Adaptive Optics: Methods, Analysis and Applications (AO)  
Topical Meeting and Tabletop Exhibit

The Fairmont San Jose  
San Jose, California, USA

Postdeadline Submission Deadline: September 21, 2009 12:00 p.m. EDT (16.00 GMT)  
Hotel Reservation Deadline: September 11, 2009  
Pre-Registration Deadline: September 16, 2009

Part of the Fall OSA Optics & Photonics Congress

Featuring Five Topical Meetings Collocated with FiO 2009/LS XXV:

- Frontiers in Optics/Laser Science XXV (FiO 2009/LS XXV)
- Adaptive Optics: Methods, Analysis and Applications (AO)
- Advances in Optical Materials (AIOM)
- Computational Optical Sensing and Imaging (COSI)
- Femtosecond Laser Microfabrication (LM)
- Signal Recovery and Synthesis (SRS)

2009 Meeting Chairs

Julian C. Christou, Gemini Observatory, USA  
Brent L. Ellerbroek, Thirty Meter Telescope Project, USA

View entire program committee

About AO

This meeting investigates the possible synergies between the methods developed by various communities pursuing different applications. The meeting will include a full spectrum of papers from surveys, results of the most recent research, panel discussions, poster sessions, and time for informal discussion and interaction.

Topics to be Considered

- AO concepts and applications  
  - Advanced system concepts for atmospheric turbulence compensation, including multi-conjugate, multi-object, ground-layer, and extreme AO  
  - Innovative applications, including vision science and optical communication
- AO control algorithms  
  - Optimal and adaptive control
  - Computationally efficient algorithms
  - Amplitude and phase control
  - PSF reconstruction and performance estimation
  - Simulation and modeling methods
- Component technologies  
  - Conventional, MEMS, and large deformable mirrors
  - Wavefront sensing optics and detectors
  - Signal processing electronics
  - Lasers and fiber optics for laser guidestar systems
- AO laboratory and field tests
About Adaptive Optics

This meeting investigates the possible synergies between the methods developed by various communities pursuing different applications. The meeting will include a full spectrum of papers from surveys, results of the most recent research, panel discussions, poster sessions, and time for informal discussion and interaction.

The mission of the Topical Meeting on Adaptive Optics: Methods, Analysis and Applications is

- to provide a forum for the presentation and discussion of adaptive optics (AO) system concepts, control algorithms, and analysis/simulation methods;
- to promote an interdisciplinary exchange between the developers and users of AO component technologies;
- to publicize recent progress in AO laboratory and field tests, and to summarize plans for future systems;
- to facilitate AO solutions to challenges in fields including vision science and optical communications, and to promote synergy between classical and innovative applications of adaptive optics.

Who should attend:

- Developers and users of adaptive optical systems for both conventional and innovative applications;
- Adaptive optics theoreticians, analysis, and modelers;
- Developers of adaptive optical components including wavefront sensors, wavefront correctors, laser systems, detectors and control electronics; and
- Students and generalists seeking an exposure to the subject of adaptive optics.

Submission Topics:

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Program Committee

Program Chairs

Julian C. Christou, Gemini Observatory, USA
Brent L. Ellerbroek, Thirty Meter Telescope Project, USA

Committee Members

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Christophe Veninaud, European Organisation for Astronomical Research in the Southern Hemisphere, Germany
Mikhail Vorontsov, Univ. of Maryland at College Park, USA
**Special Events**

**Joint AO/COSI/LM/SRS Welcome Reception and Poster Session**
Tuesday, October 13, 6:00 p.m.–7:30 p.m.
*Regency Ballroom, Fairmont Hotel*

Get the meeting off to a great start by attending the welcome reception and joint poster session. Meet with colleagues from around the world and tour the wide range of poster displays. The reception is open to all AO/COSI/LM/SRS registered attendees and will feature light fare.
Invited Speakers

Joint AO/COSI/SRS Session

JWA1, **Innovative Adaptive Optics and Applications**, Christopher Dainty; Natl. Univ. of Ireland Galway, Ireland

JWA2, **Adaptive Regression Kernels for Image/Video Restoration and Recognition**, Peyman Milanfar; Univ. of California at Santa Cruz, USA

JWA3, **Light Field Photography and Microscopy**, Marc Levoy; Stanford Univ., USA

JWA4, **Adaptive Complex Field Control with an Array of Phase-Locked Fiber Collimators**, Mikhail Vorontsov, Thomas Weyrauch, A. Beresnev, Gary W. Carhart, Ling Liu, Konley Aschenbach; Inst. for Systems Res., Univ. of Maryland at College Park, USA

Joint FiO/AO Sessions: Advances in Adaptive Optics Imaging of the Living Retina

JWB3, **Adaptive Optics Psychophysics**, Heidi Hofer; Univ. of Houston, USA

JWF1, **Adaptive Optics Instrumentation**, Stephen A. Burns¹, Zhangyi Zhong², Weiyao Zou², Cong Deng¹, Daniel Ferguson², Xiaofeng Qi¹; ¹Indiana Univ., USA, ²Physical Sciences Inc., USA

JWF3, **Adaptive Optics-OCT Imaging of the Retina**, Donald T. Miller; Indiana Univ., USA

Invited Speakers

AOWB1, **Control Design and Turbulent Phase Models in Adaptive Optics: A State-Space Interpretation**, Caroline Kulcsár¹, Henri-François Raynaud¹, Jean-Marc Conan², Carlos Correia², Cyril Petit²; ¹Univ. of Paris, France, ²ONERA, France

AOWB2, **Predictive Fourier Wavefront Control: Theory and Observational Results**, Lisa Poyneer¹, Marcos van Dam², Jean-Pierre Véran³; ¹Lawrence Livermore Natl. Lab, USA, ²W. M. Keck Observatory, USA, ³Herzberg Inst. of Astrophysics, Canada

AOTuA1, **A New Sodium Guidestar Adaptive Optics System for the Starfire Optical Range 3.5m Telescope**, Robert Johnson¹, Dennis Montera¹, Timothy Schneeberger², James Spinhirne²; ¹Starfire Optical Range, AFRL/DES, USA, ²Boeing Co., USA

AOTuB1, **Polar Coordinate CCD Array for LGS Wavefront Sensing**, Sean Adkins; Keck Observatory, USA

AOTuD1, **MEMS Wavefront Correctors**, Thomas Bifano¹; ¹Boston Univ., USA, ²Boston Micromachines Corp., USA
TECHNICAL CONFERENCE
October 11 – 15, 2009

EXHIBIT
October 13 – 14, 2009

EXHIBIT HOURS
Tuesday, October 13
10:00 a.m. – 4:00 p.m.

Wednesday, October 14
10:00 a.m. – 4:00 p.m.

EXHIBIT-ONLY TIME
Tuesday, October 13
12:00 p.m. – 1:30 p.m.

Fairmont Hotel
San Jose, California, USA

www.frontiersinoptics.org
### EXHIBIT AND CONFERENCE INFORMATION

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<tr>
<th>Event</th>
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<td><strong>Registration</strong></td>
<td>Fairmont Hotel, Market Street Foyer</td>
<td>7:00 a.m. – 6:00 p.m.</td>
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<td><strong>E-Center</strong></td>
<td>Fairmont Hotel, Market Street Foyer</td>
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<td><strong>Press Room</strong></td>
<td>Fairmont Hotel, Redwood Room</td>
<td>12:00 p.m. – 4:00 p.m.</td>
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<td><strong>1st International OSA Student Chapter Solar Mini-Car Competition</strong></td>
<td>Fairmont Hotel, Imperial Ballroom</td>
<td>4:00 p.m. – 7:00 p.m.</td>
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<td><strong>FiO/LS Welcome Reception</strong></td>
<td>Sainte Claire Hotel, Ballroom</td>
<td>6:00 p.m. – 7:30 p.m.</td>
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<td><strong>Joint FiO/LS Plenary Session/ Award Presentations</strong></td>
<td>Fairmont Hotel, Regency Ballroom</td>
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<td><strong>Export Regulation Fundamentals for the Optics and Photonics Industry (Registration Required)</strong></td>
<td>Sainte Claire Hotel, Sainte Claire Room</td>
<td>9:00 a.m. – 12:00 p.m.</td>
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<td><strong>Exhibit</strong></td>
<td>Fairmont Hotel, Imperial Ballroom</td>
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<td><strong>Exhibit Hall Coffee Breaks</strong></td>
<td>Fairmont Hotel, Imperial Ballroom</td>
<td>10:00 a.m. – 10:30 a.m.</td>
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<td><strong>Exhibit-Only Time</strong></td>
<td>Fairmont Hotel, Imperial Ballroom</td>
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<td><strong>Refreshment Break</strong></td>
<td>Fairmont Hotel, Imperial Ballroom</td>
<td>3:30 p.m. – 4:00 p.m.</td>
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<tr>
<td><strong>OSA Member Reception</strong></td>
<td>Sainte Claire Hotel, Ballroom</td>
<td>7:00 p.m. – 8:30 p.m.</td>
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<tr>
<td><strong>Joint FiO/LS Poster Session</strong></td>
<td>Fairmont Hotel, Imperial Ballroom</td>
<td>12:00 p.m. – 1:30 p.m.</td>
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The Fall OSA Optics & Photonics Congress 2009 is collocated with FiO 2009 / LS XXV and features the following topical meetings:

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- Advances in Optical Materials (AIOM)
- Computational Optical Sensing and Imaging (COSI)
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- Signal Recovery and Synthesis (SRS)

Look for these meetings October 13-15 at the Fairmont San Jose.
E-Center  
*Fairmont Hotel, Market Street Foyer*  
The E-Center, offering free Internet connectivity, will be open Sunday through Thursday during registration hours.

Business Center  
*Fairmont Hotel, B Level*  
The Fairmont Hotel’s in-house Business Center offers one-stop shopping for all of your business needs, including e-mail and high-speed Internet access, secretarial/transcription services, photocopying, and faxing. The business center is open 24 hours a day with a guest room key. Attendees staying at other hotels should contact an operator from a house phone to gain access to the business center. All machines require a credit card swipe to activate a session.

Lost and Found  
*Fairmont Hotel, Registration Desk, Market Street Foyer*  
For lost and found items and/or questions, please check at the registration desk. Please put your name on all conference materials (Conference Program, Technical Digest CD-ROM and Short Course Notes), as they will only be replaced for a fee.

Special Needs  
If you have a disability and require special accommodations in order to fully participate in this conference, please contact Conference Management at the registration desk. Your specific needs will be addressed.

Sponsoring Society Membership Booths  
*Fairmont Hotel, Market Street Side*  
Catch up on the latest product and service offerings of the conference’s sponsoring societies, APS and OSA, by visiting their membership booths.

**SUNDAY**

1st International OSA Student Chapter Solar Mini-Car Competition  
Preliminary race: Sunday, October 11, 4:00 p.m. – 7:00 p.m.  
*Fairmont Hotel, Imperial Ballroom*  
OSA Student Chapters compete to build their own mini solar cars and race them. The chapters will work to optimize light capturing efficiency, and demonstrate sustainability and aesthetic appeal.

**FiO/LS Welcome Reception**  
Sunday, October 11, 6:00 p.m. – 7:30 p.m.  
*Sainte Claire Hotel, Ballroom*  
Free to all Technical Conference Attendees: Get the FiO 2009/LS XXV meeting off to a great start by attending the welcome reception! Meet with colleagues from around the world. Light hors d’oeuvres will be served.  
*A special thanks to Thorlabs for their sponsorship of the 2009 FiO/LS Welcome Reception.*

**TUESDAY**

1st International OSA Student Chapter Solar Mini-Car Competition  
Final races: Tuesday, October 13, 12:00 p.m. – 2:00 p.m.  
*Fairmont Hotel, Imperial Ballroom*  
OSA Student Chapters compete to build their own mini solar cars and race them. The chapters will work to optimize light capturing efficiency, and demonstrate sustainability and aesthetic appeal.

Refreshment Break  
Tuesday, October 13, 3:30 p.m. – 4:00 p.m.  
*Fairmont Hotel, Imperial Ballroom*  
Free to all Attendees: Enjoy a light refreshment on the Exhibit Hall Floor.  
*A special thanks to JK Consulting for sponsoring this event.*

OSA Member Reception  
Tuesday, October 13, 7:00 p.m. – 8:30 p.m.  
*Sainte Claire Hotel, Ballroom*  
Free to all OSA Members: The OSA Member Reception is a great opportunity to see old friends and establish new contacts. Appetizers and beverages will be served. Please note: Membership will be verified at the entrance.
WEDNESDAY

Export Regulation Fundamentals for the Optics and Photonics Industry
Presented by the OSA Corporate Associates
Wednesday, October 14, 9:00 a.m. – 12:00 p.m.
Sainte Claire Hotel, Sainte Claire Room
Instructor: Kay Allan Morrell, Esq.; Managing Partner and Counsel, MK Technology, USA
With the global nature of business, it is a necessity for every company employee involved in non-U.S. transactions to fully understand the regulations surrounding export controls. This program will provide the foundation by covering need-to-know information about International Traffic in Arms Regulations (ITAR), Export Administration Regulations (EAR) and your compliance, data management and licensing responsibilities. Registration required. Employees of OSA Corporate Associates receive a special registration rate.

Joint FiO/LS Poster Session
Wednesday, October 14, 12:00 p.m. – 1:30 p.m.
Imperial Ballroom, Fairmont Hotel
This year, rather than two poster sessions throughout the week, all FiO/LS posters will be presented in one session. Make sure to visit the poster session in the Exhibit Hall to see the 75 FiO and 8 LS posters scheduled for presentation.

EXHIBIT HALL REGULATIONS

• All bags are subject to search.
• Neither photography nor videotaping is permitted without the express written consent of Show Management. Non-compliance may result in the surrendering of film or other storage device(s) and removal from the hall.
• Children under 18 are not permitted in exhibit hall during set-up and tear-down.
• Children 12 and under must be accompanied by an adult at all times.
• Strollers are not permitted on the exhibit floor at any time.
• Soliciting in the aisles or any public space is not permitted.
• Distribution of literature is limited to exhibitors and must done from within the confines of their booths. All other materials will be discarded.
• Smoking is permitted only in designated exterior areas of the facility.
• Alcohol is not permitted in the exhibit hall during set-up and tear-down hours.

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As a designer and manufacturer of adaptive optics for the research and the industry, ALPAO offers you a complete range of adaptive optics products: the next generation of deformable mirrors featuring the largest strokes available, a large bandwidth and a small actuator pitch, extremely sensitive wavefront sensors, and complete adaptive optics loops. Thanks to the unique ALPAO Core Engine control software, the user benefits from a flexible and open architecture.

ALPAO Hi-Speed DM37: ALPAO adds a new model to its unique Hi-Speed deformable mirror Series with a cost-optimized product featuring 37 actuators, large bandwidth and high linearity.

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Booth 208
One Broadway, 14th Floor | Cambridge, MA 02142
Phone: 617.401.2195 | Fax: 617.758.4101
Email: rbraunschweig@amplitude-laser.com | URL: www.amplitude-laser.com
Amplitude Laser is the US based subsidiary for Amplitude Systemes, pioneer in Ytterbium laser technology, manufactures advanced diode-pumped ultrafast lasers for scientific, industrial and medical applications. Products include high energy oscillators (Mikan and t-Pulse series), amplifiers (s-Pulse series) and fiber amplifiers (Satsuma and Tangerine series). Today, by combining high quality manufacturing and aggressive R&D, Amplitude Systemes brings new solutions to your most demanding applications.

Satsuma: Compact fiber laser, delivering ultrashort pulse duration as low as 250 fs, high repetition rate (1 MHz or more) and high energy (up to 10 µJ).
CREOL, The College of Optics and Photonics

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Phone: 407.823.6800 | Fax: 407.823.6880
Email: info@creol.ucf.edu | URL: www.creol.ucf.edu/

CREOL, The College of Optics & Photonics at the University of Central Florida is an internationally recognized academic and research institution, offering MS and PhD degrees in Optics, and serving as a scientific and technical resource partner to industry. The College has 40 faculty, 69 research scientists, and 146 graduate students conducting research into all aspects of optics and photonics. CREOL, FPCE, and the Townes Laser Institute are centers within the College.

Optics Graduate Education: The College of Optics & Photonics offers Masters and Doctoral degrees in Optics. Additionally, optics tracks are offered within UCF’s Physics and Electrical Engineering Bachelor and graduate Programs.

Elsevier

Booth 310
Radarweg 29 | Amsterdam | 1043 NX | Netherlands
Phone: +31 20 485 2037 | Fax: +31 20 485 3280
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Scientific journals and books on Optics, Lasers and Photonics: Elsevier offers journals and books on Optics, Lasers and Photonics: hardcopy and sciencedirect.com. New online author service: CiteAlert. Dedicated alerting services for companies in this field.

FEMTOLASERS, Inc.

