Empire

FiO

8:00 a.m.–9:30 a.m.
FTuA • 3-D Entertainment in the Marketplace
Hong Hua; Optical Sciences Ctr., Univ. of Arizona, USA, Presider

FTuA1 • 8:00 a.m. Keynote

3-D Entertainment: A Revolution that has Already Started, *Rod Archer; RealD Inc., USA.* A new era of 3-D entertainment has begun. This wave of change from the entertainment industry will soon bring huge opportunities to optical products companies worldwide. I will discuss the current state-of-the-art, challenges and rewards.

Crystal

FiO

8:00 a.m.–10:00 a.m.
FTuB • Plasmonic Emitters and Resonators
Harald Giessen; Univ. of Stuttgart, Germany, Presider

FTuB1 • 8:00 a.m. Invited

Active Terahertz Metamaterials, *Hou-Tong Chen; Los Alamos Natl. Lab, USA.* We demonstrate planar terahertz metamaterial devices enabling actively controllable transmission amplitude, phase, or frequency at room temperature via carrier depletion or photo excitation in the semiconductor substrate or in semiconductor materials incorporated into the metamaterial structure.

FTuB2 • 8:30 a.m.

Plasmonic Nano-Laser below the Diffraction Limit, *Volker J. Sorger[1], Rupert F. Oulton[1], Thomas Zentgraf[1], Chris W. Gladden[1], Guy Bartal[1], Ren-Min Ma[2], Lun Dai[2], Xiang Zhang[1,3]; [1]NSF Nanoscale Science and Engineering Ctr., Univ. of California at Berkeley, USA, [2]State Key Lab for Mesoscopic Physics and School of Physics, Peking Univ., China, [3]Materials Sciences Div., Lawrence Berkeley Natl. Lab, USA.* We report a plasmonic laser device exhibiting strong sub-wavelength confinement. These nanowire-based plasmonic lasers are not subjected to diffraction limitations, hence can operate below the photonic mode cut-off diameter of purely dielectric nanowire lasers.

Gold

JOINT FiO/LS

8:00 a.m.–10:15 a.m.
JTuA • Gravitational Wave Interferometers II
David H. Reitze; Univ. of Florida, USA, Presider

JTuA1 • 8:00 a.m. Invited

Next Generation Interferometers for Gravitational Wave Astronomy, *Rana Adhikari; Caltech, USA.* Kilometer scale interferometers (such as LIGO) are now being used to search for gravitational waves; fluctuations in space-time. I will describe the new generation of interferometric gravitational wave detectors and future prospects.

JTuA2 • 8:30 a.m.

210 W Single-Frequency Laser with 88% of Output Power in TEM_{00} Mode for Advanced LIGO, *Lutz Winkelmann, Oliver Puncken, Christian Veltkamp, Raphael Kluzik, Maik Frede, Joerg Neumann, Dietmar Kracht, Peter Weßels; Laser Zentrum Hannover e.V., Germany.* A solid-state laser for the next generation of gravitational wave detectors with 210W of single-frequency output power is presented. The measured TEM_{00} mode content, using a non-confocal ring cavity for beam analysis, was 88%.

Valley

FiO

8:00 a.m.–10:15 a.m.
FTuC • Optical Communication
Gee-Kung Chang; Georgia Tech, USA, Presider

FTuC1 • 8:00 a.m. Invited

Next-Generation Optical Access Networks, *Leonid Kazovsky[1], Shing-Wa Wong[1], She-Hwa Yen[1], Shinji Yamashita[2]; [1]Stanford Univ., USA, [2]Fujitsu Labs Ltd., Japan.* First-generation optical access networks have now been well-defined. This talk will focus on second- and third- generation networks including graceful evolution from single-wavelength to WDM and increasing integration of optical and wireless technologies.

FTuC2 • 8:30 a.m. Invited

Agile WDM Layer for FlexSelect™ Metro Optical Network, *Shan Zhong, Jean-Luc Archambault, Loudon Blair; Ciena Corp., USA.* This talk will introduce Ciena's FlexSelect™ architecture and share our vision on next generation service-converging metro optical network with enhanced agile WDM layer based on the multi-degree ROADM solutions and high-density agile interface.

California

FiO

8:00 a.m.–10:00 a.m.
FTuD • Novel Fiber Devices I
Jonathan Knight; Univ. of Bath, UK, Presider

FTuD1 • 8:00 a.m. Invited

Novel Fiber Lasers with Advanced Glasses and Fiber Designs, *Axel Schülzgen; Univ. of Arizona, USA.* We will discuss recent progress in combining microstructured fiber, highly-doped active glasses, and novel laser cavity designs to enhance the performance of very compact fiber lasers.

FTuD2 • 8:30 a.m.

Nearly Octave-Spanning Cascaded Four-Wave-Mixing Generation in Dispersion Optimized Highly Nonlinear Fiber, *Jose M. Chavez Boggio[1], Slaven Moro[1], Nikola Alic[1], Magnuss Karlsson[2], Joss Bland-Hawthorn[3], Stojan Radic[1]; [1]Univ. of California at San Diego, USA, [2]Chalmers Univ. of Technology, Sweden, [3]Univ. of Sydney, Australia.* Efficient generation of cascaded four-wave mixing using a dispersion flattened optical fiber is reported. The measured optical frequency comb (with 300 GHz spacing) spans over 900 nm.

For Fall Congress presentations on Tuesday, see pages 116-124.

Glen Ellen — JOINT FiO/LS

8:00 a.m.–10:00 a.m.
JTuB • Entanglement Generation and Measurement II
Paul Kwiat; Univ. of Illinois, USA, Presider

JTuB1 • 8:00 a.m. Tutorial

Efficient Algorithms for Quantum State and Process Tomography, *Andrew Doherty; Univ. of Queensland, Australia.* This talk will introduce numerical and analytical techniques of convex optimization. While these techniques have found wide application in quantum information, we will focus on applications to data analysis in quantum state and process tomography.

Andrew Doherty is a Senior Lecturer in Physics at the University of Queensland. He completed his Ph.D. under the supervision of Professor Dan Walls at the University of Auckland in 1999. From 2000–2003 he was a postdoctoral research at the California Institute of Technology and he moved to the University of Queensland in 2003. His research interests are in quantum measurement control and quantum information.

Atherton — FiO

8:00 a.m.–10:00 a.m.
FTuE • Fiber Optics Sensors
Ozdal Boyraz; Univ. of California at Irvine, USA, Presider

FTuE1 • 8:00 a.m.

Integrated Fiber Based Multimode Interference Bio/Chemical Sensor, *Jose G. Aguilar-Soto[1], Miguel A. Basurto-Pensado[2], Peng Zhang[3], Hyoung J. Cho[3], Patrick LiKamWa[4], Daniel A. May-Arrioja[1]; [1]INAOE, Mexico, [2]CIICAp, Univ. Autónoma del Estado de Morelos, Mexico, [3]Dept. of Mechanical, Materials and Aerospace Engineering, Univ. of Central Florida, USA, [4]CREOL, College of Optics and Photonics, Univ. of Central Florida, USA.* Here we designed, fabricated and tested a novel optical sensor for bio/chemical applications based on multimode interference (MMI) effects in a no-core multimode fiber that is integrated with single-mode fiber sections and PDMS microfluidic channels.

FTuE2 • 8:15 a.m.

Low Energy Type II Fiber Bragg Gratings, *Dan Grobnic, Christopher W. Smelser, Stephen J. Mihailov; Communications Res. Ctr. Canada, Canada.* Type II gratings are made with low energy ultrafast infrared pulses after the inscription of a type I grating that help coupling of the radiation during the type II exposure and lower the threshold.

FTuE3 • 8:30 a.m. Invited

Advances in Chemical and Biological Sensing Using Emerging Soft Glass Optical Fibers, *Yinlan Ruan, Heike Ebendorff-Heidepriem, Afshar V. Shahraam, Stephen Warren-Smith, Tanya Monro; Univ. of Adelaide, Australia.* Emerging subwavelength-core microstructured fibers provide new ways of interacting light with materials for sensing applications. Developments in the design, fabrication and application of these fibers for the sensitive-detection of chemicals and biomolecules will be reviewed.

Sacramento — LS

8:00 a.m.–10:00 a.m.
LSTuA • General Laser Science
Mike Barnes; Univ. of Massachusetts Amherst, USA, Presider

LSTuA1 • 8:00 a.m.

Coupling Efficiency of Hollow Optical Beams into Hollow-Core Fibers, *Francesco A. Narducci; Naval Air Systems Command, USA.* We experimentally and theoretically study the coupling efficiency of hollow optical beams to hollow-core fibers. The efficiency is compared to the coupling efficiency of Gaussian beams.

LSTuA2 • 8:15 a.m.

Light Switch for Positive and Negative Group Velocities, *T. Y. Abi-Salloum[1], Seth Meiselman[2], J. P. Davis[3], Francesco A. Narducci[3]; [1]Widener Univ., USA, [2]Drexel Univ., USA, [3]Naval Air Systems Command, USA.* We explore phenomena responsible for switching the group velocity of a probe between positive and negative regimes. We study a four-level N-Scheme in two distinct dressed states pictures. The presented study is supported by simulations.

LSTuA3 • 8:30 a.m.

Novel Matter-Wave Gyroscope via Vortex Superposition in BEC, *Kishore T. Kapale[1], Sulakshana Thanthvari[2], Jonathan P. Dowling[2]; [1]Western Illinois Univ., USA, [2]Louisiana State Univ., USA.* We present a novel matter-wave gyroscope employing a superposition of two counter-rotating vortices in Bose-Einstein condensates that can be generated using orbital angular momentum of light. We also discuss the sensitivity of such a device.

Piedmont — LS

8:00 a.m.–10:00 a.m.
LSTuB • Cavity Optomechanics I
Nergis Mavalvala; MIT, USA, Presider

LSTuB1 • 8:00 a.m. Invited

Cavity Optomechanics with Ions, *K. Vahala[1], M. Herrmann[2], S. Knünz[2], V. Batteiger[2], G. Saathoff[2], T. W. Hänsch[2], Th Udem[2]; [1]Caltech, USA, [2]Max-Planck-Inst. für Quantenoptik, Germany.* A trapped Mg^+ ion is laser cooled within a Paul trap, and is simultaneously excited using a continuous blue-detuned pump wave. The ion subsequently exhibits coherent oscillatory motion with a well-defined threshold.

LSTuB2 • 8:30 a.m. Invited

Preparation and Detection of a Mechanical Resonator Near the Ground State of Motion, *Keith Schwab; Cornell Univ., USA.* We have cooled the motion of a radio-frequency nanomechanical resonator by parametric coupling to a driven microwave frequency superconducting resonator and have observed occupation factors as low as <N>= 3.8 +/- 1.3. We expect to find the mechanical resonator in the quantum ground state of motion with probability 0.21. We have also identified three effects which limit further cooling and will comment on the prospect of producing colder states.

Hillsborough — LS

8:00 a.m.–10:00 a.m.
LSTuC • Ultrafast X-Ray Science III
Harry Ihee; KAIST, Republic of Korea, Presider

LSTuC1 • 8:00 a.m. Invited

Sub-Picosecond Intersystem Crossings and Structural Dynamics: Combined Ultrafast Optical and X-Ray Absorption Studies, *Majed Chergui; Lab of Ultrafast Spectroscopy, École Polytechnique Fédérale de Lausanne, Switzerland.* We will present different examples where the combination of optical and hard X-ray spectroscopies allowed us to obtain a complete picture of the dynamics of molecular processes in solutions.

LSTuC2 • 8:30 a.m. Invited

Structural Tracking of Chemical Reactions in Solution by Time-Resolved X-Ray Scattering, *Martin Meedom Nielsen; Nano-Science Ctr., Univ. of Copenhagen, Denmark.* Photo excitation of molecules creates transient structures and can initiate bimolecular reactions. Such processes have been tracked using optical pumping and picosecond X-ray scattering to probe key elements of transient structures in liquid environments

For Fall Congress presentations on Tuesday, see pages 116-124.

Empire | Crystal | Gold | Valley | California

FiO | JOINT FiO/LS | FiO

FTuA • 3-D Entertainment in the Marketplace—Continued

FTuA2 • 8:45 a.m. Tutorial

What Should We Know about Human Depth Perception in Constructing 3-D Displays? *Martin Banks; Univ. of California at Berkeley, USA.* A variety of perceptual issues arise in the use of stereoscopic displays including perceptual distortions, decreased visual performance and increased visual discomfort. I will discuss the causes of these effects and strategies for minimizing them.

Martin S. Banks is a Professor of Optometry, Vision Science, Psychology, and Neuroscience at the University of California at Berkeley. He is known for his research on human visual perception, particularly the perception of depth, and for his research on the integration of cues from different sensory organs. He was involved in the development of novel stereo displays that present nearly correct focus cues and other stereo displays that bypass the optics of the human eye. Professor Banks is a Fellow of the American Association for the Advancement of Science, Fellow of the American Psychological Society, Fellow of the Center for the Advanced Study of the Behavioral Sciences, recipient of the McCandless Award for Early Scientific Contribution, recipient of the Gottsdanker and Howard lectureships, the first recipient of the Koffka Award for Contribution in Perception and Development, and an Honorary Professor of the University of Wales, Cardiff.

FTuB • Plasmonic Emitters and Resonators—Continued

FTuB3 • 8:45 a.m.

Plasmonic Metal-Insulator-Metal Structures for Interaction with Erbium in Amorphous Silicon Nitride, *Yiyang Gong[1], Selçuk Yerci[2], Luca Dal Negro[2], Jelena Vučković[1]; [1]Stanford Univ., USA, [2]Boston Univ., USA.* We propose to use plasmonic modes in periodically patterned metal-insulator-metal structures to enhance emission from erbium doped silicon nitride. Enhancements of emission up to a factor of 2.3 are experimentally demonstrated.

