Jauregui, Jens Limpert, Andreas Tünnermann, Friedrich-Schiller-Univ., Jena, Germany; Fraunhofer Inst. for Applied Optics and Precision Engineering, Jena, Germany. We report on the realization of a mode-locked fiber laser emitting 27 W of average power. Pulses are compressed to sub-100 fs (80% compressor efficiency) corresponding to 3.2 MW of peak power.

High-energy chirally-coupled-core Yb-fiber laser with high-dispersion limited beam quality, Hung-Wen Chen, Tom Sosnowski, Chi-Hung Liu, Li-Jin Chen, Jonathan Birge, Almantas Galvanauskas, Franz Kärtner, Guoqing Chang, Dept. of Electrical Engineering and Computer Science and Res. Lab of Electronics, MIT, Cambridge, MA, USA; Arbor Photonics, Inc., Ann Arbor, MI, USA; Dept. of Electrical Engineering and Computer Science, the Univ. of Michigan, Ann Arbor, MI, USA. We demonstrate a high-energy femtosecond laser system with two rapidly advancing technologies: 3C LMA fiber to ensure single-mode operation and high-dispersion mirror to enable loss-free pulse compression with the diffraction-limited beam quality.

13.00–14.30
Lunch Break (on your own)

Inversion Grating Assisted Beam Quality Degradation in High Power Fiber Laser Systems, Cesar Jauregui, Tino Eidam, Jens Limpert, Andreas Tünnermann, Friedrich-Schiller-Univ., Jena, Germany; IOF, Fraunhofer Inst. for Applied Optics and Precision Engineering, Jena, Germany. Modal interference along a LMA fiber creates an inversion grating with the right period to provide energy transfer between the interfering modes. This effect can lead to a substantial degradation of the beam quality.

Record-Efficient Resonantly Cladding-Pumped Yb-free Er-doped LMA Fiber Laser, Jun Zhang, Viktor Fromzel, Mark Dubinskii, US Army Res. Lab, Adelphi, MD, USA. Further power scaling of resonantly cladding-pumped Er-doped LMA fiber laser is reported. Over 88 W of single transverse mode power at 1590 nm was achieved. Maximum observed optical-to-optical efficiency was 69%.

Fiber CPA System delivering 2.2 mJ, sub 500 fs pulses with 3.8 GW Peak Power, Tino Eidam, Jan Rothhardt, Fabian Stutzki, Florian Jansen, Steffen Hädrich, Henning Carstens, Jens Limpert, Andreas Tünnermann, Inst. of Applied Physics, Friedrich-Schiller-Univ., Jena, Germany; Helmholtz-Inst. Jena, Jena, Germany. We report on an ultrashort pulse fiber CPA system that delivers clean pulses with 2.2 mJ pulse energy, sub 500fs and 3.8GW peak power. The main amplifier of the system is a 108µm core diameter Large Pitch Fiber.

All Thulium Fiber CPA System with 107 fs Pulse Duration and 42 nm Bandwidth, Robert Sims, Pankaj Kadwani, Lawrence Shal, Martin Richardson, CREOL/The College of Optics and Photonics, Orlando, FL, USA. 107 fs pulses were generated in a tunable Raman amplifier with energies up to 8.5 nJ at 70 MHz. Pulses were temporal stretched and amplified to 120 nJ with a spectral width of 42 nm.

High Pulse Energy Sub-10 ps Pulses from Compressed Passively Q-Switched Laser, Alexander Steinmetz, Dirk Nodop, Tino Eidam, Jens Limpert, Andreas Tünnermann, Friedrich-Schiller-Univ., Jena, Inst. of Applied Physics, Jena, Germany; Fraunhofer Inst. for Applied Optics and Precision Engineering, Jena, Germany. We report on nonlinear compression of passively Q-Switched microchip-laser pulses. Initial 100-ps pulses are fiber-amplified, thereby SPM-spectrally broadened and compressed to 6-ps with pulse energies of 13-µJ at repetition rates of several 100-kHz.

High-power, broadly tunable, and low-quantum-defect Yb-doped double tungstate channel waveguide lasers, Dimitri Gerskus, Shammmugam Aravazhi, Kerstin Wörhoff, Markus Pollnau, IOMS, Univ. of Twente, Enschede, Netherlands. KGd1-xLux(WO4)2-Yb+ channel waveguides delivered 418 mW of output power at 1023 nm with a slope efficiency of 71%. Grating tuning from 980 nm to 1045 nm and a record-low quantum defect of 0.8% was achieved.

Highly Efficient Distributed Feedback Waveguide Laser in AlOx:Yb+ on Silicon, Edward H. Bernhardt, Kerstin Wörhoff, René M. de Ridder, Markus Pollnau, Integrated Optical MicroSystems Group, Univ. of Twente, ENSCHEDE, Netherlands. An ytterbium-doped aluminum oxide distributed feedback channel waveguide laser is reported. The laser has a 5 mW threshold and emits 34 mW in single-frequency operation at 1022.2 nm wavelength with a slope efficiency of 67%.

Fiber CPA System delivering 2.2 mJ, sub 500 fs pulses with 3.8 GW Peak Power, Tino Eidam, Jan Rothhardt, Fabian Stutzki, Florian Jansen, Steffen Hädrich, Henning Carstens, Jens Limpert, Andreas Tünnermann, Inst. of Applied Physics, Friedrich-Schiller-Univ., Jena, Germany; Helmholtz-Inst. Jena, Jena, Germany. We report on an ultrashort pulse fiber CPA system that delivers clean pulses with 2.2 mJ pulse energy, sub 500fs and 3.8GW peak power. The main amplifier of the system is a 108µm core diameter Large Pitch Fiber.
ATuE • Near Infrared Lasers

Bosphorus, P Floor
16.45–18.15
Jennifer Hastie; Univ. of Strathclyde, UK, Presider

ATuE1 • 16.45 Invited
Anisotropic Laser Ceramics toward Giant Micro-photonics,
Takunori Taira1; 1Laser Res. Ctr. for Molecular Science, Inst. for Molecular Science, , Japan. Transparent laser ceramics have been demonstrated to offer tremendous processing and design advantages. After progress review for giant micro-photonics, we’d like to discuss the next generation of high brightness lasers based on the anisotropic ceramics.

ATuE2 • 17.15
High Efficiency Nanosecond Pulse Amplification Based on Diode-Pumped Cryogenic-Cooled Yb:YAG, Joerg Koerner1, Joachim Hein2, Martin Kahle1, Hartmut Liebetrau1, Malte Kaluz1, Mathias Siebold1; 1Institute of Optics and Quantum Electronics, Jena, Germany; 2Forschungszentrum Dresden Rossendorf, Dresden, Germany. An output energy of 1.1 J of amplified nanosecond pulses was obtained by utilizing a diode-pumped Yb:YAG laser amplifier with the crystal cooled to 125 K. We achieved an unrivaled high total amplifier efficiency of 45 %.

ATuE3 • 17.30
High power Yb:CaF2 laser at cryogenic temperature, Frédéric Druv1, Sandrine Ricaud1-4, Dimitris N. Papadopoulos1, Patrick Georges1, Patrice Camy1, Jean-Louis Doualan1, Richard Moncorgé1, Antoine Courjaud1, Eric Mottay1; 1Laboratoire Charles Fabry de l’Inst. d’Optique, Palaiseau, France; 2Inst. de la Lumière Extrême, Palaiseau, France; 3Crt. de recherche sur les Ions, les Matériaux et la Photonique, Caen, France; 4Amplitude Systèmes, Pessac, France. A high-power diode-pumped Yb:CaF2 laser operating at cryogenic temperature is presented with an extracted output power of 97 W at 1034 nm. We also demonstrate 992-nm laser operation (1.1 % quantum defect).

ATuE4 • 17.45
6.6 J / 2 Hz Yb:YAG Diode-Pumped Laser Chain Activation, Jean-Christophe Chanteloup1, Daniel Albach1, Antonio Lucianetti1, Thierry Novo1, Bernard Vincent1; 1CNRS, Palaiseau, France. With careful Amplified Spontaneous Emission and thermal management, 6.6 Joules 7 ns pulses were extracted at 2 Hz in four passes from Lucia active mirror Yb:YAG Diode Pumped Laser amplifier. 15% optical to optical efficiency was achieved.

ATuE5 • 18.00
Efficient \( \sigma^- \)-polarized Resonantly-Pumped Er\(^{3+}\):YVO\(_4\) Laser at 1593.5 nm, Nikolay Ter-Gabrielyan1, Viktor Fromzel1, Tadeusz Lukasiewicz2, Witold Ryba-Romanowski1, Mark Dubinskii2; 1US Army Res. Lab, Adelphi, MD, USA; 2Inst. of Low Temperature and Structure Res., Wroclaw, Poland; 3Inst. of Electronic Materials Technology and Structure Res., Warsaw, Poland. Laser operation of a resonantly-
pumped Er\(^{3+}\):YVO\(_4\) laser at 1593.5 nm is demonstrated for the first time. Maximum slope efficiency of ~70% and maximum quasi-CW power of 59.8 W were achieved with spectrally-narrowed diode pumping at 1534 nm.
• Wednesday, 16 February 2011 •

7.00–18.00
Registration Open

8.00–8.15
FILAS Opening Remarks

8.00–8.15
AIOM Opening Remarks

8.00–8.15
HILAS Opening Remarks

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**Bosphorus, P Floor**

**Anadolu, P Floor**

**Citronelle, N Floor**

**JWA • Joint ASSP/FILAS Session**

8.15–10.00
Farzin Amzajerdian; NASA Langley Res. Ctr., USA, Presider

**JWA1 • 8.15**

Invited
Advanced Specialty Fibers for Applications in Fiber Lasers, Liang Dong; Clemson Univ., USA. Progress in specialty fibers is the foundation to further breakthroughs in fiber lasers. We review our efforts in leakage-channel-fibers, wide band air-core photonic-bandgap-fibers, and SBS simulation in optical fibers by incorporating leaky acoustic modes.

**JWA2 • 8.45**

Mode-Locked Yb-Fiber Laser for Rapid Dual Pulse Scanning Applications, Albert Romann¹, Christian Mohr¹, Axel Ruehl², Ingmar Hartl¹, Martin E. Fernmann³; ¹IMRA America, Inc., Ann Arbor, MI, USA; ²Inst. for Lasers, Life and Biophotonics, Vrije Univ. Amsterdam, Amsterdam, Netherlands. We demonstrate a mode-locked Yb fiber soliton oscillator for the generation of pulse pairs with rapidly scanning pulse separations at interferometric precision.

**JWA3 • 9.00**

Sub-5 fs pulses with 12 GW peak power from high repetition rate OPCPA, Jan Rothhardt¹,², Steffen Hädrich¹,², Stefan Demmler¹, Christoph Jocher¹, Jens Limpert¹,², Andreas Tünnermann¹,²; ¹Friedrich-Schiller-Univ. Jena, Germany; ²Helmholtz-Inst. Jena, Jena, Germany; ³Fraunhofer Inst. for Applied Optics and Precision Engineering, Jena, Germany. The average power of high harmonics driven by a fiber chirped pulse amplification system is measured to be ~30nW in the 35-50 nm range. We prove that this a promising source for processes requiring high photon flux such as photoemission spectroscopy.

**AIWA • Transparent Ceramics and Laser Crystals I**

**AIWA1 • 8.15**

Invited
Fabrication of Transparent Ceramics Using Spark Plasma Sintering, Byungnam Kim¹; ¹National Inst. for Materials Science, Tsukuba, Japan. Transparent Al₂O₃, MgAl₂O₄ and ZrO₂ ceramics with fine microstructures were fabricated by controlling the heating rate and pressure during spark plasma sintering. The scattering theory for Al₂O₃ ceramics was evaluated with the measured properties.

**AIWA2 • 8.45**

Development of Submicrometer-Grained Highly Transparent Sesquioxide Ceramics, John Ballato¹, Karn Serivalsi²; ¹Materials Science and Engineering, Clemson Univ., Anderson, SC, USA. This paper discusses rare earth doped transparent sesquioxide ceramics with average grain size of 0.3 μm using a two-step sintering approach followed by hot isostatic pressing as well as properties of these ceramics.

**AIWA3 • 9.00**

Fabrication of Rare-Earth Patterned Laser Ceramics by use of Gradient Magnetic Field, Jun Akijama¹, Takunori Taira¹; ¹IMS, Okazaki, Japan. New micro-domain orientation controlling and patterning process for

**HWA • High-Intensity Fiber and Hollow Waveguide Sources**

**HWA1 • 8.15**

Invited
Technologies for Integrated High Power Ultrashort-Pulse Fiber Lasers, Almantas Galvanaukstis; Univ. of Michigan, USA. Abstract not available.

**HWA2 • 8.45**

Fiber Laser Based High Harmonic Generation at High Repetition Rate and Average Power, Manuel Krebs¹,², Steffen Hädrich¹,², Jens Limpert¹,², Andreas Tünnermann¹,²; ¹Inst. of Applied Physics, Friedrich-Schiller-Univ. Jena, Jena, Germany; ²Helmholtz-Inst. Jena, Jena, Germany; ³Fraunhofer Inst. for Applied Optics and Precision Engineering, Jena, Germany. The average power of high harmonics driven by a fiber chirped pulse amplification system is measured to be ~30nW in the 35-50 nm range. We prove that this a promising source for processes requiring high photon flux such as photoemission spectroscopy.

**HWA3 • 9.00**

Highly efficient hollow fiber compression scheme for generating multi-mJ, carrier-envelope phase stable, sub-5fs pulses, Xiaowei Chen¹; ¹Laboratoire d’Optique Appliquee, Palaiseau Celect, France. We present a simple technique
Jena, Germany; ′Helmholtz-Inst., Jena, Germany; ′Fraunhofer Inst. for Applied Optics and Precision Engineering, Jena, Germany. We report on an OPCPA system delivering sub-5 fs pulses with more than 12 GW peak power at high repetition rates. Target peak intensities as high as 1018 W/cm² appear feasible assuming diffraction-limited focusing.

AIWA 4 • 9.15
Thermally Induced Depolarization in Sesquioxide Crystals of m3 Symmetry Class, Anton G. Vyatkin1, Efim Khazanov1; ′Inst. of Applied Physics of the Russian Acad. of Sciences, Nizhny Novgorod, Russia. Thermally induced depolarization degree in cubic crystals of classes 23 and m3 as a function of crystal orientation was investigated. Three new specific orientations were defined. The best and the worst orientations were determined.

AIWA 5 • 9.30
Ti-doped sapphire single crystals grown by Kyropoulos technique (KT) and characterizations, Abdellatif Nehari1, Kheirredine Lebbou1, Alain Brenier1, Gérard Panczer1, Jean Godfroy1, Serge Labor2, Hervé Legal1, Gilles Chériaux2, Jean-Paul Chambaret3, Richard Moncorgé5; ′Univ. de Lyon 1, LPCML, Lyon, France; ′RSA, Le Rubis SA, Jarrie-Grenoble, France; ′Ecole Polytechnique, LOA-ENSTA, Palaiseau, France; ′CNRS, ILE, Palaiseau, France; ′Univ. de Caen, CIMAP, Caen, France.

High optical quality (FOM over 100), highly doped (up to 0.45%Ti) and large size (100 mm diameter) Ti-sapphire (Ti³⁺-doped Al₂O₃) crystals have been grown by using the Kyropoulos technique. Very encouraging laser results are obtained.

for increasing the throughput of static hollow fiber compressors by up to 60%. By seeding the fiber with positively chirped, circularly polarized pulses, we obtain CEP-stable, 1.6mJ, sub-5fs pulses.

HWA 4 • 9.15
Towards few-cycle pulses with relativistic intensities, using pulse compression in planar waveguides, Selcuk Akturk1, Cord Arnold2, Bing Zhou3, Shichua Chen3, Arnaud Couairon1, Andre Mgsyrowicz3; ′Dept. of Physics, Istanbul Technical Univ., Istanbul, Turkey; ′Laboratoire d’Optique Appliquée, École Nationale Supérieure des Techniques Avancées, Palaiseau, France; ′Ctr. de Physique Théorique, École Polytechnique, Palaiseau, France. We show that planar hollow waveguides can be used to compress pulses to few-cycles, in energy up-scalable manner. Controlling the beam size in the free direction allows stable compression without compromising the spatial mode quality.

HWA 5 • 9.30
Pulse Compression of 6mJ, 200-fs Pulses From a cw-Diode-Pumped Single-Stage Yb:CaF₃ MOPA in Hollow-Core Fiber, Daniil Kartashov1, Giedrius Andriukaitis5, Dusan Lorenčič2, Audrius Pugžlys1, Andrius Baltuska1, Linas Giniunas3, Romualdas Danielius3, Jens Limpert1; ′Photonic Inst. Vienna Univ. of Technology, Vienna, Austria; ′Light Conversion Ltd, Vilnius, Lithuania; ′Inst. of Applied Physics, Friedrich Schiller Univ., Jena, Germany. 200-fs 6mJ pulses from a cw-diode-pumped Yb:CaF₃ MOPA are spectrally broadened in an Ar- or Ne-filled hollow-core fiber and recompressed to 20 fs (Ar) and 40 fs (Ne) using a prism pair.
JWA5 • 9.45
All Fibre High repetition rate, High Power Picosecond Laser and UV generation,
Simonette Pierrot¹, Flavien Liegeois², Julien Saby³, Benjamin Cocquelin¹, Yves Hernandez¹, Francois Salin¹, Domenico Giannone²; ¹Eolite Systems, Pessac, France; ²Multitel, Mons, Belgium. We report on a 93W, 1.1μJ, 83MHz, 35ps MOPA fibre laser based on an Yb mode-locked fibre oscillator and a rod-type LMA amplifier. This configuration can generate up to 20W at 343nm and we demonstrated over 2W at 257nm.