Table 11
1 Mifflin Place | 119 Mt. Auburn Street, Suite 400 | Cambridge, MA  02138
Phone: 978.456.9920 | Fax: 978.456.9922
Email: info@femtolasers.com | URL: www.femtolasers.com

FEMTOLASERS is the premier manufacturer of ultrafast laser oscillator and amplifier solutions, offering laser pulses down to sub-7 fs at MHz and multi-kHz repetition rates up to multi-mJ energies. FEMTOOPTICS features a patented optics line with ultra-broadband dispersive/non-dispersive components and custom solutions. Applications include ultrafast spectroscopy, OCT, THz-generation, MP-microscopy, micromachining and Attoscience.

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Fianium Ltd.

Booth 109
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Phone: 541.343.6767 | Fax: 541.343.1838
Email: sales@fianium.com | URL: www.fianium.com

Fianium is a leading manufacturer of optical supercontinuum lasers, operating across 400-2400 nm spectral range and delivering up to 6 W of power in a collimated laser beam. These unique laser sources enable significant improvements in performance of imaging instruments, including confocal and STED microscopes, FLIM and flow-sytometry. Based on compact, maintenance free ultra-fast fiber lasers, the supercontinuum systems offer a versatile laser source for a variety of bio-medical applications.

Gooch & Housego

Table 2
Dowlish Ford | Ilminster | Somerset  TA19 0PF
United Kingdom
Phone: +44 1460 256457 | Fax: +44 1460 256441
Email: sales@goochandhousego.com
URL: www.goochandhousego.com

Gooch & Housego is a global manufacturer of custom precision-optic, acousto-optic, crystal-optic, electro-optic and fibre-optic components, combined with material engineering, crystal growth, polishing and coating capabilities for the Aerospace & Defense, Industrial & Research and Biomedical & Life Sciences Markets.
Imagine Optic

Booth 208
Third Street, Suite 231 | San Francisco, CA 94107
Phone: 617.583.1350 | Fax: 617.758.4101
Email: contact@imagine-optic.com
URL: www.imagine-optic.com

Imagine Optic is the leading provider of Shack-Hartmann wavefront sensing hardware and software, adaptive optics technologies and professional services in applied optics. We work with scientists and industrials in domains including pure science, industrial quality control, space and defense, semiconductors and many others. Since 1996, we’ve been supplying industry leaders around the world with the high-quality products and services that they need to perform. From X-EUV, through the visible light spectrum and on to NIR (near infra-red), we develop, manufacture, distribute and support the largest range of wavefront measurement and correction technologies.

HASO First: The HASO First is a mono wavelength calibration wavefront sensor taking benefits of both the calibration performances of Imagine Optic and the HASO V3 software for a very interesting price.

IOP Publishing

Table 4
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IOP Publishing, a not for profit company wholly owned by the Institute of Physics, is one of the largest and most dynamic publishers of physics information in the world. Our publishing activity, which dates back to 1874, includes a wide range of journals, magazines and community websites. We partner with more than a dozen international organizations and have a global network of offices located in Bristol, Philadelphia, Washington DC, Munich, St Petersburg, Moscow, Beijing and Tokyo.

Journal of Optics: As of 2010, the journal has been re-named (previously Journal of Optics A: Pure and Applied Optics).

LaserFest

Booth 113
c/o The Optical Society
2010 Massachusetts Ave., NW | Washington, DC 20036
Phone: 202.416.1412
Email: info@laserfest.org | URL: www.laserfest.org

Sponsored by Founding Partners, The Optical Society, the American Physical Society and SPIE, LaserFest is a yearlong celebration of the 50th anniversary of the laser. This celebration will recognize and honor the accomplishments of the scientists, engineers, inventors and entrepreneurs who made possible the discovery, development and application of the laser; inform students, educators, legislators, funding agencies and the general public about the impact that the laser has had on the economy and how it has affected and continues to affect their lives in many ways; and use the story of the laser to illustrate the importance of scientific discovery and technological innovation.

MPF Products, Inc.

Table 10
3046 Bramlett Church Road | Gray Court, SC 29645
Phone: 864.876.9853 | Fax: 864.876.2465
Email: sales@mpfpi.com | URL: www.mpfpi.com

MPF Products, Inc. specializes in ceramic-to-metal sealing technology. We offer UHV rated electrical feedthroughs, connectors, isolators and viewports. MPF stocks more than 1300 standard parts, and produces custom assemblies with highly competitive costs and lead times. MPF’s Viewports are used for energy transmission into vacuum systems. MPF offers several material options – sapphire, fused silica, MgF2, CaF2, ZnSe and other advanced materials. Single and multi-layer coatings can be added to viewports to optimize transmission performance.

MPF’s Laser-Optics Viewports: MPF’s Laser-Optics viewports have lens and AR-coating features specific to use with high powered lasers - 193 ArF-Excimer, 248 KrF-Excimer, 780 Diode, and 1064 Yag.

Laser Focus World / Pennwell

Table 8
98 Spit Brook Road | Nashua, NH 03062-5737
Phone: 603.891.0123 | Fax: 603.891.0574
Email: aadler@pennwell.com
URL: www.laserfocusworld.com

Published since 1965, Laser Focus World is a global resource for engineers, researchers, scientists and technical professionals providing comprehensive coverage of optoelectronics and photonics technologies, applications and markets.
Nature Publishing Group

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OPN

Table 17
2010 Massachusetts Ave., NW | Washington, DC 20036
Phone: 202.416.1942
Email: opn@osa.org | URL: www.osa-opn.org

*Optics & Photonics News* (OPN) is a global news and information source that is consistently ranked by OSA members as their #1 member benefit. OPN is published by The Optical Society (OSA), the association that brings together optics and photonics scientists, engineers, educators, technicians and business leaders. OPN’s circulation consists of the members of OSA and The Society for Applied Spectroscopy as well as a select group of qualified professionals.

OP-TEC: National Center for Optics and Photonics Education

Table 6
324B Kelly Drive | Waco, TX 76710
Phone: 254.741.8338 | Fax: 254.399.6581
Email: op-tec@op-tec.org | URL: www.op-tec.org

OP-TEC, the National Center for Optics and Photonics Education, is funded by the National Science Foundation’s Advanced Technological Education (ATE) program. OP-TEC has developed materials and strategies for infusing optics and photonics into curriculum for several industries and is committed to developing a robust supply of well-educated engineering technicians in photonics, lasers and related technologies. OP-TEC has also begun to plan and enlist colleges and employers to begin education/training programs for Precision Optics Technicians.

Optikos Corporation

Table 7
107 Audubon Road, Bldg. 3 | Wakefield, MA 01880
Phone: 617.354.7557 | Fax: 617.354.5946
Email: sales@optikos.com | URL: www.optikos.com

Optikos Corporation is the world’s largest manufacturer of equipment for the measurement of optical image quality and a leading provider of optical product development services. As the world leader in the field of MTF testing, Optikos offers complete solutions for both component and system level tests on imaging systems operating from the ultraviolet to the far infrared. Optikos’s product line includes testing suites for measuring the performance of optical and electro-optical imaging systems.

Optimax Systems, Inc.

Table 5
6367 Dean Parkway | Ontario, NY 14519
Phone: 585.265.1066 | Fax: 585.265.1033
Email: sales@optimaxsi.com | URL: www.optimaxsi.com

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Contact: Lihmei Yang, Director Sales & Product.
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**Email:** svcinfo@svc.org  |  **URL:** www.svc.org  
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**URL:** www.swampoptics.com  
**Email:** linda.trebino@swampoptics.com  
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## Agenda of Sessions — Sunday, October 11

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<td>7:00 a.m.–3:00 p.m.</td>
<td><strong>OSA Student Chapter Leadership Meeting</strong>, Plaza Ballroom, Crowne Plaza Hotel</td>
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<tr>
<td>7:00 a.m.–6:00 p.m.</td>
<td>Registration, Market Street Foyer, Fairmont Hotel</td>
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<tr>
<td>9:00 a.m.–12:30 p.m.</td>
<td><strong>Short Courses</strong>, Locations will be provided at registration</td>
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<td><strong>SC235:</strong> Nanophotonics: Materials, Fabrication and Characterization, Joseph W. Haus, Andrew Sarangan, Qiwen Zhan; Univ. of Dayton, USA</td>
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<td><strong>SC324:</strong> Plasmonics, Stefan Maier; Experimental Solid State Group, Dept. of Physics, Imperial College London, UK</td>
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<td><strong>SC326:</strong> Patent Fundamentals, Mohammed N. Islam; Optics and Photonics and Solid State Electronics Lab, Dept. of Electrical Engineering and Computer Science, Univ. of Michigan, USA</td>
</tr>
<tr>
<td>12:30 p.m.–1:30 p.m.</td>
<td>Lunch Break (on your own)</td>
</tr>
<tr>
<td>1:30 p.m.–5:00 p.m.</td>
<td><strong>Short Courses</strong>, Locations will be provided at registration</td>
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<td><strong>SC274:</strong> Polarization Engineering, Russell Chipman; Univ. of Arizona, USA</td>
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<td><strong>SC322:</strong> Silicon Nanophotonics, Jelena Vučković; Edward L. Ginzton Lab, Stanford Univ., USA</td>
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<td></td>
<td><strong>SC340:</strong> Tissue Optics and Optical Coherence Tomography, Kirill Larin¹, Valery V. Tuchin²; ¹Univ. of Houston, USA, ²Saratov State Univ., Russian Federation</td>
</tr>
<tr>
<td>4:00 p.m.–6:00 p.m.</td>
<td>What's Hot in Optics Today? Regency Ballroom, Fairmont Hotel</td>
</tr>
<tr>
<td>4:00 p.m.–7:00 p.m.</td>
<td>1&lt;sup&gt;st&lt;/sup&gt; International OSA Student Chapter Solar Mini-Car Preliminary Races, Imperial Ballroom, Fairmont Hotel</td>
</tr>
<tr>
<td>6:00 p.m.–7:30 p.m.</td>
<td><strong>FiO/LS Welcome Reception</strong>, Ballroom, Sainte Claire Hotel</td>
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### Key to Shading
- Frontiers in Optics
- Laser Science
- Joint
- Fall OSA Optics & Photonics Congress
## Agenda of Sessions — Monday, October 12

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<thead>
<tr>
<th>Time</th>
<th>Empire</th>
<th>Crystal</th>
<th>Gold</th>
<th>Valley</th>
<th>California</th>
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<tbody>
<tr>
<td>7:00 a.m.–6:00 p.m.</td>
<td>Registration, Market Street Foyer, Fairmont Hotel</td>
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<tr>
<td>8:00 a.m.–12:00 p.m.</td>
<td>2009 Joint FiO/LS Awards Ceremony and Plenary Session, Regency Ballroom, Fairmont Hotel</td>
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<tr>
<td>10:00 a.m.–10:30 a.m.</td>
<td>Coffee Break, Regency and Imperial Ballroom Foyer, Fairmont Hotel</td>
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<td>12:00 p.m.–1:30 p.m.</td>
<td>Lunch Break (on your own)</td>
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<tr>
<td>12:00 p.m.–2:00 p.m.</td>
<td>LSMA: Laser Science Symposium on Undergraduate Research Posters, Cupertino Room, Fairmont Hotel</td>
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<tr>
<td>1:30 p.m.–3:30 p.m.</td>
<td>JMA: Entanglement Generation and Measurement I (Joint FiO/LS)</td>
<td>FMA: Metamaterials I</td>
<td>FMB: Optics for Renewable Energy</td>
<td>FMC: Anderson Localization I</td>
<td>FMD: RF Photonics</td>
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<td>3:30 p.m.–4:00 p.m.</td>
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<tr>
<td>4:00 p.m.–6:00 p.m.</td>
<td>FMG: Quantum Optics in Waveguides I</td>
<td>FMH: Metamaterials II (ends at 5:45 p.m.)</td>
<td>JMB: Gravitational Wave Interferometers I (Joint FiO/LS)</td>
<td>FMI: High Peak Power Laser Technology I (ends at 5:45 p.m.)</td>
<td>FMJ: Integrated Optical Sensors</td>
</tr>
<tr>
<td>6:30 p.m.–8:30 p.m.</td>
<td>OSA Student Member Reception, O'Flaherty's Irish Pub, 25 N. Pedro Street, San Jose, California 95110, Phone: 408.947.8007</td>
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### Key to Shading
- Frontiers in Optics
- Laser Science
- Joint
- Fall OSA Optics & Photonics Congress
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<tr>
<th>Glen Ellen</th>
<th>Atherton</th>
<th>Sacramento</th>
<th>Piedmont</th>
<th>Hillsborough</th>
<th>Fairfield</th>
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<tr>
<td>FME: Tissue Imaging and Spectroscopy</td>
<td>FMF: Spatial Nonlinearities: Solitons and Beams</td>
<td>LSMB: Advances in Chiroptical Spectroscopy I</td>
<td>LSMC: Micro- and Nanofluidics I (ends at 3:15 p.m.)</td>
<td>LSMD: Ultrafast X-Ray Science I</td>
<td>LSME: Laser Science Symposium on Undergraduate Research I (2:00 p.m.–4:00 p.m.)</td>
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<tr>
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<tr>
<td>FMM: Microscopy and OCT I</td>
<td>FML: Silicon Photonics I</td>
<td>LSMF: Advances in Chiroptical Spectroscopy II (ends at 5:30 p.m.)</td>
<td>LSMG: Micro- and Nanofluidics II (ends at 6:15 p.m.)</td>
<td>LSMH: Ultrafast X-Ray Science II (ends at 5:45 p.m.)</td>
<td>LSMI: Laser Science Symposium on Undergraduate Research II (4:30 p.m.–6:30 p.m.)</td>
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<tr>
<td>OSA Student Member Reception, O’Flaherty’s Irish Pub, 25 N. Pedro Street, San Jose, California 95110, Phone: 408.947.8007</td>
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## Agenda of Sessions — Tuesday, October 13

<table>
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<th>Time</th>
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<th>Valley</th>
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<th>Glen Ellen</th>
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<tr>
<td>7:00 a.m.–5:30 p.m.</td>
<td>FTuA: 3-D Entertainment in the Marketplace (ends at 9:30 a.m.)</td>
<td>FTuB: Plasmonic Emitters and Resonators</td>
<td>JTuA: Gravitational Wave Interferometers II (Joint FiO/LS) (ends at 10:15 a.m.)</td>
<td>FTuC: Optical Communication (ends at 10:15 a.m.)</td>
<td>FtuD: Novel Fiber Devices I</td>
<td>JTuB: Entanglement Generation and Measurement II (Joint FiO/LS)</td>
</tr>
<tr>
<td>8:00 a.m.–9:30 a.m.</td>
<td>OSA Young Professionals Networking Event with Corporate Members, Courtyard Atrium, Sainte Claire Hotel</td>
<td>Student Programming: Painless Publishing, Science Policy and OSA Traveling Lecturer, Regency Ballroom II, Fairmont Hotel</td>
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<tr>
<td>9:00 a.m.–12:00 p.m.</td>
<td>1st International OSA Student Chapter Solar Mini-Car Final Races, Imperial Ballroom, Fairmont Hotel</td>
<td>OSA Fellow Member Lunch, Silicon Valley Capital Club, 50 W. San Fernando, Suite 1700, San Jose, California 95113, Phone: 408.971.9300</td>
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<tr>
<td>12:00 p.m.–1:30 p.m.</td>
<td>Lunch Break (on your own)</td>
<td>Coffee Break, Imperial Ballroom, Fairmont Hotel</td>
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<tr>
<td>12:00 p.m.–3:30 p.m.</td>
<td>FTuM: Emerging 3-D Display Technologies and Research Frontiers I (ends at 3:00 p.m.)</td>
<td>FTuN: Negative Index Materials and Cloaking</td>
<td>FTuO: Diffractive and Holographic Optics II</td>
<td>FTuP: Optical Access</td>
<td>FtuQ: Light in the Eye</td>
<td>FtuR: Rogue Waves and Related Phenomena</td>
</tr>
<tr>
<td>1:30 p.m.–4:00 p.m.</td>
<td>Coffee Break/Exhibits, Imperial Ballroom, Fairmont Hotel</td>
<td>Meet the Editors of the APS Journals, Bamboo Lounge, Fairmont Hotel</td>
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<tr>
<td>3:30 p.m.–5:30 p.m.</td>
<td>Minorities and Women in OSA (MWOSA) Tea, Sainte Claire Room, Sainte Claire Hotel</td>
<td>OSA Annual Business Meeting, Piedmont Room, Fairmont Hotel</td>
<td>DLS Annual Business Meeting, California Room, Fairmont Hotel</td>
<td>JTuC: Joint AO/COSI/LM/SRS Welcome Reception and Poster Session, Regency Ballroom, Fairmont Hotel</td>
<td>OSA Member Reception, Ballroom, Sainte Claire Hotel</td>
<td>Laser Science Banquet, Gordon Biersch, 33 East San Fernando Street, San Jose, California, Phone: 408.294.6785</td>
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<tr>
<td>Key to Shading</td>
<td>Frontiers in Optics</td>
<td>Laser Science</td>
<td>Joint</td>
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<td>Fall OSA Optics &amp; Photonics Congress</td>
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<td>8:00 a.m.</td>
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<td>Student Programming: Painless Publishing, Science Policy and OSA Traveling Lecturer, Courtyard Atrium, Sainte Claire Hotel</td>
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<tr>
<td>10:00 a.m.</td>
<td>Exhibit Hall Open, Imperial Ballroom, Fairmont Hotel</td>
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<td>10:00 a.m.</td>
<td>Exhibit Only Time, Imperial Ballroom, Fairmont Hotel</td>
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<td>12:00 p.m.</td>
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<tr>
<td>12:00 p.m.</td>
<td>OSA Annual Business Meeting, Piedmont Room, Fairmont Hotel</td>
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<td>12:00 p.m.</td>
<td>DLS Annual Business Meeting, California Room, Fairmont Hotel</td>
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<td>12:00 p.m.</td>
<td>JTuC: Joint AO/COSI/LM/SRS Welcome Reception and Poster Session, Regency Ballroom, Fairmont Hotel</td>
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<tr>
<td>12:00 p.m.</td>
<td>OSA Member Reception, Ballroom, Sainte Claire Hotel</td>
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<td>12:00 p.m.</td>
<td>Laser Science Banquet, Gordon Biersch, 33 East San Fernando Street, San Jose, California, Phone: 408.294.6785</td>
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**Agenda of Sessions**

