ROOM 318-320	ROOM 321-323	ROOM 324-326	ROOM 314	ROOM 315	ROOM 316	ROOM 317	ROOM 336
CLEO	JOINT	CLEO					QELS

8:00 a.m. – 9:45 a.m.
CMA • Short Wavelength NLO
Majid Ebrahim-Zadeh; ICFO, Spain, Presider

CMA1 • 8:00 a.m.
Tunable Femtosecond Optical Parametric Generator in the Vacuum Ultraviolet, *Jiaan Zheng, Mark Mero, Pancho Tzankov, Oliver Steinkellner, Max Born Inst. for Nonlinear Optics and Short Pulse Spectroscopy, Germany*. Femtosecond pulses tunable between 168 and 181 nm are generated at an energy of 100 nJ by mixing the third-harmonic of a Ti:Sapphire laser with pulses from an optical parametric amplifier in an argon-filled capillary.

CMA2 • 8:15 a.m.
Optimum Laser and Plasma Conditions for Achieving High-Order Harmonic Generation from Manganese Plume in the Range of 8.4nm, *Luc Bertrand Elouga Bom[1], R. A. Ganeev[2], J. C. Kieffer[1], T. Ozaki[1]; [1]Inst. Natl. de la Recherche Scientifique, Energie, Matériaux et Télécommunications, Canada, [2]Scientific Association Akadempribor, Uzbekistan*. We present our recent results on the study of the optimum conditions for both laser and plasma characteristics for achieving the highest order harmonic generation in manganese plasma.

8:00 a.m. – 9:45 a.m.
JMA • Plasmonic Nanophotonics
Vladimir M. Shalaev; Purdue Univ., USA, Presider

JMA1 • 8:00 a.m. Invited
Negative Refraction in Visible in 3-D Opal Photonic Crystals, *Joshua Rous, Rabia Moussa, Ali Aliev, Anvar A. Zakhidov; Univ. of Texas at Dallas, USA*. We discuss the different spatial fluorescent patterns in terms of negative refraction in upper photonic bands, which have negative group velocity. We analyze fluorescence patterns of same size QD in inverted opals, and opals with strong disordering.

8:00 a.m. – 9:45 a.m.
CMB • Ultrafast Processes
Michael Damzen; Imperial College, UK, Presider

CMB1 • 8:00 a.m.
Frequency Doubling in Femtosecond-Written Periodically-Poled Potassium Titanyl Phosphate Waveguides, *Stuart Campbell[1], Robert R. Thomson[1], Duncan P. Hand[1], Ajoy K. Kar[1], Derryck T. Reid[1], Carlota Canalias[2], Fredrik Laurell[2]; [1]Heriot Watt Univ., UK, [2]Royal Technical Inst., Sweden*. Frequency doubling is demonstrated in femtosecond-laser-created single-mode waveguides written in a periodically-poled potassium titanyl phosphate crystal. Conversion efficiencies of 0.22%/W (0.02%/W) were obtained for first (third) order phasematching at 980nm (800nm).

CMB2 • 8:15 a.m.
Efficient High-Energy Femtosecond Pulse Compression in Quadratic Media with Flattop Beams, *Jeffrey Moses[1], Eihab Albammali[2], Jason M. Eichenbolz[2], Frank W. Wise[1]; [1]Cornell Univ., USA, [2]Neuport Corp., USA*. Using a Gaussian-to-flattop beam reshaper and a frequency-doubling crystal, we demonstrate highly efficient and spatially uniform pulse compression of 1-mJ, ~100-fs pulses from a regenerative Ti:Sapphire amplifier.

8:00 a.m. – 9:45 a.m.
CMC • Fiber Lasers I
Clifford Headley; OFS Labs, USA, Presider

CMC1 • 8:00 a.m.
Towards the Short-Wavelength Limit at 1450 nm in a Widely Tunable Erbium-Doped Fiber Laser, *Chi-Ming Hung[1], Nan-Kuang Chen[1], Yinchieh Lai[1], Sien Chi[1,2]; [1]Dept. of Photonics and Inst. of Electro-Optical Engineering, Natl. Chiao Tung Univ., Taiwan, [2]Dept. of Electrical Engineering, Yuan Ze Univ., Taiwan*. We demonstrate a widely tunable fiber ring laser over 1451.9~1548.1 nm with temperature tuning efficiency as high as 57.3 nm/°C by using a 16-m-long standard silica-based erbium-doped fiber under 980-nm pump power of 208 mW.