AIWA6 • 9.45
Influence of point defects on the laser efficiency of Tm-doped sodium double molybdate crystals, M. Rico¹, X. Han¹, José Maria Cano-Torres¹, Dolores Serrano¹, C. Zaldo¹; ¹Inst. de Ciencia de Materiales de Madrid. CSIC., Madrid, Spain. The Tm³⁺ laser efficiency of NaGd(MoO₄)₂ crystals (η=50.8%, Pout=641mW) grown in Na₂MoO₄/Na₂Mo₂O₇ flux is larger than that obtained in similar Czochralski-grown crystals annealed to eliminate color centers.

HWA6 • 9.45
High energy and efficient cross polarized wave generation for high contrast ultrashort laser sources, Lourdes Patricia Ramirez¹, Dimitris N. Papadopoulos¹⁺², Alain Pellegrina¹⁺², Pascal Monot¹, Aurelien Ricci³⁻⁴, Aurélie Jullien¹, Xiaowei Chen², Jean-Philippe Rousseau¹, Rodrigo Lopez-Martens⁴, Patrick Georges⁴, Frédéric Druron⁴; ¹Inst. d’Optique, Palaiseau, France; ²Inst. de la Lumière Extrême, Palaiseau, France; ³CEA, IRAMIS, Gif-sur-Yvette, France; ⁴Laboratoire d’Optique Appliquée, Palaiseau, France; ⁵Thales Optronique SA, Elancourt, France. We present a compact and energy-scalable ultrashort laser setup based on waveguide filtering and cross polarized wave generation. A 650 μJ, 15.5 fs, 10-10 contrast ratio XPW pulse is produced with 3.3 mJ, 25 fs input pulses.
Cryogenic AWAO2 suppression. optimally frequency and developed. laser Martial1,2, France; Er:YAG AWA04 plate. Computer USA. Franz 1Inst. of Applied Physics, Univ. of Muenster, Muenster, Germany. CARS microscopy is performed using a light source based on a single femtosecond laser oscillator and soliton self-frequency shift in microstructured fiber. A fiber stretcher for optimally chirped pulses results in considerable background suppression.

AWA02 Cryogenic Laser Properties of Er:YAG and ErScO₃ - A Comparison, Larry Merkle1, Nikolay Ter-Gabrielyan1, Viktor Fromzel1; 1Army Res. Lab, Adelphi, MD, USA. At cryogenic temperatures, Er:ScO₃ offers spectroscopic properties that can make it a more attractive laser material than Er:YAG when a very small quantum defect is desired. We discuss these properties, and representative laser results.

AWA03 Mode-locked tuning of diode-pumped femtosecond Cr:LiSAF and Cr:LiCAF lasers using AlGaAs-based saturable Bragg reflectors, Limit Demirbas1, Gale S. Petrich1, Duo Li1, Jiug Wang1, Sheila Nabavij1, Jonathan Birge3, Peter Fendel1, Alphan Senmaroglu1, Leslie A. Kolodziejski2, Franz Kärtner3, James G. Fujimoto3; 1Dept. of Electrical Engineering and Computer Science and Res. Lab of Electronics, MIT, Cambridge, MA, USA. We obtained femtosecond tuning-ranges of 803-831 nm (28-nm), 828-873 nm (45-nm) and 890-923 nm (33-nm) with Cr:LiSAF, and of 767-817 nm (50-nm) with Cr:LiCAF gain media using AlGaAs-based saturable Bragg reflectors and a birefringent tuning-plate.

AWA04 Er:YAG single-crystal fiber laser in Q-switched operation, Igor Martial1,2, Julien Didierjean2, François Balembois1, Patrick Georges1; 1Laboratoire Chasles Fabry de l’Inst. d’Optique, Palaiseau cedex, France; 2Fibercryt, Lyon, France. We describe an efficient Q-switched laser emission from a directly grown Er:=YAG single-crystal fiber resonantly pumped by a laser diode in an off-axis configuration. The laser produces 2 mJ, 38 ns pulses at 1 kHz.

AWA05 High-power high repetition rate mid-infrared flash-pumped Q-switched Er:YAG laser, Marek Skorczakowski1, Jacek Swiderski2, Wieslaw Pichola1, Jacek Kwiatkowski1, Maria Maciejewska1, Łukasz Galecki1; 1Inst. of Optoelectronics, Military Univ. of Technology, Warsaw, Poland. The mechanically Q-switched 2.94 μm Er:YAG laser was developed. The laser operated at 25 Hz repetition rate generating pulses of 30 mJ energy and duration below 290ns which corresponds to over 100 kW peak power.

AWA06 Conceptual design for sub-100 kW laser system based on total-reflection active-mirror geometry, Hiroaki Furuse1, Junji Kawamura1, Noriaki Miyazaga1, Hauk Chosrowjan1, Masayuki Fujita1, Shinya Ishii1, Kazuo Inasaki1, Kenji Takeshita1, Yasukazu Izawa1; 1Inst. for Laser Technology, Osaka, Japan; 2Inst. of Laser Engineering, Osaka Univ., Osaka, Japan; 3Mitsubishi Heavy Industries, Tokyo, Japan. We propose a new concept for a sub-100-kW laser system based on a cryogenic Yb:YAG multiple total-reflection active-mirror design. By adjusting the thickness and doping concentrations of Yb:YAG layers, we will obtain an ideal source.

AWA07 Transverse Mode Control by a Crossing Pair of Linearly Pumped Regions in a Yb:YAG Ceramic Thin Disk, Koki Shimohira1, Yuichi Kozawa1, Shunichi Kato1,2; 1Inst. of Multidisciplinary Res. for Advanced Materials, Tohoku Univ., Sendai, Japan. We demonstrated that a pair of linearly pumped regions was created in a Yb:YAG ceramic thin disk. This enabled us to readily select Laguerre-Gaussian and Hermite-Gaussian beams of higher transverse mode without mechanical manipulation.

AWA08 A comparison of resonantly pumped Ho:YLF and Ho:LLF lasers in CW and Q-switched operation, Martin Schellihorn1,2; 1ISL, French German Res. Inst., Saint-Louis, France. Ho:YLF and Ho:LLF are studied under identical pump conditions. Ho:LLF shows lower threshold and in CW operation higher slope efficiencies. 37 and 38.5 mJ were achieved at 100 Hz with Ho:LLF and Ho:YLF, respectively.

AWA09 Enhancement of Third Harmonic Generation with Double-Layer Structure of Nonlinear Organic Material, Myungsik Choi1, Hee Joo Choi2; 1Dept. of Physics, Pusan National Univ., Busan, Republic of Korea. We designed and fabricated a double-sided organic film device that could enhance the optical third-harmonic generation (THG) at 420 nm. The possibility of quasi-phase-matching THG is experimentally demonstrated.

AWA10 Femtosecond Microjoule-Class Ytterbium Fiber Lasers, Ammar Hideur1, Caroline Lecaplain1, Bülend Oruç1, Guillaume Machinet1, Johan Boulet1, Eric Cormier1, Martin Baumgart1, Thomas Schreiber1; 1CNRS UMR 6614 CORIA, Saint etienne du Rouvray, France; 2UNAM-Inst. of Materials Science and Nanotechnology, Ankara, Turkey; 3Univ. de Bordeaux -CNRS-CEA CELIA, Bordeaux, France; 4Inst. for Applied Physics, Jena, Germany; 5Fraunhofer Inst. for Applied Optics and Precision Engineering, Jena, Germany. We report the generation of 830 nJ energy from a mode-locked all-normal dispersion fiber laser featuring large-
mode-area photonic crystal fibers. After external compression, 550 fs pulses with 1.2 MW peak power are demonstrated.

**AWA11**

All-fiber design for linearly polarized CW Yb-doped tunable fiber laser, Chau Perng Seah1, Tsz Yang Ng1, Rui Fen Wu2; 1DSO National Laboratories, Singapore, Singapore. We report on our results of a stable CW, linearly polarized all-fiber tunable fiber laser. Tunability was achieved from 1052nm to 1080nm, with linewidth of 0.3nm. Output power was tested to 60W.

**AWA12**

Path Length Sensitivity in Coherent Laser Beam Combining: Comparison between Architectures, James R. Leger1, Bradley Tiffany2, Chenhao Wan1; 1Electrical and Computer Engineering, Univ. of Minnesota, Minneapolis, MN, USA. The effect of path length errors on coherent beam combining performance is analyzed and measured for several combining architectures. Cavity loss and coherence characteristics are highly dependent on design, and can often be optimized.

**AWA13**

Laser operation near 2 μm of Tm-doped LiLu:Ba(MoO₄)₂ single crystal, M. Rico1, X. Han1, Concepción Cascales2, C. Zaldo2; 1Inst. de Ciencia de Materiales de Madrid. CSIC., Madrid, Spain. Tm-doped LiLu:Ba(MoO₄)₂ monoclinic crystals were grown by TSSG-method. Laser operation is shown at λ=1940 nm with 62% of slope efficiency. The disordered crystal structure confers potential applications for mode-locked sub-200 fs laser pulses.

**AWA14**

Nd:LuVO₄ Laser Passively Mode-Locked by χ(2) -Formation in Periodically-Poled Stoichiometric Lithium Tantalate, Hristo Ilić1, Ivan Buchvarov2, Sunao Kurimura3, Huanjin Zhang4, Jiayang Wang4, Junhai Liu5, Valentin Petrov6; 1Physics, Sofia Univ., Sofia, Bulgaria; 2Advanced Materials Lab, National Inst. for Materials Science, Tsukuba, Japan; 3National Lab of Crystal Materials, Jilin, China; 4College of Physics, Qingdao Univ., Qingdao, China; 5Max-Born-Inst. for Nonlinear Optics and Ultrafast Spectroscopy, Berlin, Germany. Stable mode-locking of a Nd:LuVO₄ laser by intracavity second harmonic generation in PPMgSLT nonlinear crystal is demonstrated with maximum achieved average power of 1.7 W and pulse durations as short as 3.4 ps.

**AWA15**

Micromachining with square-shaped 1 ns-long pulses from an all-fiber Yb-doped laser-amplifier system, Kivanç Ozgören1, Bulent Oktem1, F Oemer Ilday1, Ece Pasin1, Koray Eken1; 1Material Science and Nanotechnology Graduate Program, Bilkent Univ., Ankara, Turkey; 2Dept. of Physics, Bilkent Univ., Ankara, Turkey; 3FiberLAST, Ltd, Ankara, Turkey. We demonstrate micromachining with 1ns-long pulses from an all-fiber laser. Fiber lasers generating uncompressible long pulses have been ignored as undesired modes, however their robust, low-repetition-rate operation is well suited to micromachining.

**AWA16**

1.34-μm Nd:YVO₄ Laser Mode-Locking by Chi-2 Lensing in Periodically Poled Stoichiometric Lithium Tantalate, Ivan Buchvarov1, Sunao Kurimura2, Valentin Petrov3; 1Physics, Sofia Univ., Sofia, Bulgaria; 2National Inst. for Materials Science, Tsukuba, Japan; 3Max-Born-Inst. for Nonlinear Optics and Ultrafast Spectroscopy, Berlin, Germany. Self-starting Chi-2 lens mode-locking of a 1.34-μm Nd:YVO₄ laser using second harmonic generation in PPMgSLT is demonstrated. A train of 5.9 ps pulses with ~1 W average output power at 102 MHz is achieved.

**AWA17**

Compact All-Solid-State Continuous-Wave Single-Frequency UV Source for Laser Cooling of Beryllium Ions, Sergey Vasiliev1, Alexander Neesky1, Ingo Ernsting1, Michael Hansen2, Jianwei Shen3, Stephan Schiller1; 1Inst. für Experimentalphysik, Düsseldorf, Germany. A compact setup for generation, absolute frequency stabilization, and precision tuning of the UV laser radiation at 313 nm was developed and tested. The maximum output power of the source is 100 mW.

**AWA18**

Femtosecond Nd:glass Lasers Mode-Locked with Carbon Nanotube Saturable Absorber Mirror, Antonio Agnesi1, Alessandro Grebhorio1, Federico Pirzio1, Giancarlo Reali1, Elena Ugozotti1, Sun Young Cha2, Fabian Rotermund2, Uwe Griebner2, Valentin Petrov3; 1Electronics Dept., Univ. of Pavia, Pavia, Italy; 2Division of Energy Systems Res., Ajou Univ., Suwon, Republic of Korea; 3Max-Born-Inst. for Nonlinear Optics and Ultrafast Spectroscopy, Berlin, Germany. We present femtosecond Nd:glass lasers pumped by single-mode 200-mW diodes, mode-locked by single-walled carbon nanotube saturable absorbers. We obtained sub-150-fs and sub-100-fs stable pulse trains with phosphate and silicate glasses, respectively.

**AWA19**

Concept and realization of collinearly pumped multiple thin disk active medium, Aidas Aleknačiūnas1, Rakas Smilingis1, Mikhail Grishin1, Andrejus Michailovas2, Kirilas Michailovas2, Jurgis Plipavičiūnas2, Valdas Girdauskas2; 1Inst. of physics, Ctr. for Physical Sciences and Technology, Vilnius, Lithuania; 2Faculty of Chemistry, Vilnius Univ., Vilnius, Lithuania; 3Faculty of Natural Sciences, Vytautas Magnus Univ., Kaunas, Lithuania. Two approaches for multiple thin disk active elements configurations are presented. Preliminary lasing experiments and numerical calculations for temperature distribution inside medium are presented.

**AWA20**

Improved pulse control by all-optical synchronization of fiber lasers, Till Walbaum1, Petra Gross1, Carsten Fallnich1; 1Inst. of Applied Physics, Univ. of Muenster, Muenster, Germany. We show repetition
frequency stability transfer between mode-locked fiber lasers synchronized by all-optical means and investigate the influences on the locking range, output pulse and a potential carrier envelope offset frequency control.

AWA21
High duty cycle and long pulse operation of Dy:PgGa:Si laser excited by diode pumped Nd:YAG, Jan Šalči, Helena Jelínková, Maxim E. Doroshenko, Tasoltan T. Bасиев, Vyacheslav V. Osiko, Valerii V. Badikov, Dmitrii V. Badikov; Faculty of Nuclear Sciences and Physical Engineering, Czech Technical Univ. in Prague, Prague 1, Czech Republic; 1Faculty of Nuclear Sciences and Physical Engineering, Czech Technical Univ. in Prague, Prague 1, Czech Republic; 2Faculty of Nuclear Sciences and Physical Engineering, Czech Technical Univ. in Prague, Prague 1, Czech Republic; 3Faculty of Nuclear Sciences and Physical Engineering, Czech Technical Univ. in Prague, Prague 1, Czech Republic; 4Faculty of Nuclear Sciences and Physical Engineering, Czech Technical Univ. in Prague, Prague 1, Czech Republic; 5Faculty of Nuclear Sciences and Physical Engineering, Czech Technical Univ. in Prague, Prague 1, Czech Republic; 6Faculty of Nuclear Sciences and Physical Engineering, Czech Technical Univ. in Prague, Prague 1, Czech Republic; 7Faculty of Nuclear Sciences and Physical Engineering, Czech Technical Univ. in Prague, Prague 1, Czech Republic; 8Faculty of Nuclear Sciences and Physical Engineering, Czech Technical Univ. in Prague, Prague 1, Czech Republic; 9Faculty of Nuclear Sciences and Physical Engineering, Czech Technical Univ. in Prague, Prague 1, Czech Republic; 10Faculty of Nuclear Sciences and Physical Engineering, Czech Technical Univ. in Prague, Prague 1, Czech Republic. The room temperature operating Dy:PgGa:Si laser, excited at 1318 nm by diode pumped Nd:YAG was realized and mean power 18.4 mW with slope efficiency 3.8 % was obtained at 4.3 μm (pulse length 10 ms, rep. rate 50 Hz).

AWA22
PbS-Quantum-Dot Saturable Absorber Q-switched Tm:KYW Mini-Laser with 9 ns/40 μJ Pulses, Maxim Gaponenko, Victor Kiseli, Alexander Malyshevich, Konstantin Yunushev, Nikolai Kudeshov, Alexei Onushchenko; Ctr. for Optical Materials and Technologies, Belarusian National Technical Univ., Minsk, Belarus; 1Res. and Technological Inst. of Optical Materials Science, St. Petersburg, Russian Federation. A compact Tm:KYW diode-pumped laser with cavity length of 8 mm passively Q-switched with PbS-quantum-dot saturable absorber is demonstrated. The laser produces pulses with duration of 9 ns and energy of 40 μJ.

AWA23
Directly diode pumped mid-IR laser based on PbGa:Sc:Dy crystal, Maxim E. Doroshenko, Tasoltan T. Basiev, Vyacheslav V. Osiko, Valerii V. Badikov, Dmitrii V. Badikov; General Physics Inst. RAS, Moscow, Russian Federation; 1Kaban State Univ., Krasnodar, Russian Federation. Direct diode pumped mid-IR oscillations of PbGa:Sc:Dy crystal were obtained with slope efficiency up to 1%. “Long” output pulses were obtained and the mechanism of lower laser level depopulation is suggested.

AWA24
2 μm Ho:YAG Thin Disk Laser, Günther Renz, Peter Mahnke, Jochen Speiser; Inst. of Technical Physics, German Aerospace Ctr., Stuttgart, Germany. A Thulium fiber laser pumped Ho:YAG thin disk laser with 15W (cw) or several mJ (pulsed) operation will be presented. Additionally, a narrow (<0.5nm), tunable (30nm) cw operation near 2.09 μm, will be shown.

AWA25
Optical Parametric Oscillators with Idler Absorption, Gunnar Rastad, Øystein Farsund, Gunnar Arisholm; 1FFI (Norwegian Defence Res. Establishment), Kjeller, Norway. We show by simulations that idler absorption may improve the performance of pulsed high energy OPOs, and obtain high signal conversion efficiency and signal beam quality with idler absorption coefficients above 3 cm⁻¹.