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<th>AO</th>
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<th>SRS</th>
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<tr>
<td>FTuE: Fiber Optics Sensors</td>
<td>LSTuA: General Laser Science</td>
<td>LSTuB: Cavity Optomechanics I</td>
<td>LSTuC: Ultrafast X-Ray Science III</td>
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<tr>
<td>LSTuA: General Laser Science</td>
<td>LSTuB: Cavity Optomechanics I</td>
<td>LSTuC: Ultrafast X-Ray Science III</td>
<td>AOTuA: Adaptive Optics Systems I (ends at 9:50 a.m.)</td>
</tr>
<tr>
<td>LSTuB: Cavity Optomechanics I</td>
<td>LSTuC: Ultrafast X-Ray Science III</td>
<td>AOTuA: Adaptive Optics Systems I (ends at 9:50 a.m.)</td>
<td>CTuA: Computational Imaging and Compressive Sensing</td>
</tr>
<tr>
<td>LSTuB: Cavity Optomechanics I</td>
<td>LSTuC: Ultrafast X-Ray Science III</td>
<td>AOTuA: Adaptive Optics Systems I (ends at 9:50 a.m.)</td>
<td>STuA: Imaging from Limited and Compressed Data</td>
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<tr>
<td>LSTuB: Cavity Optomechanics I</td>
<td>LSTuC: Ultrafast X-Ray Science III</td>
<td>AOTuA: Adaptive Optics Systems I (ends at 9:50 a.m.)</td>
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## Agenda of Sessions — Wednesday, October 14

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<tr>
<td>8:00 a.m.–10:00 a.m.</td>
<td>FWA: Biomedical Applications of Ultrafast Lasers</td>
<td>FWB: Optical Information Processing and Transport in the Age of Nanophotonics and Metamaterials</td>
<td>FWC: Extraordinary Transmission and Structured Surface</td>
<td>FWD: Turbulence and Other Nonlinear Phenomena</td>
<td>FWE: Novel Fiber Devices II (ends at 9:45 a.m.)</td>
<td>FWF: Photonic Bandgap Devices (ends at 9:45 a.m.)</td>
</tr>
<tr>
<td>9:00 a.m.–12:00 p.m.</td>
<td>Export Regulation Fundamentals for the Optics and Photonics Industry, Sainte Claire Room, Sainte Claire Hotel</td>
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<td>10:00 a.m.–10:30 a.m.</td>
<td>Coffee Break, Imperial Ballroom, Fairmont Hotel</td>
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<td>10:00 a.m.–4:00 p.m.</td>
<td>Exhibit Hall Open, Imperial Ballroom, Fairmont Hotel</td>
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<tr>
<td>10:30 a.m.–12:00 p.m.</td>
<td>FWH: Coherence and Fundamental Optics I (ends at 12:15 p.m.)</td>
<td>FWI: Optics in Information Sciences</td>
<td>FWJ: Quantum Optics in Waveguides II (ends at 12:15 p.m.)</td>
<td>FWK: All-Optical Signal Processing III</td>
<td>FWL: Optical Communication Devices</td>
<td>FWM: Optical Trapping and Micromanipulation I (ends at 11:45 a.m.)</td>
</tr>
<tr>
<td>12:00 p.m.–1:30 p.m.</td>
<td>JWC: Joint FiO/LS Poster Session, Imperial Ballroom, Fairmont Hotel</td>
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<td>12:00 p.m.–1:30 p.m.</td>
<td>Lunch Break (on your own)</td>
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<td>1:30 p.m.–3:30 p.m.</td>
<td>JWD: Entanglement Generation and Measurement III (Joint FiO/LS)</td>
<td>FWQ: OSA Topical Meeting Highlights I</td>
<td>FWP: Metamaterials III</td>
<td>FWQ: Phase Space Optics—Optical System Theory for the 21st Century I (ends at 3:15 p.m.)</td>
<td>FWR: Novel Optical Architectures in Emerging Technologies I</td>
<td>FWS: Optical Trapping and Micromanipulation II</td>
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<tr>
<td>3:30 p.m.–4:00 p.m.</td>
<td>Coffee Break/Exhibits, Imperial Ballroom, Fairmont Hotel</td>
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<tr>
<td>4:00 p.m.–5:30 p.m.</td>
<td>FWU: Coherence and Fundamental Optics II</td>
<td>FWV: OSA Topical Meeting Highlights II</td>
<td>JWE: Entanglement Generation and Measurement IV (Joint FiO/LS) (ends at 6:00 p.m.)</td>
<td>FWW: Phase Space Optics—Optical System Theory for the 21st Century II</td>
<td>FWX: Novel Optical Architectures in Emerging Technologies II</td>
<td>FWY: Optical Trapping and Micromanipulation III</td>
</tr>
<tr>
<td>6:30 p.m.–8:00 p.m.</td>
<td>FiO Postdeadline Paper Sessions, See the Postdeadline Papers Book in your registration bag for exact times and locations</td>
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<td>Export Regulation Fundamentals for the Optics and Photonics Industry</td>
<td>Sainte Claire Room, Sainte Claire Hotel</td>
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<td>10:00 a.m.</td>
<td>Exhibit Hall Open</td>
<td>Imperial Ballroom, Fairmont Hotel</td>
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<tr>
<td>10:30 a.m.</td>
<td>Coffee Break</td>
<td>Imperial Ballroom, Fairmont Hotel</td>
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<td>12:00 p.m.</td>
<td>Lunch Break</td>
<td>(on your own)</td>
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<td>1:30 p.m.</td>
<td>JWC: Joint FiO/LS Poster Session</td>
<td>Imperial Ballroom, Fairmont Hotel</td>
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<tr>
<td>2:30 p.m.</td>
<td>Coffee Break/Exhibits</td>
<td>Imperial Ballroom, Fairmont Hotel</td>
</tr>
<tr>
<td>3:00 p.m.</td>
<td>FiO Postdeadline Paper Sessions</td>
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**Agenda of Sessions**

- **AO**
- **AIOM**
- **COSI**
- **SRS**

**Registration**, Market Street Foyer, Fairmont Hotel

**Coffee Break**, Imperial Ballroom, Fairmont Hotel

**Exhibit Hall Open**, Imperial Ballroom, Fairmont Hotel

**Lunch Break**

**Coffee Break/Exhibits**, Imperial Ballroom, Fairmont Hotel

**FiO Postdeadline Paper Sessions**, See the Postdeadline Papers Book in your registration bag for exact times and locations

**AIOM Welcome Reception**, Regency Ballroom I, Fairmont Hotel
## Agenda of Sessions — Thursday, October 15

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<thead>
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<td>FThB: Diffractive and Holographic Optics III</td>
<td>FThC: Micro-Cavity Devices I</td>
<td>FThD: High-Power Fiber Lasers I</td>
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<tr>
<td>8:00 a.m.–10:00 a.m.</td>
<td>LSThA: X-Ray Imaging I</td>
<td>FThA: Nanofocusing Optics I</td>
<td>FThC: Micro-Cavity Devices I</td>
<td>FThD: High-Power Fiber Lasers I</td>
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<td>10:00 a.m.–10:30 a.m.</td>
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<td>Coffee Break, Regency and Imperial Ballroom Foyer, Fairmont Hotel</td>
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<tr>
<td>10:30 a.m.–12:00 p.m.</td>
<td>LSThC: X-Ray Photon Correlation Spectroscopy</td>
<td>FThG: Nanofocusing Optics II</td>
<td>FThH: Aspheric and Freeform Optical Surfaces: Design, Characterization and Alignment I (ends at 11:45 a.m.)</td>
<td>FThI: Novel Nonlinear Optical Phenomena</td>
<td>FThJ: High-Power Fiber Lasers II</td>
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<tr>
<td>12:00 p.m.–1:30 p.m.</td>
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<td>Lunch Break (on your own)</td>
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<tr>
<td>1:30 p.m.–3:30 p.m.</td>
<td>LSThE: X-Ray Imaging II (ends at 2:45 p.m.)</td>
<td>FThM: Nanoscale Methods and Instruments I</td>
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<td>3:30 p.m.–4:00 p.m.</td>
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<td>FThN: Aspheric and Freeform Optical Surfaces: Design, Characterization and Alignment II</td>
<td>FThO: Micro-Cavity Devices II</td>
<td>FThP: Optics in Interventional Medicine</td>
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<tr>
<td>4:00 p.m.–6:00 p.m.</td>
<td>FThS: Optical Nonlinear Properties of Materials (ends at 5:45 p.m.)</td>
<td>FThT: Nanoscale Methods and Instruments II (ends at 5:15 p.m.)</td>
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<td>Coffee Break, Regency and Imperial Ballroom Foyer, Fairmont Hotel</td>
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<td>5:30 p.m.–8:00 p.m.</td>
<td>Science Educators’ Day, McCaw Hall, Frances C. Arrillaga Alumni Center, Stanford Univ., 326 Galvez Street, Stanford, California 94305, Phone: 650.723.2021</td>
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<td>7:30 a.m.</td>
<td>Registration, Market Street Foyer, Fairmont Hotel</td>
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<td>8:00 a.m.</td>
<td>LSThA: X-Ray Imaging I FThA: Nanofocusing Optics I FThB: Diffractive and Holographic Optics III FThC: Micro-Cavity Devices I FThD: High-Power Fiber Lasers I FThE: Integrated Optics LSThB: Single-Molecule Biophysics III</td>
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<td>9:00 a.m.</td>
<td>AOThA: Adaptive Optics Systems II (ends at 9:40 a.m.) AOThA: Adaptive Optics Systems II (ends at 9:30 a.m.)</td>
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<td>12:00 p.m.</td>
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<td>12:00 p.m.</td>
<td>LSThE: X-Ray Imaging II (ends at 2:45 p.m.) FThM: Nanoscale Methods and Instruments I FThN: Aspheric and Freeform Optical Surfaces: Design, Characterization and Alignment II FThO: Micro-Cavity Devices II FThP: Optics in Interventional Medicine FThQ: Molecular Imaging in the Eye LSThF: Single-Molecule Biophysics V (ends at 3:00 p.m.)</td>
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<td>3:30 p.m.</td>
<td>Coffee Break, Regency and Imperial Ballroom Foyer, Fairmont Hotel</td>
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<td>4:00 p.m.</td>
<td>FThR: Computational Imaging and Photography I FThT: Nanoscale Methods and Instruments II (ends at 5:15 p.m.) FThU: Micro-Cavity Devices III FThV: Microscopy and OCT II FThW: Plasmonic Waveguides and Devices (ends at 5:45 p.m.) FThX: Computational Imaging and Photography II (ends at 5:30 p.m.)</td>
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<td>5:30 p.m.</td>
<td>Science Educators’ Day, McCaw Hall, Frances C. Arrillaga Alumni Center, Stanford Univ., 326 Galvez Street, Stanford, California 94305, Phone: 650.723.2021</td>
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<td>5:30 p.m.</td>
<td>AO ThD: Optical Fibers CThD: COSI Panel Discussion (ends at 5:45 p.m.)</td>
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<td>6:00 p.m.</td>
<td>Science Educators’ Day, McCaw Hall, Frances C. Arrillaga Alumni Center, Stanford Univ., 326 Galvez Street, Stanford, California 94305, Phone: 650.723.2021</td>
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Fall OSA Optics & Photonics Congress

AO AOIOM COSI

Registation, Market Street Foyer, Fairmont Hotel
AOTuA1 • 8:30 a.m.
High-Resolution Lidar Observations of Mesospheric Sodium and Implications for Adaptive Optics, Paul Hickson, Thomas Pyroemer; Univ. of British Columbia, Canada. We describe new observations of sodium density variability obtained with a high-resolution lidar system. These show significant mean altitude variations extending to frequencies above 1 Hz with a near-Kolmogorov spectrum.

AOTuA2 • 8:30 a.m.
A New Sodium Guidestar Adaptive Optics System for the Starfire Optical Range 3.5m Telescope, Robert Johnson1, Dennis Montenat2, Timothy Schneberger1, James Spinhrine1; Starfire Optical Range, AFFL/DES, USA, Boeing Co., USA. A new adaptive optics system is being installed on the Starfire 3.5m telescope, using the existing 50W pump to create a sodium guidestar. Transmission to the wavefront sensor is improved from 0.16 to 0.67.

CTuA2 • 8:30 a.m.
On Improved Temporal Resolution for Magnetic Resonance Angiography, Phil Bones, Bing Wu, Bahreher Vajad, Anthony Butler, Richard Watts; Univ. of Canterbury, New Zealand. Use of a support constraint derived from a complete k-space acquisition combined with progressive k-space sampling allows improved and adaptive time resolution to be achieved in parallel magnetic resonance angiography (MRA).

CTuA4 • 8:45 a.m.
Sparce Reconstruction of Complex Signals in Compressed Sensing Terahertz Imaging, Zixin Xu1, Wai Lam Chan2, Daniel M. Mittleman1, Edmund Y. Lam1; 1Dept. of Electrical and Electronic Engineering, Univ. of Hong Kong, Hong Kong, 2Dept. of Electrical and Computer Engineering, Rice Univ., USA. In reconstructing complex signals, many existing methods apply regularization on magnitude only. We show that by adding control on phase, reconstruction quality can be improved. This is demonstrated in a compressed sensing terahertz imaging system.

CTuA5 • 9:15 a.m.
Multi-Frequency Inverse Scattering by Compressed Sensing, Albert Fannjiang; Univ. of California at Davis, USA. Inverse-scattering schemes based on the restricted isotropy property (RIP) in compressed sensing are proposed and analyzed. The methods employ randomly and repeatedly (multiple-shot) the single-input single-output measurements and can recover exactly targets of sufficiently low sparsity.

AOTuA3 • 8:00 a.m.
Interference Measurements of Parallel Femtosecond-Laser-Induced Phenomena, Yoshio Hayasaki, Mitsuhito Isaka, Akihiko Takita; Utsunomiya Univ., Japan. Time-resolve pump-probe interference microscope was performed to investigate laser-induced phenomena in parallel femtosecond laser processing. We observed the dynamics of the phenomena with microplasma and shockwaves.

LMTuA2 • 8:30 a.m.
Controlling Ultrafast Laser-Induced Refractive Index Changes in Optical Glasses via Adaptive Spatio-Temporal Beam Engineering, Razvan Stoian; UO, Deutschland. Spatio-temporal beam engineering can adaptively regulate the energy exposure, enabling a synergetic interaction between light and matter. We discuss the possibility of controlling refractive index changes and explore the potential for parallel photoinscription.

LMTuA3 • 8:45 a.m.
Spatio-temporal beam compression

LMTuA1 • 8:00 a.m.
Intense Field Science in Dielectrics, M. Gertroff1, D. Grogg2, M. Spannert1, P. P. Rijeci1, P. B. Corkum1, D. M. Rayner; Natl. Res. Council Canada, USA, Univ. of Ottawa, Canada. We develop the relationship between intense field ionization in the gas phase and the interaction of femtosecond laser pulses with bulk dielectrics. We establish that sub-cycle dynamics can be observed in solids.

LMTuA4 • 9:15 a.m.
Effect of Pulse Shaping on Micromachining Transparent Dielectrics, Jay D. Shah, Tissa C. Gunaratne, Xin Zhu, Vadim Lozovoy, Jay D. Shah, Tissa C. Gunaratne, Xin Zhu, Vadim Lozovoy; Univ. of Illinois at Urbana-Champaign, USA. Micromachining of transparent dielectric materials by high-repetition-rate laser pulses requires understanding of the physical processes involved. Here we report investigations of the effect of pulse shaping on the ablation yields of silicon dioxide, which can be used to produce structurally sound devices with high spatial and temporal resolutions.

CFuA2 • 8:30 a.m.
Task-Specific Compressive Imaging, Mark Allen Neifeld; Univ. of Arizona, USA. Compressive imaging enables optimal use of collected photons. We discuss the implications on image fidelity and task-specific implementations for motion detection, target recognition, and object tracking using both static and adaptive measurements.