CMC2 • 8:15 a.m.
396 fs, 2.5-12 GHz Asynchronous Mode-Locking Erbium Fiber Laser, *Eduardo S. Boncristiano, Lucia AM Saito, Eunezio A. De Souza; Mackenzie Univ., Brazil*. 396 fs pulses with adjustable repetition rate from 2.5 GHz to 12 GHz were directly generated by an asynchronous modelocked Er-fiber laser in conjunction with intracavity solitonic effect in a hybrid regime.

8:00 a.m. – 9:45 a.m.
CMD • Semiconductor Quantum Dot Lasers I
Ann Catrina Bryce; Univ. of Glasgow, UK, Presider

CMD1 • 8:00 a.m.
Three-Dimensional Quantization from an Ordered Nanopore Array Diode Laser, *V. C. Elarde, J. J. Coleman; Univ. of Illinois, USA*. The ordered nanopore array laser diode is a structure which exhibits three-dimensional carrier confinement similar to quantum dot lasers without the undesirable effects of spatially disconnected carrier pools. Simulation and experimental results will be presented.

CMD2 • 8:15 a.m.
Ground State Lasing at 1.34 μm from InAs Quantum Dots Grown on GaAs Substrate by Antimony-Mediated Metal Organic Chemical Vapor Deposition, *Denis Guimard[1,2,3], Mitsuru Ishida[1,2], Masao Nishioka[1,2], Shiro Tsukamoto[1,2], Nobuaki Hatori[1,2], Hisao Sudo[4], Tsuyoshi Yamamoto[4], Yoshiaki Nakata[1,2], Hiroji Ebe[1,2], Mitsuru Sugawara[4,5], Yasuhiko Arakawa[1,2,3,6]; [1]Inst. of Industrial Science, Univ. of Tokyo, Japan, [2]Nanoelectronics Collaborative Res. Ctr., The Univ. of Tokyo, Japan, [3]Lab for Integrated Mechatronic Systems, CNRS UMI, Japan, [4]Fujitsu Labs Ltd., Japan, [5]QD Laser Inc., Japan, [6]Res. Ctr. for Advanced Science and Technology, Univ. of Tokyo, Japan*. Ground state lasing abobe 1.30 μm (1.34 μm) was obtained for the first time from InAs quantum dots grown on GaAs substrate by metal organic chemical vapor deposition.

8:00 a.m. – 9:45 a.m.
CME • UV and Visible Semiconductor Optoelectronic Materials
Nelson Tansu; Lehigh Univ., USA, Presider

CME1 • 8:00 a.m.
Highly Efficient Resonance Energy Transfer in Ultrathin Organic-Inorganic Semiconductor Hybrid Films, *Qiang Zhang[1], Tolga Atay[1], Jonathan Tischler[2], Scott Bradley[2], Vladimir Bulovic[2]; [1]Div. of Engineering and Dept. of Physics, Brown Univ., USA, [2]Dept. of Electrical Engineering and Computer Science, MIT, USA*. We report on the optical study of efficient excitation transfer in organic-inorganic hybrid thin films composed of alternating monolayers of CdSe/ZnS QDs and J-aggregate of cyanine dyes, by steady-state and time-resolved photoluminescence spectroscopy study.

CME2 • 8:15 a.m.
Near Field Optical Spectroscopy Studies of Carrier Localization in $Al_xGa_{1-x}N$ Alloys, *Pavel Capek[1], Naveen Jha[1], Liangcheng Zhou[1], Vollmar Dierolf[1], A. V. Sampath[2], M. Wraback[2]; [1]Lehigh Univ., USA, [2]U.S. ARL, USA*. Using UV-near-field optical spectroscopy and AlGaN layers that exhibit a strong, red-shifted emission band, we demonstrate the existence of different localization regions that can be excited selectively with excitation below the bandgap.

8:00 a.m. – 9:45 a.m.
CMF • 100 Years of LEDs: Past, Present and Future
Marek Osinski; Univ. of New Mexico, USA, Presider

CMF1 • 8:00 a.m. Invited
Visible LEDs: Past, Present and Future, *George Craford; Philips Lumileds Lighting Co., USA*. Red AlInGaP and blue InGaN LEDs have wallplug efficiencies of over 40%, and white LEDs luminous efficacies of 150 lm/W. New applications are emerging and LEDs are on course to replace conventional lighting.