FTuB4 • 9:00 a.m.

FDTD Simulation of Semiconductor Plasmonic Nano-Ring Laser Based on Realistic Semiconductor Gain Model, *Xi Chen[1], Bipin Bhola[2], Yingyan Huang[3], Seng-Tiong Ho[1]; [1]Northwestern Univ., USA, [2]Data Storage Inst., Singapore, [3]OptoNet. Inc, USA.* A nano-scale electrically pumped ring laser design is simulated using multi-level, multi-electron FDTD model. We discuss the regime where nano-ring laser is feasible in which the metal loss is compensated by semiconductor gain.

FTuB5 • 9:15 a.m.

Stimulated Emission in Microring Cavity with Gold Core, *J. K. Kitur[1], V. A. Podolskiy[2], M. A. Noginov[1]; [1]Norfolk State Univ., USA, [2]Oregon State Univ., USA.* We have demonstrated stimulated emission in microring cavity formed by dye-doped polymer deposited on a gold wire. The mode structure suggests that the stimulated emission originates from surface plasmon polaritons propagating at the gold-polymer interface.

JTuA • Gravitational Wave Interferometers II—Continued

JTuA3 • 8:45 a.m. Invited

GEO600 and Directions in Optics Related Research for Interferometric Gravitational Wave Detector, *Sheila Rowan; Univ. of Glasgow, UK.* This talk will discuss the design, status and plans for upgrades to the GEO 600 long-baseline interferometric gravitational wave detector.

JTuA4 • 9:15 a.m.

Adaptive Beam Shaping Using Photothermal Effects, *Muzammil A. Arain, William Z. Korth, Guido Mueller, David B. Tanner, David H. Reitze; Dept. of Physics, Univ. of Florida, USA.* We present an experimental demonstration of adaptive beam shaping via heat induced photo-thermal effects in optical elements. One application of the proposed system is for correction of astigmatic thermal aberrations in high power laser systems.

FTuC • Optical Communication—Continued

FTuC3 • 9:00 a.m.

Electronic Compensation of Optical Fiber Nonlinearity in on-off Keyed 40 Gb/s WDM Transmission Systems, *Nisar Ahmed, M. I. Hayee; Univ. of Minnesota at Duluth, USA.* We propose and analyze a novel technique to compensate fiber nonlinearity in on-off-keyed 40Gb/s long-haul WDM transmission systems. Our analysis shows that the proposed technique can increase the overall system margin by >1.0 dB.

FTuC4 • 9:15 a.m.

Minimization of Gain Error Due to Spectral Hole Burning Using HGC-EDFA with Generalized Dynamic Gain Range, *Júlio C R. F. de Oliveira[1], Adolfo F. Herbster[1,2], Juliano R. F. Oliveira[1], Aldário C. Bordonalli[2]; [1]CPqD Foundation, Campinas Mogi-Mirim, Brazil, [2]Univ. of Campinas, Brazil.* A method to minimize gain error due to SHB based on HGC-EDFA is demonstrated. A simultaneous pump and VOA attenuation control scheme provide SHB reduction control and enable add/drop of any number of channels (C-Band).

FTuD • Novel Fiber Devices I—Continued

FTuD3 • 8:45 a.m.

Compact MOFA System: A ~1-mJ, 1-ns Output from a Specialty Fiber at a Multi-kHz Repetition Rate, *Alexander V. Kir'yanov[1,2], Sergey M. Klimentov[1,3], Igor V. Mel'nikov[1,4]; [1]Optolink Ltd., Russian Federation, [2]Ctr. de Investigaciones en Óptica, Mexico, [3]A M Prokhorov General Physics Inst., Russian Acad. of Sciences, Russian Federation, [4]High Q Labs, Inc., Canada.* We present a compact laser system made of a hybrid Q-switched Nd^{3+}:YAG/Cr^{4+}:YAG microchip laser seeding an Yb-doped specialty-fiber amplifier with gain factor as high as 20-25 dB achieved for nanosecond pulses at 1-10-kHz repetition rate.

FTuD4 • 9:00 a.m.

Enhanced Soliton Self-Frequency Shift in a Longitudinally Varying Taper, *Alexander C. Judge[1], Ole Bang[2], Benjamin J. Eggleton[1], Boris T. Kuhlmey[1], Eric C. Mägi[1], Ravi Pant[1], C. Martijn de Sterke[1]; [1]Univ. of Sydney, Australia, [2]Technical Univ. of Denmark, Denmark.* We propose a method for the enhancement of the soliton self-frequency shift in a tapered PCF with a carefully designed waist diameter profile which optimizes the dispersion and nonlinearity at the soliton wavelength.

FTuD5 • 9:15 a.m.

All-Fiber Isolator Based on Faraday Rotation, *Lei Sun[1,2], Shibin Jiang[3], Jonathan D. Zuegel[2], John R. Marciante[1,2]; [1]Inst. of Optics, Univ. of Rochester, USA, [2]Lab for Laser Energetics, Univ. of Rochester, USA, [3]AdValue Photonics Inc., USA.* An all-fiber isolator with optical isolation of 18 dB is demonstrated. The fiber Faraday rotator uses 56-wt% terbium-doped silica fiber, and the fiber polarizers are Corning SP1060 single-polarization fiber.

For Fall Congress presentations on Tuesday, see pages 116-124.

JTuB • Entanglement Generation and Measurement II—Continued

JTuB2 • 8:45 a.m.
Evaluation of an Optimal Experiment Design Protocol Based on Convex Optimization for Photonic State Tomography, *Manuel de la Cruz Gutierrez[1,2], Ian A. Walmsley[1]; [1]Clarendon Lab, Oxford Univ., UK, [2]Univ. of Houston, USA.* We implemented a model-based optimized method of data acquisition for two-qubit tomography both theoretically and experimentally. Limitations of the method's results and their potential for larger qubit systems were also established.

JTuB3 • 9:00 a.m.
Improved Linear Optic Bell-State Measurement Using Ancillary Photons, *Warren Grice; Oak Ridge Natl. Lab, USA.* It is not possible to construct a linear optic device that unambiguously discriminates all four Bell states. However, the Bell-state measurement efficiency can be made arbitrarily close to unity by introducing additional entangled photons.

JTuB4 • 9:15 a.m.
Spatial Light Modulators to Measure Entanglement between Spatial States, *Barry Jack[1], Jonathan Leach[1], Jacquiline Romero[1], Sonja Franke-Arnold[1], Stephen Barnett[2], Miles Padgett[1]; [1]Univ. of Glasgow, UK, [2]Univ. of Strathclyde, UK.* We use spatial light modulators to observe single-photon, non-trivial superpositions of orbital angular momentum (OAM) states. Using the analogy between polarisation and two-dimensional OAM subspaces, we also measure entanglement between these complex modal superpositions.

FTuE • Fiber Optics Sensors—Continued

FTuE4 • 9:00 a.m.
Portable Photonic Crystal Fiber Sensor Based on Surface Enhanced Raman Scattering (SERS), *Chao Shi[1], Claire Gu[1], Rebecca Newhouse[1], Jin Zhang[1], Kazuki Tanaka[2], Bin Chen[2]; [1]Univ. of California at Santa Cruz, USA, [2]NASA Ames Res. Ctr., USA.* A molecular sensing system is theoretically analyzed and experimentally demonstrated with a hollow core photonic crystal fiber surface enhanced Raman scattering (SERS) probe to achieve high sensitivity and a portable Raman spectrometer to achieve flexibility.

FTuE5 • 9:15 a.m.
Antiresonant-Guiding Photonic Crystal Fibers for Refractive Index Gradients Sensing, *Roshni Biswas, Mikhail Kandel, Gaurav Mehta, H. Kulhandjian, Aleksandr Verevkin, Adly T. Fam, Natalia M. Litchinitser; SUNY Buffalo, USA.* We propose, design and experimentally demonstrate a novel, simple, distributed refractometric sensor based on unique spectral properties of anti-resonant-guiding photonic crystals fibers for measuring temperature gradients. Design optimization and potential applications will be discussed.

LSTuA • General Laser Science—Continued

LSTuA4 • 8:45 a.m.
Multipartite Quantum Nonlocality Using Functional Bell Inequalities, *Qiong Y. He[1], Eric G. Cavalcanti[2], Margaret D. Reid[1], Peter D. Drummond[1]; [1]Ctr. for Quantum-Atom Optics, Swinburne Univ., Australia, [2]Ctr. for Quantum Dynamics, Griffith Univ., Australia.* We show that arbitrary functions of continuous variables can be used to generate tests of local hidden variable theories. The effect of non-ideal detectors and noise is included, revealing that optimized functional inequalities are robust.

LSTuA5 • 9:00 a.m.
Diagrammatic Semiclassical Laser Theory, *Oleg Zaitsev[1], Lev Deych[2]; [1]Physics Inst., Univ. of Bonn, Germany, [2]Physics Dept., Queens College, CUNY, USA.* We derive semi-classical laser equations valid in all orders of nonlinearity. A diagrammatic representation allows us to take into account a weak effect of population pulsations in a controlled way, while treating the nonlinearity exactly.

LSTuA6 • 9:15 a.m.
Behavior of Lasers in the Small Particle Number Limit, *Kaushik Roy Choudhury, A. F. J. Levi; Univ. of Southern California, USA.* Master equations and random walk methods are used to study the dominant role of quantum fluctuations in determining the steady-state and temporal-behavior of small lasers. Suppression of lasing threshold and de-pinning of carriers is observed.

LSTuB • Cavity Optomechanics I—Continued

LSTuB3 • 9:00 a.m.
Optomechanical RF Signal Processing, *Mani Hossein-Zadeh[1], Kerry Vahala[2]; [1]Ctr. for High Technology Materials, Univ. of New Mexico, USA, [2]Caltech, USA.* We have explored the applications of optomechanical oscillator (OMO) as an RF signal-processing element. RF frequency-conversion and injection locking in the optomechanical domain are demonstrated in the context of a microtoroidal OMO.

LSTuB4 • 9:15 a.m.
Mode Splitting of a Nanomechanical Oscillator under Parametric Interactions in a Cavity, *Sumei Huang, Girish S. Agarwal; Oklahoma State Univ., USA.* We show how a type I optical parametric amplifier inside the cavity can aid the normal mode splitting of the movable mirror coupled with the optical cavity in the resolved sideband regime.

LSTuC • Ultrafast X-Ray Science III—Continued

LSTuC3 • 9:00 a.m. Invited
Ultrafast Photochemical Dynamics in Solution, *Munira Khalil; Univ. of Washington, USA.* This talk will outline the use of X-ray absorption spectroscopy (XAS) for probing electronic and geometric changes dynamics following ultrafast charge transfer processes in transition metal complexes in solution.

For Fall Congress presentations on Tuesday, see pages 116-124.

Empire	Crystal	Gold	Valley	California
FiO		JOINT FiO/LS	FiO	

FTuB • Plasmonic Emitters and Resonators—Continued

FTuB6 • 9:30 a.m.
Design and Implementation of Plasmonic Resonators with Sub-Radiant and Fano Modes, *Yannick Sonnefraud[1], Niels Verellen[2,3], Heidar Sobhani[4], Feng Hao[4], Victor Moshchalkov[3], Pol Van Dorpe[2], Peter Nordlander[4], Stefan A. Maier[1]; [1]Imperial College London, UK, [2]IMEC, Belgium, [3]Inst. for Nanoscale Physics and Chemistry, Katholieke Univ. Leuven, Belgium, [4]Rice Univ., USA.* Design principles and implementations of plasmonic nanocavities sustaining sub-radiant and Fano-type modes are described. These structures show high sensing figures of merit and could form a basis for nanoscale optical sensors and metamaterials.

FTuB7 • 9:45 a.m.
Strong Mode Coupling in Hybrid Plasmonic-Photonic Microresonators Using Momentum Matching, *Maysamreza Chamanzar, Mohammad Soltani, Siva Yegnanarayanan, Babak Momeni, Ali Adibi; Georgia Tech, USA.* Efficient coupling to plasmonic ring resonators through the whispering-gallery mode of a SiN_x micro-disk resonator is proposed. The structure has a relatively high-Q hybrid mode with the large sensitivity advantage of surface plasmon polaritons.

JTuA • Gravitational Wave Interferometers II—Continued

JTuA5 • 9:30 a.m. Invited
Japanese Gravitational Wave Detectors: LCGT and DECIGO, *Seiji Kawamura, LCGT Collaboration, DECIGO Working Group; Natl. Astronomical Observatory of Japan, Japan.* The current status of LCGT, the Japanese 3km cryogenic gravitational wave detector to be built in the Kamioka mine, and DECIGO, the Japanese future space gravitational wave antenna, will be described in the talk.

JTuA6 • 10:00 a.m.
A White Light Cavity as a Non-Invasive, Compound Mirror for High Sensitivity, Broadband Signal Recycling in a Gravitational Wave Detector, *Mary Salit, Honam Yum, Selim M. Shahriar; Northwestern Univ., USA.* We describe a non-invasive design of a white light cavity acting as a compound mirror for signal recycling, yielding much higher sensitivity and bandwidth than what is achievable in advanced LIGO for gravitational wave detection.

FTuC • Optical Communication—Continued

FTuC5 • 9:30 a.m.
Orbital Angular Momentum Distribution in a Multi-Vortex Free-Space Optical Link, *Jaime A. Anguita; Univ. of the Andes, Chile.* In a vortex-multiplexed free-space optical link affected by turbulence, orbital angular momentum is transferred to adjacent states creating undesirable crosstalk. The underlying distributions governing crosstalk and the correlation between crosstalk events are studied.