CFuA3 • 8:00 a.m.
Millimeter-Wave Imaging Using k-Space Compression, Christy Fernandez-Culli, David Brady, David A. Wiker, Joseph N. Mait; Duke Univ., USA, US ARL, USA. We apply compression in the spatial frequency domain to generate millimeter wave images. Simulations indicate the efficacy of the approach. We are in the process of testing the system experimentally.

CFuA4 • 9:15 a.m.
An Efficient Method for Multi-Dimensional Compressive Imaging, Hair Rivenson, Adrian Stern; Ben-Gurion Univ. of the Negev, Israel. In previous work we have demonstrated that using a separable imaging operator overcomes practical difficulties of 2-D compressive imaging. Here we extend the separability notion to multidimensional imaging and present the implementation issues it addresses.

CFuA1 • 8:00 a.m.
Computational Photography, Ramesh Raskar; MIT, USA. The goal is to create an entirely new class of imaging platforms that have an understanding of the world that far exceeds human ability and produce meaningful abstractions that are well within human comprehensibility.

STuA1 • 8:00 a.m.
Bayesian Multiresolution Method for Local Tomography, Kati Niinimaki1, Ville P. Kolmonen1, Samuli Siltanen1; 1Univ. of Kuopio, Finland, Dept. of Mathematics, Univ. of Helsinki, Finland. We present a wavelet based multiresolution model for local tomography. Reconstruction model is reduced by discarding fine-scale wavelets outside the region-of-interest (ROI). The approach allows significant model reduction without loss of accuracy in the ROI.

STuA2 • 8:30 a.m.
Laser Interactions with Materials

STuA3 • 8:45 a.m.
On Improved Resolution Lidar Observations of Mesospheric Sodium and Implications for Adaptive Optics, Paul Hickson, Thomas Pyroemer; Univ. of British Columbia, Canada. We describe new observations of sodium density variability obtained with a high-resolution lidar system. These show significant mean altitude variations extending to frequencies above 1 Hz with a near-Kolmogorov spectrum.

STuA4 • 9:00 a.m.
Sparse Reconstruction of Complex Signals in Compressed Sensing Terahertz Imaging, Zixin Xu, Wai Lam Chan, Daniel M. Mittleman, Edmund Y. Lam; 1Dept. of Electrical and Electronic Engineering, Univ. of Hong Kong, Hong Kong, 2Dept. of Electrical and Computer Engineering, Rice Univ., USA. In reconstructing complex signals, many existing methods apply regularization on magnitude only. We show that by adding control on phase, reconstruction quality can be improved. This is demonstrated in a compressed sensing terahertz imaging system.

STuA5 • 9:15 a.m.
Multi-Frequency Inverse Scattering by Compressed Sensing, Albert Fannjiang; Univ. of California at Davis, USA. Inverse-scattering schemes based on the restricted isotropy property (RIP) in compressed sensing are proposed and analyzed. The methods employ randomly and repeatedly (multiple-shot) the single-input single-output measurements and can recover exactly targets of sufficiently low sparsity.
AOTuA • Adaptive Optics Systems I—Continued

LMTuA • Fundamentals of Femtosecond Laser Interactions with Materials—Continued

CTuA • Computational Imaging and Compressive Sensing—Continued

STuA • Imaging from Limited and Compressed Data—Continued

9:30 a.m.–12:00 p.m. Student Programming: Painless Publishing, Science Policy and OSA Traveling Lecturer, Regency Ballroom II, Fairmont Hotel

10:00 a.m.–10:30 a.m. Coffee Break, Imperial Ballroom, Fairmont Hotel

10:00 a.m.–4:00 p.m. Exhibit Hall Open, Imperial Ballroom, Fairmont Hotel

NOTES

For FiO/LS presentations on Tuesday, see pages 56-75.
AOTuB1 • 10:30 a.m.
Polar Coordinate CCD Array for LGS Wavefront Sensing
Sean Adkins; W. M. Keck Observatory, USA. Abstract not available.

AOTuB2 • 11:00 a.m.
Comparison of Self-Referenced Center of Gravity, Quad-Cell and Matched Filter Algorithms for Laser Guide Star Wavefront Sensing
Rodolphe Coman, Olivier Landrieu, Kate Jackson; Univ. of Victoria, Canada. The UVic AO laboratory has built an optical test bed reproducing LGS wavefront sensing with Shack–Hartmann WFSs on ELTs. The test bench has been used to compare self-referenced version of the center-of-gravity, quad-cell and matched-filter algorithms.

LMTuB1 • 10:30 a.m.
Three-Dimensional Structuring of Materials by Femtosecond Laser Pulses
Saoulous Harikitsin, Hiroaki Misawa; Hokkaido Univ., Japan. Current trends in three-dimensional laser fabrication of materials and their structural modifications will be discussed. Strategies for achieving a sub-100 nm resolution via engineering a light delivery and localization are described.

LMTuB2 • 11:00 a.m.
Patterning of Functional Polymers by Femtosecond Lasers
Andrea Camposeo, Marco Poli, Antonio A. R. Neves, Roberto Cingolani; Natl. Nanotechnology Lab, CNR-INFM, Italy. We investigated possible routes for the patterning of conjugated polymers by fs laser pulses. In particular, we analyzed the impact of the exposure to fs laser on the emission properties of the light-emitting conjugated polymers.

LMTuB3 • 11:15 a.m.
Multifunctional Volume Optics Generated by Direct Femtosecond Laser Writing
Timothy D. Gerke, Rafael Piestun; Univ. of Colorado at Boulder, USA. We present a three-dimensional scattering approach to the design of aperiodic volume optical elements and explore new functionalities utilizing the available degrees of freedom. We demonstrate volume diffractive elements that multiplex spatial and spectral information.

CTuB1 • 10:30 a.m.
Frequency Analysis in the Light Field and Time Space Domains
Fredo Durand; MIT, USA. Computational imaging can reduce motion and defocus blur. New analysis in the Fourier domain of the 4-D light field (light rays) and 3-D space-time sheds new insights and leads to new practical solutions.

CTuB2 • 11:00 a.m.
Lightfield Photography and Phase-Space Tomography: A Paradigm for Computational Imaging
Markus E. Tistler, Michael A. Fiddy; Dartmouth College, USA, ’Univ. of North Carolina at Charlotte, USA. The interpretation of lightfield photography as phase-space tomography is used to introduce a formalism for analyzing and optimizing computational imaging systems. We illustrate this concept by discussing lightfield wavefront sensing and computational imaging applications.

CTuB3 • 11:15 a.m.
Resolution in Plenoptic Cameras
Frattin1, Kevin Coyle 1, Karl Haack 1, Marc P. Christensen2, Dinesh Rajan2, Scott Douglas 2; 1Northrop Grumman Info. Systems, USA, 2Southern Methodist Univ., USA. Resolution of traditional and focused plenoptic cameras show the former rotates pixels Π/2 in phase space, while the latter does not. These results are interpreted regarding the cameras’ computational imaging applications.

CTuB4 • 11:30 a.m.
Resolution Enhancement and Classification of Virus Particles in Cellular Tomography
Kang Wang, Peter Doerschuk; Cornell Univ., USA. We report recent work on inverse scattering problems in which manipulation of internal degrees of freedom of a scattering medium leads to improvements in image resolution.

CTuB5 • 11:45 a.m.
Resolution Enhancement and Classification of Virus Particles in Cellular Tomography
Timothy D. Gerke, Rafael Piestun; Univ. of Colorado at Boulder, USA. Derivation and analysis of sampling patterns of traditional and focused plenoptic cameras show the former rotates pixels Π/2 in phase space, while the latter does not. These results are interpreted regarding the cameras’ computational imaging applications.

For FiO presentations on Tuesday, see pages 56-75.
AOTuB • Wavefront Sensing I—Continued

AOTuB4 • 11:40 a.m.
Off-Axis Beacon Sharpening, Erez N. Ribak1,2, Ruth Mackey1; 1Technion-Israel Inst. of Technology, Israel, 2Natl. Univ. of Ireland, Ireland. We design an atmospheric beacon which can be observed at an angle with reduced loss of resolution along its main axis. We employ direct inversion or iterative optimization, either by computer or in the laboratory.

LMTuB • Three-Dimensional Micromachining with Femtosecond Lasers—Continued

LMTuB4 • 11:45 a.m.
The Role of Metaphosphate Glass Composition on Changes to the Glass Network Structure after Modification by Femtosecond Laser Pulses, Luke B. Fletcher1, Jon J. Witcher1, Denise M. Krol1, Richard K. Brown1; 1Univ. of California at Davis, USA, 2Missouri Univ. of Science and Technology, USA. Changes to the glass structure after femtosecond laser modification have been studied in multiple metaphosphate glass systems using white light and laser microscopy. Results indicate initial glass structure is important to the resulting morphological changes.

CTuB • Light Field Representations—Continued

CTuB5 • 11:45 a.m.
Quasi Light Fields: A Model of Coherent Image Formation, Anthony Accardi, Gregory Wornell; MIT, USA. We develop a model of coherent image formation that strikes a balance between the simplicity of the light field and the comprehensive predictive power of Maxwell's equations, by extending the light field to coherent radiation.

LMTuB • Three-Dimensional Micromachining with Femtosecond Lasers—Continued

LMTuB4 • 11:45 a.m.
The Role of Metaphosphate Glass Composition on Changes to the Glass Network Structure after Modification by Femtosecond Laser Pulses, Luke B. Fletcher1, Jon J. Witcher1, Denise M. Krol1, Richard K. Brown1; 1Univ. of California at Davis, USA, 2Missouri Univ. of Science and Technology, USA. Changes to the glass structure after femtosecond laser modification have been studied in multiple metaphosphate glass systems using white light and laser microscopy. Results indicate initial glass structure is important to the resulting morphological changes.

STuB • Inverse Scattering—Continued

STuB5 • 11:45 a.m.
New Computational Methodology for the Recovery of Facial Images Retained in Human Memory, Christopher J. Solomon1,2, Stuart J. Gibson1, Matthew I. S. Maylin1; 1Univ. of Kent, UK, 2Natl. Univ. of Ireland, Ireland. We present a new computational methodology for the construction of facial composites from eyewitness memory for criminal investigation. The conceptual and theoretical basis is described and results from both laboratory and real-world applications are presented.

12:00 p.m.–1:30 p.m. Exhibit Only Time, Imperial Ballroom, Fairmont Hotel

12:00 p.m.–2:00 p.m. 1st International OSA Student Chapter Solar Mini-Car Final Races, Imperial Ballroom, Fairmont Hotel

12:00 p.m.–1:30 p.m. OSA Fellow Member Lunch, Silicon Valley Capital Club, 50 W. San Fernando, Suite 1700, San Jose, California 95113, Phone: 408.971.9300

12:00 p.m.–1:30 p.m. Lunch Break (on your own)

For FiO/LS presentations on Tuesday, see pages 56-75.
Differential Photometry through PDF Deconvolution.

Szymon Gladysz1, Julian Christou2; 1European Southern Observatory, de Sophia-Antipolis, France, 2Observatoire de Meudon, LESIA, France. We present a new class of algorithms for the detection of faint companions to stars. The new approach was tested on astronomical observations and on high-contrast corona graphic data recorded in a laboratory experiment.

AOTuC2 • 1:50 p.m.


Szymon Gladysz1, Patrice Martinez1, Emmanuel Aller-Carpentier1, Julian Christou1,2; European Southern Observatory, Germany, Gemini Observatory, USA. We present a novel approach to differential photometry in high-contrast observations. Our algorithm exploits the difference in statistics between the on-axis and off-axis intensity. We test the method on data from the Lick Observatory’s 3m telescope.


Alberto Cornia1,2, Laurent Mugnier1, Jean-François Sauvage1, Thierry Fuco1, Marcel Carbillot1, David Mouillot1, Gérard Rouset2, Anthony Boccaletti1; ONERA Chatillon, France, ‘Observatoire de Meudon, LESIA, France, ‘LHb Fizeau, Univ. de Sophia Antipolis, France. We propose a method based on maximum likelihood for the direct detection of exoplanets from the ground using spectral-angular differential imaging. We can estimate the position and intensity of potential planets orbiting the observed star.

Demonstration of a fs-Laser Written Highly Efficient Yb:YAG Channel Waveguide Laser.

Jörg Siebenmorgen, Klaus Petermann, Günter Huber; Inst. of Laser-Physics, Univ. of Hamburg, Germany. Using a femtosecond laser tracks were written in Yb:YAG. Due to stress induced birefringence waveguiding was possible in channels surrounding the tracks. Laser oscillation was achieved with an output-power of 719mW at 1223mW of pump power.

Femtosecond Laser Micromachining: An Enabling Tool for Optofluidics.

R. Osellame, R. Martinez Vazquez, M. Ams, D. J. Little, P. Dekker, A. Fuernbach, M. J. Withford; Ctr. for Ultrahigh-bandwidth Devices for Optical Systems (CUDOS), Australia. We report on active photonic devices, both in bulk and fiber glass formats, fabricated using ultrafast laser direct writing. Recent demonstrations include a monolithic 100 mW DFB waveguide laser and a 100W fiber laser.

Femtosecond Laser Systems

Invited.

Recent Developments in Monolithic Fibre and Waveguide, DFB and DFB Lasers Fabricated Using Ultrafast Laser Direct-Write Methods.

G. D. Marshall, N. Iovanovici, M. Ams, D. J. Little, P. Dekker, A. Fuernbach, M. J. Withford; Ctr. for Ultrahigh-bandwidth Devices for Optical Systems (CUDOS), Australia. We present a new class of algorithms for the detection of faint companions to stars. The new approach was tested on astronomical observations and on high-contrast corona graphic data recorded in a laboratory experiment.

Holographic Ghost Imaging.

M. J. Padgett1, B. Jack1, J. Leach1, J. Robens1, S. Franke-Arnold1, M. Ritsch-Marte1, S. M. Barnett2; 1Univ. of Glasgow, UK, 2Innsbruck Medical Univ., Austria. We examine a basic general limit to optical components that scatter, separate, disperse, or delay light, an upper bound that depends on material properties and device volume, independent of design details.
Gladysz, Chris Dainty 1; 1Natl. Univ. of Ireland, Galway, Ireland, the GPI AO simulation tool. PSF based on a statistical analysis of the AO WFS data provided by European Organisation for Astronomical Res. in the Southern Long Exposure PSF Reconstruction for GPI AOTuC4 • 2:30 p.m.
Spread Function Calibration I—Continued

AOTuC • High Contrast Imaging and Point Spread Function Calibration I—Continued

AOTuC4 • 2:30 p.m.
Long Exposure PSF Reconstruction for GPI, Jérôme Maire1, Jean-Pierre Viyé1, Lisa A. Peyote1, 2Univ. of Montreal, Canada, 2Herzberg Inst. of Astrophysics, Canada, ‘Lawrence Livermore Natl. Lab, USA. We investigate the performance and limitations of two different methods to reconstruct the Gemini Planet Imager Long-exposure PSF based on a statistical analysis of the AO WFS data provided by the GPI AO simulation tool.

AOTuC5 • 2:50 p.m.
Enhanced Faint Companion Photometry and Astrometry Using Wavelength Diversity, Daniel Burke1, Nicholas Devaney1, Szymon Gladysz, Chris Dainty1; 1Natl. Univ. of Ireland, Galway, Ireland, ‘European Organisation for Astronomical Res. in the Southern Hemisphere, Germany. We propose a new method to enhance the differential photometry and astrometry of faint companions in adaptive optics images. Our approach combines PSF estimation from multi-wavelength data with a pre-whitening matched filter.

LMTuC • Fabrication of Waveguides with Femtosecond Laser Systems—Continued

LMTuC4 • 2:45 p.m.
Annealing Behavior of Femtosecond Laser-Written Waveguides in Fused Silica, Jonathan Witthor, Luke Fletcher, Willter Reichman, Denise Krol. Univ. of California at Davis, USA. We have studied thermal annealing of fs-laser fabricated waveguides in fused silica using confocal fluorescence and Raman microscopy. The results show that laser-induced NBOHC defects disappear at much lower temperatures than three-membered SiO rings.

LMTuC5 • 3:00 p.m.
Femtosecond Laser Writing of Phase-Shifted Bragg Grating Waveguides in Fused Silica, Luis A. Fernandez1, Jason G. Grenier1, Peter R. Herman1, J. Stewart Atichison2, Paolo V. S. Marques1; 1Univ. of Toronto, Canada, 2INESC Porto, Univ. do Porto, Portugal. Phase-shifted Bragg grating waveguide filters were formed in bulk glass for the first time by femtosecond laser direct writing. A narrow, tunable 0.1-nm transmission window at 1550-nm is demonstrated for tunable r and other phase-shifts.

LMTuC6 • 3:15 p.m.
Curvilinear Low-Loss Waveguides in Borosilicate Glass Fabricated by Femtosecond Chirp-Pulse Oscillator, Mykhaylo Dubon; T. Allopi, S. R. Nairajian, V. E. Mazzantii, J. Bremner; Aston Univ., UK. Results on direct femtosecond inscription of straight low-loss waveguides in borosilicate glass are presented. The refractive index contrast obtained allowed us to fabricate low-loss curvilinear waveguides, which are main building blocks for integrated optics circuits.