AWA26
Few-cycle pulse characterisation with an acousto-optic pulse shaper, Seth Cousin, Nicolas Forget, Philip K. Bates, Jens Bieger, Alexander Gruen; 1ICFO - the Inst. of Photonic Sciences, Castelldefels (Barcelona), Spain; 2FASTLITE, Ctr. Scientifique d’Orsay, Orsay, France. An acousto-optic pulse shaper has been used to characterise an 8.2 fs pulse generated in a hollow-core fibre. A grism-pair compressor has been used to overcome a dispersion related bandwidth limit of the acousto-optic crystal.

AWA27
Frequency tripling for next generation high energy lasers, Gabriel Mennerat; 1Direction des Applications Militaires, Commissariat à l’Energie Atomique, Le Barp, France. Societal applications of high energy lasers require operating at high repetition rate. Merits of frequency triplers at high-average power are discussed. Performances of LBO are demonstrated by generating 360J of ultraviolet with 80% efficiency.

AWA28
Pulsed, Single-Frequency, Ring Laser With A Holographic Output Coupler, Alex Dergachev; 1Q-Peak, Inc., Bedford, MA, USA. A ring laser with reflective thick holographic grating as an output coupler is demonstrated. Unidirectional, passively Q-switched, 2.05-μm Ho:YLF ring laser provides single-frequency, 100-200-ns-long pulses at kHz rate.

AWA29
High Energy Mode-Locked Fiber Laser at 976nm, Guillaume Machinet, Jerome Lhérémé, Caroline Lecaplain, Johan Boulet, Ammar Hider, Nicholas Traynor, Eric Cormier, Cédia, Talence, France; 1Ceria, Rouen, France; 2Alphaton, Talence, France; 3Azur light system, Talence, France. We report on a passively mode-locked fiber laser emitting around 976nm. The laser emits chirped pulses with a duration of 1.02ps and 12nJ at 40.7MHz. External compression leads to pulses as short as 286fs.
### Bosphorus, P Floor

<table>
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<tr>
<th>JWB • Joint ASSP/AIOM Session</th>
<th>FWA • Fiber Lasers and Applications I</th>
<th>HWB • Strong-field Atomic Physics</th>
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<tr>
<td><strong>11.30–13.00</strong></td>
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<td>Kathleen Schaffers; Lawrence Livermore Natl. Lab, USA, Presider</td>
<td>Farzin Amzajerdian; NASA Langley Res. Ctr., USA, Presider</td>
<td>Jens Biegert; ICFO, Spain, Presider</td>
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<th>JWB1 • 11.30</th>
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<td>5 mm Thick Periodically Poled Rb:KTIOPO4 for High Power Optical Frequency Conversion, Andrius Zukauskas1, Nicky Thümmann2, Valdas Pasiskievicius3, Fredrik Laurell1, Carlota Canalias1; Laser Physics, KTH (Royal Inst. of Technology), Stockholm, Sweden. A periodically poled bulk Rb-doped KTIOPO4 crystal with 5 mm aperture was fabricated at room temperature. The ferroelectric domain structure is shown to be homogeneous across the whole aperture with a deflection of 11 pm/V.</td>
<td>Yb-Doped Laser Materials: Advances and Challenges, Günter Huber1, Kolja Beil1, Thomas Calmano1, Susanne T. Fredrich-Thornton1, Ulve Kelling1, Christian Kränkel1, Henning Kühn2, Jörg Siebenmorgen1, Ulrike Wolters1, Klaus Petermann1; Inst. for Laser-Physik, Hamburg, Germany. We review the progress in performance of Yb:YAG, Yb:LuAG, and Yb:Lu2O3 for ultrahigh power generation. Future challenges are the prevention of loss at high Yb inversion densities, further power scaling of thin disk and crystalline waveguide lasers.</td>
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### Marmara, P Floor

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<th>FWA1 • 11.00</th>
<th>FWA2 • 11.45</th>
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<tr>
<td><strong>Title to Be Announced</strong>, David Payne, Univ. of Southampton, UK. Abstract not available.</td>
<td>Fourier Transform Spectrometry Using a Single Cavity Length Modulated Mode-Locked Fiber Laser, Christian Mohr1, Albert Romann1, Axel Ruch1, Ingmar Harth1, Martin E. Fernmann1; IMRA America, Inc., Ann Arbor, MI, USA; Inst. for Lasers, Life and Biophotonics, Vrije Univ. Amsterdam, Amsterdam, Netherlands. We present a Fourier transform spectrometer based on a single repetition rate modulated mode locked Yb-fiber laser configured as a coherent scanning delay line using an imbalanced Mach-Zehnder interferometer. Effective mirror scan rate is 7.5 m/s.</td>
<td>Scaling of Strong-Field Atomic Physics, Lou DiMauro1; Ohio State Univ., USA. Abstract not available.</td>
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<th>FWA3 • 12.00</th>
<th>HWB2 • 12.00</th>
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<td>Ultrabroadband Er:fiber Lasers for Applications in Nanophotonics and Confocal Microscopy, Alfred Leitenstorfer1; Fachbereich Physik, Universität Konstanz, Germany, Constance, Germany. An Er:fiber technology is presented delivering output tunable from visible to infrared, at pulse durations down to 4 fs. Applications in ultrafast quantum optics with solid-state nanostructures and confocal microscopy of live systems are featured.</td>
<td>Attosecond Depletion of Resonant Auger Decay in Krypton, Aart J. Verhoeven3, Alexander V. Mitrofanov1, Maria Krikunova2, Nikolay Kabachnik3, Armin Scriniari3, Markus Drescher3, Andrius Baltuska1; Inst. für Photonik, TU Wien, Wien, Austria; Inst. für Experimentalphysik, Univ. Hamburg, Hamburg, Germany; Computational &amp; Plasma Physics, LMU München, München, Germany. Changes in the spectral width of Auger emission reveal...</td>
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Yb doped Fluorides for High Power and Short-Pulse Laser Applications, Frédéric Druon¹, Sandrine Ricaud², Dimitris N. Papadopoulos², Alain Pellegrini², Marc Hanna¹, Patrice Camy¹, Jean-Louis Doualan³, Richard Moncorge³, Antoine Courjaud³, Patrick Georges⁴; ¹LCF IO, Palaiseau, France; ²ILE, Palaiseau, France; ³CIMAP, Cuen, France; ⁴Amplitude Systemes, Pessac, France. We present an overview of laser results we obtained with Yb-doped calcium-fluoride. Spectral and thermal properties will be discussed, and experimental demonstration on high-power and ultrashort pulse oscillators and amplifiers will be presented.

High Power Thulium Fiber Lasers, Laurence Shah, R. Andrew Sims, Christina C.C. Willis, Pankaj Kaduani, Joshua Bradford, Martin Richardson; Univ. of Central Florida, USA. Tm fiber-lasers at ²µm wavelength are following a similar development path to Yb fiber-lasers. We review recent progress exploiting the unique characteristics of these lasers in the high power, spectral and temporal domains.

Benchmarking attosecond physics with atomic hydrogen, Michael G. Pullen¹,², William Wallace²,³, Dane Laban¹,², Adam Palmer¹,², Friedrich Hanne³, Alexei Grum-Grzhimailo⁴,⁵, Brant Abeln⁶, Klaus Bartschat⁶, Daniel Weflen⁶, Igor Ivanov⁶, Anatoli Kheifets⁶, Harry Quiney⁶, Igor Litevnyuk¹,², Robert Sang¹,², Dave Kiełpinski¹,²; ¹ARC Ctr. of Excellence for Coherent X-Ray Science, Griffith Univ., Nathan, QLD, Australia; ²Australian Attosecond Science Facility and Ctr. for Quantum Dynamics, Griffith Univ., Nathan, QLD, Australia; ³Atomic and Electronics Physics Group, Westfälische Wilhelms-Universität Münster, Germany; ⁴Dept. of Physics and Astronomy, Drake Univ., Des Moines, IA, USA; ⁵Inst. of Nuclear Physics, Moscow State Univ., Moscow, Russian Federation; ⁶Res. School of Physical Sciences, The Australian National Univ., Canberra, ACT, Australia; ⁷ARC Ctr. of Excellence for Coherent X-Ray Science, Univ. of Melbourne, Melbourne, VIC, Australia. We have performed the first experiment on the interaction of intense few-cycle laser pulses with atomic hydrogen. Experimental data is compared with an advanced ab initio simulation and agrees quantitatively with simulations at the 10% level.

Nearly bandwidth-limited attosecond pulses via periodic resonance interaction with hydrogen-like atoms, Vladimir A. Polovinkin¹, Yevgeny V. Radeyntsev¹, Olga A. Kocharoskaya¹; ¹Inst. of Applied Physics of the Russian Acad. of Science, Nizhny Novgorod, Russian Federation; ²Dept. of Physics, Texas A&M Univ., College Station, TX, USA. We show the possibility to produce few-cycle attosecond pulses via periodic-resonance interaction of radiation with the bound atomic states. Periodic resonance is provided by adiabatic Stark splitting and tunnel ionization from excited energy levels.
Phase-Matching Properties of BaGa4S7 and BaGa4Se: Wide-Bandgap Nonlinear Crystals for the Mid-Infrared, Valerii V. Badikov², Dmitrii V. Badikov², Galina Shevyrdyaeva², Aleksey Tyazhev¹, Georgi Marchev¹, Vladimir Panyutin¹, Valentin Petrov¹, Albert Kwasniewski³; ¹A3, Max-Born-Inst., Berlin, Germany; ²High Technologies Lab, Kuban State Univ., Krasnodar, Russian Federation; ³Inst. for Crystal Growth, Berlin, Germany. Biaxial BaGa4S7 and BaGa4Se crystals have been grown by the Bridgman-Stockbarger technique in sufficiently large sizes and with good optical quality to measure the refractive indices and analyze the phase-matching configurations.

On The Challenge Of Attosecond Pulse Metrology, Charalambidis Dimitrios¹,², Jan Kruse³,², Paraskevas Tzallas¹, Emmanouel Skantzakis¹,², George Tsakiris³; ¹IESL, FORTH, Heraklion, Greece; ²Physics Dept, Univ. of Crete, Heraklion, Greece; ³MPQ, Garching, Germany. We report a comparative experimental study, showing severe inconsistencies between two main attosecond pulse metrology methodologies, namely the 2nd order IVAC and the RABITT techniques [Phys. Rev. A 82, 021402(R) (2010)] and their derivatives.
13.00–14.30
Lunch Break (on your own)

**JWC • Joint ASSP/HILAS Session**

**JWC1 • 14.30**
Approaching the Full Octave: Noncollinear Optical Parametric Chirped Pulse Amplification with Two-Color Pumping,
Daniel Herrmann1,2, Christian Homann1, Raphael Tautz1,2, Ferenc Krausz1,2,3, Eberhard Riedle1, Laszlo Veisz2,3, LS für BioMolekulare Optik, Ludwig-Maximilians-Universität München, München, Germany; 2Max-Planck-Institut für Quantenoptik, Garching, Germany; 3LS für Photonik und Optoelektronik, Ludwig-Maximilians-Universität München, München, Germany. We amplify ultrabroadband spectra to mJ energies: 575-1050 nm by two-color-pumping and 675-1000 nm by two-beam-pumping. We demonstrate the compressibility of these spectra and reveal the significance of a parametric phase imprint on the signal.

**JWC2 • 14.45**
Temporal Contrast Measurements of a Noncollinear Optical Parametric Amplifier Seeded by a White-Light Continuum, Jake Bromage1, Christophe Dorrer1, Jonathan Zuegel1, Lab for Laser Energetics, Univ. of Rochester, Rochester, NY, USA. Temporal cross-correlation measurements of a white-light-seeded noncollinear optical parametric amplifier (NOPA) show that its prepulse contrast exceeds the 105-dB dynamic range of the broadband NOPA-based cross-correlator.

**JWC3 • 15.00**
Progress Toward an Exawatt Laser, Todd Ditmire1, Univ. of Texas at Austin, USA. Abstract not available.

**AIWB • Crystal and Glass Fibers I**

**AIWB1 • 14.30**
Invited
Photo darkening in rare earth doped silica: Model and Experiment, Kent E. Matssson1, DTU Fotonik, Technical Univ. of Denmark, Kgs. Lyngby, Denmark. A model for photo darkening based on chemical bond formation is presented. The formation process, color center spectral response and bleaching is discussed and model predictions is found to follow high power fiber laser operation.

**AIWB2 • 15.00**
Single-mode Low-loss Optical Fibers for Long-wave Infrared Transmission, Shiben Jiang1, AdValue Photonics, Inc., Tucson, AZ, USA. We report the synthesis of single-mode fibers made of chalcogenide glasses with low-loss in the 5-12 μm range. The resulting single mode fibers exhibited losses of ~6dB/m at 10.6 μm.

**FWB • Fiber Laser Frequency Combs**

**FWB1 • 14.30**
Invited
Optics to Microwave Synchronisation at sub-100 Attoseconds Stability Level, Yann Le Coq1, Wei Zhang2, Zhenyu Xue2, Jacques Millo2, Rodolphe Boudot2, Michel Lours2, Pierre-Yves Bourgeois2, Andre Luiten2, Giorgio Santarelli3, LNE-SYRTE - Observatoire de Paris, CNRS, UPMC, Paris, France; 3FEMTO-ST Inst., CNRS, ENSMM, Besançon, France; 4Univ. of Western Australia, Crawley, WA, WA, Australia. We will present our results on low phase noise and high stability synchronisation of a microwave signal with an optical ultra-stable reference. We apply noise reduction strategies which provide timing stability substantially below 100 attoseconds.
μm and 3-4 dB/m in the 6-10 μm range.

AIWB3 • 15.15
-2 μm laser output in short length highly Tm³⁺-doped tungsten tellurite glass double cladding fiber, Kefeng Li¹,², Lili Hu¹, Guang Zhang¹,², Damping Chen²; ¹Shanghai Inst. of Optics and Fine Mechanics, Chinese Acad. of Sciences, Shanghai, China; ²Graduate School of Chinese Acad. of Sciences, Beijing, China. Highly Tm³⁺-doped tungsten tellurite glass double cladding fibers were prepared by using rod-in-tube method. A 306 mW laser output at ~2 μm was demonstrated from a 8.9 cm length of this fiber.

FWB3 • 15.15
Atmospheric Propagation Testing Using Broadband Thulium Fiber Systems, Pankaj Kadoswani¹, Robert Sims¹, Jeffery Chiu¹, Faleh Alatt¹, Lawrence Shah¹, Martin Richardson¹; ¹Towens Laser Inst., CREOL College of Optics and Photonics, The Univ. of Central Florida, Orlando, FL, USA; ²College of Optical Sciences, The Univ. of Arizona, Tuscan, AZ, USA; ³Masdar Inst. of Science and Technology, Abu Dhabi, United Arab Emirates. Broadband ultrashort pulse and amplified spontaneous emission thulium fiber systems are utilized for atmospheric propagation testing. These systems enable precise characterization of H2O and CO2 absorption in the 2 μm wavelength regime.

JWC4 • 15.30
Scalable High-Energy Sub-Cycle Waveform Synthesis for High-Field Physics, Shu-Wei Huang¹, Giovanni Cirmi¹, Kyung-Hun Hong¹, Jeffrey Moses¹, Jonathan Birge¹, Siddharth Bhardwaj¹, Vasileios-Marios Gkortsas¹, Andrew Benedick¹, Li-Jin Chen¹, Enbang Li², Benjamin Eggelton¹, Giulio Cerullo¹, Franz Kärtner¹; ¹RLE, MIT, Cambridge, MA, USA; ²CUDOS ARC, Univ. of Sydney, Sydney, NSW, Australia; ³Dipartimento di Fisica, Politecnico di Milano, Milano, Italy. We demonstrate coherent pulse synthesis from two few-cycle phase-stable OPCPA’s, enabling scalable, high-energy arbitrary optical waveform generation on subcycle time scales, suitable for attosecond control of high-field physics experiments.

AIWB4 • 15.30
Crystalline Semiconductor Core Optical Fibers, John Bathory¹, Thomas Hawkins¹, Paul Foy¹, Colin McMillen¹, Roger Stolen¹, Robert Rice¹, ¹Materials Science and Engineering, Clemson Univ., Anderson, SC, USA; ²Northrop Grumman Space Technology, Redondo Beach, CA, USA. Silicon and germanium core optical fibers are discussed. Losses of 4 dB/m have been achieved at 3 μm and suggest that such semiconductor optical fibers could be of practical value for nonlinear and infrared applications.

FWB4 • 15.30
Invited
High Power Fiber Laser Frequency Combs for XUV Spectroscopy, Axel Ruell¹, Martin E. Fermann¹, Ingmar Hartl², A. Cingöz², Dylan C. Yost², Jun Ye²; ¹IMRA America Inc, Ann Arbor, MI, USA; ²Department of Physics, JILA, National Institute of Standards and Technology and University of Colorado, Boulder, CO, USA. A Yb-fiber frequency comb with 120 fs pulse duration, 154 MHz repetition rate, and 80 W average power is used for cavity-enhanced high harmonic generations. Plateau harmonics beyond the microwatt level have been demonstrated.