FTuC6 • 9:45 a.m.
Comparison of Spreading of Beams of Different Kinds in Free Space and in the Turbulent Atmosphere, *Anabil Chaudhuri; Univ. of Rochester, USA.* Depending on the beam type, a criterion is used to estimate the distance of propagation up to which a beam preserves its beam like form both in free space and in the turbulent atmosphere.

FTuC7 • 10:00 a.m.
Effect of Splice Losses on Chromatic Dispersion Mapping along Dispersion Compensated Optical Transmission System, *Mirza Imran Baig[1], Faisal ul Hoda[1], Shinya Sato[2], Masaaki Imai[2]; [1]Sir Syed Univ. of Engineering and Technology, Pakistan, [2]Muroran Inst. of Technology, Japan.* A new formulation has been proposed for the mapping of chromatic dispersion (CD) along a dispersion compensated optical transmission system that enhanced the correction factor, which then leads to an improvement in the measurement results.

FTuD • Novel Fiber Devices I—Continued

FTuD6 • 9:30 a.m.
Optofluidic Tuning of MMI Bandpass Filter, *Jose E. Antonio-Lopez, Ivan Hernandez-Romano, Daniel A. May-Arrioja, Jose J. Sanchez-Mondragon, Daniel A. May-Arrioja; Inst. Natl. de Astrofísica, Óptica y Electrónica, Mexico.* An optofluidically tunable multimode interference (MMI) bandpass filter is demonstrated. This scheme allows for a tuning range of almost 40 nm, which can be made continuous by increasing the liquid level around the multimode fiber.

FTuD7 • 9:45 a.m.
High Temperature Stable Fiber Bragg Gratings in Hydrogen Loaded All-Silica Core Fiber, *Christopher Smelser, Dan Grobnic, Stephen Mihailov; Communications Res. Ctr. Canada, Canada.* High temperature stable fiber Bragg gratings are demonstrated in fluorine doped all-silica core fiber. The grating morphology suggests that the presence of hydrogen reduces the threshold of type II damage.

9:00 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*

For Fall Congress presentations on Tuesday, see pages 116-124.

Glen Ellen	Atherton	Sacramento	Piedmont	Hillsborough
JOINT FiO/LS	FiO	LS		

JTuB • Entanglement Generation and Measurement II—Continued

JTuB5 • 9:30 a.m.
High-Efficiency Single Photon Collection from Trapped Barium Ions, *Nathan Kurz, Gang Shu, Matthew R. Dietrich, Boris B. Blinov; Univ. of Washington, USA.* We have incorporated a high numerical aperture spherical mirror and aspherical corrector with a barium ion trap to improve photon collection efficiency by more than an order of magnitude for generation of ion-photon entanglement.

JTuB6 • 9:45 a.m.
Improving Ion Fluorescence Collection by Integrating High Numerical Aperture Spherical Mirror into Ion Trap, *Gang Shu, Nathan Kurz, Matthew R. Dietrich, Boris B. Blinov; Dept. of Physics, Univ. of Washington, USA.* We integrated a high N.A. spherical mirror into a Paul trap and improved its image by special aspheric correctors. We designed a trap based on metallic spherical mirror which greatly increases the ion-photon/ion-ion entanglement efficiency.

FTuE • Fiber Optics Sensors—Continued

FTuE6 • 9:30 a.m.
Simultaneous Measurement of Strain and Temperature Using an FBG Written in Erbium Doped Fiber, *Umesh K. Tiwari[1], K. Thyagarajan[2], M. R. Shenoy[2], Nahar Singh[1], Pawan Kakur[1]; [1]Central Scientific Instruments Organization, India, [2]Indian Inst. of Technology, India.* Fabrication and experimental characterization of a novel FBG sensor that can simultaneously measure strain and temperature is presented. It is shown that the strain sensitivity is 0.8 pm/με and temperature sensitivity is 12 pm/0C.

FTuE7 • 9:45 a.m.
End-of-Fiber Long-Period Fiber Grating-Based Sensors, *Michael R. Hutsel, Thomas K. Gaylord; Georgia Tech, USA.* Carbon-dioxide-laser-induced long-period fiber gratings are fabricated near fiber end-faces and assessed for use as sensors. The effects of changing the surrounding refractive index are characterized. A solvent vapor sensor is fabricated and experimentally evaluated.

LSTuA • General Laser Science—Continued

LSTuA7 • 9:30 a.m.
Operational Behavior of an Injection-Locked Quantum-Dash Fabry-Perot Laser at Zero-Detuning, *Michael C. Pochet[1], Nader A. Naderi[1], Nathan B. Terry[2], Vassilios Kovanis[2], Luke F. Lester[1]; [1]Ctr. for High Technology Materials, Univ. of New Mexico, USA, [2]US AFRL, USA.* The behavior of a zero-detuned injection-locked Quantum-Dash Fabry-Perot laser under varied injected field ratios is investigated theoretically and experimentally. A low slave laser line-width enhancement factor is found to inhibit chaotic/Period-2 operation.

LSTuA8 • 9:45 a.m.
A Self-Injection Locked Unidirectional Diode Pumped Solid State Ring Laser Cavity, *Ronald W. Stites, Ken O'Hara; Pennsylvania State Univ., USA.* We present a novel single-mode unidirectional ring laser. By injecting a small amount of power from one beam path from the output coupler back into the other, unidirectional operation is forced, eliminating many intracavity elements.

LSTuB • Cavity Optomechanics I—Continued

LSTuB5 • 9:30 a.m. Invited
Cooling Acoustic Oscillators with Electromagnetic Parametric Transducers and Prospects of Measuring below the Standard Quantum Limit of Displacement, *Michael Tobar; Univ. of Western Australia, Australia.* We describe high-Q parametric transducers developed at the University of Western Australia for precise displacement measurements. This includes sapphire and niobium transducers, with the potential to reach the Standard Quantum Limit and Quantum Non Demolition.

LSTuC • Ultrafast X-Ray Science III—Continued

LSTuC4 • 9:30 a.m. Invited
Ultrafast Soft X-Ray Spectroscopy of Spin-Crossover Dynamics in Solvated Transition-Metal Complexes, *Nils Huse[1], Ha Na Cho[1,2], Tae-Kyu Kim[2], Lindsey Jamula[3], James McCusker[3], Robert Schoenlein[4,1]; [1]Chemical Sciences Div., Lawrence Berkeley Natl. Lab, USA, [2]Pusan Natl. Univ., Republic of Korea, [3]Michigan State Univ., USA, [4]Advanced Light Source, Lawrence Berkeley Natl. Lab, USA.* We report the first femtosecond time-resolved soft X-ray measurements of solvated transition-metal complexes. L-edge spectroscopy directly reveals dynamic changes in ligand field splitting of 3-D-orbitals associated with the spin transition, and mediated by ligand-bond changes.

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*

For Fall Congress presentations on Tuesday, see pages 116-124.

Empire	Crystal	Gold	Valley	California
FiO				

10:30 a.m.–12:00 p.m.
FTuF • 3-D Capturing, Visualization and Displays

Martin Banks; Univ. of California at Berkeley, USA, Presider

FTuF1 • 10:30 a.m. Invited

Three-Dimensional Sensing, Visualization, and Display by Integral Imaging, *Bahram Javidi[1], Manuel Martinez-Corral[2], Adrian Stern[3], Edward Watson[4]; [1]Univ. of Connecticut, USA, [2]Univ. of Valencia, Spain, [3]Ben Gurion Univ. of the Negev, Israel, [4]AFRL, USA.* This invited paper presents an overview of advances in 3-D sensing, visualization, and display by integral imaging. Theoretical and experimental results will be presented. Various applications and technical challenges will be discussed.

FTuF2 • 11:00 a.m. Invited

Development of Integral Images, *Pingfan Wu, Douglas S. Dunn, Robert L. Smithson, Steven J. Rhyner; 3M Corp., USA.* Development of Integral Images 3M has invented integral image products that have true 3-D appearance and exhibit full motion parallax. We will present the optics of the materials and analysis of image quality.

FTuF3 • 11:30 a.m. Invited

3-D TV Based on Integral Method Using Extremely High-Resolution Video System, *Masahiro Kawakita, Jun Arai, Fumio Okano; NHK Science and Technical Res. Labs, Japan.* We developed integral 3-D TV using extremely high-resolution video that had a resolution of 7680 x 4320 pixels. The resolution of the displayed 3-D images was four times higher than that of the previous system.

10:30 a.m.–11:45 a.m.
FTuG • Wavefront Design for Information Transport and Sensing I

Greg Gbur; Univ. of North Carolina at Charlotte, USA, Presider

FTuG1 • 10:30 a.m. Invited

Modulation of Coherence and Polarization Properties of Beams for Communications and LIDARs Operating in Atmospheric Turbulence, *Olga Korotkova; Univ. of Miami, USA.* We will demonstrate the ability of such statistical properties of light sources as states of coherence and polarization to improve performance of LaserCom and LIDAR systems operating through turbulent atmosphere.

FTuG2 • 11:00 a.m. Invited

Vectographic Computer-Generated Optical Elements, *Grover A. Swartzlander, Jr.; Chester F. Carlson Ctr. for Imaging Science, RIT, USA.* A new class of computer designed optical element is introduced. These thin, light weight elements are neither diffractive nor refractive. Achromatic elements such as optical vortices lenses, and highly chromatic elements are possible.

FTuG3 • 11:30 a.m.

Scintillation of Nonuniformly Polarized Beams in Atmospheric Turbulence, *Yalong Gu[1], Olga Korotkova[2], Greg Gbur[1]; [1]Univ. of North Carolina at Charlotte, USA, [2]Univ. of Miami, USA.* The scintillation properties of a class of non-uniformly polarized beams propagating in atmospheric turbulence are numerically investigated. They are demonstrated to have appreciably smaller scintillation than comparable beams of uniform polarization.

10:30 a.m.–12:00 p.m.
FTuH • Diffractive and Holographic Optics I

Presider to Be Announced

FTuH1 • 10:30 a.m. Invited

Dynamic Holograms, *Guoqiang Li; Univ. of Missouri at St. Louis, USA.* Recent work on dynamic holograms is reviewed. We report photorefractive polymeric hologram with subsecond response time and two-hour decay time which can be applied for rewritable 3-D display. The recording method is simple yet efficient.

FTuH2 • 11:00 a.m.

A 3CCD Imaging System Based on Holographic Gratings, *Selim M. Shahriar, Xue Liu, Shih Tseng; Northwestern Univ., USA.* We present a 3CCD imaging system based on multiplexed volume holographic gratings. The recombined image from the monochromatic images taken by individual CCD's shows the ability of such a system to perform high quality imaging.

FTuH3 • 11:15 a.m.

Self-Assembled Diffraction Grating for Microfluidic Velocimetry, *Antony Orth, Ethan Schonbrun, Kenneth B. Crozier; Harvard Univ., USA.* A self-assembled elastomeric diffraction grating is used to perform flow rate measurements in micro-fluidic channels. The simple fabrication technique alleviates the need for multi-step lithographic procedures while conserving optical access via the bottom wall.

FTuH4 • 11:30 a.m.

Excitation of Surface Plasmon Polaritons and Leaky Modes with Dielectric Gratings over Metallic Substrates, *Mehrdad Shokooh-Saremi, Robert Magnusson; Univ. of Texas at Arlington, USA.* A dielectric grating on a metallic substrate permits excitation of both surface-plasmon polaritons (SPPs) and resonant leaky-modes. We compare the spectral characteristics and local field structure of the excited classical SPPs and mixed leaky-mode SPPs.

10:30 a.m.–12:00 p.m.
FTuI • All-Optical Signal Processing I

Roderick P. Webb; Tyndall Natl. Inst., Univ. College Cork , Ireland, Presider

FTuI1 • 10:30 a.m. Invited

Polychromatic High Speed Sampling, *Stojan Radic; Univ. of California at San Diego, USA.* Recent advances in parametric devices have led to fundamental changes with respect to ultrafast waveform processing. We discuss physics, construction and basic implications stemming from one's ability to perform polychromatic sampling for the first time.

FTuI2 • 11:00 a.m.

Ultrafast Optical Sampling Using Nondegenerate Two-Photon Absorption in a GaAs Photodiode, *Paveen Apiratikul, Thomas E. Murphy; Univ. of Maryland at College Park, USA.* We demonstrate optical sampling based on non-degenerate two-photon absorption in a GaAs photodiode, using sampling pulses below the half-bandgap. The system is capable of resolving a quasi- 2 Tb/s signal with low background photocurrent.

FTuI3 • 11:15 a.m.

Raman-Assisted Fiber Optical Parametric Amplification (RAFOPA): Numerical Simulations and Experimental Results, *Cyril L. Guintrand, Jean Toulouse; Lehigh Univ., USA.* We investigate theoretically and experimentally the RAOPA. Performances of amplification and wavelength conversion are discussed. We demonstrate several benefits compare to simple OPA, such as gain and bandwidth increase, spectrum tailoring and power distribution flexibility.

FTuI4 • 11:30 a.m. Invited

Advances in High-Confinement Fibers, *Msaaki Hirano; Sumitomo Electric Industries, Ltd., Japan.* Recent progresses on silica-based high-confinement fiber as platform of various nonlinear processings are presented. Important characteristics for applying the fibers to nonlinear devices including nonlinear coefficient, bend loss and chromatic dispersions are discussed.