CTuC • Constraints on Imaging—Continued

CTuC3 • 3:30 p.m.
An Information Theoretic Analysis of Support Assisted Optical Superresolution in One and Two Dimensions, Sudhakar Prasad, Xuan Luo; Univ. of New Mexico, USA. A Fisher-information-theoretic analysis is presented of the fidelity of optical superresolution of low-resolution image sequences in one and two dimensions based on object support. Both rectangular and circular support geometries are treated.

CTuC8 • 3:45 p.m.
Surpassing the Diffraction Limit of Digital Imaging Systems Using Sinusoidal Illumination Patterns, Prasanna V. Rangaranjan, Vikrant B. Bhakta, Mark F. Christiansen; Dept. of Electrical Engineering, Southern Methodist Univ., USA. This work presents experimental evidence on surpassing the diffraction limit of digital imaging systems using sinusoidal illumination patterns. Unique contributions of the work include aliasing management, and the notion of incoherent band-pass filtering using sinusoidal modulation.

STuC • Atmospheric Imaging—Continued

STuC5 • 2:45 p.m.
Wavelength Diversity in Restoration from Atmospheric Turbulence Effected Surveillance Imagery, Andrew J. Lambert1, Geoffrey Nicholls1; ‘Australian Defence Force Acad., Univ. of New South Wales, Australia, 1Defence Science and Technology Organisation, Australia. We investigate the fusion of imagery taken at long-range and high-magnification in four wavelength bands, and consider the localized tip-tilt variance that shifts regions of the images differently in each wavelength range.

STuC6 • 3:00 p.m.
Specular Imaging with a Partitioned Aperture, Brandloch Calef; Boeing LTS, USA. We describe a generalization of aperture masking interferometry that improves the speckle imaging performance of a telescope in the large $D/r_0$ regime while making use of all collected photons.

STuC7 • 3:15 p.m.
Image Restoration Using Natural Image Statistics, Zhiying Wen, Donald Fraser, Andrew Lambert; Australian Defence Force Acad., Univ. of New South Wales, Australia. This paper proposes to use the natural image statistics to reconstruct a potential image from a blurred image. The compressive sensing theory and l1 minimization technique is employed to iteratively estimate the image gradient.

For FiO/LS presentations on Tuesday, see pages 56-75.
AOTuD1 • 4:00 p.m.
Extreme Adaptive Optics Simulations for the European ELT. Vita Korkickaoki, Christophe Vérinaud; Lab d’Astrophysique de Grenoble, France. EPICS is a project for a high contrast imaging instrument dedicated to direct imaging of exo-planets with the European Extremely Large Telescope. We present end-to-end simulation results for Astronomical Res., Germany.

AOTuD2 • 4:20 p.m.
High Fidelity Sky Coverage Analysis and Long Exposure PSF Modeling for Multi-Conjugate AO. Lianqi Wang, Brent Ellerbroek; Thirty Meter Telescope, Caltech, USA. We report a method for long exposure PSF modeling using the previously reported time domain sky coverage simulation. The enclosed energy and point source sensitivity PSF metrics are used as measures of sky coverage.

LMTuD1 • 4:30 p.m.
Optically-Controlled Growth of Carbon Nanotubes. Y. S. Zhou, W. Xiong, M. Mahjouri-Samani, Y. Gao, M. Mitchell; Univ. of Nebraska, USA. Controllable growth and integration of single-walled carbon nanotubes (SWNTs) were achieved using an optically controlled approach. By applying optical near-field effects in a laser-assisted chemical vapor deposition process, controllable growth of SWNTs was realized.

LMTuD2 • 4:30 p.m.
Three-Dimensional Supersolution Using Single-Molecule Photoswitches and a Double-Helix PSF. W. E. Moerner 1, Michael Thompson 2, Matthew Lew 1, Majid Badieirostami 1, Samuel J. Lord 1, Nicholas R. Conley 1, Hsin-I D. Lee 1, Sri Rama Prasanna Parvani 1, Rafael Piestun 1; Stanford Univ., USA, 2Univ. of Colorado at Boulder, USA. Supersolution detail provided by fluorescence imaging of optically-controllable single-molecule emitters can be extended to three dimensions using a novel double-helix point spread function. The molecules and methods enabling this advance will be reviewed.

CTuD1 • 4:00 p.m.
Signal Reconstruction Techniques for Optical Pulse Characterization, Christophe Dorrer; Lab for Laser Energetics, USA. Optical pulse characterization techniques are reviewed in the framework of phase-space representations. The principle and field reconstruction algorithms for spectrography, tomography, and interferometry are described.

CTuD2 • 4:30 p.m.
Iterative Phase Retrieval from Wigner Distribution Projections. Tatiana Alieva 1, José A. Rodríguez 2; 1Univ. Complutense de Madrid, Spain, 2Imaging and Vision Dept., Inst. de Óptica (CSIC), Spain. The application of the Gerchberg-Saxton algorithm for phase recovery of optical field, which is an eigenfunction of the fractional Fourier transform, is considered. This analysis is useful for determination of the Laguerre-Gaussian mode topological charge.

CTuD3 • 4:45 p.m.
Experimental Reconstruction of Wigner Distribution. Tatiana Alieva, Alejandro Cámara, José A. Rodríguez, María L. Calvo; Univ. Complutense de Madrid, Spain, 2Imaging and Vision Dept., Inst. de Óptica (CSIC), Spain. Flexible optical setups for the phase-space tomography are discussed. The experimental reconstruction of the Wigner distribution of an optical beam separable in the Cartesian coordinates is demonstrated.

For FiO/LS presentations on Tuesday, see pages 56-75.
AOTuD • System Simulation and Modeling I—Continued

AOTuD4 • 5:00 p.m.
Monte-Carlo Simulation of EAGLE, Alastair G. Basden, Richard M. Myers, Timothy Butterley, Durham Univ., UK. The EAGLE instrument for the E-ELT is a multi-IFU spectrograph that uses a MOAO system for wavefront correction. We present Monte-Carlo AO simulation results, comparisons with an analytical code and details of the simulation package.

LMTuD • Surface Processing and Panel Discussion on Femtosecond Laser Micromachining—Continued

LMTuD1 • Surface Processing and Panel Discussion on Femtosecond Laser Micromachining—Continued

5:00 p.m.
Panel Discussion: Challenges and Opportunities in Femtosecond Laser Microfabrication

Attend the closing technical session, which will begin with two invited speakers (see LMTuD1 and LMTuD2 on page 122) and will end with an exciting panel discussion, where leaders in the field share their perspective on the most significant recent advances and the most important challenges and opportunities in femtosecond laser microfabrication.

Panel participants include:
- Alan Araiz; IMRA, USA
- Eric Mazur; Harvard Univ., USA
- Andreas Ostendorf; Ruhr Univ. Bochum, Germany
- Chris Schaffer; Cornell Univ., USA

5:00 p.m.
Wigner Analysis of 3-D Coherence Imaging, Se Baek Oh, George Barbastathis; MIT, USA. We interpret 3-D coherence imaging with Wigner analysis. The mutual intensity and the Wigner distribution function are associated with the Fourier slice theorem, where the 3-D manifold of 4-D space is sufficient for 3-D imaging.

STuD • Time-Frequency and Phase-Space Methods—Continued

STuD5 • 5:15 p.m.
Invited
Illuminating Cameras, Srinivasa Narasimhan; Carnegie Mellon Univ, USA. Light sources and cameras are optical duals: sources emit light rays while the cameras capture them. This talk will argue that light sources can serve as better cameras advancing many computer vision technologies.

CfuTuD • 3-D Imaging and PSF Design—Continued

CfuTuD5 • 5:00 p.m.
The Averaged Wigner Distribution Function and Subsurface Target Detection, Markus E. Testorf1, Nadege Thirion2, Marc Saillard2; 1Dartmouth College, USA, 2Univ. de Toulon et du Var, LSEET, France. The Wigner function is used for detecting subsurface targets underneath a rough surface. The target is detected by averaging the Wigner functions of the scattered field obtained with different wavelength and source configurations.

CTuD4 • System Simulation and Modeling I—Continued

CTuD • 3-D Imaging and PSF Design—Continued

CTuD5 • 5:15 p.m.
Invited
Illuminating Cameras, Srinivasa Narasimhan; Carnegie Mellon Univ, USA. Light sources and cameras are optical duals: sources emit light rays while the cameras capture them. This talk will argue that light sources can serve as better cameras advancing many computer vision technologies.
JOINT AO/COSI/LM

6:00 p.m.—7:30 p.m.
JUST • Joint AO/COSI/LM Poster Session and Welcome Reception

AO Posters

JTuC1
Direct Slope Reconstruction Algorithm for Woolfer-Tweeter Adaptive Optics Systems, Chaosheng Li, Nirupama Sreedhar, Katie Queener, Kevin M. Ivers, Jason Porter; Univ. of Houston, USA. We present a direct slope reconstruction algorithm to control dual-deformable mirror adaptive optics systems. A global response matrix was derived from the response matrices of each deformable mirror. Simulation results validated this control method.

JTuC2
Type II Woolfer-Tweeter Control for NFIRAOS on TMT, Jean-Pierre Veran, Glen Harris, Herberg Inst. of Astrophysics, Canada. This paper presents a type II control architecture that will be used in NFIRAOS on TMT to control tip-tilt and the plate scale modes measured by the on-instrument wave-front sensors.

COSI Posters

JTuC3
Open-Loop Shaping of a 4K MEMS with Four-Domain Pre-Compensation, Lisa A. Payne, Andrew Norton, Darren Dillon; Lawrence Livermore Natl. Lab, USA, UKCO Lick Observatory, Lab for Adaptive Optics, Univ. of California at Santa Cruz, USA. We describe a computationally efficient four-domain algorithm for influence function compensation and an improved voltage-phase calibration technique that together enable precise open-loop shaping of a 4x6x4 MEMS deformable mirror.

JTuC4

JTuC5
Application of Cavity Deformable Mirror in PW Laser Facility with U-Turn Reverser, Feng Jing, Dongxia Hu, Qihua Zhu, Wanjun Dai, Xiaodong Xie, Wei Zhou, Xianmin Zhou, Junjie Zhou, Xiaojun Huang; Kun Zhang, Xiaojun Yang. Wu Dong Res. Ctr. of Laser Fusion, Chinese Acad. of Engineering Physics, China. Deformable mirror is applied as cavity wavefront correction. We describe a new mathematical method to prove its feasibility and compare two different schemes of cavity deformable mirror in XG-PW facility with U-turn reverser.

JTuC6
Adaptive Optics Retinal Imaging System Using a Pyramid Wavefront Sensor, Sabine Chiesa, Christopher Dainty; Applied Optics, School of Physics, Natl. Univ. of Ireland, Galway, Ireland. A pyramid wavefront sensor based adaptive optics system for retinal imaging has been constructed. We demonstrate its dynamic range for sensing and first closed-loop results.

JTuC7
Computational Confocal Scanning Tomography, Keith J. Dillon, Yoshitaka Fujimori; Univ. of California at San Diego, USA. We demonstrate a technique to perform computed tomographic reconstruction of a refractive and an alternative sample using a confocal laser scanning microscope that employs a spatial heterodyne to perform coherent detection of the entire aperture signal.

JTuC8
Six-Dimensional Joystick Based on Detection of Optical Spot, Meng-Chie Tsai, Pin-Hao Hu; ITRI, Industrial Technology Res. Inst., Taiwan. We demonstrated a six-dimensional (6-D) joystick by using a CMOS sensor array to image the cross-spot from a LED. It is simple and cheap to sensor signals of 3-D planar and 3-D rotational motion.

JTuC9
Computer Generated a Three-Dimensional Holograph from Two-Dimensional Photos, Nicholas Hagemeier, Xiaomin Jin; University of California, Irvine, USA. A holograph of 3-D objects is reconstructed from a set of 2-D photos using computer generated hologram (CGH). The photo is segment into foreground/middle-ground/background. Matlab is used to create the CGH. Both single-laser/dual-laser setups are investigated for the 3-D image recoverng.

JTuC10
Optical Imaging of Objects in Turbid Media Using Principal Component Analysis and Time Reversal Matrix Methods, Binlin Wei, Mohammad Ahrabiani, Wei Cui, Min Xie, Swapam K. Gayen; ‘City College of New York, CUNY, USA, Fairfield Univ., USA. Principal component analysis and time reversal matrix methods were used to develop approaches for imaging of targets in turbid media. The effcacy is demonstrated by imaging two targets embedded in intralipid-10% suspension in water.

JTuC11
EMCCD Based Photon Imaging in Ultra Low Light Level, Wei He, Qian Chen, Guangyu Gu, Junfeng Huang, Nanjing Univ. of Science and Technology, China. An EMCCD based photon imaging strategy for ultra low light level scene was present. 3-D thresholding scheme was develop and experimentally tested for distinguishing photon events above noise.

JTuC12
Utilization of the Laser-Induced Breakdown Spectroscopy (LIBS) for Spectrochemical Analysis of Plant Samples with High Spatial Resolution, Josef Kaisier, Radim Madina, Jan Novotny, David Prochazka, Karel Novotny, Lucie Krajcarova, Michalda Galliov, Marketa Holak; ‘Inst. of Physical Engineering, Faculty of Mechanical Engineering, Brno Univ. of Technology, Czech Republic, Dept. of Chemistry, Faculty of Science, Masaryk Univ., Czech Republic. The capability of laser-induced breakdown spectroscopy for elemental mapping of plant tissues is discussed in wider context. Comparison with another laser-ablation based method (LA-ICP-MS) and with synchrotron hard-X-ray radiography and micro-CT techniques is provided.

JTuC13
Computational Imaging in Machine Vision System for Automated Optical Inspection, Nak-Hoon Ko, Seok-Suk Lee, Sang-Chul Jung; Dae-Dan Kim, ‘Tan-I Choi, Beom-Hoon Oh, ’Se-Gran Park’, El-Hang Lee, Seung-Gol Lee; Inha Univ., Republic of Korea, ‘Samsung Electro-Mechanics Co., Ltd., Republic of Korea. This paper describes a virtual eye inspector which can numerically calculate an image to be acquired in a machine vision system for automatic optical inspection. This program will be useful for optimizing machine vision system.

JTuC14
Two-Photon Near-Infrared Cancer Imaging, Nikolay S. Makarov, Jean Starkey, Mikhael Drobnich, Aleksander Rebuen, Montana State Univ., USA. We present a way of optical detection of malignant cancer cell colonies by using multi-wavelength two-photon excited fluorescence from environmentally sensitive Stryr 940 dye, allowing distinguishing between samples containing no cells, normal cells and cancer cells.

LM Posters

JTuC15
Material Modifications with Ultrafast Bessel Beams, Veronique Zambon, Nathalie McCarthy, Michel Piché; Ctr. d’Optique, Photo- nique et Laser (COPL) and Dept. de Physique, de Génie Physique et d’Optique, Univ. Laval, Canada. Ultrafast Bessel beams produced by axicon focusing have a long collimation length that is advantageous for laser micromachining. We have used these beams to fabricate optical waveguides and micro-fluidic channels in transparent glass.

JTuC16
Scan Speed Dependence of Quill Writing with Ultrashort Laser Pulses in Fused Silica, Matthieu Lenzi, Wei-Jing Yang, Bertrand Poumellec, Bernard Bourquin; Univ. of Paris Sud, France. We demonstrate that the quill writing phenomena in ultrashort laser modification of fused silica is dependent on the scan speed. The phenomenon appears when the pulse overlapping is higher than 95%.

JTuC17
Femtosecond Laser Fabrication and Optical Studies of Microstructures in PMMA and PDMS, Kallepalli L. N. Deepak, Venugopal Rao Somar, Narayana Rao Desar; ‘School of Physics, Univ. of Hyderabad, India, ‘Advance Ctr. of Res. in High Energy Materials (ACRHIM), Univ. of Hyderabad, India. Several microstructures, including gratings and holes, were fabricated in PMMA and PDMS using 100 fs pulses. Our results on the physical/optical studies such as fluorescence, Raman, diffraction efficiency etc. will be presented.

JTuC18
Dynamics of Femtosecond Laser Nanostructuring of Metals, Tae-Yong Hong, A. Y. Vorobyev, Chunlei Guo; Inst. of Optics, Univ. of Rochester, USA. We perform a systematic study on femtosecond laser-induced nanostructures on noble metals. Our study reveals the ultrafast dynamics of nanostructural formation on metals following femtosecond laser irradiation.

JTuC19
Q Switched Operation of Yb-Fiber Laser Based on the Waveguide YAG:Cr4+ Saturable Absorber, Andrey Okhrimchuk, Alexander Shetskav, Vladimir Mazentsov, Vladislav Drozny, Evgeny Sholokhov, Ivan Bessonov; 1’Astro Univ., UK, 2’ELS Co., Russian Federation, 3’Fiber Optics Res. Ctr., Russian Acad. of Sciences, Russian Federation, 4’General Physics Inst., Russian Acad. of Sciences, Russia Federation. The waveguide saturable absorber is inscribed by femtosecond pulses in YAG:Cr4+ crystal. Q-switch operation of a fiber laser with such saturable absorber is demonstrated for the first time.