JWC5 • 15.45
Mid-IR Multimillijoule 100-fs Chirped-Pulse Parametric Amplifier, Giedrius Andriukaitis¹, Tadas Balciunas¹, Alexey Andrianov², Oliver D. Mücke¹, Igor Diomin¹, Linas Giniunas¹, Roman Daniels¹, Andrea Baltuska¹, Audrius Puzelys¹; ¹Inst. of photonics, Vienna Univ. of Technology, Vienna, Austria; ²Inst. of Applied Physics, Russian Acad. of Sciences, Nizhny

AIWB5 • 15.45
Spectroscopic investigation of Tm³⁺:TeO₂-K₂O-Nb₂O₅ glasses at different doping levels for 2 μm laser applications, Adil T. Gorgulu¹, Huseyn Cankaya¹, Adnan Kurt¹, Adolfo Speghini¹, Marco Bettinelli¹, Alphan Senaroglu¹; ¹Koc Univ., Istanbul, Turkey; ²Teknofil, Inc., Istanbul, Turkey; ³Univ. of Verona and INSTM, Verona, Italy. Spectroscopic measurements performed
Novgorod, Russian Federation; *Light Conversion Ltd., Vilnius, Lithuania. We demonstrate a 20-Hz-repetition-rate mid-IR OPCPA based on inverted stretching technique delivering 300-nm FWHM 7.5 mJ pulses centered at 3600 nm. 3-mJ 100-fs pulses obtained after compression are suitable for a variety of high-field applications.

with Tm3+:TeO2-K2O-Nb2O5 glass at different concentrations show a high emission cross section (6.22×10⁻²¹cm²) for the 1860-nm band, making the material potentially important for 2-μm laser development.
AIWC • Nonlinear Crystals and Processes I

16.30–18.00
Martin Fejer; Stanford Univ., USA, Presider

AIWC1 • 16.30 Invited
Growth of Large GaN Single Crystals, Sylvester Porowski, Izabella Grzegory; Inst. of High Pressure Physics, Polish Acad. of Sciences, Poland. The state of art results achieved in bulk GaN crystallization by most relevant techniques are reviewed. A special role of HVPE and ammonothermal methods in development of laser quality quasi-bulk GaN substrates and bulk GaN crystals is emphasized. The High Nitrogen Pressure Solution method is presented in more details.

AWB • Ultrafast Sources II

16.30–17.45
Akira Shirakawa; Univ. of Electro-Communications, Japan, Presider

AWB1 • 16.30
Diode-Pumped Mode-Locked Yb⁺⁺:YCaAlO₃(BO₃)₃ Laser Generating 35 fs Pulses, Uwe Griebner¹, Akira Yoshida¹, Andreas Schmidt¹, Valentin Petrov¹, Huajin Zhang¹, Jiyang Wang¹, Junhai Liu¹, Christian Fiebig³, Katrin Paschke³, Götz Erbert³; ¹Max Born Inst., Berlin, Germany; ²Inst. of Laser Engineering, Osaka Univ., Osaka, Japan; ³Shandong Univ., Jinan, China; ¹Quingdao Univ., Quingdao, China; ²Ferdinand-Braun-Inst., Berlin, Germany. A mode-locked Yb:CaAlO3(BO3)3 laser delivering pulses as short as 35 fs at 1055 nm is demonstrated. The oscillator is pumped by a two-section distributed Bragg-reflector tapered diode-laser and mode-locked by a semiconductor saturable absorber mirror.

AWB2 • 16.45
Sub-200-fs Pulses at 92 GHz Repetition Rate from a Harmonically Mode-locked Semiconductor Disk Laser, Uwe Griebner¹, Peter Kloppe¹, Martin Zorn², Markus Weyers³; ¹Max Born Inst., Berlin, Germany; ²Ferdinand-Braun-Inst., Berlin, Germany. Ultrashort-pulse semiconductor disk lasers emitting around 1025 nm are presented. Pulse durations of 198 fs at 92 GHz and 107 fs at 5.1 GHz repetition rate were achieved by harmonic and fundamental mode-locking, respectively.

AIWC2 • 17.00 Invited
Bulk PPKTP by crystal growth, Benoit Boulanger¹; ¹Univ. Joseph Fourier, Grenoble, France. We performed the first growth of a 39.86 μm-periodicity PPKTP crystal of good optical quality over a thickness of 800 μm onto a (001) face of a PPKTP substrate previously obtained by electric field poling.

AWB3 • 17.00
High peak power from a mode-locked two-crystal Yb:KYW oscillator with cavity-dumping, Guido Palmer¹, Moritz Emmons¹, Marcel Schultz¹, Uwe Morgner¹; ¹Leibniz Univ. Hannover, Inst. für Quantenteilphysik, Hannover, Germany; ²Laser Zentrum Hannover, Hannover, Germany. We report on a chirped-pulse two-crystal Yb:KYW oscillator with cavity-dumping which generates 12 MW of peak power. Pulse energies of 7 μJ and 416 fs short pulses have been obtained at 1 MHz repetition.

FWC • Fiber Lasers in LIDAR and Space

16.30–18.00
Arturo Chavez-Pirson; NP Photonics, Inc., USA, Presider

FWC1 • 16.30 Invited
Fiber-Based Coherent Doppler Lidar for Precision Landing on the Moon and Mars, Farzin Amjazerdian¹, Larry Petway¹, Bruce Barnes¹, Glenn Hines¹, Diego Pierrotert², George Lockard³; ¹NASA, Hampton, VA, USA; ²Coherent Applications, Inc., Hampton, VA, USA. A coherent Doppler lidar capable of providing highly accurate vector velocity and altitude data is being developed for enabling precision navigation of landing vehicles to the designated safe landing site.

FWC2 • 17.00
Narrow Linewidth Continuous Wave Fiber Raman Amplifier for Remote Sensing of Atmospheric O2 at 1.27μm, James A. Nagel¹, Valery Temyanko¹, Jeremy Dobler³, Evgeni Dianov¹, Alexej Sysoliatin³, Alexander Birikov³, Robert Norwood³, Nasser Pegghambarian³; ¹College of Optical Sciences, Univ. of Arizona, Tucson, AZ, USA; ²ITT Geospatial Systems, Fort Wayne, IN, USA; ³Fiber Optic Res. Ctr., Russian Acad. of Sciences, Moscow, Russian Federation. We report
rate.

AWB4 • 17.15
Octave Spanning Ultra-Broadband Carbon Nanotube Saturable Absorber for Bulk Solid-State Lasers, Sun Young Choi¹, Won Bae Cho¹, Dong-II Yeom¹, Kihong Kim¹, Fabian Rotermund¹, Ji-Hee Kim², Ki-Ju Yee², Andreas Schmidt³, Günter Steinmeyer³, Benjamin Wolter³, Valentin Petrov⁴, Uwe Griebner⁵; ¹Division of Energy Systems Res., Ajou Univ., Suwon, Republic of Korea; ²Dept. of Physics, Chungnam National Univ., Daejeon, Republic of Korea; ³Max Born Institut Inst. for Nonlinear Optics and Short Pulse Spectroscopy, Berlin, Germany. Octave spanning saturable absorber possessing operation bandwidth of ~1000 nm is fabricated on the basis of single-walled carbon nanotubes and applied for mode-locking of different bulk lasers in the 1 and 2 μm spectral range.

AWB5 • 17.30
Toward Efficient Femtosecond Solid State Yb Amplifiers Pumped by a 976-nm YDFA, Audrius Pugžlys¹, Giedrius Andriukaitis¹, Daniel Adam¹, Andrius Baltuska¹, Guillaume Machinet¹, Jerome Lhermite¹, Dominique Descampe², Eric Cormier¹, Ronald Holzwarth³; ¹Photonics Inst., Vienna Univ. of Technology, Vienna, Austria; ²Ctr. Lasers Intenses et Applications, Univ. de Bordeaux-CNRS-CEA, Talence, France; ³Menlo Systems GmbH, Martinsried, Germany. We demonstrate high-gain broadband amplification in Yb:CaF₂ crystal pumped with a bright source based on an ultra-large-core PCF-rod. 3-fold single-pass gain was obtained in a 10-mm Yb:CaF₂, which significantly outperforms any cw-diode-pumped scheme.

FWC3 • 17.15
Tm:Fiber Laser Resonantly-Pumped Ho:YLF Laser for air/space borne lidar application, Yingxin Bai¹, Jirong Yu¹, Songsheong Chen¹, Mulugeta Petros², Paul Petzar², Upendra N. Singh¹; ¹Science and Systems Applications, Incorporation, Hampton, VA, USA; ²NASA Langley, Hampton, VA, USA; ³Science and Technology Corporation, Hampton, VA, USA. Tm: Fiber laser pumped Ho:YLF laser enables efficient operation at high repetition rate. Corresponding injection seeding technique has been developed. Its significant application is a transmitter of air/space borne CO₂ differential absorption lidar.

AIWC3 • 17.30
Two-dimensional domain engineering in LiNbO₃ via a hybrid patterning technique, Michele Manzo¹, Fredrik Laurell¹, Valdas Passkevicius¹, Katia Gallo⁴; ¹Laser Physics, Applied Physics, KTH, Stockholm, Sweden. We propose a novel electric field poling technique employing selective proton exchange and resist patterning to fabricate nonlinear photonic crystals in LiNbO₃. We demonstrate 2D tetragonal bulk lattices with 8x6.78μm² periodicity in 0.5mm substrates.

AIWC4 • 17.45
Direct Bonding of Periodically-Poled Lithium Niobate Crystals for Broadly Tunable Quasi-Phase Matching, Myoungsik Cha¹; ¹Pusan National Univ., Busan, Republic of Korea. We fabricated a 2-mm-thick periodically-poled lithium niobate (PPLN) by direct bonding of two 1-mm-thick PPLNs. A broad spectral range of quasi-phase matched second-harmonic generation was demonstrated by angular tuning.

FWC4 • 17.30
Invited
Tm:Fiber Pumped Solid-State Ho:YLF 2-μm Coherent Laser Transmitter for Air and Space-based CO₂ Measurements, Upendra Singh¹, Yingxin Bai¹, Jirong Yu¹; ¹NASA Langley Res. Ctr., Hampton, VA, USA; ²Science Systems and Applications, Inc., Hampton, VA, USA. Researchers at NASA Langley Research Center has developed an efficient, high repetition rate, Tm:fiber pumped Ho:YLF 2-μm coherent laser transmitter to measure atmospheric CO₂ profiles and column concentration from an airborne and space-borne platform.
HWC1
Mapping the Coulomb Potential’s Influence on the Motion of Electronic Wave Packets in Strong Laser Fields, Xinhua Xie1, Stefan Roithner1, Daniil Kartashov2, Emil Persson1, Li Zhang1, Stefanie Graefe2, Markus Schöffler1,2, Matthias Lezniak1, Reinhard Dürer1, Joachim Burgdörfer1, Andrius Baltuska1, Markus Kitzler3; 1Photonics Inst., Vienna Univ. of Technology, Vienna, Austria; 2Inst. for Theoretical Physics, Vienna Univ. of Technology, Vienna, Austria; 1Inst. für Kernphysik, J.W. Goethe Univ., Frankfurt/Main, Germany; 3Max-Planck Inst. for Quantum Optics, Garching, Germany. We manipulate the trajectories of field-ionizing electron packets using two-color laser pulses for controlling the Coulomb potential’s influence on their three-dimensional momentum distributions.

HWC2
Attosecond Ionization Dynamics in Transparent Solids, Alexander V. Mitrofanov1, Aart J. Verheoef2, Evgenii E. Serebryannikov2, Julien Lameau1, Leonid Glebov1, Alexey M. Zheltikov1, Andrius Baltuska1; 1Photonics Inst., TU Wien, Vienna, Austria; 2International Laser Ctr., Moscow State Univ., Moscow, Russian Federation; 3CREOL, Univ. of Central Florida, Orlando, FL, USA. We observe an optical signature induced by sub-cycle modulation of the free carrier density in several transparent dielectrics, quasi-periodically ionized on an attosecond time scale by electric field peaks of a focused few-cycle laser pulse.

HWC3
Tunable THz generation with a CEP-stable muticolor OPA, Tadas Balciunas1, Dusan Lorenc1, Misha Ivanov2, Olga Smirnova3, Audris Pugzlys1, Alexey M. Zheltikov1, Daniel Dietze2, Juraj Darma1, Karl Unterrainer1, Tim Rathje1, Gerhard G. Paulus2, Andrius Baltuska1; 1Photonics Inst., Vienna Univ. of Technology, Vienna, Austria; 2Department of Physics, Imperial College London, London, UK; 3Max-Planck-Institut für für Kernphysik, Heidelberg, Germany; 4Department of Physics, M.V. Lomonosov Moscow State Univ., Moscow, Russian Federation; 5Institute of Optics and Quantum Electronics, Friedrich-Schiller-Universität Jena, Jena, Germany. THz emission tunability is demonstrated in a plasma driven by a field synthesized with a multicolor CEP stable OPA. Sub-cycle field ionization followed by continuum-continuum electron transitions are responsible for tunable low frequency emission.

HWC4
Using the Classical Ensemble Method in Strong-Field Atomic Physics, Xu Wang1, Joseph H. Eberly2; 1Physics & Astronomy, Univ. of Rochester, Rochester, NY, USA; 2Physics and Astronomy, Univ. of Houston, Houston, TX, USA. The classical ensemble method gives a unified picture to strong-field ionization problems. Recently it has been extended to include ellipticity in laser polarization. New effects are predicted for both sequential and nonsequential double ionization.

HWC5
Development of a Novel Large Bandwidth Front-end System for High Peak Power OPCPA Systems, Andrey Lyachev1, Oleg Chakhlov2, John Collier1, Marco Galimberti1, Cristina Hernandez-Gomez2, Pavel Matousek1, Ian Musgrave1, Ian Ross1, Yunxin Tang2; 1Central Laser Facility, Science and Technology Facilities Council, Didcot, UK. We present the development of a novel large bandwidth front-end that is capable of supporting sub 30fs pulses, with 0.4J of energy at a 2Hz repetition rate that is centered at 910nm.

HWC6
Small-Scale Self-Focusing Suppression at Intense Laser Beams in Mediums with Quadratic and Cubic Nonlinearity, Sergey Mironov1, Efim Khazanov1, Vladimir Lozhkarev1, Vladimir Ginzburg2, Gerard Mourou1; 1Inst. of Applied Physics of RAS, Nizhny Novgorod, Russian Federation; 2Inst. de la Lumière Extreme, Palaiseau, France. Method of small-scale self-focusing suppression at intense laser beams (1-4TW/cm²) was developed and verified in experiments successfully. The theoretical model of plane wave instability in mediums with quadratic and cubic nonlinearity was created.

HWC7
Spatio-Temporal Chirped Amplification for avoiding spectral modifications in ultra-short Petawatt laser Pulse, Gilles Chériaux1, Christophe Radier1, Fabio Gianbruno1, Christophe Simon-Boisson1, Vincent Moro1; 1LOA, Palaiseau, France; 2TOSA USL, Elancourt, France. Amplification of medium bandwidth pulses in a spatio-temporal configuration is demonstrated at 28 mJ for avoiding spectral shifting in high energy power amplifiers in CPA laser chain. Application to hundreds joules pulses will be discussed.

HWC8
Influence of asymmetry and nodal planes on high-harmonic generation in heteronuclear molecules, Bradley B. Augstein1, Carla Figueira de Morisson Faria1; 1Physics and Astronomy, Univ. College London, London, UK. We investigate the connection between high-harmonic spectra and the geometry of heteronuclear and homonuclear isoelectronic molecules. Two distinct behaviors of the nodal planes are identified, and the physics behind them discussed.

HWC9
Independent Control of Arbitrary Dispersion Order of High Intensity Laser Pulses, Borzsonyi Adami1,2, Peter Ijárt1, Mate Kovacs1, Mihály Gorbe1,2, Károly Osvay1; 1Optics and Quantum Electronics, Univ. of Szeged, Szeged, Hungary; 2CE Optics, Szeged, Hungary; Faculty of Mechanical Engineering and Automation, Kecskemét College, Kecskemét, Hungary. We report on wedge pairs made of different materials, which are capable of tuning exclusively one dispersion coefficient of laser pulses. Contrary to conventional dispersion controlling devices, these wedges can be used with high intensities.
HWC10
Generation of White-Light Supercontinuum with Axially Symmetric Polarization, Shunichi Sato1, Yuichi Kozawa1, Takahiro Nakamura1; 1Inst. of Multidisciplinary Res. for Advanced Materials, Tohoku Univ., Sendai, Japan. The generation of white-light supercontinuum with axially symmetric polarization was demonstrated by transmitting a Ti:sapphire vector beam through water based on the polarization preservation in a white light generation process.

HWC11
Quantum Control of Strong-Field Ladder Climbing in Atomic Sodium, Sangkyung Lee1, Jongseok Lim1, Jaewook Ahn1; 1Dept. of Physics, KAIST, Daejeon, Republic of Korea. We demonstrate quantum control of energy-level ladder climbing in Sodium 4s and 7p states in the strong-field regime, by spectro-temporal ultrafast pulse shaping. Dressed state picture model calculations show good agreements with the experiment.

HWC12
Recent Advancements in Compact Laser Plasma EUV Sources based on a Gas Puff Target, Henryk Fiederowicz1, Andrzej Bartnik1, Roman Jarocki1, Jerzy Kostecki1, Miroslaw Szezrek1, Przemyslaw Wachulak1; 1Inst. of Optoelectronics, Military Univ. of Technology, Warsaw, Poland. In this paper the recent advancements in technology of compact laser plasma EUV sources based on a gas puff target are presented. These sources have been used in nanoimaging and micro- and nanoprocesing polymers.

HWC13
Multiphoton Population of Rydberg States and Strong-Field Interference Stabilization in Low-Frequency Laser Fields, Alexander Popov1, Olga Tikhonova1, Ekaterina Volkova1; 1Inst. of Nuclear Physics, Moscow State Univ., Moscow, Russian Federation. The set of new phenomena corresponding to the strong field regime of atomic photoionization and stabilization in IR laser field is analyzed by direct numerical integration of non-stationary Schrodinger equation for the model atom in a laser field.

HWC14
High Order Harmonic Generation in the Presence of a Resonance, Maria Tudorovskaia1,2, Manfred Lein1; 1Inst. für Theoretische Physik and Ctr. for Quantum Engineering and Space-Time Res. (QUEST), Leibniz Univ. Hannover, Hannover, Germany; 2Inst. für Physik, Univ. Kassel, Kassel, Germany. High-harmonic generation and its time-frequency analysis are studied numerically for a system with a shape resonance. Resonant enhancement occurs for long or short laser pulses. In a gas the resonance remains significant after intensity averaging.