10:30 a.m.–12:00 p.m.
FTuJ • Anderson Localization II

Andrey A. Chabanov; Univ. of Texas at San Antonio, USA, Presider

FTuJ1 • 10:30 a.m. Invited

Probing Localization in Absorbing Systems via Loschmidt Echos, *Tsampikos Kottos[1,2]; [1]Wesleyan Univ., USA, [2]Max-Planck-Inst., Germany.* Using echo dynamics we probe diffusive or localized random media even in the presence of absorption. Our theory, based on a random matrix approach, is supported by experimental measurements with disordered quasi-one-dimensional waveguides.

FTuJ2 • 11:00 a.m.

Electromagnetic Modes and Dynamics of Localized Waves, *Jing Wang, Azriel Genack; Dept. of Physics, Queens College, CUNY, USA.* We have found the central frequencies, linewidths and field speckle patterns in transmission for quasimodes of random media. We study the time evolution of modes and correlation using time-frequency analysis.

FTuJ3 • 11:15 a.m.

Universal Mesoscopic Statistics and the Localization of Light, *Jongchul Park[1], Sheng Zhang[1,2], Samuel Gilman[1], Azriel Genack[1]; [1]Queens College, CUNY, USA, [2]Chiral Photonics Inc., USA.* The probability distribution of intensity through layered media changes from one dimensional to a mixture of a mesoscopic function of a single parameter, the "statistical conductance," and a distribution of intensity for Gaussian waves.

FTuJ4 • 11:30 a.m. Invited

Quantum Optics of Random Media, *Sergey E. Skipetrov; CNRS, Univ. Joseph Fourier, France.* We study quantum effects in multiple scattering of light in a random medium. A link between photocount statistics and Anderson localization is established. Novel ways of performing diffusing-wave spectroscopy of random media are proposed.

For Fall Congress presentations on Tuesday, see pages 116-124.

FiO

LS

10:30 a.m.–12:00 p.m.
FTuK • High Peak Power Laser Technology II
David H. Reitze; Univ. of Florida, USA, Presider

FTuK1 • 10:30 a.m. Invited
Status of the National Ignition Facility, *Edward I. Moses; Lawrence Livermore Natl. Lab, USA.* I will discuss the current status of NIF and NIF capabilities including demonstrating fusion, new opportunities in astrophysics and other areas of high energy density science, and LIFE, the near-term goal of clean fusion energy.

FTuK2 • 11:00 a.m. Invited
The Texas Petawatt Laser and Technology Development toward an Exawatt Laser, *Todd Ditmire; Univ. of Texas at Austin, USA.* We will report on the performance of the Texas Petawatt Laser and the science program we are pursuing on this system. We will also discuss how this technology might scale to an Exawatt-class laser.

FTuK3 • 11:30 a.m.
Generation of Sub-Three-Cycle, 16-TW Light Pulses through Noncollinear OPCPA, *Daniel Herrmann[1], Raphael Tautz[1], Laszlo Veisz[1], Franz Tavella[2], Karl Schmid[1], Christopher Sears[1], Vladimir Pervak[3], Ferenc Krausz[1,3]; [1]Max-Planck Inst. für Quantenoptik, Germany, [2]HASYLAB/DESY, Germany, [3]Ludwig-Maximilian-Univ. München, Germany.* We present a 16-TW (7.9 fs, 130 mJ) non-collinear optical parametric chirped-pulse amplification system. This unique source can serve as seed source for PW-class lasers and by itself allows for new experiments in high-field physics.

10:30 a.m.–12:00 p.m.
FTuL • Molecular Imaging and Nanomedicine
Michael J. Levene; Yale Univ., USA, Presider

FTuL1 • 10:30 a.m. Invited
Molecular Probes for Microendoscopy, *Chris Contag; Stanford Univ., USA.* Achieving cellular resolution and molecular specificity is the objective of *in vivo* molecular microensdoscopy. This requires co-development of optical technologies with molecular probes. We have identified unique peptides that provide molecular contrast for miniaturized confocal microscopes.

FTuL2 • 11:00 a.m.
Real-Time Phase-Free and Background-Free Detection of Nanoparticles and Viruses, *Anirban Mitra, Bradley Deutsch, Filipp Ignatovich, Lukas Novotny; Univ. of Rochester, USA.* We implement phase-sensitive optical detection and characterization of nanoparticles. The elimination of the phase contribution to the detected signal helps improve the measured particle size accuracy and resolution, compared to standard interferometric techniques.

FTuL3 • 11:15 a.m.
***In vivo* Imaging of Targeted Drug Delivery to Tumors Based on Fluorescence Resonance Energy Transfer and Optical Diffusion Tomography**, *Vaibhav Gaind, Kevin J. Webb, Sumith A. Kularatne, Philip S. Low; Purdue Univ., USA.* Experimental results for imaging a model for targeted anti-cancer drug delivery to a tumor in a mouse using fluorescence resonance energy transfer (FRET) and optical diffusion tomography (ODT) are presented.

FTuL4 • 11:30 a.m. Invited
Biomimetic Strategies for Modification of Surfaces with Passivating and Targeting Moieties, *Phillip B. Messersmith; Northwestern Univ., USA.* The use of nanoparticles in medicine requires great attention to surface properties due to the high surface areas of nanoparticles. In this talk I will describe biologically inspired strategies for controlling bio-interfacial phenomena at surfaces.

10:30 a.m.–12:00 p.m.
LSTuD • Photophysics of Quantum Dots and Nanostructures I
Kelly J. Gaffney; SLAC Natl. Accelerator Lab, Stanford Univ., USA, Presider

LSTuD1 • 10:30 a.m. Invited
Strong Coupling of Propagating Laser Light to Single Emitters: From Absorption to Stimulated Emission, *Vahid Sandoghdar; ETH Zurich, Switzerland.* Strong coupling of laser light to an emitter will be discussed in different contexts, ranging from absorption spectroscopy of single quantum dots at room temperature and stimulated emission of single dye molecules at cryogenic temperatures.

LSTuD2 • 11:00 a.m. Invited
Single Quantum Dots for Probing Local Environments, *Haw Yang; Princeton Univ., USA.* The intermittent emission of individual quantum dots makes it challenging to probe time-dependent changes. We explain strategies to overcome these difficulties and discuss using them as ratiometric resonance energy transfer-based probes and as temperature sensors.

LSTuD3 • 11:30 a.m.
Temperature Dependence of the Polarization and Linewidth of the Optical Transitions of Single Nitrogen-Vacancy Centers in Diamond, *Kai-Mei C. Fu[1], Charles Santori[1], Paul E. Barclay[1], Lachlan J. Rogers[2], Neil B. Manson[2], Raymond G. Beausoleil[1]; [1]Hewlett-Packard Labs, USA, [2]Australian Natl. Univ., Australia.* Polarization and photoluminescence excitation spectroscopy are used to measure the nitrogen-vacancy center optical transition polarization and linewidth as a function of temperature. Finite relaxation and line-broadening is observed even at temperatures below 25~K.

10:30 a.m.–12:00 p.m.
LSTuE • Cavity Optomechanics II
Kerry Vahala; Caltech, USA, Presider

LSTuE1 • 10:30 a.m. Invited
Control and Sensing of Ultracold Atoms and Molecules by Nanomechanical Cantilevers, *Pierre Meystre; Univ. of Arizona, USA.* We illustrate the potential of cavity optomechanics (COM) for control and sensing in two examples: a bi-stable configuration that controls the many-body state of ultra-cold atoms; and the quantum limit of COM-based inertial mass sensors.

LSTuE2 • 11:00 a.m. Invited
Optomechanics of Phononic-Photonic Crystal Defect Cavities, *Matt Eichenfield, Jasper Chan, Ryan M. Camacho, Kerry J. Vahala, Oskar J. Painter; Caltech, USA.* We present the theory and experimental realization of localized and strongly coupled optical and acoustic modes in periodic nanostructures. Properties of localized phonons with Gigahertz frequencies and sub-picogram masses are studied via all-optical measurements.

LSTuE3 • 11:30 a.m. Invited
Sensing Nanomechanical Motion with a Shot-Noise Limited Microwave Cavity Interferometer, *Konrad W. Lehnert, John D. Teufel, Tobias Donner, Jennifer W. Harlow, Manuel A. Castellanos-Betran; JILA, NIST, Univ. of Colorado, USA.* We measure the motion of a nano-mechanical oscillator with precision beyond the standard quantum limit, by using a microwave interferometer that operates near the shot-noise limit.

10:30 a.m.–12:00 p.m.
LSTuF • Micro- and Nanofluidics III
Paul Bohn; Univ. of Notre Dame, USA, Presider

LSTuF1 • 10:30 a.m. Invited
Single Molecule Tracking as a Probe of Free Volume Transitions in Stimulus-Responsive Polymers--Do Single Molecules Behave Like Caribou? *Lindsay C. C. Elliott[1], Paul Bohn[2]; [1]Univ. of Illinois at Urbana-Champaign, USA, [2]Univ. of Notre Dame, USA.* Actively-switchable transport can be achieved in stimulus-responsive polymer brushes. Single molecule trajectories are used to understand local diffusion and, in turn, to study the polymer free volume distribution.

LSTuF2 • 11:00 a.m.
Quasi-Continuous Fiber Optic Liquid Level Sensor, *Syed H. Murshid; Florida Inst. of Technology, USA.* A quasi-continuous liquid level sensor that exploits changes in reflection upon contact with a target fluid has been successfully developed and tested for a host of liquids including liquid nitrogen, oils and boiling water.

LSTuF3 • 11:15 a.m.
An FPGA-Based Anti-Brownian Electrokinetic Trap for Studying Single Molecules in Solution, *Quan Wang, Alexandre Fürstenberg, Samuel Bockenhauer, W. E. Moerner; Stanford Univ., USA.* We have designed and implemented an Anti-Brownian ELectrokinetic (ABEL) trap on an FPGA platform, with programmable feedback algorithms and online tunable trapping parameters. Trapping of sub-10nm bio-molecules for seconds in buffer is achieved.

LSTuF4 • 11:30 a.m. Invited
Micro- and Nanofluidics for Single Biomolecule Analysis, *Yoshinobu Baba; Nagoya Univ., Japan.* I will describe real-time monitoring of an interaction between a single DNA and an enzyme molecule, an atto litre chamber for single enzymatic molecular reaction characterization, and single molecular trafficking analysis in a single cell.

For Fall Congress presentations on Tuesday, see pages 116-124.

FTuF • 3-D Capturing, Visualization and Displays—Continued

FTuH • Diffractive and Holographic Optics I—Continued

FTuH5 • 11:45 a.m.
Binary Diffractive Element for Linearizing Sinusoidal Scanning: Interference Approach Implementation, *Bahareh Haji-Saeed[1], Jed Khoury[1], Charles L. Woods[1], John Kierstead[2]; [1]AFRL, Sensors Directorate, USA, [2]Solid State Scientific Corp., USA.* In this paper we test and characterize our previously designed and fabricated optical corrective element with zooming capability for converting nonlinear sinusoidal scanning to linear scanning.

FTuI • All-Optical Signal Processing I—Continued

FTuJ • Anderson Localization II—Continued

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)*

NOTES

For Fall Congress presentations on Tuesday, see pages 116-124.

FiO

FTuK • High Peak Power Laser Technology II—Continued

FTuK4 • 11:45 a.m.
Generation of 100-J Sub-Picosecond Laser Pulse from High Energy Nd:Glass Chirped Pulse Amplification System, *Xudong Xie, Qihua Zhu, Xiaoming Zeng, Xiao Wang, Xiaojun Huang, Kainan Zhou, Yanlei Zuo, Feng Jing, Haiwu Yu; Res. Ctr. of Laser Fusion, China.* We demonstrated high energy broadband chirped pulse amplification at Nd:glass amplifiers system. Seed pulse generated by OPA was amplified up to 168J with 5.5nm and recompressed to 710 fs by tiled gratings compressor.

FTuL • Molecular Imaging and Nanomedicine—Continued

LS

LSTuD • Photophysics of Quantum Dots and Nanostructures I—Continued

LSTuD4 • 11:45 a.m.
Single Quantum Dot Spectroscopy via Non-Resonant Dot-Cavity Coupling, *Arka Majumdar[1], Dirk Englund[2], Andrei Faraon[1], Jelena Vučković[1]; [1]Stanford Univ., USA, [2]Harvard Univ., USA.* Coherent quantum dot spectroscopy is performed in a quantum dot coupled to a photonic crystal cavity by exploiting non-resonant dot-cavity coupling. This enables manipulation of the quantum dot levels and readout through cavity emission.

LSTuE • Cavity Optomechanics II—Continued

LSTuF • Micro- and Nanofluidics III—Continued

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)*

NOTES

For Fall Congress presentations on Tuesday, see pages 116-124.

Empire	Crystal	Gold	Valley	California

FiO

1:30 p.m.–3:00 p.m.
FTuM • Emerging 3-D Display Technologies and Research Frontiers I
Bahram Javidi; Univ. of Connecticut, USA, Presider

FTuM1 • 1:30 p.m. Invited
Accommodation Responses to Stereoscopic Images, *Kazuhiko Ukai; Waseda Univ., Japan.* Our recent attempts to measure and analyze the static and dynamic behaviors of accommodation and convergence when viewing stereoscopic images with discrepancy between accommodative and convergence stimuli and may cause visual fatigue will be introduced.

FTuM2 • 2:00 p.m. Invited
A Novel 3-D Display that Presents Nearly Correct Focus Cues, *Martin S. Banks[1], Gordon D. Love[2], David M. Hoffman[1], Philip J. W. Hands[2], Andrew K. Kirby[2]; [1]Univ. of California at Berkeley, USA, [2]Durham Univ., UK.* We describe a stereoscopic system that uses a fast, switchable lens (1000Hz), synchronized to the display, to construct a temporally-multiplexed image with correct focus cues. It has great potential for vision research and various applications.