QMA • Ultrafast Dynamics in Quantum Wells
Sarah Bolton; Williams College, USA, Presider

QMA1 • 8:00 a.m.
Optical Pumping Using Chirped Pulses of a Vertical-Cavity Surface-Emitting Laser (VCSEL), *Sangam Chatterjee[1], Wendel Wohlleben[2,3], Christoph Lange[1], Marcus Motzkus[2], Wolfgang Stolz[1], Angela Thränhardt[1], Eckhardt Kühn[1], Stephan W. Koch[1], Wolfgang W. Rühle[1]; [1]Faculty of Physics and Material Sciences Ctr., Philipps-Univ. Marburg, Germany, [2]Faculty of Chemistry and Material Sciences Ctr., Philipps-Univ. Marburg, Germany, [3]Polymer Physics Res., BASF AG, Germany*. We study the response of a VCSEL after optical pumping using pulses with varying quadratic chirp. The data are in good agreement with a microscopic rate approximation model.

QMA2 • 8:15 a.m.
Echo Peak Shift Spectroscopy of Quantum Well Excitons, *Sam G. Carter, Zbigang Chen, Steven T. Cundiff; JILA, Univ. of Colorado and NIST, USA*. Three-pulse four-wave-mixing is used to observe the loss of optical phase memory in an inhomogeneous quantum well. The system's ability to form a photon echo is almost entirely lost due to spectral diffusion of excitons.

ROOM 337	ROOM 338	ROOM 339	ROOM 340	ROOM 341
QELS		CLEO		

8:00 a.m. – 9:45 a.m. QMB • Spatial Solitons

Demetrios Christodoulides; CREOL, College of Optics and Photonics, Univ. of Central Florida, USA, Presider

QMB1 • 8:00 a.m.
Incoherent Solitons in Effectively-Instantaneous Nonlocal Nonlinear Media, *Carmel Rotschild, Tal Schwartz, Oren Cohen, Mordechai Segev; Technion—Israel, Israel.* We demonstrate incoherent spatial solitons in effectively instantaneous nonlocal nonlinear-media. This new kind of "ensemble-averaged solitons" has profound new features (e.g., random soliton's deflection) making it different than all previously-observed coherent and incoherent solitons.

QMB2 • 8:15 a.m.
Nonlocal Surface-Wave Solitons, *Barak Alfassi[1], Carmel Rotschild[1], Ofer Manela[1], Mordechai Segev[1], Demetrios N. Christodoulides[2]; [1]Technion - Israel Inst. of Technology, Israel, [2]CREOL, Univ. of Central Florida, USA.* We demonstrate, experimentally and theoretically, surface-wave solitons occuring at the interface between a dielectric medium (air) and a nonlinear material with high range of nonlocality.

8:00 a.m. – 9:45 a.m. QMC • EIT and Slow Light

Presider to Be Announced

QMC2 • 8:15 a.m.
Slow Light and Matched Pulses in 4-wave Mixing, *Vincent Boyer[1], Colin F. McCormick[1], Ennio Arimondo[2], Paul D. Lett[1]; [1]NIST, USA, [2]Univ. di Pisa, Italy.* We have observed a very clean slow light effects and matched pulse propagation in nondegenerate four-wave mixing in hot atomic vapor. Locking between probe and conjugate pulses gives some insight in the nonlinear dynamics.

8:00 a.m. – 9:45 a.m. CMG • Filters

Shayan Mookherjea; Univ. of California at San Diego, USA, Presider

CMG1 • 8:00 a.m.
Low Loss and Low Crosstalk Multimode Polymer Waveguide Crossings for High-Speed Optical Interconnects, *Nikolaos Bamiedakis[1], Joseph Beals[1], Richard V. Penty[1], Ian H. White[1], Jon V. DeGroot[2], Terry T. V. Clapp[2]; [1]Univ. of Cambridge, UK, [2]Dow Corning Corp., USA.* Multimode polymer waveguide crossings exhibiting the lowest reported excess loss of 0.006 dB/crossing and crosstalk values as low as -30 dB are presented. Their potential for use in high-speed dense optical interconnection architectures is demonstrated.