JTuC20
Femtosecond Laser Ablation on Dental Resins and Biomaterials: Analysis of Ablated Profile near an Interface Using Local Effective Intensity, Gustavo Nicolaoldoli, M. M. Costa, V. S. Bagnato; Physical Inst. of São Carlos, Univ. of São Paulo, Brazil. The purpose of this study was to evaluate the progression of ablation, near an interface separating two distinct media. We have used a method that correlates ablation with intensity obtained from surface ablation data.

Regency Ballroom

Fall OSA Optics & Photonics Congress

For FIO/LS presentations on Tuesday, see pages 56-75.
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<td><strong>AWA</strong> • Semiconductor Materials</td>
<td><strong>AOIM</strong> • <strong>JOUNT</strong></td>
<td><strong>JWA</strong> • Joint AO/COSI/SRS Session</td>
<td><strong>NOTES</strong></td>
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<td>Martin M. Fejer, Stanford Univ., USA, Presider</td>
<td>8:00 a.m.–9:45 a.m.</td>
<td>Rafael Piestun; Univ. of Colorado at Boulder, USA, Presider; Julian C. Christou; Gemini Observatory, USA, Presider</td>
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<td><strong>AWA1</strong> • 8:00 a.m. <strong>Invited</strong></td>
<td>Growth of Orientation-Patterned Semiconductors for Nonlinear Optical Frequency Conversion, Candace Lynch, Vladimir Tasser, George Bryant, Cal Yapp, David Bliss; APL, USA, ‘Solid State Scientific Corp., USA. Millimeter-thick crystals of orientation-patterned GaAs have been grown using low pressure Hydride Vapor Phase Epitaxy for use in the generation of mid-IR and THz radiation.</td>
<td>Adaptive Regression Kernels for Image/Video Restoration and Recognition, Peyman Milanfar; Univ. of California at Santa Cruz, USA. I present a nonparametric framework for locally-adaptive signal processing and analysis. Without making strong assumptions about noise/signal models, the framework is applicable to many problems including denoising, upscaling, and object detection in images and video.</td>
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<td><strong>AWA2</strong> • 8:30 a.m.</td>
<td>All Epitaxial Growth of Low-Loss, Large-Aperture Orientation-Patterned Gallium Arsenide (OPGaAs), Peter G. Schunemann, Lee Mohnkern, Alice Venz, Daniel C. Creeden, Thomas M. Pollock; BAE Systems Inc., USA. Improved reactor design and optimized process parameters have enabled all epitaxial growth of large diameter (3-inch), large aperture (&gt;1.5mm thick), and low-loss (&lt;0.005cm⁻¹) quasi-phasematched GaAs for powerful and efficient fiber-laser-pumped mid-IR OPOs.</td>
<td>Efficient Mid-Infrared Optical Parametric Oscillator Based on CdSiP₂, Peter G. Schunemann, Leonard A. Pomeranz, Kevin T. Zawilski, Leonel Gonzalez, Shekhar Guha, T. M. Pollock; BAE Systems Inc., USA, US AFRDL/RXJ, USA. We report the first optical parametric oscillator based on the new mid-infrared nonlinear optical crystal CdSiP₂. Pumping with a 2W, 1.99-micron Ti:YALO laser produced 340 mW average power output (signal + idler) at 27% slope.</td>
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<td><strong>AWA3</strong> • 8:45 a.m.</td>
<td>Efficient Mid-Infrared Optical Parametric Oscillator Based on CdSiP₂, Peter G. Schunemann, Leonel A. Pomeranz, Kevin T. Zawilski, Leonel Gonzalez, Shekhar Guha, T. M. Pollock; BAE Systems Inc., USA. We present a nonparametric framework for locally-adaptive signal processing and analysis. Without making strong assumptions about noise/signal models, the framework is applicable to many problems including denoising, upscaling, and object detection in images and video.</td>
<td>Photosoluminescence of Magnetic Ion Doped Nanostructured Indium Tin Oxide Films, Prasanta K. Biswas, Susmita Kundu, Sumimal Jana, Nilanjan Das, Dipten Bhattacharya, Central Glass and Ceramic Res. Inst., India. Sol-gel based undoped and Cr(III)-, Mn(II)-doped quantum sized (2.5-15nm) indium tin oxide films were prepared. Photoluminescence intensity at ~395 nm for free exciton gradually decreases with increase in nanoclustered size for all films except Mn(II)-doped.</td>
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<td><strong>AWA4</strong> • 9:00 a.m.</td>
<td>Photoluminescence of Magnetic Ion Doped Nanostructured Indium Tin Oxide Films, Prasanta K. Biswas, Susmita Kundu, Sumimal Jana, Nilanjan Das, Dipten Bhattacharya, Central Glass and Ceramic Res. Inst., India. Sol-gel based undoped and Cr(III)-, Mn(II)-doped quantum sized (2.5-15nm) indium tin oxide films were prepared. Photoluminescence intensity at ~395 nm for free exciton gradually decreases with increase in nanoclustered size for all films except Mn(II)-doped.</td>
<td>Light Field Photography and Microscopy, Marc Levoy; Stanford Univ., USA. Light fields represent radiance as a function of position and direction in space. I describe three systems for recording and generating light fields: A camera array, a handheld plenoptic camera, and a light field microscope.</td>
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For FiO/LS presentations on Wednesday, see pages 76-99.
AWA • Semiconductor Materials—Continued

AWA5 • 9:15 a.m.
Optoelectronic Properties of Germanium Islands Formed on Silicon Using Stranski-Krastanov Growth by MBE. Latha Nataraj, Nathan Sustersic, Matthew Coppinger, Felipe Gerlein, James Kolodzey, Sylvain G. Cloutier; Univ. of Delaware, USA. We report on the optoelectronic properties of bulk Germanium islands formed on silicon by Molecular Beam Epitaxy. More specifically, we will discuss the role of strains and doping in favoring efficient light-emission at telecommunication wavelengths.

AWA6 • 9:30 a.m.
Substantial Enhancement in the Optical Band Gap of ZnO Films Using Ca Dopant. Kamakhya Prakash Misra, Atul Srivastava, R. K. Shukla, Anchal Srivastava; Univ. of Lucknow, India. 12.72% enhancement in the band gap of ZnO thin films has been obtained using Ca dopant for the first time. The films, deposited by sol-gel method, are nanocrystalline and highly transparent in the visible region.

JWA • Joint AO/COSI/SRS Session—Continued

JWA4 • 9:30 a.m.  Invited
Adaptive Complex Field Control with an Array of Phase-Locked Fiber Collimators. Mikhail Vorontsov, Thomas Weyrauch, A. Beresnev, Gary W. Carhart, Ling Liu, Konley Aschenbach; Inst. for Systems Res., Univ. of Maryland at College Park, USA. We discuss development of a coherent fiber-array system composed of fiber collimators with built-in capabilities for adaptive control of the outgoing beam complex field characteristics including wavefront phase piston, tip and tilt and amplitude.
AOWA1 • 10:30 a.m.
Broadband Correction for High Contrast Imaging Using Two Deformable Mirrors in Series, Tyler D. Greff, N. Jeremy Kasduri, Laurent Pueyo, Princeton Univ, USA, JPL, USA. Presented here is a wavefront control algorithm that achieves symmetric high contrast regions using electric field estimation from the science camera. This same algorithm is then extended to broadband suppression.

AOWA2 • 10:50 a.m.
Effects of Aberrations and Specimen Structure in Confocal and Two-Photon Microscopy, Richard D. Simmonds, Tony Wilson, Martin I. Booth, Dept. of Engineering Science, Univ. of Oxford, UK. Aberrations affect the image contrast of different specimen structures in microscopes. We have modeled and observed the intensity variation for different structures and the reduction in contrast of small objects within a large background signal.

AWA1 • 11:00 a.m.
The Electric Field Conjugation: A Unified Formalism for Wavefront Correction Algorithms, Amir Givon, JPL, USA. This paper introduces a unified formalism to describe many of the high contrast correction methods, namely, phase conjugation, classical speckle nulling and energy minimization. This unified formalism led to the Electric Field Conjugation (EFC) algorithm.

AWA2 • 11:00 a.m.
Asymmetric Writing with Scanning Direction of Femtosecond Laser in Silica Glass, Bertrand Poumellec, Matthieu Lancry, Jean Claude Poulain, Univ. of Paris Sud, France. Surface topography in femtosecond irradiated samples that part of the shearing of the laser tracks changes its sign with the change in scanning direction (pen effect or asymmetric writing), part not.

AWB1 • 10:30 a.m.
Optical Hyperdoping: Using Lasers to Tailor the Optoelectronic Properties of Semiconductors, Mark Winkler, Meng-Ju Shee, Yu-Ting Lin, Eric Mazur, Harvard Univ., USA. Irradiaing silicon and other semiconductors with intense femtosecond pulses in the presence of certain gases dramatically alters fundamental properties of the semiconductor and offers a new avenue for the development of optoelectronic devices.

AWB2 • 11:15 a.m.
Femtosecond Laser Induced Micro-Structured Silver Containing Glass as an Engineered Nonlinear Optical Material, Hyun Cheol,1,2 Matthieu Bellec, Kevin Bouart, Arnaud Royon, Lionel Cansoni, Thierry Cardinal, Evelyne Jaffrin, Vincent Rodriguez, Marc Dussaute, Aurelien Delestre, Martin Richardson, 1Twente Laser Inst., College of Optics and Photonics, Univ. of Central Florida, USA, 2CPMOH, Univ. Bordeaux, France, 3ICMCB, CNRS UPR9048, Univ. Bordeaux, France, ISM, Univ. Bordeaux, France. The creation mechanism of femtosecond laser produced silver microstructures in silver containing zinc phosphate glass is described. Laser induced depletion in a microstructure enables second harmonic generation exhibiting 2.44 times increased second-order susceptibility than quartz.

AWB3 • 11:30 a.m.
Diverse Polarimetric Measurements, John R. Valenzuela, Jeffrey A. Fessler, Univ. of Michigan, USA. A penalized likelihood algorithm for joint estimation of Stokes images and aberrations for a four channel polarimeter utilizing phase diversity is derived. System optimization is investigated using a Cramer-Rao bound. Simulation results are presented.

CWA1 • 10:30 a.m.
Full Stokes Polariometry in near Field, Janghoan Bae, David P. Haufner, Sergey Stokhun, Aristide Dogariu, CREOL, and FPCE, College of Optics and Photonics, Univ. of Central Florida, USA. An optimization technique is demonstrated to correct for inherent errors in near-field polarimetry. Stokes analysis of electromagnetic fields in reflection geometry can be optimized based on the local degree of polarization.

CWA2 • 10:45 a.m.
Joint Estimation of Stokes Images and Aberrations from Phase-Diverse Polarimetric Measurements, John R. Valenzuela, Jeffrey A. Fessler, Univ. of Michigan, USA. A penalized likelihood algorithm for joint estimation of Stokes images and aberrations for a four channel polarimeter utilizing phase diversity is derived. System optimization is investigated using a Cramer-Rao bound. Simulation results are presented.

CWA3 • 11:00 a.m.
Polarization Estimation through Computational Sensing, Wei Wang, Timothy J. Schultz, Dept. of Electrical and Computer Engineering, Michigan Technological Univ., USA. A computational approach for estimating the degree of polarization from the speckle fluctuations of total intensity data is proposed. Maximum likelihood estimators are studied, and their performances are compared to algebraic estimators and Cramer-Rao bounds.

CWA4 • 11:15 a.m.
Snapshot Spectro-Polarimetry Using Disordered Materials, Thomas Kohlgraf-Owens, Aristide Dogariu, CREOL, College of Optics and Photonics, Univ. of Central Florida, USA. An optical field is characterized by both its spectral and polarization content. Both properties may be simultaneously estimated by analyzing intensity measurements after the interaction of the field with a disordered material.
AOWA • High Contrast Imaging and Point Spread Function Calibration II—Continued

AWB • Laser-Material Interactions—Continued

CWA • Polarization Sensing and Imaging—Continued

JWB • Advances in Adaptive Optics Imaging of the Living Retina I—Continued

AOWA4 • 11:30 a.m. Paramaterization of the Adaptive Optics Point Spread Function.
Julian C. Christou1, Jack D. Drummond2, Gemini Observatory, USA, 1AFRL, USA. We demonstrate how an AO PSF can be parametrized by a model comprising Airy and Lorentzian components. We compare the PSF’s measured FWHM with that estimated from the Airy component of the model fit.

JWB4 • 11:30 a.m. Experimental Test of Simulated Retinal Images Using Adaptive Optics.
Pablo De Gracia, Carlos Dorronsoro, Lucie Sawides, Enrique Gambra, Susana Marcos; Inst. de Óptica, Spain. Ocular degradation is frequently assessed convolving images with the ocular point-spread function, estimated from the wave aberration. Comparisons of visual acuity measured using aberrated targets (viewed through adaptive-optics corrected aberrations) and under natural aberrations reveal consistent discrepancies.

CWA6 • 11:45 a.m. Reconstructing Anisotropic Polarizabilities from a Single Polarimetric Measurement.
David P. Haefner, Sergey Sukhov, Aristide Dogariu; CREOL, College of Optics and Photonics, Univ. of Central Florida, USA. We show how several probability distributions can be restored from the distribution of one single observable. The method is directly applicable to polarimetric measurements with limited control over the experimental conditions.
Predictive Fourier Wavefront Control: Theory and Observational Results

Richard Dekany; Caltech, USA, Presider

Invited

AOWB1 • 1:30 p.m.
Control Design and Turbulent Phase Models in Adaptive Optics: A State-Space Interpretation, Caroline Kulcsár1, Henri-François Raynaud1, Jean-Marc Conat1, Carlos Correia2, Cyril Petit3; 1Univ. of Paris, France, 2ONERA, France. A unified EGG framework is used for analyzing explicit/implicit turbulence models for AO control. Behavior and modeling assumptions of several control laws are discussed, together with associated turbulent phase space reconstruction.

AOWB2 • 2:00 p.m.
Predictive Fourier Wavefront Control: Theory and Observational Results, Lisa Poyneer1, Marcos van Dam2, Jean-Pierre Véran3; 1Lawrence Livermore Natl. Lab, USA, 2W. M. Keck Observatory, USA, 3CNRS, France. A phase retrieval algorithm based on transverse translation diversity is investigated as a method for retrieving the phase of the field as seen through the JWST NIRCam coronagraph using only existing hardware.

Invited

AWC1 • 1:30 p.m.
Hydrothermal Solubility and Crystal Growth of KBe2BO3F2 (KBBF), Joseph W. Kolis, Colin D. McMillen; Clemson Univ., USA. KBBF was found to have a positive solubility dependence on temperature under hydrothermal conditions explored. The hydrothermal growth of KBBF single crystals up to 15 x 10 x 4 mm3 in size is demonstrated.

AWC2 • 2:00 p.m.
Light Absorption and Pyroelectrically Induced Optical Damage in Nominally Undoped and Magnesium-Doped Lithium Niobate Crystals, Judith R. Schwesyg1,2, Martin M. Fejer1, Matthias Falk1, Carsten Langrock1, Roger K. Route1, Chris R. Phillips1, Maria Claudia C. Kajiyama1,2, Dieter H. Jundt3, Karsten Buse2; 1E. L. Ginzton Lab, Stanford Univ., USA, 2Inst. of Physics, Univ. of Bonn, Germany, 3Crystal Technology, Inc., USA. This contribution deals with light absorption and temperature change induced optical damage due to the pyroelectric effect in undoped and magnesium-doped lithium niobate crystals. This effect is different from the photorefractive optical damage.

AWC3 • 2:15 p.m.
Vapor-Transport Equilibrated Lightly MgO-Doped Lithium Niobate for Nonlinear Optics, Bastian V. Bossuyt, Roger Route, Karol Urbanek, Robert L. Byer, Martin M. Fejer, Stanford Univ., USA. We discuss several properties of lightly MgO-doped near-stoichiometric lithium niobate in comparison with other ferroelectric nonlinear materials. Recent results on green light generation and potential advantages over 5 mol-% MgO-doped congruent lithium niobate are described.

Multiscale Optical Systems

A Computational Compound Imaging System Based on Irregular Array Optics, Jun Tanida, Kenta Fujii, Ryoichi Horisaki; Osaka Univ., Japan. A computational imaging system using compound-eye optics with irregularity can improve imaging performance especially for long distance objects. The system characteristics are analyzed and an efficient algorithm is implemented using a graphic processing unit.

Invited

CBW2 • 2:00 p.m.
Phase Retrieval with a Translating Lyot Stop Coronagraph Mask in the JWST, Ravindra Anant Athale, MITRE Corp., USA. We review the technique and discuss recent and future developments.

Paper Withdrawn

SWA3 • 2:15 p.m.
Phase Retrieval with a Translating Lyot Stop Coronagraph Mask in the JWST, Thomas P. Zielinski, James R. Fienup; Institute of Optics, University of Rochester, USA. A phase retrieval algorithm based on transverse translation diversity is investigated as a method for retrieving the phase of the field as seen through the JWST NIRCam coronagraph using only existing hardware.