1:30 p.m.–3:30 p.m.
FTuN • Negative Index Materials and Cloaking
Dai-Sik Kim; Seoul Natl. Univ., Republic of Korea, Presider

FTuN1 • 1:30 p.m. Invited
Optical Metamaterials, *Xiang Zhang; Univ. of California at Berkeley, USA.* I will discuss recent experimental demonstrations of intriguing phenomena associated with metamaterials and plasmonics. These include sub-diffraction imaging and focusing, negative refraction and negative-index metamaterials, cloaking at optical frequencies and sub-wavelength plasmonic lasers.

FTuN2 • 2:00 p.m.
Optical Cloaking Using Dielectrics, *Jason Valentine, Jensen Li, Thomas Zentgraf, Guy Bartal, Xiang Zhang; Univ. of California at Berkeley, USA.* We report an experimental realization of a dielectric optical cloak that conceals an object under a curved reflecting surface. The carpet cloak consists only of isotropic dielectric materials which enables broadband and low-loss invisibility.

1:30 p.m.–3:30 p.m.
FTuO • Diffractive and Holographic Optics II
Guoqiang Li; Univ. of Missouri at St. Louis, USA, Presider

FTuO1 • 1:30 p.m. Invited
Applications and Engineering of Three-Dimensional Optics, *Eric Johnson[1], Pradeep Srinivasan[1], Menelaos Poutous[1], Zachary Roth[1], Raymond Rumpf[2]; [1]Univ. of North Carolina at Charlotte, USA, [2]Prime Res. LC, USA.* Diffractive and micro-optical components have evolved over the last decade to enable many applications. This talk highlights optical elements that exhibit unique spectral, spatial, and polarization properties.

FTuO2 • 2:00 p.m.
Solution of the Phase Problem in the Theory of Structure Determination of Crystalline Media from X-Ray Diffraction Measurements, *Emil Wolf; Univ. of Rochester, USA.* We present solution to a long standing problem encountered in the theory of structure determination of crystalline media from X-ray diffraction experiments; namely the problem of determining phases of the diffracted beams.

1:30 p.m.–3:30 p.m.
FTuP • Optical Access
Anabil Chaudhuri; Univ. of Rochester, USA, Presider

FTuP1 • 1:30 p.m. Invited
Extended Reach Passive Optical Networks, *Chang-Hee Lee; KAIST, Republic of Korea.* Passive optical networks (PONs) with extended reach enable consolidation of central offices. A WDM-PON is most attractive for long distance PON, since it has a small splitting loss compared with a TDM-PON. Recent achievements and limiting factors for long reach WDM-PON will be addressed.

FTuP2 • 2:00 p.m.
Broadcast Signal Transmission Employing Low Noise Mutually Injected Fabry-Pérot Laser Diodes, *Sil-Gu Mun[1], Sang-Min Oh[1], Ki-Man Choi[2], Chang-Hee Lee[1]; [1]KAIST, Republic of Korea, [2]Next Generation Res. Dept., Korea Telecom Network Technology Lab, Republic of Korea.* We demonstrated a broadcast signal transmission using mutually injected Fabry-Pérot laser diodes. It can accommodate 125 channels of HDTV signals with 100 GHz channel spacing.

1:30 p.m.–3:30 p.m.
FTuQ • Light in the Eye
Melanie C. Campbell; Univ. of Waterloo, Canada, Presider

FTuQ1 • 1:30 p.m. Tutorial
Light and Eye Safety, *David Sliney; Consulting Medical Physicist, USA.* Extensive biomedical research has established thresholds for ocular injury from optical radiation—particularly with respect to laser exposure. US and international exposure limits exist for human cornea, lens and retina for all wavelengths of interest.

Dr. Sliney received his B.S. in physics from Virginia Polytechnic Institute, his M.S. in physics and radiological health from Emory University, and his Ph.D. in biophysics and medical physics from the University of London, Institute of Ophthalmology. He was the Manager of the Laser/Optical Radiation Program at the U.S. Army Center for Health Promotion and Preventive Medicine for many years until retiring in 2007. His research interests focus on subjects related to UV effects upon the eye, laser-tissue interactions, laser hazards and laser applications in medicine and surgery. He served as member, advisor and chairman of numerous committees and institutions, which are active in the establishment of safety standards for protection against non-ionizing radiation in particular from lasers and other high-intensity optical sources (ANSI, ISO, ACGIH, IEC, WHO, NCRP, and ICNIRP). He was a Fulbright Scholar to Yugoslavia in 1977 and received the Schawlow Award from the LIA in 2005 and the Wilkening Award in 2004. He co-authored the 1000-page handbook, "Safety with Lasers and Other Optical Sources" (Plenum Publishing Corp., New York, 1980). He served as President of the American Society for Photobiology, 2008–2009.

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 Fall Congress presentations on Tuesday, see pages 116-124.

FiO

1:30 p.m.–3:30 p.m.
FTuR • Rogue Waves and Related Phenomena
Colin J. McKinstrie; Bell Labs, Alcatel-Lucent, USA, Presider

FTuR1 • 1:30 p.m. Invited

Freak Ocean Waves in One and Two Dimensions, *Peter Janssen, Jean-Raymond Bidlot; European Ctr. for Medium-Range Weather Forecasts, UK.* We have developed a theory for the generation of freak ocean waves. The resulting measure for extreme sea states, namely maximum wave height, is compared with buoy observations.

FTuR2 • 2:00 p.m. Invited

Rogue Waves in Optics, *J. M. Dudley[1], G. Genty[2], F. Dias[3]; [1]Univ. of Franche-Comté, France, [2]Tampere Univ. of Technology, Finland, [3]Ctr. de Mathématiques et de Leurs Applications, École Normale Supérieure de Cachan, France.* We discuss recent studies of large amplitude extreme value "optical rogue wave" instabilities, focusing both on their intrinsic optical characteristics and their links with their oceanic counterparts.

1:30 p.m.–3:15 p.m.
FTuS • Short Wavelength Generation and Applications I: From EUV to X-Rays
Henry C. Kapteyn; Univ. of Colorado at Boulder, USA, Presider

FTuS1 • 1:30 p.m. Tutorial

EUV Lithography, *Martin Richardson; CREOL, College of Optics and Photonics, Univ. of Central Florida, USA.* EUV lithography promises to be the next, and maybe the last, technology to extend Moore's Law fabrication of computer chips. We review the development, status and challenges this technology faces as it nears implementation.

Martin Richardson made his dissertation research in lasers and plasmas in the UK in the mid-60's, and had made many contributions to these fields since. He has lead major research programs at the Herzberg Institute, CNRC Laboratories in Ottawa, at the universities of Rochester and Central Florida and is now the founding director of the Townes Laser Institute, a new laser center at UCF associated with CREOL and the College of Optics and Photonics. His group at UCF was one of the first to recognize the potential for high repetition-rate laser-plasma sources for EUV lithography. He has held visiting appointments at other institutions including the Max-Born-Institute and the Max-Planck-Institute for Quantum Optics in Germany, the Institute for Laser Engineering at Osaka University, and the Prokhorov General Physics Institute in the Soviet Union. A recipient of the Schardin Medal, an OSA fellow, he has over 500 publications and numerous patents, is a past Assoc. Editor of JQE, and has organized many conferences on lasers and laser applications.

LS

1:30 p.m.–3:45 p.m.
LSTuG • Optoelectronic Materials Characterization
Kevin T. Early; Univ. of Massachusetts Amherst, USA, Presider

LSTuG1 • 1:30 p.m. Invited

Using Fluorescence Microscopy of Oligomer Aggregates to Understand the Properties of Conjugated Polymers Used in Photovoltaic Devices, *Linda Peteanu[1], Gizelle A. Sherwood[1], Kelly Zewe[1], Jurjen Wildeman[2], James H. Werner[3], Andrew P. Shreve[3]; [1]Carnegie Mellon Univ., USA, [2]Zernike Inst. for Advanced Materials, Univ. of Groningen, Netherlands, [3]Ctr. for Integrated Nanotechnologies, Los Alamos Natl. Labs, USA.* Fluorescence microscopy is used to probe variations in vibronic structure and emission lifetime between individual aggregates and trends with aggregate size and oligomer chain length. The results are compared to theoretical models and to polymers.

LSTuG2 • 2:00 p.m.

Enhancement of Triplet Yields in Cyanine-Like Molecules, *Scott Webster[1], Lazaro A. Padilha[1], Olga V. Przhonska[1,2], Davorin Peceli[1], Honghua Hu[1], Yurii L. Slominsky[3], Alexei D. Kachkovski[3], Alexei I. Tolmachov[3], Vladimir V. Kurdyukov[3], David J. Hagan[1], Eric W. Van Stryland[1]; [1]CREOL, College of Optics and Photonics, Univ. of Central Florida, USA, [2]Inst. of Physics, Natl. Acad. of Sciences, Ukraine, [3]Inst. of Organic Chemistry, Natl. Acad. of Sciences, Ukraine.* A series of oxo- and thio-squaraine dyes were investigated by femto/pico/nanosecond pump-probe techniques. Thio-squaraines show increased triplet quantum yields which are explained by quantum chemical calculations.

1:30 p.m.–3:30 p.m.
LSTuH • Cavity Optomechanics III
Pierre Meystre; Univ of Arizona, USA, Presider

LSTuH1 • 1:30 p.m. Invited

Demonstration of Micromechanics in the Strong Coupling Regime, *Simon Groeblacher, Klemens Hammerer, Michael Vanner, Markus Aspelmeyer; IQOQI, Austrian Acad. of Sciences, Austria.* We report the observation of optomechanical normal mode splitting, which is unambiguous evidence for strong coupling of cavity photons to a mechanical resonator. This paves the way towards full quantum optical control of nano- and micromechanical devices.

LSTuH2 • 2:00 p.m. Invited

Measurement of Attractive and Repulsive Casimir Forces and Applications to Nanomechanics, *Jeremy Munday[1], Federico Capasso[2], [1]Thomas J. Watson Labs of Applied Physics, Caltech, USA, [2]Harvard Univ., USA.* The Casimir force results from quantum fluctuations between objects. We discuss the measurement of attractive and repulsive forces, how they can lead to ultra-low static friction devices, and the idea of a QED torque.

1:30 p.m.–3:30 p.m.
LSTuI • High Field Dynamics I
Markus Guehr; SLAC Natl. Accelerator Lab, Stanford Univ., USA, Presider

LSTuI1 • 1:30 p.m. Invited

Fast Electron Migration in Finite Systems during Exposure to Intense Attosecond and XFEL Pulses, *Ulf Saalmann, Ionut Georgescu, Christian Gnodtke, Alexey Mikaberidze, Jan-Michael Rost; Max-Planck-Inst. for the Physics of Complex Systems, Germany.* We analyze migration of electrons on a 1-fs time scale in rare-gas-clusters following irradiation of the cluster with an attosecond or XFEL-pulse as it will be available at LCLS in Stanford and XFEL in Hamburg.

LSTuI2 • 2:00 p.m. Invited

Strong-Field Atomic Physics in the X-Ray Regime, *Louis DiMauro; Ohio State Univ., USA.* The talk examines the scaling of strong-field physics into the X-ray regime. A status report on the first experiments performed by the AMOS team using the LCLS XFEL at SLAC will also be presented.

For Fall Congress presentations on Tuesday, see pages 116-124.

FTuM • Emerging 3-D Display Technologies and Research Frontiers I—Continued

FTuM3 • 2:30 p.m. Invited

Volumetric True 3-D Display Using Multi-Focal Scanned Light, *Brian Schowengerdt; Univ. of Washington, USA.* Our novel 3-D volumetric displays scan multiple superimposed light beams with different focus levels, to optically position objects at different viewing distances, overcome accommodation/vergence conflicts, reduce fatigue, and provide more accurate cues to depth perception.

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.

FTuN • Negative Index Materials and Cloaking—Continued

FTuN3 • 2:15 p.m.

Yellow Light Negative-Index Metamaterials, *Shumin Xiao, Uday K. Chettiar, Alexander Kildishev, Vladimir Drachev, Vladimir Shalaev; Purdue Univ., USA.* A well established silver based fishnet design was further miniaturized. By studying its transmittance, reflectance, and corresponding numerical simulations, we reported a negative refractive index of -0.25 at yellow light of 580 nm.

FTuN4 • 2:30 p.m.

Near-Infrared Ground Plane Cloak Based on Silicon Nanorod Array, *Venkata Ananth Tamma[1], John Blair[2], Jin-Hyoung Lee[1], Qi Wu[1], Seuk-Joo Rhee[3], Christopher J. Summers[2], Won Park[1]; [1]Univ. of Colorado, USA, [2]Georgia Tech, USA, [3]Hankuk Univ. of Foreign Studies, Republic of Korea.* An optical frequency ground plane cloak was implemented using silicon nano-rod array. The cloak performance was directly visualized by the near-field scanning optical microscopy. The experimental data agreed well with the numerical simulations.

FTuN5 • 2:45 p.m.

Metal-Free Optical Material with Negative Permittivity, *G. Zgu[1], E. E. Narimanov[2], H. Li[1], Yu. A. Barnakov[1], M. A. Noginov[1]; [1]Norfolk State Univ., USA, [2]Purdue Univ., USA.* We have experimentally demonstrated negative permittivity in metal-free optical material (laser dye). This result paves the road to a new generation of nanoplasmonic materials and metamaterials with low loss and optical gain.

FTuO • Diffractive and Holographic Optics II—Continued

FTuO3 • 2:15 p.m.