HWC15
Strong-field dynamics of atoms in low-frequency ultrashort laser pulses, Olga Tikhonova1, Alexander Popov1, Ekaterina Volkova1; 1Inst. of Nuclear Physics, Moscow State Univ., Moscow, Russian Federation. New features of ionization dynamics of a Hydrogen atom and rescattering process in strong ultra-short low-frequency laser field are demonstrated.

HWC16
Investigation of Contrast of Astra-Gemini Laser, Yunxin Tang1, Chris Hooker1, Oleg Chekhlov2, Steve Haeke1, Klaus Ertel1, Rajeev Pattathil1, John Collier1; 1Central Laser Facility, Rutherford Appleton Lab., Oxfordshire, UK. We report an investigation of the temporal contrast of the Astra-Gemini high power laser. Enhanced contrast by nearly an order of magnitude has been achieved by upgrading the commercial front-end to provide cleaner seed pulses.

HWC17
Relativistic birefringence induced by high-intensity laser field in plasma, Gin-yih Tsaur2; 1Mathematics, Tunghai Univ., Taichung, Taiwan. An analytical expression for relativistic birefringence induced by high-intensity laser field in plasma is derived. Its dependence on intensity, wavelength, and density is clearly displayed. The theory is verified by particle-in-cell simulation.

HWC18
Single- and two-color pump-induced high-order harmonic generation in fullerene-containing plasma plumes, Rashid Gancev1; 1Institute of Electronics, Tashkent, Uzbekistan. The results of systematic studies of single- and two-color pump-induced high-order harmonic generation in fullerene-rich laser-produced plasma under various plasma conditions and laser parameters are presented.

HWC19
Nonlinear refractive index effects in a Petawatt class OPCPA, Alexandre Thai1, Christoph Skrob1, Philip K. Bates1, Gunnar Arisholm4, Zsuzsanna Major1,6, Ferenc Krausz2,3, Stefan Karsch2,3, Jens Biegert1,5; 1ICFO, Castelldefels (Barcelona), Spain; 2Max-Planck-Inst. für Quantenoptik, Garching, Germany; 3Ludwig-Maximilians-Univ. München, Garching, Germany; 4Forsvarets Forskningsinstitutt (Norwegian Defence Res. Establishment), Kjeller, Norway; 5ICREA-Institucio Catalana de Recerca i Estudis Avançats, Barcelona, Spain. We present 3D OPCPA simulations including nonlinear refractive index for a PW system with 3.67 J, 4 fs transform limited pulses. Those effects reduce the energy by ~11% and increase the Fourier limit by ~17.5%.

HWC20
Low-energy structure of photoelectron spectra in mid-infrared strong laser fields: classical description, Chengpu Liu1, Karen Z Hatsagortsyan1; 1Max Planck Inst. for Nuclear Physics, Heidelberg, Germany. Using a semiclassical model incorporating tunneling and Coulomb field effects, the origin of the unexpected low-energy
structure in above-threshold ionization spectrum, revealed in recent experiments with mid-infrared laser pulses, is clarified.

**HWC21**

*Tracking electron motion at the 1fs temporal scale,* Charalambidis Dimitris1,2, Emmanuel Skantzakis1,2, Paraskevas Tsallas1, Jan Kruse1,2, Faucher Olivier3, George Tsakiris4; 1IESL and Physics Dept, FORTH and Univ. of Crete, Heraklion, Greece; 2Physics Dept, Univ. of Crete, Heraklion, Greece; 3Univ. of Bourgogne, Dijon, France; 4MPQ, Garching, Germany.

We report on ultra-broadband XUV Fourier Transform spectroscopy, implemented through XUV time resolve spectroscopy of an autoionizing electron wave-packet, i.e. a coherent superposition of doubly excited and Auger decaying inner-shell excited states.

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18.30–21.00

**Joint Conference Banquet**

**Banquet Speaker**

**Title to Be Announced,** David Payne, Univ. of Southampton, UK.

Abstract not available.
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**Thursday, 17 February 2011**

7.30–17.30
Registration Open

### AIThA • Transparent Ceramics and Laser Crystals II

**8.00–10.00**

*Takunori Taira; IMS, Japan, Presider*

**AIThA1 • 8.00**

*Invited*

**Fabrication and characterisation of transparent ceramics with new optical properties**, Yvonne Menke; Schott AG, Germany.

In this paper new developments in the fabrication of high refractive index materials with cubic crystal structure as possible matrix material for rare-earth activated compounds are described. Key challenges for the development of such high end materials are presented and related applications in both optical and fluorescence application fields are illustrated.

**AIThA2 • 8.30**

**Thermally Induced Light Scattering in Laser Ceramics with Arbitrary Sized Grains**, Anton G. Vyatkin1, Eftim Kharazov2, 1Inst. of Applied Physics of the Russian Acad. of Sciences, Nizhny Novgorod, Russian Federation.

Thermally induced light scattering in laser ceramics with arbitrary grain size were investigated. The average scattered power was defined and compared with the corresponding value obtained in the geometrical optics approximation.

### FThA • Fiber Lasers and their Applications

**8.00–10.00**

*Andreas Tümmermann; Friedrich Schiller Univ., Jena, Germany, Presider*

**FThA1 • 8.00**

*Invited*

**Title to Be Announced**, Valentin Gapontsev1; 1IPG Photonics Corp., Oxford, MA, USA. Abstract not available.

**FThA2 • 8.45**

*Invited*

**Mid-IR Fiber Supercontinuum Source for Hyperspectral Image Projector**, Brandon Shaw1, Rafael Gattass1, Jas Sanghera1, Ishwar Aggarwal1, Joseph Rice2; 1Naval Res. Lab, Washington, DC, USA; 2National Inst. of Standards and Technology, Gaithersburg, MD, USA. We describe a broadband all fiber mid-IR fiber supercontinuum source for illumination of the Hyperspectral Image Projector (HIP) system currently under development at NIST. The source spectral range is 1.5 μm to 5 μm.

### HThA • Particles in Intense Fields

**8.00–10.00**

*Gerard Mourou; ENSTA, France, Presider*

**HThA1 • 8.00**

*Invited*

**Laser Compton Light Sources: From Atomic to Nuclear Photonics**, Christopher P. Barty1; 1IML-L470, Lawrence Livermore National Lab, Livermore, CA, USA. Abstract not available.

**HThA2 • 8.45**

*Invited*

**High Current Electron Beam Produced with Laser Plasma Accelerators**, Victor Malka1; 1LOA, CNRS/ENSTA/ Polytechnique, Palaiseau, France. Ultra-high peak current (few kA) and ultra-short duration (few fs) electron beams have been produced using the colliding laser pulses scheme.
**FThA3 • 9.00**

**Experimental Test of a Fiber Laser Hydrophone Array,** Enrico Maccioni, Nicolò Beverini, Stefano Firpi, Mauro Morganti, Fabio Stefani, Cosimo Trono, Piero Guerrini, Alain Maguer,

1Dipartimento di Fisica, Università di Pisa, Largo Santocchio 3, Pisa, Italy; 2CNR-Istituto di Fisica Applicata “Nello Carrara”, Polo Scientifico, Sesto Fiorentino (FI), Italy; 3Nato Undersea Res. Ctr., Viale san Bartolomeo, 400, La Spezia, Italy. A fiber laser hydrophone array is described. Acoustic waves produce a strain on the fiber laser with a consequent modulation of the wavelength. The sensitivity is of few mPa/(Hz)\(^{1/2}\) in the 0.5-5 kHz frequency band.

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**FThA4 • 9.15**

**Fiber Amplifiers of Radially or Azimuthally Polarized Light,** Micha Nixor, Moti Fridman, Asher A. Friesem, Nir Davidson,

1Weizmann Inst. of Science, Rehovot, Israel. A novel configuration for amplifying radial or azimuthal polarized light with fiber amplifier is presented. We obtained 40dB amplification with more than 85% polarization purity and efficient conversion to linear polarization.

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**FThA5 • 9.30**

**Simultaneous Dual-Wavelength Laser Operation in Co-Doped (Ho,Tm):KLu(WO\(_4\)) Crystals,** Xavier Mateos, Venkatesan Jambunathan, Maria Cinta Pujol, Joan Josep Carrojal, Magdalena Aguillo, Francesc Diaz, Andreas Schmidt, Uwe Griebner, Valentín Petrov,

1Univ. Rovira i Virgili, Tarragona, Spain; 2Max-Born Inst., Berlin, Germany. Simultaneous lasing of Ho\(^{3+}\) at 2061 nm and Tm\(^{3+}\) at 1937 or 1919 nm is observed in co-doped monoclinic (Ho,Tm):KLu(WO\(_4\)) at room temperature with output power and slope efficiency reaching 218 mW and 27%, respectively.

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**HThA3 • 9.15**

**LWFA Experiments at PEARL Facility,** Alexander Soloviev, Konstantin Burdonov, Vladimir Ginzburg, Evgeny Katin, Efim Khazanov, Alex Kirsanov, Vladimir Lozhkarev, Grigory Luchinin, Anatoly Mal'shakov, Mikhail A. Martynov, Oleg Palashov, Anatoly K. Poteomkin, Alexander Sergeyev, Andrey Shagin,

1CREOL, 2Joint Inst. of High Temperatures, Russian Acad. of Sciences, Moscow, Russian Federation. The results of laser wakefield acceleration experimental series carried out at PEARL (PETawatt pArametrical Laser) system are discussed in the paper. The electron beams with energies up to 300 MeV were observed.

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**HThA4 • 9.30**


2Joint Inst. of High Temperatures, Russian Acad. of Sciences, Moscow, Russian Federation; 3Graduate School of Maritime Sciences, Kobe Univ., Hyogo, Japan; Graduate School of Engineering, Osaka Univ., Osaka,
Influence of Nd³⁺-concentration on laser transitions in Nd:YAG, Yoichi Sato¹, Takunori Taira¹; ¹Laser Res. Ctr. for Molecular Science, Inst. for Molecular Science, Okazaki, Japan. We found 30.9% difference in stimulated emission cross section at 1319 nm between 0.4at.% and 5.4at.% Nd:YAG ceramics by fine spectroscopy. It was also revealed that Stark splitting of Nd:YAG depended on Nd³⁺-concentration and fabrication processes.

Efficient generation of DD fusion by all diode-pumped solid-state laser, Takashi Sekine¹, Toshiyuki Kawashima¹, Nakahiro Sato¹, Masaru Takagi¹, Hirofumi Kani¹, Yonegoshi Kitagawa², Yoshitaka Mori³, Ryohki Hanayama³, Shinichiro Okihara³, Kazuhide Fujita¹, Katsuhiko Ishii³, Naoki Nakamura¹, Yasushi Miyamoto³, Hirozumi Azuma⁴, Tomyoshiba Motohiro⁴, Tatsumi Hisaki⁴; ¹Development bureau, Hamamatsu Photonics K. K., Shizuoka, Japan; ²The Graduate School for the Creation of New Photonics Industries, Shizuoka, Japan; ³Advanced Material Engineering Division, TOYOTA Motor Corporation, Shizuoka, Japan; ⁴TOYOTA Central Res. and Development Laboratories, Inc., Aichi, Japan. We have started a new project of inertial fusion driven by all diode-pumped solid-state laser (DPSSL). 105 DD fusion neutron yield from a 500-µm-thick deuterated polystyrene film has preliminarily demonstrated by 10 TW HAMA laser.
AITHB05
Low-Phonon BaF₂: Ho³⁺, Tm³⁺ Doped Crystals for 3.5 - 4 μm Lasing, Yuriy V. Orlowski1, Olim Alimov1, Tasoltan T. Basiev1; 1Laser Materials and Technology Res. Ctr., General Physics Inst., Moscow, Russian Federation. New pumping and sensitization scheme of 3.9 μm laser transition of Ho³⁺ in low-phonon the BaF₂:Ho³⁺:Tm³⁺ crystals is studied. Energy transfer from Tm³⁺ to Ho³⁺ and back transfer from Ho³⁺ to Tm³⁺ are analyzed.

AITHB06
Heat Generation and Flow and Thermal Effects on Optical Spectra in Laser Diode Pumped Thulium-doped Vanadate Crystals, Radoslaw Lisiecki1, Piotr Stachowiak1, Andrzej Jezowski2, Piotr Solarz1, Grazyna Dominik-Dzik1, Witold Ryba-Romanskiw3, Tadeusz Lukasiewicz1; 1Inst. of Low Temperature and Structure Res., Polish Acad. of Sciences, Wroclaw, Poland; 2Inst. of Electronic Materials Technology, Warsaw, Poland. Optical spectra, excited state relaxation dynamics and thermal conductivity in a wide temperature region for thulium-doped YVO₄, GdVO₄ and LuVO₄ have been measured and analyzed to assess thermal effects in laser-diode-pumped Tm:vanadate lasers.

AITHB07
Thermoluminescent detectors based on YAP:Mn crystals, Yaroslav Zhuydachevskii1, Andrzej Suchocki1, Marek Berkowski1; 1Inst. of Physics Polish Acad. of Sciences, Warsaw, Poland; 2Inst. of Physics, Kazimierz Wielki Univ., Bydgoszcz, Poland; 3Lwiv Polytechnic National Univ., Lwiv, Ukraine. The work presents results of the experimental study of thermoluminescent (TL) properties of the high-temperature TL peak at 570 K observed in YAIQ: Mn crystals at low concentrations of manganese ions.

AITHB08
MeV He Ion-Implanted Planar Waveguide in RTP Crystal, Gang Fu1, 2School of Science, Shandong Jianzhu Univ., Jinan, China. A planar optical waveguide was formed in RbTiOPO₄ (RTP) crystal by 3.0- MeV He-ion implantation with a dose of 1.0×10¹⁶ions/cm² at room temperature. The annealing process effectively removed the color centers and reduced the loss of waveguide.

AITHB09
Measurement Of Up Conversion In Er:YAG And Comparison With Laser Performance, Norman Barnes1, Farzin Amjadian1, Brian Walsh1, Donald Rechtle1, George Busche1, William Carrion1; 1NASA Langley Res. Ctr., Hampton, VA, USA; 2NASA Langley Res. Ctr., Hampton, VA, USA. Up conversion significantly affects Er:YAG lasers. Measurements done here for low Er concentration are significantly smaller than reported high Er results. Results are used to predict laser performance and results are compared with experiment.
AITHB10
Structural Peculiarities, Energy Transfer and the Visible Emission in Gd2SiO5: Single Crystal Doped with Pr3+, Sm3+ and Dy3+. Grażyna Dominiak-Dzięk, Witold Ryba-Romanowski, Radosław Lisiecki, Piotr Solarz, Boguslaw Macalik, Marek Berkowski; 1Inst. of Low Temp. and Structure Res. PAS, Wroclaw, Poland; 2Inst. of Physics, Polish Acad. of Sciences, Warsaw, Poland. Analysis of optical spectra and luminescence decay curves with reference to host structural peculiarities revealed mechanisms involved in excitation and relaxation processes leading to the visible emission of Pr3+, Sm3+ and Dy3+ in Gd2SiO5: crystals.

AITHB11
Paper Withdrawn

AITHB12
Bistable Switching based on Pseudo Resonant States in Nonlinear Fractal Photonic Crystals, Mohammad Hosain Teimourpour1; 1Optics and Laser Engineering, Kermanshah Univ. of Technology, Kermanshah, Islamic Republic of Iran. All optical switching based on Kerr bistability in fractal photonic crystal without any defects is investigated. Finite element analysis is used to investigate bistable switching with low threshold (6.12 W/cm2).

AITHB13
Switching dynamics and thickness effect of an intensity modulator based on a novel nematic liquid crystal mixture, Habib Khooshnava, Babak Olyaeifar1; 1Photonics, Res. Inst. for Aplied Physics, Tabriz, Islamic Republic of Iran. In this experimental work, the latest results for the dynamic behavior of a novel nematic liquid crystal mixture are presented. The free relaxation time and viscoelastic coefficient of samples in three different thicknesses are calculated.

AITHB14
Simulation of Transmission Behaviors of Photonic Crystal Structures Etched into an Ion-implanted LN Waveguide, Qing Huang1, Jin-Hua Zhao1, Peng Liu1, Jing Guan1, Xue-Lin Wang1; 1School of Physics, Shandong Univ., Jinan, China. The transmission behaviors of one and two-dimensional photonic crystal structures etched into an oxygen-ion-implanted LN waveguide were simulated by FDTD method. The cavity formed in one-dimensional photonic crystal structure works well as a filter.

AITHB15
Photoluminescence, afterglow and color properties in nanocrystalline SrMgAl5SiO14:Eu2+, Dy3+ phosphor, Hassan Sameie, Reza Salimi1, Ali A. Sabbagh1, Ali A. Sarabi, Mohammadreza Tahriri1, Mohammad A. Mohktari Farsi1; 1Dept. of Polymer Engineering & Color Technology, Amirkabir Univ. of Technology, Tehran, Islamic Republic of Iran; 2Color and Polymer Res. Ctr. (CPRC), Amirkabir Univ. of Technology, Tehran, Islamic Republic of Iran. The phase-condition, morphology and optical properties for sol-gel derived phosphor, SrMgAl5SiO14:Eu2+, Dy3+ were studied. Results showed that although Dy decreases the emission intensity, but can obviously improve the afterglow characteristic.

AITHB16
Site-Selective Spectroscopy of Garnets Doped with Chromium and Praseodymium Ions, Humeyra Orucu1, Ozen Genc1, Baldassare Di Bartolo1, John Collins1; 1Physics and Astronomy, Wheaton College, Norton, MA, USA; 2Physics, Boston College, Chestnut Hill, MA, USA. In this paper we present various techniques that can be used for site-selective spectroscopic studies and we follow with a study of some garnet crystals doped with chromium and praseodymium ions.