Thank you for attending FiO/LS/Fall Congress. Look for your post-conference survey via email and let us know your thoughts on the program.

For FiO/LS presentations on Wednesday, see pages 76-99.
AOWB3 • 2:30 p.m.

AOWB4 • 2:50 p.m.
Minimum Variance Control for the Woofer-Tweeter Concept. Carlos Correia1,2, Henri-François Raynaud1, Caroline Kulcsár1, Jean-Marc Conan1; 1ONERA, France, 2L2TI, Univ. Paris XIII, France. Optimal minimum-variance control of the double stage woofer-tweeter concept in adaptive optical systems is addressed using a LQG approach. Results are shown for an infinitely-fast tweeter coupled to a slower woofer.

AOWB5 • 3:10 p.m.
Bulk Wind Estimator Performance for AO Systems. Luke C. Johnson, Donald T. Gavel, Donald M. Wiberg; Ctr. for Adaptive Optics, Univ. of California at Santa Cruz, USA. We use the Cramer-Rao lower bound to find that the error in a bulk wind estimator is dependent on both the signal-to-noise ratio at the wavefront sensor and the spatial frequency content of the wavefront.
Adaptive Optics Instrumentation. Stephen A. Burns, Ermanno F. Borra, Anna M. Ritcey, Melanie C. Campbell, Simon Thibault, Julie Drapeau, Azadeh Naderian; Univ. Laval, Canada, Univ. of Waterloo, Canada, Guelph Waterloo Physics Inst., Canada. We present a novel ferrofluid mirror design which will result in an inexpensive adaptive optics element with large stroke for use in ophthalmic imaging.

Adaptive Optics-OCT Imaging of the Retina. Donald T. Miller; Indiana Univ., USA. Ultrahigh resolution OCT with adaptive optics provides unprecedented 3-D resolution of the cellular retina in vivo. Here we investigate the utility of this instrument for imaging individual retinal nerve fiber bundles, retinal capillaries, and photoreceptors.

First-Order Design of Off-Axis Reflective Ophthalmic Adaptive Optics Systems Using Afoocal Telescopes. Alfredo Dubra, Armando Gómez-Vieyra, Daniel Malacara-Hernández, David R. Williams; Univ. of Rochester, USA, Ctr. de Investigaciones en Optica AC, Mexico. Expressions for minimal astigmatism in image and pupil planes in off-axis reflective afoocal telescopes formed by pairs of spherical mirrors are presented and evaluated for small angles of incidence.

Control of Defects in Laser and Scintillator Ceramics. Romain Gagne; Stanford Univ., USA. When properly designed, optical ceramics can yield high performance lasers and scintillators. Controlling the defects in these materials is essential to these applications. Systematic composition studies in YAG-ceramics, investigated by novel optical characterization techniques, will be presented.

4:30 p.m.–5:30 p.m.
AWD • Optical Ceramics
Candace L. Lynch; AFRL, USA, Presider

Ceramic and Glass Ceramic Phosphors for Solid State Lighting. Setsuhisa Tanabe; Kyoto Univ., Japan. Transparent ceramic and glass ceramic phosphors containing Ce$:3+$-doped (Y,Gd)AlO$_3$ were prepared and luminescent characteristics pumped with blue LED were investigated. Transparent ceramic samples without Gd showed the best luminous efficacy as a white light source.

Current Status of Optical Ceramics. Akio Ikuzie; World Lab Co., Ltd., Japan. We demonstrated not only high efficiency laser generation from polycrystalline Nd:YAG ceramics, but also succeeded in fabrication of high-functional ceramic lasers such as composite, fiber, micro-sphere, and single crystal by sintering method etc.
10:00 a.m.–10:30 a.m. Coffee Break, Regency and Imperial Ballroom Foyer, Fairmont Hotel
Ellerbroek, David A. Andersen 1, Matthias Schoeck 2, Tony Travouillon 2; 1Herzberg Inst. of

AOThB • System Simulation and Modeling II
Miska LeLouarn; European Southern Observatory, France, Presider

 invaders 1: 10:30 a.m.

AOThB • 10:30 a.m.

An Auto-Regression Model to Create Seeing Time Series, Sriram1, David Kearney2, Ross Frick2, Oskar Mencer1; 1Imperial College London, UK, 2Univ. of South

AOThB2 • 10:50 a.m.

Improving the Accuracy of the Ultra Fast Kolmogorov Phase Screen Generator, Ynay B. Stram1, David Kearney1, Russ Frick1, Oskar Mencer1; Imperial College London, UK, 1Univ. of South

AOThB3 • 11:10 a.m.

Hybrid Adaptive Optics Systems with Discrete-Time Atmospheric Turbulence Models, Douglas P. Looze; Univ. of Massachusetts at Amherst, USA. A discrete-time model of an AO system that incorporates the intra-frame effects of the DM but uses a discrete-time model of the atmospheric effects is presented.

Invited

AIO M • Applications of Nanophotonics
Presider to Be Announced

AIO M • 10:30 a.m.

Nanophotonics for Information Systems, Yuhaihui Fairman, Kacziru Ikeda, Dawn Tan; Univ. of California at San Diego, USA. We explore lithography to pattern metals-dielectrics-semiconductors on various scales opening new capabilities in optics, where functionality and properties are enabled by the structure-composition and not just by the intrinsic properties of a bulk material.

AIO M • 11:00 a.m.

All-Optical Magnometer Based on Magnetite Core-Polymer Shell Nanocomposite Material, Analpria Lopez-Santiago, Palkah Gengopadhyay, Jayan Thomas, Robert A. Norwood, Nasser Peyghambarian; Univ. of Arizona, USA. An all-optical magnetometer has been constructed based on magnetite core polymer shell nanocomposite material. A noise equivalent magnetic field sensitivity of 5 nT/Hz was observed using a 1 µT 500 Hz control magnetic field.

AIO M • 11:15 a.m.

Selected Applications of Atomic Layer Deposition Dielectric Nanolaminates as Functional Optical Coatings, Adriauna Angelina, Michael Helger1, Robert Brunner1, Mario Bretchneider1, Stephan Sens1, Urich Giesel1, Mato Knez1; Max Planck Inst. of Microstructure Physics, Germany; 1Carl Zeiss AG, Germany, 2IFG Inst. for Scientific Instruments GmbH, Germany. The paper discusses optical applications of atomic layer deposition. X-ray mirrors, antireflective coatings and band-pass filters were made for the visible spectral region. Coatings applied to two-dimensional shallow gratings produced tunable guided modes resonance filters.

AIO M • 11:30 a.m.

Degenerate Two-Beam Interaction by Hologram Grating in Nano-Colloid, Sergei Mikhailov, Radu Lipitov1, Eugene Ageev1, Sergei Shestov2, Leonid Zagrebin2; 1Tomsk State Univ., 2Ricoh Innovations, USA. We designed and built a spherical coded triplet imaging system and experimentally verified its extended depth-of-field imaging capabilities.

AIO M • 11:45 a.m.

Time Domain Numerical Observation of Superluminal Pulse in Photonic Band-Gap Structures, Tingyi Gu, Chun Jiang; Shanghai Jiaotong Univ., China. In this paper we systematically study the time domain properties of superluminal light in 1-D and 2-D band-gap photonic crystals, including band diagram, transmission, group velocity, energy velocity and dwell time.

COS I • Pupil Encoding Methods
Aristide Dogariu; CREOL, College of Optics and Photonics, Univ. of Central Florida, USA

COS I • 10:30 a.m.

Rewriting the Rules of Imaging Design in the New Era of Electro-Optics, David G. Stork; Ricoh Innovations, USA. Centuries-old rules of optics design and informal rules-of-thumb are becoming obsolete in the new era when digital image processing is included into the data path.

COS I • 11:00 a.m.

Pupil Phase Encoding for Mitigation of Laser-Induced Saturation in Imaging Sensors, Joseph van der Gracht, Lei Zhang, Todd Torgersen, Paul Pauca1; HoloSpectrum, Inc., USA, 1Agiltron, Inc., USA, 2Wake Forest Univ., USA. Wave-front coding can mitigate the harmful effects of unwanted laser illumination. The pupil phase element spreads out the focused beam and avoids detector saturation. We consider different classes of phase masks for this application.

COS I • 11:15 a.m.

Extending Depth-of-Field: Spherical Coding Versus Asymmetric Wavefront Coding, Dirk Robinson, David G. Stork; Ricoh Innovations, USA. We compare the image quality between asymmetric wavefront codings and the simple-to-manufacture spherical aberration over an extended focal range. We verify and explain the superior performance of the spherical aberration via simulation results.

COS I • 11:30 a.m.

Experimental Validation of Extended Depth-of-Field Imaging via Spherical Coding, Michael D. Robinson, Vikrant Bhaskar, Michael A. Kulis; Southern Methodist Univ., USA. We designed and built a spherical coded triplet imaging system and experimentally verified its extended depth-of-field imaging capabilities.

COS I • 11:45 a.m.

Computational Differential Interference Contrast (DIC) Microscopy for Quantitative Imaging, Chrysanthi Peraz, Joseph A. O’Sullivan; Univ. of Memphis, USA, 2Washington Univ. in St. Louis, USA. We demonstrate that application of a regularized alternating minimization algorithm to DIC microscopy images results in quantitative imaging of the specimen’s phase and amplitude information. The alternating minimization algorithm's robustness to noise is investigated.

COS I • 12:00 p.m.

Off-Axis Sensor Modulation Transfer Function Measurement Using Band-Limited Laser Speckle, Xi Chen, Doug Fettig, Bob Gravelle, Donna Cao, Gennadiy Agranov; Aptina Imaging, USA. We present a new methodology for measurement of off-axis sensor modulation transfer function using band-limited laser speckle and two-dimensional generalized sampling theorem. The effect of chief ray angle on sensor modulation transfer function is studied.

For FiO/LS presentations on Thursday, see pages 100-115.
Recently, a modal wavefront sensing method, with the use of binary basis functions, was proposed. In this paper we examine some of the optical arrangements for its applications and present experimental results obtained.

A Linear Model for Shack-Hartmann Sensors

New Modal Wavefront Sensing Employing Binary Basis Functions

Scene Based Wavefront Sensing for Figure Control of Airborne and Space Optics

Microlens Array Laser Sintered on Glass Sheets

Microlens Array Laser Sintered on Glass Sheets

Microlens Array Laser Sintered on Glass Sheets

Low-Loss Tin Silica Glass-Ceramic Waveguides Doped by Rare-Earth Elaborated by Sol-Gel Route

Glass-Imprinting for Optical Device Fabrication

Computational Depth-Variant Imaging for Quantitative Fluorescence Microscopy

Adaptive Feature-Specific Spectroscopy

Video Enhancement through Automated Lucky-Region Fusion from a Stream of Atmospherically- Distorted Images

CThC • Imaging through Complex Media and Spectroscopy

CThC4 • 2:15 p.m.
Computational Depth-Variant Imaging for Quantitative Fluorescence Microscopy

Vimeetha Myneni, Chrysanthe Preza; Univ. of Memphis, USA.

CThC4 • 2:30 p.m.
Adaptive Feature-Specific Spectroscopy

Dineshbabu V. Dinakarababu, Michael E. Gehm; Univ. of Arizona, USA. We introduce the Adaptive Feature-Specific Spectrometer (AFSS), a chemical-detection methodology that uses an adaptively reconfigured set of signal projections to drastically shorten time-to-identification in low-SNR situations.

Joe Van der Gracht; Holospex, Inc., USA, Presider

Invited

Invited

Invited

Invited

Invited

Invited
Data Compression for Nearly-Periodic Data. Amos Talma1, Erez N. Ribak1,2; Timi Technologies Ltd., Israel; Technion-Israel Inst. of Technology, Israel; Applied Optics, School of Physics, Natl. Univ. of Ireland, Galway, Ireland. Shape from shade and Hartmann sensing require plenty of pixels for measurement, but many fewer can be analyzed, saving space and time. We found a method to compress large-format camera outputs with minimal accuracy loss.

Ultrafast Dephasing Time Measurements in a Niobic-Silicate Nanocomposite Using Incoherent Light. Euclides C. L. Almeida1, Leonardo de S. Menezes1, Cid B. de Araújo1, Andrei A. Lipovskii2; 1Univ. Federal de Pernambuco, Brazil; 2St. Petersburg State Technical Univ., Russian Federation. We report on the measurement of a short optical dephasing time (~20 fs) in a glass-ceramic containing sodium niobate nanocrystals using degenerate four-wave mixing with incoherent light. The dephasing mechanisms are discussed.

Compressive Sensing Echelle Spectrometer. Lina Xu, Ting Sun, Kevin Kelly; Rice Univ., USA. A compressive sensing echelle spectrometer has been built. By employing compression, we reconstructed the two dimensional echelle spectrums using the single photodetector with far fewer measurements when compared to raster scanning.

3:30 p.m.–4:00 p.m. Coffee Break, Regency and Imperial Ballroom Foyer, Fairmont Hotel
MEMS Wavefront Correctors, Thomas Bifano1,2; 1Boston Univ., USA, 2Boston Micromachines Corp., USA. Deformable mirrors made using MEMS processes have become commodity products. Newer capabilities include nanometer-scale predictive open-loop control and scaling to >4000 actuators, while maintaining exceptionally low size, weight, and power.

Optically Addressed MEMS Coupled Photodetector Spatial Light Modulator, Baharch Haji-Saeed1,2, Jed Khoury3, Kenneth Vaccaro4, John Kirkread5, Charles Woods6, Andrew Davis7; 1Sensors Directorate, AFRL, USA, 2Solid State Scientific Corp., USA. We are in the process of developing an all optically driven deformable mirror device through integration of an array of photodetectors with an array of MEMS deformable mirrors.

Piezo Array Deformable Mirrors and New Associated Technologies: Spherical Shape and Tip/Tilt Mount, Jean-Christophe Sinquin, Jean-Marie Lurçon, Pierre Motte; CILAS, France. We recall the principles, performances and main technical advantages of CILAS Piezo Array Deformable Mirrors. Then we present two new associated technologies: the possible spherical shape of these mirrors and specific tip/tilt mount.

Fast, Robust Parameter Estimation and Open-Loop Control of Point-Actuated, Continuous-Facesheet Deformable Mirrors, Curtis R. Vogel1, Glenn Tyler2, Rodolphe Conan3, Celia Blain4; 1Montana State Univ., USA, 2Optical Sciences Co., USA, 3Univ. of Victoria, Canada. We introduce robust order N algorithms to estimate model parameters and control DMs in open loop based on the Vogel-Yang model for deformable mirrors appearing in JOSA-A, 23, pp. 1074-1081, 2006.

What’s the Use of Silica Microstructured Fibers? Jonathan Knight; Univ. of Bath, UK. Photonic crystal materials offer opportunities to overcome the limitations of naturally-occurring optical materials. Recent developments in photonic crystal fibers formed from silica and air offer several examples.

Chalcogenide Glass Fibers and Their Applications, Ishwar Aggarwal; NRL, USA. IR transmitting chalcogenide glasses and fibers are being developed for numerous military, commercial and biomedical applications in the infrared region. Latest results regarding fabrication of the fibers, fiber properties and their applications will be presented.

Optical Properties of Chalcogenide-Filled Silica-Air PCF, Markus A. Schmidt1, Nicolai Granzow1, Lothar Nöthnisch2, Philip St. J. Russell1; 1Max Planck Inst. for the Science of Light, Germany, 2Dept. of Materials Science and Engineering, Univ. of Erlangen-Nuremberg, Germany. Sub-micron strands of Ge3As52S45 glass are incorporated into hollow channels in silica-air fibers. Band gap guidance is observed in a completely filled PCF. Coupling is observed between conventional fiber core and an adjacent chalcogenide strand.

Highly Efficient 1300 nm Emission in Bismuth Doped AlGeP-Silica Fiber, Richard S. Quimby1, Roman L. Shubochkin2, Theodore F. Morse2; 1Worcester Polytechnic Inst., USA, 2Boston Univ., USA. Bismuth doped AlGeP-silica fibers prepared by aerosol deposition have a 1300 nm emission band extending from 1100-1450 nm when pumped at 808 nm. The radiative efficiency was measured to be near unity.

Bi-Doped Fibers for NIR Lasers and Amplifiers: Opportunities and Challenges, Evgeny M. Dianov; Fiber Optics Res. Ctr., Russian Acad. of Sciences, Russia. Recent results on Bi-doped glasses and optical fibers are reviewed. The absorption and luminescent properties of Bi-doped fibers and the results on creation of Bi-doped fiber lasers for a spectral region of 1140-1550nm are presented.

End the meeting with an exciting panel discussion. In addition to reviewing some of the highlights of the meeting, this will also provide a forum to review related funding programs such as DARPA MOSAIC and some of the recommendations made by recent initiatives such as the Computational Space Telescope study.