Non-Destructive Quality Evaluation of Periodically Poled Domains of Lithium Niobate Crystal by Diffraction, *Krishnamoorthy Pandiyan, Yeon Sook Kang, Hwan Hong Lim, Byoung Joo Kim, Myoungsik Cha; Pusan Natl. Univ., Republic of Korea.* We demonstrate an efficient diffraction method for quality evaluation of periodically poled lithium niobate crystals. Microscopic statistical quantities could be easily obtained from the index modulation induced by the internal fields in the ferroelectric domains.

FTuO4 • 2:30 p.m.

Surface Inspection with LEDs, *Stephan Stürwald, Robert Schmitt; Fraunhofer Inst. for Production Technology IPT, Germany.* Phase-shifting holography allows quantitative phase contrast imaging of reflective and partially transparent samples. Light emitting diodes (LEDs) have been investigated as low coherent light sources for applicability as low cost light sources in phase-shifting holography.

FTuO5 • 2:45 p.m.

Measuring the Spatio-Temporal Field of Diffracting Ultrashort Pulses, *Pamela R. Bowlan[1], Madis Lõhmus[2], Peeter Piksarv[2], Heli Valtna-Lukner[2], Peeter Saari[2], Rick Trebino[1]; [1]School of Physics, Georgia Tech, USA, [2]Inst. of Physics, Univ. of Tartu, Estonia.* Using SEA TADPOLE, we directly measure the spatio-temporal field of diffracting ultrashort pulses with fs-temporal and μm-spatial resolutions. Using a circular aperture and an opaque disk, we observe boundary wave pulses including their superluminal speeds.

FTuP • Optical Access—Continued

FTuP3 • 2:15 p.m. Invited

Principal Modes in Graded-Index Multimode Fibers, *Mahdieh Shemirani, Joseph Kahn; Stanford Univ., USA.* We model multimode propagation, including spatial- and polarization-mode coupling. At low coupling, the impulse response is polarization-dependent; differential mode delays (DMDs) scale linearly with length. At high coupling, DMDs scale as the square-root of length.

FTuP4 • 2:45 p.m.

Beyond 100 Gb/s Transmission over Graded-Index Plastic Optical Fiber (GI-POF) Links, *Ivan B. Djordjevic[1], Lei Xu[2], Ting Wang[2]; [1]Univ. of Arizona, USA, [2]NEC Labs, USA.* We present a power-variable-rate-adaptive LDPC-coded-OFDM scheme, suitable for communication over GI-POF-links. We demonstrate that channel-capacity can be closely approached with proposed scheme. We show that transmission at 100Gb/s over 500m of perfluorinated-GI-POF-links can be achieved.

FTuQ • Light in the Eye—Continued

FTuQ2 • 2:15 p.m. Invited

Unexpected Retinal Damage below the ANSI Standard, *Jennifer Hunter[1], Jessica I. W. Morgan[2], William H. Merigan[1], David R. Williams[2]; [1]Univ. of Rochester, USA, [2]Univ. of Pennsylvania, USA.* Using a fluorescence-equipped adaptive optics scanning laser ophthalmoscope, we have discovered retinal changes in the *in vivo* macaque retina resulting from exposure to visible light at levels below the ANSI maximum permissible exposure.

FTuQ3 • 2:45 p.m. Invited

Light Exposure and the Retina, *Jacque Duncan; Univ. of California at San Francisco, USA.* Exposure to light is necessary to initiate phototransduction, the first step in visual perception. However, the risk that excessive exposure to light poses to retinal cells must be considered when developing new ocular imaging modalities.

For Fall Congress presentations on Tuesday, see pages 116-124.

FiO

FTuR • Rogue Waves and Related Phenomena—Continued

FTuR3 • 2:30 p.m. Invited

Methods for Simulating Rare Events in Optical Systems, *Gino Biondini[1], Richard O. Moore[2]; [1]SUNY Buffalo, USA, [2]New Jersey Inst. of Technology, USA.* We describe the application of importance sampling techniques to improve the efficiency of Monte Carlo computations of various rare event probabilities, including phase deviations in soliton-based communications and frequency comb generation.

FTuS • Short Wavelength Generation and Applications I: From EUV to X-Rays—Continued

FTuS2 • 2:15 p.m.

Table Top Schemes for Nano-Patterning with Extreme Ultraviolet Lasers, *Lukasz Urbanski[1], Przemyslaw W. Wachulak[1], Artak Isoyan[2], Fan Jian[2], Yang-Chun Cheng[2], Jorge J. Rocca[1], Carmen S. Menoni[1], Mario C. Marconi[1], Franco Cerrina[2]; [1]Colorado State Univ., USA, [2]Univ. of Wisconsin-Madison, USA.* We discuss different nanopatterning approaches using table top extreme ultraviolet lasers based on interferometric lithography, Talbot self imaging and holographic projection lithography.

FTuS3 • 2:30 p.m. Invited

High Brightness Plasma-Based Soft X-Ray Lasers and Applications, *James Dunn; Lawrence Livermore Natl. Lab, USA.* Plasma-based X-ray lasers are ultrabright, compact sources with continued improvements in efficiency, output energy, repetition rate, coherence and related characteristics. Results are presented for recent developments in sources and applications.

LS

LSTuG • Optoelectronic Materials Characterization—Continued

LSTuG3 • 2:15 p.m.

Coherent Acoustic Phonon Generation in Exciton Self-Trapping: Dependence on Coupling Strength, *Jason Mance, F. X. Morrissey, Susan L. Dexheimer; Washington State Univ., USA.* The dynamics of self-trapped exciton formation are studied in quasi-one-dimensional systems using femtosecond impulsive excitation techniques. Low temperature measurements reveal the generation of coherent acoustic waves associated with the formation of the localized lattice deformation.

LSTuG4 • 2:30 p.m.

Light-Induced Tuning and Enhancement of Two Photon Absorption in Bulk Semiconductor Single Crystal, *Adarsh Kumaran Nair Valsala Devi[1], Sharon Shwartz[1], Mordechai Segev[1], Lev Chuntonov[2], Zohar Amitay[2], Emil Zolotoyabko[3], Uri El-Hanany[4]; [1]Physics Dept., Technion-Israel Inst. of Technology, Israel, [2]Dept. of Chemistry, Technion-Israel Inst. of Technology, Israel, [3]Dept. of Materials Engineering, Technion-Israel Inst. of Technology, Israel, [4]43C Gordon St., Israel.* We demonstrate a light-induced method to enhance, control, and tune two-photon-absorption in bulk CZT:V crystals. The technique is reversible in real-time, and enhancement scales linearly with control-beam intensity, reaching 2.5 times of the original values.

LSTuG5 • 2:45 p.m.

Disorder-Mediated Dispersive Transport in a-SiGe Studied by Time-Resolved Terahertz Spectroscopy, *C. R. Hamner, Susan L. Dexheimer; Washington State Univ., USA.* Photo-excited carrier dynamics in a-SiGe:H are studied using optical-pump/terahertz-probe spectroscopy. We find dynamics that are dominated by dispersive transport with a time-dependent mobility that varies systematically with the degree of disorder in the material.

LSTuH • Cavity Optomechanics III—Continued

LSTuH3 • 2:30 p.m. Invited

Exploring the Quantum Limit in Gravitational Wave Detection, *Nergis Mavalvala; MIT, USA.* We describe experiments in which radiation pressure forces are used to optically trap and cool macroscopic oscillators, and discuss applications of this technique to gravitational-wave detection, and to observation of quantum effects involving macroscopic mechanical oscillators.

LSTuI • High Field Dynamics I—Continued

LSTuI3 • 2:30 p.m. Invited

Probing Coupled Electronic and Nuclear Dynamics Using Coherent Electrons and X-Rays, *Wen Li[1], Xibin Zhou[1], Robynne Lock[1], Serguei Patchkovskii[2], Albert Stolow[2], Etienne Gagnon[1], Arvinder Sandhu[1], Robin Santra[3], Phay Ho[3], Vandana Sharma[1], Craig W. Hogle[1], Predrag Ranitovic[4], C. Lewis Cocke[4], Margaret Murnane[1], Henry C. Kapteyn[1]; [1]JILA, Univ. of Colorado at Boulder, USA, [2]Natl. Res. Council Canada, Canada, [3]Argonne Natl. Lab, USA, [4]Kansas State Univ., USA.* I will present three studies in which the coupled electronic and nuclear dynamics in molecules are probed using high harmonic generation (HHG), HHG-based ultrashort X-ray laser and strong field ionization.

For Fall Congress presentations on Tuesday, see pages 116-124.

FTuN • Negative Index Materials and Cloaking—Continued

FTuN6 • 3:00 p.m.
Photorealistic Rendering of Metamaterials, Gradient Index Devices, and Polarization-Dependent Invisibility Cloaks, *Aaron J. Danner; Natl. Univ. of Singapore, Singapore.* Visually stunning depictions of devices such as invisibility cloaks in action are useful in assessing performance of imperfect metamaterials proposed for their fabrication. A comprehensive study on the invisible sphere will be presented.

FTuN7 • 3:15 p.m.
Mixing Plasmonic Cloaking with Second-Order Optical Nonlinearity, *Uday Chettiar, Nader Engheta; Univ. of Pennsylvania, USA.* Using plasmonic cloaks around second-order nonlinear optical materials, we theoretically show that relative values of second-harmonic induced dipoles can be enhanced as compared with uncloaked scenarios, while having relatively low scattering at the fundamental frequency.

FTuO • Diffractive and Holographic Optics II—Continued

FTuO6 • 3:00 p.m.
Reflection Phase Gratings: An Elegant Way of THz Beam Multiplexing, *Vishal S. Jagtap, Annick F. Dégardin, Alain J. Kreisler; SUPELEC/LGEP; CNRS/UMR-8507; UPMC Univ. Paris 06; Univ Paris-Sud 11, France.* Reflection phase gratings offer great potential as local oscillator beam multiplexer in heterodyne receiving passive terahertz imaging array. Using phase-retrieval algorithm, high diffraction efficiencies were achieved for three, four and five beam 1-D multiplexers.

FTuO7 • 3:15 p.m.
Improvements of Aperiodic Rigorous Coupled Wave Analysis, *Pavel Kwiecien, Ivan Richter; Faculty of Nuclear Sciences and Physical Engineering, Czech Technical Univ., Czech Republic.* Recent improvements and extensions of the aperiodic rigorous coupled wave analysis as the efficient and robust numerical frequency domain method for simulating the behavior of advanced photonic structures are discussed and demonstrated on several examples.

FTuP • Optical Access—Continued

FTuP5 • 3:00 p.m.
Dispersion Model of Two Simultaneously Propagating Spatial Domain Multiplexing (SDM) Channels of Same Wavelength in Step Index Multimode Fibers, *Syed H. Murshid, Abhijit Chakravarty; Florida Inst. of Technology, USA.* Spatial domain multiplexing allows co-propagation of spatially separated channels of same wavelength over a single strand of step index multimode fiber. Dispersion model for spatially multiplexed helically propagating channels is presented.

FTuQ • Light in the Eye—Continued

FTuQ4 • 3:15 p.m.
A Rat Eye Model for Studying and Treating Age-Related Macular Degeneration, *Melanie C. W. Campbell[1,2], Aden Seaman[1], Dafna Sussman[1,2], Mark Bird[1,2], Marsha L. Kisilak[1], Christopher J. Cookson[1], Kostadinka Bizheva[1,2], Laura Gowing[1], Kaitlin Bunghardt[1]; [1]Univ. of Waterloo, Canada, [2]Guelph Waterloo Physics Inst., Canada.* The rat eye model of age-related macular degeneration can give both high resolution imaging of fundus structures and localized light delivery in potential therapies. We induced and tracked AMD-like damage *in vivo*.

3:30 p.m.–4:00 p.m. Coffee Break/Exhibits, *Imperial Ballroom, Fairmont Hotel*

3:30 p.m.–5:30 p.m. Meet the Editors of the APS Journals, *Bamboo Lounge, Fairmont Hotel*

4:30 p.m.–5:30 p.m. Minorities and Women in OSA (MWOSA) Tea, *Sainte Claire Room, Sainte Claire Hotel*

NOTES

For Fall Congress presentations on Tuesday, see pages 116-124.

FTuR • Rogue Waves and Related Phenomena—Continued

FTuR4 • 3:00 p.m.
Spectral Dependence of Spatially-Incoherent Modulation Instability, *Can Sun, Dmitry V. Dylov, Jason W. Fleischer; Princeton Univ., USA.* We present the first experimental study of spatially-incoherent modulation instability for different spectral distributions. Characteristic behavior depends sensitively on the underlying profiles. The setup and results introduce a new experimental degree-of-freedom into nonlinear statistical optics.

FTuR5 • 3:15 p.m.
Characterisation and Optimisation of the Soliton Self-Frequency Shift in Photonic Crystal Fibres, *Ravi Pant, Alexander Judge, Eric C. Mägi, Boris T. Kuhlmey, Martijn de Sterke, Benjamin J. Eggleton; CUDOS, IPOS, Univ. of Sydney, Australia.* We develop a simple model to analyze the self-frequency shift in optical fibers. We use it to predict the frequency shift in two different fibers, and confirm the prediction by experiment and full numerical simulations.

FTuS • Short Wavelength Generation and Applications I: From EUV to X-Rays—Continued

FTuS4 • 3:00 p.m.
The Role of the Phase Locking Phenomenon in the Second and Third Harmonics Cavity Localization, *Vito Roppo[1,2], Crina M. Cojocaru[1], Giuseppe d'Aguanno[2], Fabrice Raineri[3], Rama Raj[3], Jose F. Trull[1], Ramon Vilaseca[1], Michael Scalora[2]; [1]Univ. Politècnica de Catalunya, Spain, [2]C. M. Bowden Res. Facility, USA, [3]Lab de Photonique et de Nanostructures, France.* We theoretically and experimentally study how the phase-locking mechanism changes effective dispersion of the medium at the harmonic frequencies making them become localized inside an opaque cavity designed to be resonant for the fundamental field.