CMG2 • 8:15 a.m.
Wavelength-Independent Bent-Fiber Coupler to an Ultra-High *Q* Cavity Demonstrated over 850 nm Span, *Steven Wang, Tal Carmon, Eric P. Ostby, Kerry J. Vahala; Caltech, USA.* A bent tapered-fiber coupler is experimentally demonstrated to allow wavelength independent fiber-to-cavity coupling over an 850nm span; opening current technology of ultra-high *Q* cavities for applications spanning the UV to the IR band.

8:00 a.m. – 9:45 a.m. CMH • Advanced Modulation Formats

Pak S. Cho; CeLight, Inc., USA, Presider

CMH1 • 8:00 a.m. Invited
Advanced $LiNbO_3$ Modulation, *Tetsuya Kawanishi, Takahide Sakamoto, Akito Chiba, Masayuki Izutsu; Natl. Inst. of Information and Communications Technology, Japan.* We describe integrated optical modulators based on $LiNbO_3$ waveguide device technologies, which can be applicable for advanced modulation formats. Over 100 Gb/s transmission can be acheived by differential quadrature-shift-keying (DQPSK).

8:00 a.m. – 9:45 a.m. CMI • Precision Spectroscopy I

Thomas R. Schibli; JILA, USA, Presider

CMI1 • 8:00 a.m. Invited
Optical Clocks Based on Single Ions and Atoms, *Fritz Riehle; Physikalisch-Technische Bundesanstalt (PTB), Germany.* Optical atomic clocks are beginning to outperform the best microwave clocks with respect to accuracy and stability. We report on PTB's optical atomic clocks based on a single ion and on neutral atoms.

NOTES

ROOM 318-320	ROOM 321-323	ROOM 324-326	ROOM 314	ROOM 315	ROOM 316	ROOM 317	ROOM 336
CLEO	JOINT	CLEO					QELS

CMA • Short Wavelength NLO—Continued

CMA3 • 8:30 a.m.
Achromatic and Single-Beam Pulse Characterization Technique for Visible-UV Pulses Based on Direct UV Pulse Shaping and Cross-Polarized Wave Generation, *Nicolas Forget[1], Sébastien Coudreau[1], Fabien Lepetit[2], Olivier Albert[3], Thomas Oksenhendler[1]; [1]Fastlite, France, [2]DSM/DRECAM/SPAM CEA, France, [3]LOA, ENSTA, Ecole Polytechnique, CNRS UMR 7639, France.* 40fs pulses at 397nm are characterized by a single-beam, achromatic, programmable and self-compensated spectrally resolved interferometric autocorrelation technique based on the conjugate use of a broadband pulse shaper and crossed-polarized wave generation.

CMA4 • 8:45 a.m. Tutorial
Ultrafast X-Ray Studies, *Roger Falcone; Univ. of California at Berkeley, USA.* I will describe techniques which utilize time-resolved X-ray scattering for understanding material dynamics at the atomic length-scale and ultrafast time-scale. Studies involve investigations of atoms, molecules, liquids, solids, and plasmas subjected to excitation.

JMA • Plasmonic Nanophotonics—Continued

JMA2 • 8:30 a.m.
Negative Index Metamaterial for Two Distinct Polarizations: Double Negative at 813 nm and Single Negative at 770 nm, *Uday K. Chettiar, Alexander V. Kildishev, Hsiao-Kuan Yuan, Wenshan Cai, Vladimir Drachev, Vladimir M. Shalaev; Purdue Univ., USA.* A negative index metamaterial demonstrating n=-1.0+0.8i with both negative effective permittivity and permeability at 813 nm of linearly polarized light is fabricated. It also exhibits a negative refractive index at 770 nm for orthogonal polarization.

JMA3 • 8:45 a.m.
Nanomechanical Control of an Optical Nanoantenna, *Joerg Merlein, Matthias Kahl, Annika Zuschlag, Alexander Sell, Andreas Halm, Johannes Boneberg, Paul Leiderer, Alfred Leitenstorfer, Rudolf Bratschitsch; Univ. of Konstanz, Germany.* We mechanically tune the feedgap of a single gold bowtie antenna by precise nanomanipulation with the tip of an atomic force microscope. At the same time, its optical response is determined via dark-field scattering spectroscopy.