AITHB17
PbS Quantum Dots Formation in Glasses Controlled by Ag Nanoclusters, Kai Xu1, Jong Heo1; 1Dept. of Materials Science & Engineering, Pohang Univ. of Science and Technology (POSTECH), Pohang, Republic of Korea. Control of the formation of PbS quantum dots in glasses was attempted by precipitating Ag nanoclusters. Heat-treatment and ion-exchange processes were used to form Ag nanoclusters. Ag nanoclusters significantly enhanced the formation of quantum dots.

AITHB18
Chemical synthesis, crystal growth and mid-IR Difference Frequency Generation in ZnGeP2: and AgGaS2: Johan Petiti1, Antoine Godard2, Myriam Raybaud2, Jean-Michel Melkonian1, Michel Lefebvre1; 1DMSC, ONERA, Chatillon, France; 2DMPH, ONERA, Palaiseau, France. Chalcopryte as ZnGeP2: and AgGaS2: are very promising non linear materials for the 3-12 μm laser sources. Their elaboration process is presented before first DFG experiments in the mid-IR.

AITHB19
Integrated chalcogenide waveguide resonators for mid-IR sensing: Leveraging material properties to meet fabrication challenges, Kathleen Richardson, Nathan Carlie, J. David Maugraves, Bogdan Zdyrko1, Igor Luzinov, Juejun Hu, Vivek Singh, Anu Agarwal, Lionel C. Kimerling, Antonio Canciamilla, Francesco Morichetti, Andrea Melloni; 1Materials Science and Engineering, COMSET, Clemson Univ., Clemson, SC, USA; 2Microphotonics Lab, MSE, MIT, Cambridge, MA, USA; 3Electronics and Information, Politecnico Milano, Milano, Italy. Efforts to reduce loss and tailor optical characteristics of planar chalcogenide devices are discussed and results of trimming experiments to correct fabrication errors, presented.
FThB • Short Pulse Fiber Lasers

10.30–12.30
Valentin Gapontsev; IPG Photonics Corp. USA, Presider

FThB1 • 10.30  Invited
Recent Progress on the ALPINE (Advanced Lasers for Photovoltaic INDustrial processing Enhancement) FP7 Integrated Project, Yves Hernandez†, Anthony Bertrand†, Stefano Selleri‡, Francois Salin†, Lasse Leick†, Marc Hueske‡, Rok Perkova§, Fabio Ferraro§, Norbert Lichtenstein‡; †Multitel, Mons, Belgium, ‡Univ. of Parma, Parma, Italy, §EOLITE Systems, PESSAC, France, ‡NKT Photonics, Birkerød, Denmark. SolarQuipment GmbH, Garbsen, Germany, ‡Univ. of Ljubljana, Ljubljana, Slovenia, †Quanta System S.p.A., Solbiate Olona (VA), Italy, §Oclaro Zurich, Zurich, Switzerland. We present the recent advances on the ALPINE project dedicated to developing innovative fibre lasers for scribing thin film CIGS and CdTe solar cells. The project started in September 2009 and involves 15 European partners.

FThB2 • 11.00
High average power femtosecond pulses at 520 nm via second harmonic generation of a fiber chirped pulse amplification system, Tino Eidam†,‡, Steffen Händrich†,‡, Jan Rothhardt†,‡, Fabian Stutzki†, Florian Jansen†, Thomas Gottschalk†, Thomas V. Andersen‡, Jens Limpert‡, Andreas Tümmermann‡,‡; †Inst. of Applied Physics, Friedrich-Schiller- Univ. Jena, Jena, Germany; ‡Helmholtz-Inst. Jena, Jena, Germany; †NKT Photonics, Birkerød, Denmark. We present efficient second harmonic generation of a femtosecond fiber chirped pulse amplification system. At a record average power of 135W and a repetition rate of 5.25MHz we measured a M² value <1.2.

FThB3 • 11.15
High Efficiency Chirped Bragg Gratings for Pulse Stretching and Compression, Vadim Smirnov†, Eugeniu Rotari‡, Ion Cohanoshi‡, Almantas Galvaunaskas§, Leonid Glebov†; †OptiGrate, Orlando, FL, USA; ‡EECS Dept., Univ. of Michigan, Ann Arbor, MI, USA/CREOL/ The College of optics and Photonics, Univ. of Central Florida, Orlando, FL, USA. This paper report on the advances in the

HThB • Enhanced Higher-Order Harmonic Generation

10.30–12.30
Presider to be announced

HThB1 • 10.30  Invited
Generalized Double Optical Gating, a Route to High Power Isolated Attosecond Sources, Zenghu Chang; Kansas State Univ., USA. Abstract not available.

HThB2 • 11.00  Invited
High-Energy Isolated Attosecond Pulses and Applications to Molecular Physics, Francesca Calegari†, Federico Ferrari†, Matteo Lucchini‡, Caterina Vozzi‡, Salvatore Stagira†, Giuseppe Sansone†, Mauro Nisoli‡; †Dept. of Physics, Politecnico di Milano, Milano, Italy. We report on the generation of isolated 155-as pulses with a pulse energy on-target of a few nanojoules, by using 5-fs driving pulses with stable carrier-envelope phase and peak intensity beyond the gas saturation intensity.

HThB3 • 11.15  Invited
High Efficiency Chirped Bragg Gratings for Pulse Stretching and Compression, Vadim Smirnov†, Eugeniu Rotari‡, Ion Cohanoshi‡, Almantas Galvaunaskas§, Leonid Glebov†; †OptiGrate, Orlando, FL, USA; ‡EECS Dept., Univ. of Michigan, Ann Arbor, MI, USA/CREOL/ The College of optics and Photonics, Univ. of Central Florida, Orlando, FL, USA. This paper report on the advances in the

AITHC • Specific Applications

11.30–13.00
Shibin Jiang; AdValue Photonics, Inc. USA, Presider
large-aperture linearly chirped Bragg grating stretcher/compressor, which enables efficient compact and robust chirped pulse amplification systems for high peak and high average power ultrashort pulses.

**FThB4 • 11.30** Invited
**ns and fs Fiber Lasers**
*Jian Liu*, Peng Wang¹, Libo Yang¹, Farzin Amzajerdian², PolarOnyx Inc., Sunnydale, CA, USA; ¹NASA Langley Res. Ctr., Hampton, VA, USA. Pulse shaping technology is present to mitigate pulse narrowing and SBS effects in high energy/power ns fiber lasers and to balance SPm and gain narrowing in high energy/power fs fiber lasers.

**HThB3 • 11.30**

**High-Order Harmonics Tunable Enhancement by a DC-Electric Field**, Carles Serra³, Joris Biegert³, UPC - Universitat Politècnica de Catalunya, Terrassa, Spain; ²ICFO, Castelldefels (Barcelona), Spain; ¹ICREA, Barcelona, Spain. A static electric field periodically distributed in space controls and enhances the yield in high harmonic generation. The method is relatively simple to implement and allows tuning from the extreme-ultraviolet to soft x-ray.

**FThB5 • 12.00** Invited
**Photovoltaics Applications of High Power Green and UV Fiber Lasers**, Julien Saby, Benjamin Coquelin, Francois Salin, Nicolas Falletto, Eolite Systems, Pessac, France. We present industrial laser products delivering 200W at 1030nm, 60W at 515nm and 20W at 343nm with pulse duration down to 10ns and M2<1.3 with a very simple MOPA architecture based on rod-type fiber laser. Photovoltaics applications are then presented on both silicon and thin film wafers.

**HThB5 • 12.00** Invited

**Bright Coherent Ultrafast X-rays from mid-IR Lasers**, Tenio Popmintchev³, Ming-Chang Chen¹, Paul Arpin¹, Michael Gerrity¹, Matthias Seaberg¹, Bosheg Zhang¹, Dimitar Popmintchev³, Giedrius Andriukaitis², Tadas Balciunas², Oliver D. Mücke³, Audrius Pugžlys³, Andrius Baltuska³, Margaret Marrnane³, Henry Kapteyn¹; ¹JILA and Univ. of Colorado at Boulder, Boulder, CO, USA; ²Photonics Inst., Vienna Univ. of Technology, Vienna, Austria. We combine the attosecond physics of high harmonic generation with phase-matching in extreme nonlinear optics to demonstrate bright

**A1ThC1 • 11.30** Invited


**A1ThC2 • 12.00**

**Photo-Thermo-Refractive glass - Properties and Applications**, Larissa Glebova¹, Karina Chamma², Julien Lumeau¹, Leonid Glebov¹; ¹Univ. of Central Florida, CREOL, Orlando, FL, USA. Mechanisms of photo-thermo-induced refractive index change, advances in glass properties and applications for holographic optical elements, laser beam profilers, volume phase masks, and monolithic solid state lasers are discussed.
coherent upconversion into the X-ray spectral region using longer wavelength mid-IR lasers.

**AITHC3 • 12.15**
Visible to infrared down conversion in rare-earth doped fluorides for luminescent solar converters, Diana Serrano¹, Alain Braud²; ¹CIMAP-ENSICAEN, Caen, France.
KY3F₁₀ and CaF₂ fluoride crystals co-doped with Pr³⁺ and Yb³⁺ ions are investigated as possible quantum cutting systems to enhance solar cells efficiency. More than 95% Pr³⁺ to Yb³⁺ energy transfer efficiencies are obtained.

**AITHC4 • 12.30**
Crystal growth and Spectroscopy of Cerium doped CaSc₂O₄, Matthias Fechner¹, Fabian Reichert¹, Klaus Petermann¹, Günter Huber¹; ¹Inst. für Laser-Physik, Hamburg, Germany.
Within cerium doped CaSc₂O₄ single crystals a ligand to metal Ce⁴⁺ - Ce³⁺ charge transfer absorption band is identified. Crystal growth and its influence on the incorporation of different charged Cerium ions are discussed.

**AITHC5 • 12.45**
Effect of Ho³⁺ in (Tm³⁺,Yb³⁺): KLu(WO₄)₂ nanocrystals for RGB light generation, E. William Barrera Bello¹, Maria Cinta Pujol¹, Joan Josep Carvajal¹, Xavier Mateos¹, Magdalena Aguilo¹, Francesc Díaz¹, Concepción Cascales²; ¹Universitat Rovira i Virgili, Tarragona, Spain; ²Inst. de Ciencia de Materiales de Madrid, Madrid, Spain.
Nanocrystalline powder of Ho³⁺,Tm³⁺,Yb³⁺:KLu(WO₄)₂ was synthesized by modified Pechini method. Under 930 nm, RGB emissions were observed. The decay times were studied to describe the luminescence dynamics. The CIE chromaticity was evaluated.

13.00–14.30
Lunch Break (on your own)
Despite its advantages with respect to precision, ultrashort pulse micromachining often suffers from a low processing speed. We will discuss the opportunities for high repetition rate and high average power ultrafast fiber lasers to overcome these problems.

We demonstrate an all-fiber source producing 30ps pulses with energy up to 30μJ and average power up to 45W. 50% conversion efficiency to the UV and application to CIGS thin film scribing is demonstrated.

This paper deals with the latest results in the field of chalcogenide glasses and fibers for infrared photonics, including light sources, photonic crystal fibers, and biosensors.
**FThC4 • 15.00 Invited**

Influence of Peak Power and ns Pulse Duration on Micromachining, Sami Hendou1; 1Multiaire Photonics, San Jose, Portugal. Experimental and modeling results are presented for 10 to 200 ns pulsed fiber laser at 1064nm, showing peak power and pulse duration affecting ablation depth and HAZ, and produce hard surface oxidation of stainless steel.

**FThC5 • 15.30 Invited**

Visible and Infrared Sources based on Three-Level Ytterbium-doped Fiber Lasers, J. Boulet1, R. Bello-Doua2, R. Dubrasquet3, Nicholas Traynor4, Caroline Lecaplain4, Ammar Hideur5, Jerome Lhermitte6, Guillaume Machet6, C. Médina1, Eric Cornier7; 1Azur Light Systems, Talence, France, 2Alphanov, Centre Technologique Optique et Lasers, Talence, France, 3Centre Lasers Intenses et Applications, Univ. de Bordeaux, Bordeaux, France, 4Univ. de Rouen-CNRS UMR, Saint Etienne du Rouvray, France. We present recent work on a variety of Yb-doped fiber laser systems operating on the three-level transition at 976 nm, both CW and pulsed, and subsequent frequency doubling.

**HThC2 • 15.00**

Generation of intense ultrashort mid-infrared pulses by laser-plasma interaction in the bubble regime, Jihyung Wang1; 1Inst. of Atomic and Molecular Sciences, Academia Sinica, Taipei, Taiwan. Generation of intense mid-infrared pulses by laser-plasma interaction in the bubble regime is demonstrated experimentally. Nonlinear phase modulation is shown to be the conversion mechanism by theoretical analysis and numerical simulation.

**HThC3 • 15.15**

Spatiotemporal Model of Passively Mode-locked Few-cycle Ti:sapphire Lasers: The Role of Plasma Formation, Li-Jin Chen1, Chien-Jen Lai1, Franz Kärtner1; 1MIT, Cambridge, MA, USA. A spatiotemporal model for Kerr-lens mode-locked few-cycle Ti:sapphire lasers is developed. The ultra-high intensity leads to significant plasma formation in the crystal which dominates the beam propagation in agreement with experimental observation.

**HThC4 • 15.30**

Plasma Defocusing in High Harmonic Generation with Long-Wavelength Driver Pulses, Chien-Jen Lai1, Franz Kärtner1; 1EECS, MIT, Cambridge, MA, USA. Plasma defocusing in gas media and its impact on high-order harmonic generation (HHG) is discussed. It confines HHG with long-wavelength driver pulses to short propagation lengths significantly diminishing the HHG yield from high density media.

**HThC5 • 15.45**

Routes towards Single Intense Attosecond Pulses, George Tsakiris1; 1Attophysics, Max-Planck Inst. for Quantum Optics, 85748 Garching, Germany. The plasma medium converts laser light into higher harmonics more efficiently than gaseous media without inherent limitation on the laser intensity. This opens the prospect of generating brilliant, single attosecond pulses for applications.

**AITHD2 • 15.00**

Chalcogenide Square Registered IR Imaging Bundles, Brandon Shaw1, Dan Gibson1, Vinh Nguyen1, Rafael Gattass1, Jas Sanghera1, Ishwar Aggarwal1, Gabrielle Farrar1; 1Naval Res. Lab, Washington, DC, USA; 2Univ. Res. Foundation, Greenbelt, MD, USA. We report on development and characterization of square registered infrared imaging bundles fabricated from As2S3 fiber. Bundle cross-talk measurements are presented.

**AITHD3 • 15.15**

Dy(Pr3+)doped GaGeSbS(Se) fibers for CO2 sensing at 4.35μm, Jean-Louis Doualan1; 1CIMAP, Caen, France. Dy3+ and Pr3+ doped GaGeSbS(Se) glasses provide good emission efficiencies in the mid IR. By using the 4.5μm emission of a Dy3+ doped GaGeSbS fiber, the CO2 gas concentration measurement is carried out successfully.

**AITHD4 • 15.30**

Low loss micro and nano structured single mode crystalline fibers for 5-15 μm, Leonid N. Butvina1, Alexey L. Butvina1, Andrey Okhrimchuk1, Nixel Lichkova2, Vladimir Zagorodnev2, Evgeni Dianov2; 1Fiber optic, FORC RAS, Moscow, Russian Federation; 2High purity materials, IPTM RAS, Chernogolovka, Russian Federation. Low loss multi component photonic micro- and nano-structured metal halide crystalline fibers for 5-15 μm are extruded. Fibers of different type from silver and metal halides are singlemode for 10 μm.

**AITHD5 • 15.45**

Theoretical and experimental study of microstructured chalcogenide As:Se fibers for frequency conversion, Claire Alhenc-Gelas1, Pierre Bourdon1, Guillaume Canat1, Frédéric Draoui1, Anne Durecu1; 1DOTA-SLS, ONERA, Palaiseau, France; 1Laboratoire Charles Fabry de l’Inst. d’Optique, CNRS, Palaiseau, France. The potential of mid-IR frequency conversion in As:Se microstructured fibers is assessed using an effective index method. The dispersion measurement setup used to validate the model on real chalcogenide fibers is also presented.
Large nonlinear LBO crystals for high power laser chains, Alexander E. Kokh\textsuperscript{1}, Nadezda Kononova\textsuperscript{1}, Vasily Vlezko\textsuperscript{1}, Konstantin Kokh\textsuperscript{1}, Philippe Villal\textsuperscript{2}, Dominique Luptiński\textsuperscript{2}, Stephane Durst\textsuperscript{2}; \textsuperscript{1}Inst. of Geology and Mineralogy, Novosibirsk, Russian Federation; \textsuperscript{2}Cristal Laser, Nancy, France.

In order to improve the quality and dimensions of LBO crystal we have performed the growth under nonuniform rotating heat field. Currently Ø 65 mm NLO elements for 2nd and 3rd harmonic generation of 1053 nm were produced.

Crystal growth and optical properties of LYSB, Alain Maillard\textsuperscript{1}, Regine Maillard\textsuperscript{1}, Gerard Aka\textsuperscript{1}, Philippe Villal\textsuperscript{2}; \textsuperscript{1}Physics, Univ. Metz, Metz, France; \textsuperscript{2}Cristal Laser, Messein, France; \textsuperscript{3}CMCP UMR CNRS 7574, Paris, France.

Borate crystal LYSB is successfully grown in large dimensions. This non hygroscopic crystal presents large transparency and good non linear optical properties. Diffraction by non homogeneities grating is studied in relation with crystal parameters.