LSTuG • Optoelectronic Materials Characterization—Continued

LSTuG6 • 3:00 p.m.
Synthesis and Characterization of Nanospherical Hydroxyapatite Using SDS as Template, *Michael S. L. Shanthi[1], M. Ashok[1], T. Balasubramanian[1], R. V. Mangalaraja[2]; [1]Dept. of Physics, Natl. Inst. of Technology, India, [2]Dept. of Materials Engineering, Univ. of Concepcion, Chile.* Spherical nano crystalline hydroxyapatite with diameter ~200 nm has been prepared by co-precipitation method. FTIR and XRD pattern confirmed the phase of HAp. The results obtained from SEM and EDS analysis also discussed.

LSTuG7 • 3:15 p.m. Invited
New Aspects of Nanocrystal Lasing, *Victor I. Klimov; Los Alamos Natl. Lab, USA.* In this talk, I will review our recent spectroscopic studies of specially engineered core-shell nanocrystals that exhibit a significant suppression of Auger recombination. This property greatly simplifies real-life applications of colloidal nanoparticles in lasing technologies.

LSTuH • Cavity Optomechanics III—Continued

LSTuH4 • 3:00 p.m. Invited
Silicon Optomechanics, *Hong X. Tang; Yale Univ., USA.* We demonstrate the convergence of silicon nanomechanics and nanophotonics by building silicon based optomechanical devices that operate on optical forces. Practical routes to optomechanical cooling and amplifications via circuit coupled optomechanical cavities will be discussed.

LSTuI • High Field Dynamics I—Continued

LSTuI4 • 3:00 p.m.
Ultrafast All-Optical Switching of Bistable Semiconductor Ring Lasers, *J. Javaloyes[1], A. Trita[2], G. Mezosi[1], F. Bragheri[2], I. Cristiani[2], G. Giuliani[2], M. Sorel[1], A. Scire[3], S. Balle[3]; [1]Univ. of Glasgow, UK, [2]Univ. di Pavia, Italy, [3]CSIC, Spain.* We have investigated the all-optical switching properties of bi-stable semiconductor ring lasers acting as a logic memory element. Theoretical results are in agreement with experiments on fabricated devices. Switching times of few ps are attained.

LSTuI5 • 3:15 p.m.
All-Optical Switch Using Recoil Resonances in Cold Atoms, *G. R. White[1], D. Duncan[1], J. P. Davis[2], F. A. Narducci[2]; [1]Aerospace Mass Properties Analysis, USA, [2]Naval Air Systems Command, USA.* We describe a technique by which optical switching between two non-collinear beams can be achieved using recoil resonances in cold atoms. We experimentally demonstrate this technique and explore the fundamental limitations to the switching speed.

3:30 p.m.–4:00 p.m. Coffee Break/Exhibits, *Imperial Ballroom, Fairmont Hotel*

3:30 p.m.–5:30 p.m. Meet the Editors of the APS Journals, *Bamboo Lounge, Fairmont Hotel*

4:30 p.m.–5:30 p.m. Minorities and Women in OSA (MWOSA) Tea, *Sainte Claire Room, Sainte Claire Hotel*

NOTES

For Fall Congress presentations on Tuesday, see pages 116-124.

4:00 p.m.–5:30 p.m.
FTuT • Emerging 3-D Display Technologies and Research Frontiers II

Brian Schowengerdt; Univ. of Washington, USA, Presider

FTuT1 • 4:00 p.m. Invited

Large Area 3-D Updateable Holographic Displays Using Photorefractive Polymers, *Nasser Peyghambarian; Univ. of Arizona, USA.* Photorefractive polymers are shown to be suitable for large area dynamic 3-D holographic display. We have demonstrated 6"x 6" updateable 3-D displays that can be erased and rewritten many times.

FTuT2 • 4:30 p.m. Invited

Progress in Volumetric Three-Dimensional Displays and Their Applications, *Gregg E. Favalora; Actuality Systems Inc., USA.* Volumetric displays create volume-filling 3-D imagery, usually with full parallax and a wide viewing angle. Widespread commercial adoption has not yet occurred, but may add value to fields such as medical imaging and petroleum exploration.

4:00 p.m.–5:30 p.m.
FTuU • Wavefront Design for Information Transport and Sensing II

Olga Korotkova; Univ. of Miami, USA, Presider

FTuU1 • 4:00 p.m. Invited

SLM Microscopy: Wavefront Shaping for Microscopy with Spatial Light Modulators, *Monika Ritsch-Marte; Innsbruck Medical Univ., Austria.* We present applications of spatial light modulators (SLMs) placed either in the imaging path or in the illumination path of a microscope allowing, for instance, the emulation of various phase contrast techniques.

FTuU2 • 4:30 p.m. Invited

Optimal Transmission of Light through Disordered Materials, *Allard Mosk; Univ. of Twente, Netherlands.* Disordered photonic materials scatter and blur incident light. By controlling the incident wavefront, we show it is possible to focus light through and even inside such materials. The focusing resolution can be surprisingly high.

4:00 p.m.–5:30 p.m.
FTuV • Metamaterials in Emerging Technologies

Yanina Shevchenko; Carleton Univ., Canada, Presider

FTuV1 • 4:00 p.m. Invited

Role of Surface Plasmon Polariton in the Diffraction of a Metal Nano-Slit, *Yann Gravel, Yunlong Sheng; Univ. Laval, Canada.* Closed-form rigorous solution of the Maxwell's equations for the transit surface plasmons polariton launched by incident beam on a nano-slit is obtained, which should be taken into account in the design of nano-optical integrated circuits.

FTuV2 • 4:30 p.m.

Fabrication of High Aspect Ratio Optical Light Pipes, *Winnie N. Ye[1], Peter Duane[2], Munib Wober[2], Kenneth B. Crozier[1]; [1]Harvard Univ., USA, [2]Zena Technologies Inc., USA.* We report fabrication techniques for high aspect ratio vertical light pipes in a 10μm thick SiO_2 layer. Light pipes with an aspect ratio of 2.8:1 and a sidewall angle of 89.5 degrees were demonstrated.

4:00 p.m.–5:30 p.m.
FTuW • All-Optical Signal Processing II

Inuk Kang; Bell Labs, Alcatel Lucent, USA, Presider

FTuW1 • 4:00 p.m. Invited

All-Optical Header Processing Using Semiconductor Optical Amplifiers, *Roderick P. Webb[1], X. Yang[2], R. J. Manning[1], G. D. Maxwell[3], A. J. Poustie[3], S. Lardenois[3], D. Cotter[1]; [1]Tyndall Natl. Inst., Univ. College Cork, Ireland, [2]School of Electrical Engineering, Bangor Univ., UK, [3]CIP Technologies, UK.* A pattern recognition system comprising three SOA-based logic gates locates programmable patterns of arbitrary length in 42Gb/s data. It will provide initial screening in an optoelectronic firewall being developed to protect future optical packet-based networks.

FTuW2 • 4:30 p.m.

Physical Origin of Data Pattern Inversion in Optical Injection-Locked VCSELs, *Weijian Yang[1], Peng Guo[1,2], Devang Parekh[1], Werner Hofmann[1], Markus C. Amann[4], Connie J. Chang-Hasnain[1]; [1]Dept. of Electrical Engineering and Computer Sciences, Univ. of California at Berkeley, USA, [2]State Key Lab of Advanced Optical Communication Systems and Networks, School of Electronics Engineering and Computer Science, Peking Univ., China, [3]Walter Schottky Inst., Technical Univ. of Munich, Germany.* The physical origin and criteria for adjustable data pattern inversion in optical injection locked VCSELs are explained with a novel model including the interference effect of master laser reflection. Simulation results agree well with experiments.

4:00 p.m.–5:30 p.m.
FTuX • Novel Optics of Periodic Structures

Ofer Shapira; MIT, USA, Presider

FTuX1 • 4:00 p.m.

Above-Threshold Analysis of Large-Area, High-Power, Vertically-Emitting Circular Bragg Lasers, *Xiankai Sun, Amnon Yariv; Caltech, USA.* An exact energy relation is derived for the vertically-emitting circular Bragg lasers. By including gain saturation effects, the modal pump level and energy conversion efficiency are compared between different types of lasers in above-threshold operation.

FTuX2 • 4:15 p.m.

Demonstration of Optically-Induced Three-Dimensional Photonic Lattices and Enhanced Discrete Diffraction, *Peng Zhang[1], Robert Egger[1], Zhigang Chen[1,2]; [1]San Francisco State Univ., USA, [2]Nankai Univ., China.* We report on the first experimental demonstration of reconfigurable three-dimensional photonic lattices by employing the optical induction technique. Enhanced discrete diffraction due to the waveguide modulation and coupling in such 3-D lattices is successfully observed.

FTuX3 • 4:30 p.m.

Observation of Terahertz π-Phase Shift in an Undoped PPLN Induced by External Magnetic Field, *Guohong Ma[1], Jielong Shi[1], Qibiao Zhu[1], Chunfang Li[1], Qi Wang[1], Weiming Liu[2], Sing Hai Tang[2]; [1]Shanghai Univ., China, [2]Natl. Univ. of Singapore, Singapore.* Magnetic field dependence of terahertz wave generation in PPLN crystal was investigated. A π phase shift occurs in an un-doped PPLN under magnetic field at ~ 0.45 T due to photorefractive effect in PPLN crystal.

For Fall Congress presentations on Tuesday, see pages 116-124.

FiO

4:00 p.m.–5:45 p.m.
FTuY • Optical Biosensing
Andrew K. Dunn; Univ. of Texas at Austin, USA, Presider

FTuY1 • 4:00 p.m.
Guided-Mode Resonance Biochemical Sensor Technology, *Robert Magnusson[1], Debra Wawro[2], Yiwu Ding[2]; [1]Univ. of Texas at Arlington, USA, [2]Resonant Sensors Inc., USA.* Optical leaky-mode resonance effects associated with periodic waveguides are reviewed and their application potential in biosensing is explained. Use of resonant sensors for label-free biochemical monitoring is described. Novel transmission-based sensor designs are discussed.

FTuY2 • 4:15 p.m.
Confocal Fluorescence Detection Using a Zone Plate Array in a Microfluidic Drop Splitter, *Ethan F. Schonbrun, Adam R. Abate, Paul Steinvurzel, David A. Weitz, Kenneth B. Crozier; Harvard Univ., USA.* By parallelizing both the optics and the microfluidics, we present a fluorescence measurement system capable of extremely high throughput. The system produces approximately 52,000 discrete fluorescence measurements per second.

FTuY3 • 4:30 p.m. Invited
Designing Interfaces for Optical Biosensors, *Ashutosh Chilkoti; Duke Univ., USA.* I will describe a label-free-biosensor that exploits the local surface-plasmon-resonance of noble metal nanostructures; and a polymer-brush-interface on glass that abolishes non-specific adsorption leading to a femtomolar limit-of-detection of protein analytes in whole blood.

4:00 p.m.–5:30 p.m.
FTuZ • Short Wavelength Generation and Applications II: Spectroscopy and Microscopy
Martin Richardson; Univ. of Central Florida, USA, Presider

FTuZ1 • 4:00 p.m. Invited
Coherent X-Rays from Ultrafast Lasers, and Applications—Attosecond Science Meets Nonlinear Optics, *Henry C. Kapteyn, Margaret M. Murnane; JILA, Univ. of Colorado at Boulder, USA.* Ultrafast short-wavelength light sources using high-harmonic generation provides a tabletop coherent EUV light source for new science. Recent rapid advances show that bright sources at soft and even hard X-ray wavelengths are now feasible.

FTuZ2 • 4:30 p.m. Invited
Nanoscale Microscopy with Table-Top Extreme Ultraviolet Lasers, *C. S. Menoni[1], F. Brizuela[1], C. Brewer[1], Y. Wang[1], F. Pedaci[1], B. M. Luther[1], W. Chao[1,2], E. H. Anderson[1,2], D. T. Attwood[1,2], A. V. Vinogradov[3], I. A. Artioukov[3], A. G. Ponomareko[4], V. V. Kondratenko[4], M. C. Marconi[1], J. J. Rocca[1,4]; [1]Colorado State Univ., USA, [2]Lawrence Berkeley Natl. Lab, Univ. of California, USA, [3]P. N. Lebedev Physical Inst., Russian Acad. of Sciences, Russian Federation, [4]Technical Univ., Ukraine.* We describe the successful implementation of full-field microscopes based on λ=13.2 nm and λ= 46.9 nm table-top lasers that can image nanostructures in transmission and reflection modes with a spatial resolution of ~50 nm.

LS

4:00 p.m.–5:30 p.m.
LSTuJ • Photophysics of Quantum Dots and Nanostructures II
Michael Barnes; University of Massachusetts at Amherst, USA, Presider

LSTuJ1 • 4:00 p.m. Invited
Quantum Dots, Experiments, Theory, Predictions, Tests and Unknowns, *Rudolph A. Marcus; Caltech, USA.* There is now a substantial body of data on the intermittent fluorescence of quantum dots (QD), such as CdSe.

LSTuJ2 • 4:30 p.m.
Photoluminescence from Single Quantum Dot/Organic Nanostructures: Ligand Effects on PL Dynamics, *Kevin T. Early, Michael Y. Odoi, Pallikkara K. Sudeep, Todd S. Emrick, Michael D. Barnes; Univ. of Massachusetts Amherst, USA.* The photoluminescence dynamics and saturation profiles of quantum dot/organic composites have been studied at the single particle level. We find strong evidence for multiexcitonic character in photoexcited particles arising from ligands coordinated to the surface.