Panel participants include: Ravindra Anant Athale; MITRE Corp., USA David Brady, Duke Univ., USA Aristide Dogariu; CREOL, College of Optics and Photonics, Univ. of Central Florida, USA Michael A. Fiddy; Univ. of North Carolina at Charlotte, USA Rafael Piextran; Univ. of Colorado, USA
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FiO/LS/OSA Fall Optics & Photonics Congress Program and Exhibit Guide Addendum

**LASER SCIENCE SYMPOSIUM ON UNDERGRADUATE RESEARCH:** Please see the 6-page program in your registration bag for more information on this symposium, including the updated schedule. Note that the posters will remain in the Cupertino Room until 6:00 p.m.

**Short Course Cancellations**
- SC326 Patent Fundamentals
- SC322 Silicon Nanophotonics
- SC340 Tissue Optics and Optical Coherence Tomography

**What's Hot in Optics Today?**
Presentation updates:
- **Seeing the (Almost) Invisible: Using Novel Nonlinear Optical Effects for Image Contrast in Biology and Medicine**, Chris Schaffer; Cornell Univ., USA
- **Design Events—Solar Technology: Design, Fabrication, and Testing**, R. John Koschel; Photon Engineering LLC and College of Optical Sciences, Univ. of Arizona, USA
- **What's Hot in Information Acquisition, Processing and Display**, David Brady; Duke Univ., USA
- **What’s Hot in Photonics and Opto-Electronics**, Juerg Leuthold; Univ. of Karlsruhe, Germany
- **More to Retinal Wiring than Meets the Eye**, Alex Wade; Smith-Kettlewell Eye Res. Inst., USA

**Technical Group Meetings**
- On Sunday, from 7:00 p.m.–8:30 p.m. in the Empire Room at the Fairmont Hotel, join the Fabrication, Design, and Instrumentation Division meeting for a special guest presentation on NIF.
- On Tuesday, from 7:30 p.m.–8:00 p.m. in the Empire Room at the Fairmont Hotel, attend the joint meeting of the Optical System Design and Characterization and Polarization Technical Groups.
- On Wednesday, from 4:00 p.m.–5:00 p.m. in the Cupertino Room at the Fairmont Hotel, join the OSA Imaging Sensing and Pattern Recognition Technical Group for an informal discussion of results presented at the COSI and SRS topical meetings and at FiO. Light refreshments will be served.

**Student Programming**
The presentation by Featured OSA Traveling Lecturer: Irving Bigio scheduled for Tuesday has been cancelled. The “Painless Publishing” session is now from 9:00 a.m.–10:00 a.m. The “Career Focus: Policy in Science” session is now from 10:30 a.m.–12:00 p.m.

**Withdrawn Presentations**
- AO: AOTHuC3, AOThB3
- FiO: FTuC3, JWC71, JWC78, JWE6, FWC6, FWL6, FTHO1
- LM: LMFTuB2
- LS: LSTuA1, LSTuA4, LSWA5, LS JW1, LSWJ4, LSWK4, LSThD2

**Session Updates**
- AWA ends at 10:00 a.m.
- AWB ends at 12:00 p.m.
- AWC ends at 3:30 p.m.
- AWD ends at 6:00 p.m.
- AThA ends at 9:45 a.m.
- AOTHa ends at 10:00 a.m.
- AOThB ends at 11:50 a.m.
- CBW ends at 3:30 p.m.
- CThC ends at 3:15 p.m.
- FTuM ends at 3:30 p.m.
- JWE ends at 5:45 p.m.
- LSOH begins at 1:45 p.m.
- LSWD ends at 12:30 p.m.
- LSWJ starts at 4:30 p.m.
- SWA ends at 3:30 p.m.

**Program Additions**
LS invited presentation LSWD5, Local Structural Flexibility of Nucleic Acid Probed by a Wide Field Single Molecule FRET Imaging Technique, Tae-Hee Lee; Pennsylvania State Univ., USA will be presented at 12:00 p.m. Abstract: A simple method to probe local structural flexibility of nucleic acid based on a wide field single molecule FRET imaging technique will be presented. Applications to DNA duplexes, ribosome complexes and nucleosomes will also be presented.

FiO invited presentation FTuC3, Problems in Physically Based Simulations of Real-World Environments, Donald P. Greenberg; Program of Computer Graphics, Cornell Univ., USA will be presented at 11:30 a.m. Abstract: For the design of buildings, advertising for the automotive industry, or interior design, physically-based simulations must be accurate representations of real-world environments. This heavily illustrated graphical talk identifies the unsolved research areas necessary to reach this goal and shows several compelling applications.

The talk that was originally FTuC3 is now FTuM4, 3-D TV Based on Integral Method Using Extremely High-Resolution Video System, Masahiro Katoukita, Jun Ariai, Fumio Okano; NHK Science & Technical Res. Labs, Japan, and will be presented at 3:00 p.m.

**Presentation Schedule Updates**
AWB2, Asymmetric Writing with Scanning Direction of Femtosecond Laser in Silica Glass, is now AThC4 and will be presented by Matthias Lanery on Thursday at 2:30 p.m.

AThC4, Progress on the Fabrication of On-Chip, Integrated Chalcogenide Glass (ChG)-Based Sensors, is now AWB2 and will be presented at 11:00 a.m. on Wednesday.

AWB3, Femtosecond Laser Induced Micro-Structured Silver Containing Glass as an Engineered Nonlinear Optical Material, begins at 11:30 a.m.

AWB4, Doping Dependence of the Femtosecond Laser Damage Thresholds in Silica Glasses, begins at 11:45 a.m.

AThC5, Ultrafast Dephasing Time Measurements in a Niobic-Silicate Nanocomposite Using Incoherent Light, begins at 2:45 p.m.

AThD2, Chalcogenide Glass Fibers and Their Applications, is now AWD4 and will be presented at 5:30 p.m. on Wednesday.

FTu6, Direct Measurement of High Q-Factors in Individual Salt-Water Microdroplets by Photothermal Tuning Spectroscopy, is now FThU7 and will be presented at 5:45 p.m.

FThU7, Reversible Photothermal Tuning of Single Salt-Water Microdroplets on a Superhydrophobic Surface, is now FThU6 and will be presented at 5:30 p.m.

**Presenter Changes**
- Julian Christou; Gemini Observatory, USA will present AOTHuC1, Differential Photometry through PDF Deconvolution and AOTHuC2, Statistical Signal Enhancement in Adaptive-Optics Observations of Exoplanets.
- Caroline Kalcic; LETI, Univ. of Paris XIII, France will present AOTHa2, Experimental Validation of LTAO and MCAO Configurations with Optimal Control.
- David A. Andersen; Herzberg Inst. of Astrophysics, Natl. Res. Council of Canada, Canada will present AOTHb1, An Auto-Regressive Model to Create Seeing Time Series.
- Jeffrey Livio; NASA Goddard Space Flight Ctr., USA will present JMB2, LISA: Detecting Gravitational Waves from Space.
- Edward Watson; AFRL, USA will present FThF1, Three-Dimensional Sensing, Visualization, and Display by Integral Imaging.
- Peter (Jeff) Wisoff; Lawrence Livermore Natl. Lab, USA will present FThk1, Status of the National Ignition Facility.
- Kishor T. Kapale; Western Illinois Univ., USA will present JWC25, On Simultaneous
Measurement of Polarization and Orbital Angular Momentum of Light.

- C. Faber: Univ. of Erlangen-Nuremberg, Germany will present FWV1, Deflectometry
- Challenges Interferometry: 3-D-Metrology from Nanometer to Meter.
- Pierre Thibault; Paul Scherrer Inst., Switzerland will present FTH1, Multi-Modal Scanning X-Ray Microscopy.
- Diego Krygj; Colorado State Univ., USA will present LSWD3, Tracking Single Potassium Channels in Live Mammalian Cells.

**Author Updates**


Updated author information for JTuC8, Six-Dimensional Joystick Based on Detection of Optical Spot: Meng-Che Tsai, Pin-Hao Hu, Yung-Hsing Wang; ITRI, Industrial Technology Res. Inst., Taiwan. Yung-Hsing Wang will present.

Updated author order for JWC28, Atmospheric Propagation of Fiber and Solid State Lasers in Maritime Environments: Matthew A. Leigh, Timothy O. Murphy, Andrew Baranowski, Adin Kawate; Envisioneering, Inc., USA. Matthew Leigh will present.

Updated author information for LSTuC1, Sub-Picosecond Intersystem Crossings and Structural Dynamics: Combined Ultrafast Optical and X-Ray Absorption Studies: C. Milne1, S. Johnson2, V. T. Pham1, A. El Nahhas1, R. van der Veen1, P. Beaud3, Ch. Bressler4, M. Chergui5; 1Lab of Ultrafast Spectroscopy, Ecole Polytechnique Fédérale de Lausanne, Switzerland, 2Swiss Light Source, Paul Scherrer Inst., Switzerland. Steve Johnson will present.

**Presider Updates**

- Kathleen Richardson; Clemson Univ., USA will preside over session AWA.
- Martin M. Fejer; Stanford Univ., USA will preside over AThD.
- David H. Reitze; Univ. of Florida, USA will preside over session FMI.
- Neil Terry; Duke Univ., USA will preside over session FTuH.
- Edward Watson; AFRL, USA will preside over FTuM.
- Roberto Zambrini; IFISC ( UIB-CSIC), Univ. Illes Balears, Spain will preside over session FWS.
- Benjamin Varcoe; Univ. of Leeds, UK will preside over session FTHC.
- Thomas Schreiber; Fraunhofer Inst. Optik Feinmechanik, Germany will preside over session FThD.
- Urs Utlzinger; Univ. of Arizona, USA will preside over session FTHP.
- Andrew Harvey; Heriot-Watt Univ., UK will preside over session FTHR.
- Peter Herman; Univ. of Toronto, Canada will preside over session LMTuC.

**POSTDEADLINE PRESENTATIONS:** Please see the postdeadline papers book for times and locations of postdeadline paper presentations. AO, AITOM, COSI and SRS postdeadline papers will be presented throughout the week in various oral sessions.

**New Exhibitors:**

**Laser Quantum**

Table 16
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**Booth Move:**
Wiley-Blackwell is now exhibiting in Booths 101 & 103.

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A special thanks to the American Institute of Physics for their sponsorship of Wednesday’s FiO Coffee Breaks.
Postdeadline Papers

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FAIRMONT HOTEL
SAN JOSE, CALIFORNIA, USA

TECHNICAL CONFERENCE: October 11–15, 2009
EXHIBIT: October 13–14, 2009
Advances in Optical Materials

Belvedere Room, Fairmont San Jose Hotel
8:00 a.m.–10:00 a.m.
AWA • Semiconductor Materials
Kathleen Richardson; Clemson Univ., USA, Presider

AWA7P • 9:45 a.m.
Molecularly Engineered Semiconductor Cluster Nanocomposites with Large Nonlinear Responses and Low Losses, Ronald M. Kubacki; Ionic Systems Inc., USA. Materials can now be molecularly engineered specifically for advanced photonics. Nanocomposites enable passive waveguides with less than 0.5 dB/m loss and active sections with large (i.e. > 1,000) nonlinear optical responses.

Belvedere Room, Fairmont San Jose Hotel
1:30 p.m.–3:30 p.m.
AWC • Oxide Crystals
Peter G. Schunemann; BAE Systems, USA, Presider

AWC6P • 3:15 p.m.
Tape Cast Composite Ceramic Er:YAG Laser, Nikolay Ter-Gabrielyan1, Larry D. Merkle1, Mark Dubinski2, E. R. Kuppi2, Gary L. Messing2; 1US ARL, USA, 2Penn State Univ., USA. Laser operation of tape cast composite ceramic Er:YAG rod is demonstrated at 1645 nm with slope efficiency of 56.9% under the resonant pumping. This is believed to be the first reported composite ceramic Er:YAG laser.

Computational Optical Sensing and Imaging

Club Regent Room, Fairmont San Jose Hotel
1:30 p.m.–3:30 p.m.
CWB • Multi Aperture Systems
Ravindra Anant Athale; MITRE Corp., USA, Presider

CWB6P • 3:15 p.m.
Dual-Band Imaging System Based on a Compact Coaxial Folded Optic Architecture, R. L. Morrison1, R. A. Stack1, Gary Euliss2, R. A. Athale2, B. F. Necioglu1, R. W. Horstmeyer1, Colin Reese2; 1Distant Focus Corp., USA, 2MITRE Corp., USA, 3U.S. Army RDECOM CERDEC Night Vision and Electronic Sensors Directorate, USA. We present an unconventional coaxial architecture for simultaneous acquisition of images in two discrete spectral bands. The approach is realized by taking advantage of a novel annular-folded lens design previously developed under the DARPA/MONTAGE program.

Signal Recovery and Synthesis

Cupertino Room, Fairmont San Jose Hotel
1:30 p.m.–3:30 p.m.
SWA • Phase Retrieval Methods
Charles L. Matson; AFRL, USA, Presider

SWA7P • 3:15 p.m.
High Dynamic Range Image Capture with Plenoptic 2.0 Camera, Todor G. Georgiev1, Andrew Lumsdaine1, Sergio Goma1; 1Adobe Systems, USA, 2Indiana Univ., USA, 3Qualcomm, USA. We demonstrate high dynamic range (HDR) imaging with the Plenoptic 2.0 camera. Multiple exposure capture is achieved with a single shot using microimages created by microlens array that has an interleaved set of different apertures.
Adaptive Optics: Methods, Analysis and Applications

Fairfield Room, Fairmont San Jose Hotel
8:00 a.m.–10:00 a.m.
AOTHa • Adaptive Optics Systems II
Donald T. Miller; Indiana Univ., USA, Presider

AOTHa6p • 9:40 a.m.
A Calibration Unit for the Rayleigh Laser Guide Stars at the LBT, Christian Schwab1, Andreas Quirrenbach1, Wolfgang Gäßler2, Diethard Peter3; 1Landessternwarte, ZAH, Univ. Heidelberg, Germany, 2Max Planck Inst. for Astronomy, Germany. We describe the calibration scheme and optical design of a calibration unit for the off-axis laser guide stars at LBT’s ARGOS facility. Artificial stars with the desired wavefront are created using a computer generated hologram.

Fairfield Room, Fairmont San Jose Hotel
10:30 a.m.–11:50 a.m.
AOTHb • System Simulation and Modeling II
Miska LeLouarn; European Southern Observatory, France, Presider

AOTHb3p • 11:10 a.m.
Optimization of cw and Pulsed Sodium Guide Star Lasers, Ronald Holzlöhner1, Simon Rochester1, Domenico Bonaccini Calia1, Dmitry Budker1, James M. Highie1, Wolfgang Hackenberg1; 1European Southern Observatory (ESO), Germany, 2Univ. of California at Berkeley, USA, 3Bucknell Univ., USA. We present the results of extensive Bloch equation numerical simulations, both for cw and for various pulsed laser formats and applications.

Advances in Optical Materials

Belvedere Room, Fairmont San Jose Hotel
8:00 a.m.–9:45 a.m.
AATHa • Nanostructured Materials
Shaya Y. Fainman; Univ. of California at San Diego, USA, Presider

AATHa6p • 9:30 a.m.
100-Fold Enhancement of Fluorescence Imaging by Two-Dimensional-Grating-Coupled Surface Plasmon Resonance, Kenji Kintaka1, Xiaoqiang Cui1, Keiko Tawo1, Junji Nishii1; 1Natl. Inst. of Advanced Industrial Science and Technology, Japan, 2Hokkaido Univ., Japan. Silver-coated two-dimensional periodic structures were fabricated for high-efficiency excitation of surface plasmon resonance. The fluorescence image of labeled proteins on the periodic structure was 100 times brighter than that on a flat glass plate.

Belvedere Room, Fairmont San Jose Hotel
1:30 p.m.–3:15 p.m.
AITHc • Glass Synthesis and Properties
Jonathan Knight; Univ. of Bath, United Kingdom, Presider

AITHc6p • 3:00 p.m.
Characterization of Eu²⁺-Doped SrMgAl₂SiO₇: as a Novel Blue-Emitting Phosphor Synthesized through Sol-Gel Method, Reza Salimi, Hassan Samee, Ali A. Sabbagh Alvehi, Ali A. Sarabi, Fathollah Meztarzadeh, Mohammadreza Tahriri; Amirkabir Univ. of Technology, Islamic Republic of Iran. Phase-forming process, thermal behavior of components and luminescence properties of novel blue-emitting phosphor, SrMgAl₂SiO₇:Eu²⁺ were investigated. Narrow emission peak at 421 nm and nanocrystallite (30.6 nm) of final products, were attributed to the sol-gel process.

Computational Optical Sensing and Imaging

Club Regent Room, Fairmont San Jose Hotel
1:30 p.m.–3:15 p.m.
CITHc • Imaging through Complex Media and Spectroscopy
Joe Van der Gracht; Holospec, Inc., USA, Presider

CITHc7p • 3:00 p.m.
A Multi-Depth Image Restoration Based on a Quartic Phase Coded Lens, Ludovic J. Angot, Po-Chang Chen, Chuan-Chung Chang; Industrial Technology Res. Inst., Taiwan. A phase coded lens design using a quartic form derived from the spherical aberration of traditional optical systems and a method for image restoration of objects located at different distances are provided.
Key to Authors and Presiders
(Bold denotes Presider or Presenting Author)

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