Optical loss mechanisms in magnesium-doped lithium niobate crystals in the 300 to 2950 nm wavelength range, Judith R. Schwesig\textsuperscript{1,2}, Ashot Markosyan\textsuperscript{1}, Maria Claudia C. Kajiyama\textsuperscript{1}, Matthias Falk\textsuperscript{1}, Dieter H. Jundt\textsuperscript{1}, Karsten Buse\textsuperscript{1}, Martin M. Fejer\textsuperscript{1}; \textsuperscript{1}E. L. Ginzton Lab, Stanford Univ., Stanford, CA, USA; \textsuperscript{2}Inst. of Physics, Univ. of Bonn, Bonn, Germany; \textsuperscript{3}Crystal Technology, Inc., Palo Alto, CA, USA. Absorption measurements in 5 mol. % MgO-doped lithium niobate crystals (optical grade) are presented. Measurements reveal that optical losses in these crystals are mainly caused by H, Fe, Cu, Ni, Cr, and Mn impurities.

High repetition rate mj-level few-cycle pulse laser amplifier for XUV-FEL seeding, Franz Tavella\textsuperscript{1}, Daryl Adams\textsuperscript{1}, Valeri Apezuty\textsuperscript{1}, Nicoleta-Ionela Baboi\textsuperscript{1}, J. Bahrdt\textsuperscript{2}, Effthimios Bakarezos\textsuperscript{2}, Vladimir Balandin\textsuperscript{2}, Winfried Decking\textsuperscript{2}, Brendan Dromey\textsuperscript{2}, Thomas Dzelzains\textsuperscript{2}, Stefan Dilister\textsuperscript{2,3}, Markus Drescher\textsuperscript{4}, Hans-Jörg Eckel\textsuperscript{4}, Bart Fanta\textsuperscript{4}, José Feldhaus\textsuperscript{4}, Rolf Follath\textsuperscript{4}, Michael Gensch\textsuperscript{4}, Nina Golubeva\textsuperscript{4}, Karsten Hollbach\textsuperscript{4}, Christos Kamperidis\textsuperscript{4}, Markus Körfer\textsuperscript{4}, Tim Laarmann\textsuperscript{4}, Allrecht Leuschner\textsuperscript{4}, Lutz Lilje\textsuperscript{4}, Torsten Limberg\textsuperscript{4}, Atoosa Meseck\textsuperscript{4}, Veližar Mitčev\textsuperscript{4}, Rolf Mitzner\textsuperscript{4}, Dirk Nölle\textsuperscript{4}, Nektarios Papadogianis\textsuperscript{4}, Alexander Petrovi\textsuperscript{4}, Kay Rehlich\textsuperscript{4}, Robert Riedel\textsuperscript{4}, Jörg Rossbach\textsuperscript{4}, Holger Schlär\textsuperscript{4}, Bernhard Schmidt\textsuperscript{4}, Michael Schmitz\textsuperscript{4}, Siegfried Schreiber\textsuperscript{4}, Janulie Röösli\textsuperscript{4}, Horst Schulte-Schrepping\textsuperscript{4}, Michael Schulz\textsuperscript{4}, Joachim Spengler\textsuperscript{4}, Martin Stanczak\textsuperscript{4}, Michael Tatarakis\textsuperscript{4}, Kai Tiedke\textsuperscript{4}, Markus Tischer\textsuperscript{4}, Rolf Treusch\textsuperscript{4}, Ark Willner\textsuperscript{4,5}, Mark Yeung\textsuperscript{4}, Mathieu Zepf\textsuperscript{4}; Helmholtz Inst. Jena, Hamburg, Germany; \textsuperscript{5}Deutsches Elektronensynchrotron, Hamburg, Germany; \textsuperscript{6}Helmholtz Zentrum Berlin, Berlin, Germany; \textsuperscript{7}Univ. Hamburg, Hamburg, Germany; \textsuperscript{8}Queens Univ. Belfast, Belfast, Germany; \textsuperscript{9}Ctr. for Plasma Physics and Lasers, Rethymno, Greece. We present an operationally stable OPCPA prototype for XUV-seeding at the FLASH free electron laser. The envisioned key parameters are >1 mJ pulse energy and <7 fs pulse duration at a 100 kHz burst repetition rate.

Carrier-Envelope Phase stability of a mid-IR 100 kHz OPCPA source for strong-field physics, Alexandre Thal\textsuperscript{1}, Olivier Chalus\textsuperscript{1}, Philip K. Bates\textsuperscript{1}, Jens Biegert\textsuperscript{1,2}; \textsuperscript{1}AttoScience and Ultrafast Optics, ICF-Inst. de Ciencias Fotoniques, Castelldefels (Barcelona), Spain; \textsuperscript{2}ICREA, ICREA, Barcelona, Spain. We present CEP measurements for a 100 kHz optical parametric chirped pulse amplification source in the mid-IR at 3.2 microns. The source is passively CEP stabilised to <100 mrad RMS over 1 million pulses.

Carrier-envelope phase stabilized 9.3 fs, 0.54 mJ pulses at 1.8 μm, Ding Wang\textsuperscript{1}, Canhua Xu\textsuperscript{1}, Liwei Song\textsuperscript{1}, Chuang Li\textsuperscript{1}, Chunmei Zhang\textsuperscript{1}, Yansui Huang\textsuperscript{1}, Xiaowei Chen\textsuperscript{1,2}, Yuxin Leng\textsuperscript{1}, Ruxin Li\textsuperscript{1}, Zhishan Xu\textsuperscript{1}; \textsuperscript{1}State Key Lab of High Field Laser Physics, Shanghai Inst. of Optics and fine Mechanics, Chinese Acad. of Sciences, Shanghai, China; \textsuperscript{2}Laboratoire d’Optique Appliquée, ENSTA ParisTech, Ecole Polytechnique, Palaiseau, France.

Generation of carrier-envelope phase stabilized 0.54 mJ, 9.3 fs pulses at 1.8 μm is demonstrated. The input pulse is spectrally broadened in an argon-filled hollow-core fiber, subsequently compressed in glass plates with anomalous dispersion.
AITHE4 • 17.30
Second harmonic generation below 400 nm using potassium lithium niobate from laser-heated pedestal growth, Gisele Maxwell, Dylan Dalton, Alan B. Petersen; Spectra Physics, Santa Clara, CA, USA; Shasta Crystals, Anderson, CA, USA.
Potassium lithium niobate, compositionally adjusted for noncritical phase-matching has been grown using the laser-heated pedestal growth method. Second harmonic generation has been observed in the blue wavelength region down to 385 nm.

AITHE5 • 17.45
Intensity-dependent photorefractivity of Zirconium-doped lithium niobate crystals, Paolo Minzioni, Giovanni Navai, Wenbo Yan, Ilaria Cristiani, Vittorio Degiorgio, Nicola Argiuolo, Marco Bazzan, Maria V. Ciampolillo, Annamaria Zaltron; Electronics, Univ. of Pavia and CNISM, Pavia, Italy; Physics, Univ. of Padova and CNISM, Padova, Italy. The pump intensity dependence of photorefractive effect in Zr-doped Lithium-Niobate crystals is investigated. Photorefractivity grows linearly with light intensity in the undoped crystal, whereas it saturates when doping concentration exceeds 2mol%.

HThD4 • 17.30
Multicolor optical parametric synthesizer for high-field science, Stefan Haessler, Tadas Balciunas, Giedrius Andriukaitis, Oliver D. Mücke, Audrius Pugelys, Andrius Baltuska, Richard Squibb, Leslau Frasinski, Jon Marangoz, John W. Tisch, Linas Gintiunas, Ronald Holzwarth; Inst. of photonics, Vienna Univ. of Technology, Vienna, Austria; Dept. of Physics, Imperial College London, London, UK; Light Conversion Ltd., Vilnius, Lithuania; Max-Planck Inst. of Quantum Optics, Garching, Germany; Menlo Systems GmbH, Munich, Germany. We discuss promising high-field applications of a CEP-stable parametric wave synthesizer producing three-color phase-locked tunable frequency pulses. The asymmetric waveform reproducibility is confirmed in the measurements of ATI and THz transients.

HThD5 • 17.45
A simple linear optical measurement of carrier envelope phase shift, Peter Jojart, Borzsonyi Adam, Sebastian Koke, Mihaly Gorbe, Karoly Osvay; Optics and Quantum Electronics, Univ. of Szeged, Szeged, Hungary; CE Optics, Szeged, Hungary; Max-Born-Inst. für Nichtlineare Optik und Ultra kurzzeit spektroskopie, Berlin, Germany; Faculty of Mechanical Engineering and Automation, Kecskeméti College, Kecskemét, Hungary. A robust all-linear method based on spectral interferometry for measuring the carrier-envelope offset phase of ultrashort laser pulses is demonstrated. The performance has been proved with cross-calibration with a conventional f-to-2f interferometer.
FThE7 1.9 micron Tm3+-doped germanate fiber laser source for Si-processing, Vladislav V. Deoqvist1, Irina Sorokina2, Oleg Okhotnikov3, Valery Mashinsky3, L. Ischakov3, Evgeni Dimov3, Vladimir Khopin3, A. N. Garganov4, FORC, Moscow, Russian Federation; 1Dept. of Physics, NTNU, Trondheim, Norway; 2Tampere Univ. of Technology, Tampere, Finland, 4Inst. of Chemistry of High-Purity Substances, Nizhny Novgorod, Russian Federation. We report development of a novel Tm3+-doped fiber laser source at 1.86 μm based on highly nonlinear 55GeO2-45SiO2 dispersion shifted fiber, applicable to 3D-volume microprocessing of Si.

FThE9 Tapered Double Clad Ytterbium Fiber Laser for Material Processing, Jorma Vihinen1, Jyrki Latokartano1, Tero Kumpula1nen1, Valery Filippov2, Juho Kerttula1, Yuri Chumovskii1, Konstantin Galant1, Oleg Okhotnikov3, 1Tampere Univ. of Technology, Tampere, Finland, 3Inst. of Radio and Electronics of the Russian Acad. of Sciences, Moscow, Russian Federation. A novel tapered fiber laser has been evaluated for laser cutting applications of thin materials. High efficiency, small size and good beam quality of the tapered fiber laser makes it an interesting option for cutting applications.

FThE10 Nonlinear dispersion shifted germanate fiber for continuum generation around 2 μm, Vladimir Kalashnikov4, Irina Sorokina2, Vladislav Deoqvist1, Inst. fuer Photonik, TU Wien, Vienna, Austria; 2Dept. of Physics, Norwegian Univ. of Science and Technology, Trondheim, Norway; 3Fiber Optics Res. Ctr., Russian Acad. of Sciences, Moscow, Russian Federation. We report feasibility of continuum generation from <1 cm of nonlinear dispersion-shifted GeO2-doped SiO2-fiber, opening way to development of a compact all-in-one Tm-fiber-laser continuum source for OCT and high-resolution frequency-comb spectroscopy.

FThE11 Frequency conversion of Continuous-Wave fiber lasers with periodically-poled non-linear crystals: RIN and efficiencies, Mathieu Jacquemet1, David Harnois2, Alain Mugnier1, David Purcar1, Quantel, Lannion, France. This paper deals with SHG of CW fiber lasers with periodically-poled crystals. We compare SHG efficiencies obtained with single-frequency and with narrow linewidth longitudinally multimode fiber lasers, as well as intensity noises in the visible.

FThE12 Active Thermography for Reliability Assessment of High Power Fiber Laser FBG Reflectors, Pierre Bernard1, Judical Bessard1, Guillaume Brochu1, Éric Lemaire1, 1Teraxion, Quebec, QC, Canada. Surface temperature alone can be insufficient to predict reliability of FBG components used in fiber lasers. However, more sophisticated active thermography techniques can provide information on the size and temperature of subsurface defects.
FThE13
Energy scalability of 2 μm ultrashort pulsed Tm-laser based on germanate dispersion shifted fiber, Vladimir Kalashnikov¹, Irina Sorokina¹, Vladislav Dozyrin¹;¹ Inst. fuer Photonik, TU Wien, Vienna, Austria;¹ Dept. of Physics, Norwegian Univ. of Science and Technology, Trondheim, Norway;¹ Fiber Optics Res. Ctr., Russian Acad. of Sciences, Moscow, Russian Federation. Theoretical investigation of an all-normal-dispersion mode-locked Tm-laser based on dispersion shifted GeO₂-doped SiO₂-fiber, demonstrates its energy scalability opening a road for material processing applications.

FThE14
Multiwavelength Erbium-Doped Fiber Laser Employing A Dual-Pass Unbalanced In-Line Sagnac Interferometric Comb Filter, Hermann Lin¹;¹ Dept. of Optoelectronics and Communication Engineering, National Kaohsiung Normal Univ., Kaohsiung, Taiwan. A dual-pass unbalanced in-line Sagnac interferometric comb filter with both schemes of nonlinear polarization rotation and intensity dependent loss has been proposed for multiwavelength erbium-doped fiber lasers. The lasing SNR is improved to 60dB.

FThE15
Low Repetition Rate High Energy 1.5 μm Fiber Laser, Peng Wan¹, Jian Liu¹, LiMeei Yang¹, Farzin Amzajerdian²;² PolarOnyx, Inc., San Jose, CA, USA;² NASA LaRC, Hampton, VA, USA. Ultra low repetition rate high energy ns pulsed fiber laser is realized. 100 μJ pulse energy was obtained at all fiber based 1550 nm laser at Hz level.

FThE16
Intracavity absorption spectroscopy with Er-doped fiber lasers, Peter Fjodorov¹, Valeri M. Baev¹, Benjamin Löhden¹, Svetlana Kuznetsova¹, Sergey Cheskis²;² School of Chemistry, Tel-Aviv, Israel. Intracavity absorption spectroscopy with a broadband Er-doped fiber laser is applied to measure the concentration, temperature and chemical reactions of several gases in flames. Maximum sensitivity corresponds to an absorption path length of 2000 km.
HThE • Joule-class High-field Facilities

18.30–20.00
Todd Ditmire; Univ. of Texas at Austin, USA, Presider

HThE1 • 6:30 p.m. Invited
Towards Joule-scale few-cycle pulses - progress and challenges of short-pulse pumped OPCPA, Zsuzsanna Major1,2, Christoph Skrobol1, Izhak Ahmad1, Christoph Wandt1, Sandro Klingebiel1, Sergei A. Trushin1, Ferenc Krausz1,2, Stefan Karsch1,2; 1Max-Planck-Inst. für Quantenoptik, Garching, Germany; 2Dept. für Physik, Ludwig-Maximilians-Univ. München, Garching, Germany. The Petawatt Field Synthesizer is based on short-pulse-pumped optical parametric amplification for generating few-cycle, Joule-scale pulses. Stabilizing the pump-seed timing to ~100fs allowed for the first OPA experiments, which are reported here.

HThE2 • 7:00 p.m.
The 10PW OPCPA Vulcan Laser Upgrade, Andrey Lyachev1, Oleg Chekhlov1, John Collier1, Rob Clarke1, Marco Galimberti1, Cristina Hernandez-Gomez1, Pavel Matousek1, Ian Musgraves1, David Neely1, Peter Norreys1, Ian Ross1, Yunxin Tang1, Trevor Winstone1, Brian Wyborn1; 1Central Laser Facility, Science and Technology Facilities Council, Didcot, UK. We present progress made in developing the 10PW OPCPA capability for the Vulcan laser to produce pulses with focused intensities > 10^13Wcm^-2.

HThE3 • 7:15 p.m.
Performance Modelling of a 1 kJ DPSSL System, Klaus Ertel1, Saumyabrata Banerjee1, Cristina Hernandez-Gomez1, Paul D. Mason1, Jonathan Phillips1, John Collier1; 1Central Laser Facility, STFC Rutherford Appleton Lab, Didcot, UK. We present modelling results for a 1 kJ diode-pumped laser system, based on cryogenic gas-cooled multi-slab Yb:YAG amplifiers.

HThE4 • 7:30 p.m.
Cryogenic disk laser with high peak and average power, Ivan B. Mikhin1, Evgeny Perevezentsev1, Anton Vyatkin1, Olga Vadimova1, Oleg Palashov1, Efim Khazanov1; 1Dept. of nonlinear and laser optics, Inst. of Applied Physics Russian Acad. of Science, Nizhnij Novgorod, Russian Federation. Spectral and thermooptical properties, the stored energy and amplification in Yb:YAG disks are investigated at 77-300K temperature range. The current status of laser system development with 0.5J output energy at 1kHz repetition rate is presented.

HThE5 • 7:45 p.m.
Design and preliminary results for a sub-5-fs, 100 mJ-level, CEP-stabilized laser facility – PhaSTHEUS, Andreas Vaupel1, Nathan Bodnar1, Benjamin Webb1, Michael Hemmer1, Martin Richardson1; 1CREOL, The College for Optics and Photonics, Univ. of Central Florida, Orlando, FL, USA. We report on the preliminary results and design of a new laser facility at the Townes Laser Inst. - PhaSTHEUS. This facility is a 5 fs, 100 mJ, CEP-stabilized laser source for highly nonlinear optical experiments.