4:00 p.m.–5:15 p.m.
LSTuK • Cavity Optomechanics IV
Hong Tang; Yale Univ., USA, Presider

LSTuK1 • 4:00 p.m. Invited
Optomechanical Correlations between Light and Mirrors, *A. Heidmann, P. Verlot, A. Tavernarakis, C. Molinelli, A. Kuhn, T. Briant, P.-F. Cohadon; Lab Kastler Brossel, École Normale Supérieure, Univ. Pierre et Marie Curie, CNRS, France.* We observed optomechanical correlations induced by radiation pressure between a light beam and the resulting mirror displacements. This scheme can be extended down to the quantum level, with applications in high-sensitivity measurements and quantum optics.

LSTuK2 • 4:30 p.m. Invited
Resolved-Sideband Laser Cooling and Measurement of a Micromechanical Oscillator Close to the Quantum Limit, *Tobias J. Kippenberg[1,2]; [1]Swiss Federal Inst. of Technology Lausanne (EFPL), Switzerland; [2]Max-Planck-Inst. of Quantum Optics, Germany.* Abstract not available.

4:00 p.m.–5:45 p.m.
LSTuL • High Field Dynamics II
Markus Guehr; SLAC Natl. Accelerator Lab, Stanford Univ., USA, Presider

LSTuL1 • 4:00 p.m. Invited
First Science with the LCLS X-Ray Free Electron Laser, *John D. Bozek; SLAC Natl. Accelerator Lab, Stanford Univ., USA.* Abstract not available.

LSTuL2 • 4:30 p.m.
Trojan-Like Wavepackets on 8-Shaped Orbits in Linearly Polarized Electromagnetic Field in Hydrogen Ion Molecule, *Matt K. Kalinski; Dept. of Chemistry and Biology, Utah State Univ., USA.* We discover the existence of 8-shaped orbits in the hydrogen ions molecules capable to maintain shape oscillatory wavepackets in linearly polarized field when its frequency is in resonance or twice the frequency of the motion.

For Fall Congress presentations on Tuesday, see pages 116-124.

FTuT • Emerging 3-D Display Technologies and Research Frontiers II—Continued

FTuT3 • 5:00 p.m. Invited

The Coming Generation of Head Worn Displays, *Kevin Thompson[1], James P. McGuire[1], Ozan Cakmakci[1], Jannick P. Rolland[2]; [1]Optical Res. Associates, USA, [2]Inst. of Optics, Univ. of Rochester, USA.* Within the last 5 years, a new generation of HWDs emerged, supporting full see-through augmented reality. The coming generation will bring HD resolution in a bright, low power display combined with freeform surfaces.

FTuU • Wavefront Design for Information Transport and Sensing II—Continued

FTuU3 • 5:00 p.m. Invited

Title to Be Announced, *Aristide Dogariu; CREOL, College of Optics and Photonics, Univ. of Central Florida, USA.* Abstract not available.

FTuV • Metamaterials in Emerging Technologies—Continued

FTuV3 • 4:45 p.m.

A Metamaterial Dielectric Pattern Nanoantenna Featuring Directive Emission QCL Device, *Jing Wu, Hossein Mosallaei; Northeastern Univ., USA.* The focus of this paper is to develop an array of dielectric patterned photonic crystal (PC) integrated with a quantum cascade laser (QCL) device to manipulate the radiation performance. A directive QCL nanoantenna is demonstrated.

FTuV4 • 5:00 p.m.

Plasmonic Nanoantennas Array Enabling Optical Communication, *Shabnam Ghadarghadr, Hossein Mosallaei; Northeastern Univ., USA.* This paper demonstrates a novel approach for designing photonic nanoantennas by placing plasmonic core-shells over an engineered layered-substrate. We illustrate that by manipulating the layered-substrate and antenna radiators one can achieve focused-beams in desired directions.

FTuV5 • 5:15 p.m.

Nonlinear Surface States at the Interface between a Simple Lattice and a Superlattice, *Robert Egger[1], Peng Zhang[1], Fajun Xiao[2], Xiaosheng Wang[1], Jianlin Zhao[2], Zhigang Chen[1,3]; [1]San Francisco State Univ., USA, [2]Northwestern Polytechnical Univ., China, [3]Nankai Univ., China.* We demonstrate nonlinear surface states at the interface between optically-induced simple (periodic) and super (bi-periodic) semi-infinite photonic lattices. Two types of interface solitons (with uniform or staggered phase) were observed depending on the excitation location.

FTuW • All-Optical Signal Processing II—Continued

FTuW3 • 4:45 p.m.

Spectral Phase Conjugation Using Temporal Imaging, *Onur Kuzucu, Yoshitomo Okawachi, Reza Salem, Mark A. Foster, Alexander L. Gaeta, Amy C. Turner-Foster, Michal Lipson; Cornell Univ., USA.* We demonstrate spectral phase conjugation with a temporal imaging system based on broadband four-wave mixing in silicon waveguides. Excellent compensation is observed for second- and third-order dispersion and self-phase modulation in optical fibers.

FTuW4 • 5:00 p.m.

Wavelength Conversion Using Counter-Propagating Signals in an SOA-DI Wavelength Converter, *Shaochun Cao, Julian Noad; Communications Res. Ctr. Canada, Canada.* We have compared simulation results of wavelength conversion using counter-propagating signals with those using co-propagating signals in an SOA-DI device and showed that the counter-propagating signals yield almost the same performance as the co-propagating signals.

FTuW5 • 5:15 p.m.

All-Optical Ultra-Fast Arithmetic Units Using Nonlinear Optical Materials, *Abdallah K. Cherri, Ayman S. Al-Zayed; Kuwait Univ., Kuwait.* All-optical ultra-fast arithmetic circuits are presented using nonlinear optical material. The all-optical proposed circuits use semiconductor optical amplifier and Mach-Zehnder interferometer as switches due to their compact size, thermal stability and low power operation.

FTuX • Novel Optics of Periodic Structures—Continued

FTuX4 • 4:45 p.m.

Nonreciprocal Goos-Hänchen Shift on Oblique Incidence Reflection off Antiferromagnets, *Thomas Dumelow[1,2], Francinete Lima[2,3], José A. P. da Costa[1], Eudenilson L. Albuquerque[2]; [1]Univ. do Estado do Rio Grande do Norte, Brazil, [2]Dept. de Física, Univ. Federal do Rio Grande do Norte, Brazil, [3]Escola Agrícola de Jundaí, Univ. Federal do Rio Grande do Norte, Brazil.* We investigate a lateral shift of the reflected beam on reflection, at oblique incidence, off an antiferromagnet in an external magnetic field. This shift is nonreciprocal, and depends on the direction of the applied field.

FTuX5 • 5:00 p.m.

Band Structure Calculation of Photonic Crystal Structures Fabricated via Multi-Beam-Interference Lithography, *Justin L. Stay, Thomas K. Gaylord; Georgia Tech, USA.* The band structures of both 2-D and 3-D photonic crystal structures defined via multi-beam-interference lithography are calculated theoretically. Examples of 2-D and 3-D structures with complete band gaps are presented.

FTuX6 • 5:15 p.m.

Liquid Crystal Assisted Slow Light Propagation in Photonic Crystal and Device Application, *Swati Rawal, Ravindra K. Sinha; Delhi College of Engineering, Univ. of Delhi, India.* We propose an elliptical air hole silicon-on-insulator photonic crystal waveguide based on liquid crystal infiltration for slow group velocity. It is also investigated for its application as an optical buffer and for time/wavelength division de-multiplexing.

6:00 p.m.–7:00 p.m. OSA Annual Business Meeting, *Piedmont Room, Fairmont Hotel*

6:00 p.m.–7:00 p.m. DLS Annual Business Meeting, *California Room, Fairmont Hotel*

7:00 p.m.–8:30 p.m. OSA Member Reception, *Ballroom, Sainte Claire Hotel*

7:00 p.m.–10:00 p.m. Laser Science Banquet, *Gordon Biersch, 33 East San Fernando Street, San Jose, California, Phone: 408.294.6785*

For Fall Congress presentations on Tuesday, see pages 116-124.

FTuY • Optical Biosensing—Continued

FTuY4 • 5:00 p.m.
Label-Free Screening of Protein Binding to Small Molecule Compound Microarray with a High-throughput Optical Scanning Microscope, *James P. Landry, Yiyan Fei, Yung-Shin Sun, Juntao Luo, Kit S. Lam, Xiangdong Zhu; Univ. of California at Davis, USA.* Using a label-free high-throughput optical scanning microscope we detected endpoints and binding kinetics of vascular endothelial growth factor (VEGF) protein with microarrays of small molecule compounds from the NCI Developmental Therapeutics Program.

FTuY5 • 5:15 p.m.
Spectral Characterization of the Voltage-Sensitive Dye di-4-ANEPPDHQ Applied to Probing Live GT1-7 Neurons, *Yu Wang[1], Gaoshan Jing[2], Svetlana Tatic-Lucic[2], Susan Perry[3], Filbert Bartoli[1]; [1]Ctr. for Optical Technologies, Dept. of Electrical and Computer Engineering, Lehigh Univ., USA, [2]Sherman Fairchild Ctr., Dept. of Electrical and Computer Engineering, Lehigh Univ., USA, [3]Dept. of Chemical Engineering, Lehigh Univ., USA.* The voltage-sensitive dye di-4-ANEPPDHQ was spectrally characterized in various solutions and in GT1-7 neurons. Its spectra depend on the local chemical and electrical environment. The excitation and emission bands are 430-515nm and 550-640nm for GT1-7.

FTuY6 • 5:30 p.m.
Broad-Beam Fluctuation Spectroscopy for Non-Flow Cytometry and Clinical Diagnostics, *Eben Olson, Richard Torres, Michael J. Levene; Yale Univ., USA.* We present a novel scanning fluctuation spectroscopy system, which we term Broad-beam Scanning Fluctuation Spectroscopy, for performing cytometry. BSFS is a viable alternative to flow cytometry for a wide variety of cell-based clinical diagnostics.

FTuZ • Short Wavelength Generation and Applications II: Spectroscopy and Microscopy—Continued

FTuZ3 • 5:00 p.m. Invited
Extreme High Harmonics from Relativistically Oscillating Surfaces, *Matt Zepf; Queen's Univ. Belfast, Ireland.* Relativistically oscillating surfaces have developed are poised to provide a step change in the performance of attosecond pulses, by providing a route to achieving both extreme brightness and photon energies extending to many keV.

LSTuJ • Photophysics of Quantum Dots and Nanostructures II—Continued

LSTuJ3 • 4:45 p.m.
Photon Antibunching from Hybrid Quantum Dot/Conjugated Organic Composite Nanostructures, *Michael Y. Odoi, Kevin T. Early, Pallikkara K. Sudeep, Todd S. Emrick, Michael D. Barnes; Univ. of Massachusetts, USA.* We have studied the photo-physical properties of isolated CdSe-OPV hybrid nanostructures with photon-pair correlation spectroscopy. We observed a strong wavelength dependent multi-excitonic emission by tuning the excitation in and out of the ligand absorption.

LSTuJ4 • 5:00 p.m. Invited
Non-Blinking Semiconductor Nanocrystals, *Xiaoyong Wang[1], Xiaofan Ren[2], Keith Kahen[2], Megan A. Hahn[1], Manju Rajeswaran[2], Sara Maccagnano-Zacher[3], John Silcox[3], George E. Cragg[4], Alexander L. Efros[4], Todd Krauss[1,5]; [1]Univ. of Rochester, USA, [2]Eastman Kodak Co., USA, [3]Cornell Univ., USA, [4]NRL, USA, [5]Inst. of Optics, Univ. of Rochester, USA.* The photoluminescence from single semiconductor nano-crystals exhibits intensity fluctuations, known as "blinking." We will discuss core-shell CdZnSe/ZnSe nano-crystals that exhibit continuous, non-blinking photoluminescence, and how these nano-crystals may enable breakthroughs in photonics applications.

LSTuK • Cavity Optomechanics IV—Continued

LSTuK3 • 5:00 p.m.
Squeezing of a Nanomechanical Oscillator, *Sumei Huang, Girish S. Agarwal; Oklahoma State Univ., USA.* We show squeezing of a nanomechanical mirror can be generated by injecting squeezed vacuum light and laser into the cavity in the resolved sideband regime. We can obtain more than 70% squeezing.

LSTuL • High Field Dynamics II—Continued

LSTuL3 • 4:45 p.m. Invited
X-Ray Probing of High Field Ionization in the Attosecond Limit, *Stephen R. Leone; Lawrence Berkeley Natl. Lab, Univ. of California at Berkeley, USA.* High order harmonics of a Ti:Sapphire laser are used to investigate high field ionization and dissociative ionization by the method of time-resolved X-ray core level spectroscopic transient absorption down to femtosecond and attosecond time limits.

LSTuL4 • 5:15 p.m Invited
Ptychographic Imaging in Materials and Life Sciences, *Andreas Menzel[1], Cameron M. Kewish[1], Pierre Thibault[1], Martin Dierolf[2], Franz Pfeiffer[2], Oliver Bunk[1]; [1]Paul Scherrer Inst., Switzerland, [2]Technische Univ. München, Germany.* Coherent diffractive imaging promises ultimate resolution in X-ray microscopy, and the use of ptychographic methods has proven particularly reliable and robust. Applications in materials and life sciences will be discussed.

6:00 p.m.–7:00 p.m. OSA Annual Business Meeting, *Piedmont Room, Fairmont Hotel*

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