Anadolu, P Floor

AITHF • AIOM Postdeadline Session

18.30–20.00
Information available on-site.
### AIFA • Nonlinear Crystals and Processes III

<table>
<thead>
<tr>
<th>Time</th>
<th>Title</th>
<th>Speaker(s)</th>
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<tbody>
<tr>
<td>8.00–9.45</td>
<td>8.00</td>
<td>Benoit Boulanger; Univ. de Grenoble, France, Presider</td>
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<tr>
<td></td>
<td>Invited</td>
<td>CdsI₂P and OPGaAs: New Nonlinear Crystals for the Mid-Infrared,</td>
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<td>Peter Schunemann; BAE Systems, Inc., Nashua, NH, USA. Two new materials</td>
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<td>have emerged with high nonlinear coefficients and thermal</td>
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<td>conductivities which extend the operating range of ZGP: CdsI₂P allows</td>
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<td>for shorter wavelength 1064nm pumping and OPGaAs enables 8-12 micron</td>
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<td>generation.</td>
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<td>8.30</td>
<td>Phase-matching properties and refined Sellmeier equations of the</td>
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<td>new nonlinear infrared crystal CdsI₂P, Pierre Brand, Benoit Boulanger</td>
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<td>Patricia Segonds, Vincent Kemlin, Peter G. Schunemann, Kevin T. Zawilski,</td>
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<td>Thomas M. Pollak, Bertrand Ménager, Jérôme Debray, Institut Néel CNRS/UIJ,</td>
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<td>France; 3BAE Systems, USA We directly measured the second harmonic</td>
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<td>generation and difference frequency generation phase-matching</td>
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<td>directions of the nonlinear crystals CdsI₂P: until 9.5 μm using the</td>
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<td>sphere method, from which we refined the Sellmeier equations of the</td>
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<td>crystal.</td>
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<td>8.45</td>
<td>Invited</td>
<td>Optical, Thermal, Electrical, Damage, and Phase-Matching Properties of</td>
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<td>Lithium Selenoindate, Jean-Jacques Zondy, Valentin Petrov, Ludmila</td>
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<td>Isenko, Olivier Bidauld; Joint Lab of Metrology LNE-CNAM, La Plaine</td>
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<td>Saint Denis, France; 3Max-Born-Inst. for Nonlinear Optics and Ultrafast</td>
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<td>Spectroscopy, Berlin, Germany; 4Inst. of Geology and Mineralogy, SB RAS,</td>
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<td>Noroshihirsk, Russian Federation; 5L.C.B., CNRS - Univ. de Bourgogne,</td>
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<td>Dijon, France. LiInSe₂, a biaxial nonlinear crystal transparent from 0.54</td>
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<td>to 10 μm, is successfully grown in large sizes with good optical quality.</td>
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<td>We summarize all characteristics and physical properties of LiInSe₂</td>
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<td>essential for nonlinear frequency conversion.</td>
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### HFA • Molecules in a Strong Field

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<tr>
<th>Time</th>
<th>Title</th>
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<tr>
<td>8.00–10.00</td>
<td>8.00</td>
<td>Takao Fujii; IMS Okazaki, Japan, Presider</td>
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<td></td>
<td>Invited</td>
<td>Watching Ultrafast Motion: High Harmonic Spectroscopy of Electron</td>
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<td>Dynamics in Molecules, Olga Smirnova; Max-Born-Inst., Germany.</td>
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<td>Abstract not available.</td>
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<td>8.30</td>
<td></td>
<td>High-order Harmonics in Fragile Molecules, Caterina Vozzi, Matteo Negro,</td>
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<td>Sandro De Silvestri, Salvatore Stagira, Ricardo Torres, Leonardo Brugnera,</td>
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<td>Thomas Siegel, Jon Marangoz, Carlo Altucci, Raffaele Velotta, Fabio</td>
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<td>Frassetto, Paolo Villoro, Luca Poletto, Dipartimento di Fisica,</td>
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<td>Politecnico di Milano, Milano, Italy; 3Blackett Lab, Imperial College</td>
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<td>London, London, UK; 4Università di Napoli Federico II, Napoli, Italy; 5Università</td>
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<td>di Padova &amp; IFN-CNR, Padova, Italy. Exploiting an ultrafast IR source, we</td>
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<td>produced extended harmonic spectra in several molecules with low</td>
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<td>ionization potentials. These results pave the way to the extension of</td>
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<td>high harmonic spectroscopy to complex species like biomolecules.</td>
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<td>8.45</td>
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<td>Near-Threshold High-Order Harmonic Spectroscopy with Aligned Molecules,</td>
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<td>Hadas Soifer, Barry D. Bruener, Pierre Botheron, Dror Shafiri, Adi</td>
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<td>Diner, Oren Raz, Yann Mairesse, Bernard Pons, Nirit Dudovich; Dept. of</td>
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<td>Physics of Complex Systems, Weizmann Inst. of Science, Rehovot, Israel;</td>
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<td>CELIA, Univ. de Bordeaux I-CNRS-CEA, Talence, France. We study HHG close</td>
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<td>to the ionization threshold and identify two distinct contributions to</td>
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<td>the emitted harmonic signals. The observed near-threshold emission is</td>
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<td>shown to occur outside the realm of the standard strong field</td>
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<td>approximation.</td>
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<td>9.00</td>
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<td>Concerted High-Energy Proton Emission in Laser-Induced Fragmentations of</td>
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<td>Polytatomic Molecules, Stefan Roither, Xinhua Xie, Daniił Kartashev, Li</td>
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<td>Zhang, Hua Liang Xu, Atsushi Iwasa, Markus Schöffler, Reinhard Dörner,</td>
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<td>Kaoru Yamanouchi, Andrius Baltuskas, Markus Kitzler; 1Photonics Inst.,</td>
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<td>Vienna Univ. of Technology, Vienna, Austria; 2Dept. of Chemistry, School</td>
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<td>of Science, The Univ. of Tokyo, Tokyo, Japan; 3Inst. für Kernphysik, J.W.</td>
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<td>Goethe Univ., Frankfurt/Main, Frankfurt/Main, Germany. Using multi-party</td>
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<td>coincidence detection we are able to show that carbon-hydrogen molecules</td>
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<td>exposed to moderate laser-intensities can completely disintegrate from</td>
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<td>high charge states by a concerted emission of all protons with high</td>
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<td>kinetic energies.</td>
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### AIFA4 • 9.15
Non-resonant pump-induced refractive index changes and non-degenerate two-wave mixing in Nd\(^{3+}\) and Yb\(^{3+}\) doped laser materials, Rémi Souillard\(^1\), Andrey Zinoviev\(^1\), Arnaud Brignon\(^1\), Jean-Louis Doualan\(^1\), Oleg Antipov\(^1\), Jean-Pierre Huignard\(^2\), Richard Moncorge\(^3\); CIMAP, Univ. de Caen, Caen, France; \(^2\)TRT, Thales Res. & Technology, Palaiseau, France; \(^3\)Inst. of Applied Physics, RAS, Nizhny-Novgorod, Russian Federation. Modeling and experiments of two-wave mixing and energy-transfer based on accurate measurements of pump-induced refractive index variations were performed. Results indicate that energy transfer exceeding 50% is possible under high pumping conditions.

### AIFA5 • 9.30
Optically-pump induced athermal and non-resonant refractive index changes in Cr-doped materials: still an opened question, Thomas Godin\(^1\), Richard Moncorge\(^3\), Jean-Louis Doualan\(^1\), Michael Fromager\(^4\), Kamel Ait-Amare\(^1\), Tomaz Catunda\(^1\); Univ. de Caen, CIMAP, Caen, France; \(^3\)USP Sao-Carlos, Inst. do Fisica Sao-Carlos, Sao-Carlos, Brazil. More reliable ESA and Z-scan measurements have been performed in Cr:GSGG and ruby. The results indicate that the real origin of the purely dispersive refractive index changes observed in these materials needs to be reconsidered.

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### Dolmabahce Foyer, R Floor

10.00–10.30
Coffee Break

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### AIFB • Waveguides and Laser Patterning

10.30–12.30
Jean-Luc Adam; Univ. de Rennes 1, France, Presider

#### AIFB1 • 10.30 • Invited
Femtosecond Laser Writing of Waveguides in Glass, Luke B. Fletcher\(^4\), Jonathan J. Witcher\(^1\), Neil Troy\(^1\), Richard K. Brown\(^1\), Denise Krolof\(^4\); Univ. of California, Davis, Davis, CA, USA; \(^4\)Missouri Univ. of Science & Technology, Rolla, MO, USA. Femtosecond laser writing was used to fabricate waveguides in undoped and rare-earth doped polyphosphate glasses. The influence of glass composition and laser parameters on waveguide properties and structural changes in the glass will be discussed.

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### HFB5 • 9.15 • Invited
Molecular-Alignment-Based Frequency-Resolved Optical Gating, Heping Zeng; East China Normal Univ., Shanghai, China. Abstract not available.

### HFA6 • 9.45
Signatures of Continuum-Continuum transitions in High Harmonic Generation, Markus C. Kohler\(^2\), Christian Ott\(^1\), Philipp Rath\(^1\), Robert Heck\(^1\), Iris Schlegel\(^1\), Christoph H. Keitel\(^1\), Thomas Pfeifer\(^1\); \(^1\)MPI für Kernphysik, Heidelberg, Germany. High harmonic generation is investigated theoretically in the over-the-barrier ionization regime revealing that emission can be dominated by the interference between two distinct free wave packets of a single electron after ground-state depletion.

### HFB1 • 10.30 • Invited
Intense terahertz fields: electric and magnetic nonlinearities on the sub-cycle scale, Friederike Jungeinger\(^1\), Alexander Sell\(^1\), Olaf Schubert\(^1\), Bernhard Mager\(^1\), Daniela Brida\(^2\), Marco Marangoni\(^2\), Giulio Cerullo\(^3\), Tobias Kampfrath\(^4\); Martin Wolf\(^4\), Alfred Leitenstorfer\(^4\), Rupert Huber\(^4\); \(^1\)Dept. of Physics and Ctr. for Applied Photonics, Univ. of Konstanz, Konstanz, Germany; \(^2\)IFN-CNR, Dipartimento di Fisica, Politecnico di Milano, Milano, Italy; \(^3\)Dept. of Physics, Freie Univ. Berlin, Berlin, Germany; \(^4\)Dept. of Physics, Univ. of Regensburg, Regensburg, Germany. High-intensity single- and few-cycle transients covering the mid and far infrared are generated and electro-optically monitored by a passively CEP-locked laser. These pulses drive strong nonlinearities via electric and magnetic field coupling.
AIFB2 • 11.00
Asymmetric orientational femtosecond laser writing detected in several properties in various glasses, Bertrand Pommé1, Matthieu Lancer2, ICMMO, CNRS-Université Paris Sud, Orsay, France. Asymmetric orientational writing is demonstrated clearly in various silica-based glasses. It occurs for a domain of laser parameters and is likely connected to a memory effect coupled to an asymmetry of the beam. 

AIFB3 • 11.15
Laser Patterning of Oxyfluoride Glasses Containing Silver Nanoparticles, Chao Liu1, Jong Heo2; ‘Dept. of Materials Science and Engineering, Pohang Univ. of Science and Technology, Pohang, Republic of Korea. Irradiation of glasses containing silver nanoparticles with a continuous-wave laser was used to design the patterned glasses for advanced optical devices. Laser induced heating leads to the size reduction of Ag NPs in the glass.

AIFB4 • 11.30
Highly Efficient Waveguide Lasers in a Femtosecond Laser Inscribed Nd:YVO₃ Channel Waveguide, Yang Tao1, Jing Guan1, Feng Chen1, Javier R. Vaquez de Aldana2, G. A. Torchia3, Antonio Benayas1, Daniel Jaque4; ‘School of Physics, Shandong Univ., Jinan, China; ‘Facultad de Ciencias, Universidad de Salamanca, Salamanca, Spain; ‘Centro de Investigaciones Ópticas, CIC-Conicet, La Plata, Argentina; ‘Departamento de Fisica de Materiales, Universidad Autonoma de Madrid, Madrid, Spain.
Continuous-wave waveguide laser at 1064 nm was generated from a femtosecond laser inscribed Nd:YVO₃ channel waveguide. Single-mode laser oscillations have been observed with a low threshold power 34 mW and a high slope efficiency 65%.

AIFB5 • 11.45
Ultrafast Laser Ininscription of Waveguide Structures in Cr²⁺:ZnSe, Patrick Berry1, John MacDonald2, Ajay Kar2, Kenneth Schepler3; ‘Air Force Res. Lab, Wright-Patterson AFB, OH, USA; ‘Heriot-Watt Univ., Edinburgh, UK.
Waveguide structures were fabricated in chromium-doped zinc selenide (Cr²⁺:ZnSe) using ultrafast laser inscription. To achieve optimal results, the multi-scan fabrication technique was used.

AIFB6 • 12.00
Low Loss Silicon Waveguides Fabricated Using a Hydrogen Silsesquioxane Oxidation Mask, Maziar P. Nezhad1, Olesya Bondarenko1, Aleksandar Stivic1, Mercede Khajavikhan1, Yeshaiahu Fainman1; ‘UC San Diego, La Jolla, CA, USA. Low-loss silicon waveguides are fabricated without plasma etching via oxidation of e-beam patterned HSQ masks. Oxidation converts HSQ to a glassy compound and defines the waveguides. Losses of 0.8dB/cm and Q-factors of 450,000 were measured.

HFB2 • 11.00
Visualization of Nuclear and Electron Motion by Ultrafast Electron Diffraction, Peter Baum1; ‘LMU München, Garching, Germany. Ultrashort packets of single electrons allow to reach femtosecond and attosecond resolutions, when observing atomic and electronic motion within matter in four dimensions.

HFB3 • 11.30
A High-Harmonic Source for Time-Resolved ARPES, Georgi Dakovski1,2; ‘CINT, LANL, Los Alamos, NM, USA; ‘CMMS, LANL, Los Alamos, NM, USA. We present an apparatus for visible pump/XUV probe time- and angle-resolved photoemission spectroscopy utilizing high-harmonic generation. Wide-range tunability is achieved by using a time-delay compensated monochromator, preserving the XUV pulses.

HFB4 • 11.45
Towards MW Average Powers in Ultrafast High-Repetition-Rate Enhancement Cavities, Jan M. Kaster1, Joachim Pupeza1,2, Tino Eidam1, Christoph Jocher1, Ernst Fill1, Jens Limpert1, Ronald Holzwarth1,2, Birgitta Bernhardt1,2, Theodor W. Hänisch1,2, Andreas Tümmernann2, Ferenc Krausz1,2; ‘Attosecond and Highfield Physics, Max Planck Inst. for Quantum Optics, Garching, Germany; ‘DEpartement of Physics, Ludwig-Maximilians-Univ., München, Germany; ‘Inst. of Applied Physics, Friedrich-Schiller-Univ., Jena, Germany. We report on high-power, ultrafast enhancement cavity designs with enlarged laser spots on the mirrors. Together with a novel seeding Yb-fiber based CPA, MW-level intra-cavity average powers with sub-ps pulse durations come into reach.

HFB5 • 12.00
Intracavity high harmonic generation with fs frequency combs, Jason Jones1; ‘College of Optical Sciences, Univ. of Arizona, Tucson, AZ, USA. We report on a high power Ti:sapphire based frequency comb generating harmonics down to 53nm, with average power up to 77 microwatts at 72 nm. Fundamental limitations due to intracavity plasma dynamics are modeled numerically.
AIFB7 • 12.15
All-telluride channel waveguides for mid-infrared applications,
Caroline Vigreux¹, Marc Barillot², Elionore Barthélémy³, Lionel Bastard⁴, Jean-Emmanuel Broquin⁵, Volker Kirschner⁶, Stéphane Ménard⁷, Gilles Parent⁸, Claire Poinsoï², Annie Pradel¹, Shaoqian Zhang⁹, Xianghua Zhang⁹; ¹ICGM, Montpellier, France; ²Thales Alenia Space, Cannes La Bocca, France; ³IMEP-LACH, Grenoble, France; ⁴ESA, Noordwijk, Netherlands; ⁵LEMTA, Nancy, France; ⁶LCV, Rennes, France. In this paper, the different steps of the fabrication of single-mode RIB waveguides for both [6-11]μm and [10-20]μm spectral bands are described and the first results in term of light guiding and modal filtering are presented.

HFB6 • 12.15
Single-shot Characterization of sub-15fs Pulses with 40dB Dynamic Range, Nicolas Forget¹, Antoine Moulet¹, Stéphanie Grabielle², Christian Cornaggia³, Olivier Gobert³, Thomas Oksenhendler³; ¹Fastlite, Orsay, France; ²IRAMIS, Service Photons Atomes & Molécules, CEA, Gif-sur-Yvette, France; ³Lab for Attosecond Physics, Max Planck Inst. of Quantum Optics, Garching, Germany. We present an extended version of the self-referenced spectral interferometry technique. Sub-15fs pulses are characterized by SRSI and feedback experiments demonstrate a measurement dynamic range >40dB.
Lasers, Sources and Related Photonic Devices

OSA Optics & Photonics Congress 2011

Update Sheet

**Withdrawals**

| AIThB02 | AIFB3 |
| AIThB03 | AIFB6 |
| AIThB11 | HWC13 |
| AIThB13 | HFB3 |
| AIThB17 |

**Presider Updates**

Kent E. Mattsson, Technical Univ. of Denmark, Denmark, will preside over the session, AIThD, Crystal and Glass Fibers II

**Author Block Update**

The author block for HWA3 should read: Xiaowei Chen, Aurelien Ricci, Arnaud Malvache, Aurelie Jullien, Rodrigo Lopez-Martens; Lab d’Optique Appliquee, Palaiseau Cedex, France.

**Presenter Changes**

HWB5 will be presented by Paraskevas Tzallas, IESL, FORTH, Heraklion, Greece.

AMB10, ATuD4, and FWB3 will be presented by Lawrence Shah, CREOL College of Optics and Photonics, Univ. of Central Florida, USA.

HThE3 will be presented by P. D. Mason, STFC Rutherford Appleton Laby, Central Laser Facility, UK

HThC5 will be presented by Rainer Hoerlein, Ultrafast Innovations, Germany

**Session Changes**

AIThF • Aiom Postdeadline Session ends at 19.15.

<table>
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<th>Special Events</th>
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Please join the HILAS and FILAS chairs for an informal “rump” session to discuss the 2011 inaugural offerings of these two meetings and to brainstorm for how to improve in 2012.

**FILAS Rump Session**

Wednesday, 16 February 2011
13.00–14.00
Marmara

**HILAS Rump Session**

Thursday, 17 February 2011
20.00–21.00
Citronelle

**Welcome Event**

Please join the ASSP Chairs on Sunday at the City Lights Bar within the hotel from 18.00–19.00.

**Student Awards**

The ASSP Student Award sponsored by Lockheed Martin will be presented following session AWB on Wednesday, 16 February.

The FILAS Student Award sponsored by Multiwave Photonics will be presented during the IPG dinner on Thursday, 17 February.

**Additional Support provided by:**

**Postdeadline Paper Programs**

Postdeadline Paper Programs are available at Registration.