JMA4 • 9:00 a.m.
Magnifying Superlens in the Visible Frequency Range, *Igor I. Smolyaninov, Yu-Ju Hung, Christopher C. Davis; Univ. of Maryland, USA.* We report on the experimental realization of a magnifying superlens working in the visible frequency range. Our design is based on a metal-dielectric plasmonic metamaterial, which consists of alternating positive and negative refractive index layers.

CMB • Ultrafast Processes—Continued

CMB3 • 8:30 a.m.
Direct Time-Domain Measurements of the Pulse Amplitude Statistics of a Fiber Supercontinuum Source, *Daniel Solli, Babram Jalali; Univ. of California at Los Angeles, USA.* We demonstrate a simple high-brightness all-fiber supercontinuum source that controllably produces amplitude-stable or unstable pulse trains. We present the first direct time-domain measurements of the amplitude statistics of a supercontinuum source in these distinct regimes.

CMB4 • 8:45 a.m.
All-Optical Delay of Images Using Slow Light, *Ryan M. Camacho, Curtis J. Broadbent, Irfan Ali-Khan, John C. Howell; Univ. of Rochester, USA.* Two-dimensional images are delayed in a cesium vapor cell. The transverse phase and amplitude profiles of the images are shown to be preserved, even at very low light levels.

CMB5 • 9:00 a.m.
Ultrafast Mirrorless Optical Parametric Oscillator in Periodically Poled $KTiOPO_4$ via Extended Phase Matching, *Ye Pu, Jie Wu, Mankei Tsang, Demetri Psaltis; Caltech, USA.* We report an experimental demonstration of an optical parametric generator in a periodically poled $KTiOPO_4$ crystal based on the principle of mirrorless optical parametric oscillation, with the highest down conversion efficiency ever reported for $KTiOPO_4$.

CMC • Fiber Lasers I—Continued

CMC3 • 8:30 a.m.
Mode-Locked, Multi-Wavelength Erbium-Doped Fiber Laser with 25 GHz Spacing, *Lawrence R. Chen[1], Alan L. K. Cheng[2], Chester Shu[2], Serge Doucet[3], Sophie LaRochelle[3]; [1]McGill Univ., Canada, [2]Chinese Univ. of Hong Kong, Hong Kong, [3]Univ. Laval, Canada.* We demonstrate a mode-locked, multi-wavelength erbium-doped fiber laser with 25 GHz spacing and wavelength tunability operating at 1 GHz. Stable room-temperature operation is obtained by exploiting four-wave mixing in a length of highly nonlinear fiber.

CMC4 • 8:45 a.m.
Dynamics of All-Fiber Self-*Q*-switched Ytterbium/Samarium Laser, *Andrei Fotiadi[1], Andrei Kurkov[2], Igor Razdobreev[3]; [1]Faculté Polytechnique de Mons, Belgium, [2]Fiber Optics Res. Ctr. at the GPI of the Russian Academy of Sciences, Russian Federation, [3]Univ. des Sciences et Technologies de Lille, France.* We have explored self-Q-switched operation of the fiber laser comprising ytterbium and samarium fibers in the cavity. Regular pulses are attainable at any wavelength within the gain spectrum. Dynamics of pulsation involves polarization mode switching.

CMC5 • 9:00 a.m.
Linearly-Polarized Yb-Doped Fiber Laser in an All-Fiber Configuration, *Akira Shirakawa[1], Makoto Kamijo[1], Jun Ota[1], Kenichi Ueda[1], Kiminori Mizuuchi[2], Hiroyuki Furuya[2], Kazuhisa Yamamoto[2]; [1]Inst. for Laser Science, Univ. of Electro-Communications, Japan, [2]AV-Core Technology Development Ctr., Matsushita Electric Industrial Co., Ltd., Japan.* Characteristics of polarization selection in Yb fiber laser by use of birefringent fiber-Bragg gratings are investigated. An 8W, 1064nm linearly-polarized fiber laser with 87% slope efficiency and <20pm bandwidth has been successfully demonstrated.

CMD • Semiconductor Quantum Dot Lasers I—Continued

CMD3 • 8:30 a.m. Invited
Infrared Lasers Using Colloidal Quantum Dots, *Edward Sargent, Sjoerd Hoagland; Univ. of Toronto, Canada.* We report a 1.54 μm semiconductor laser produced by processing from the solution phase. The approach, based on colloidal quantum dots, is compatible with spin-coating onto an arbitrary substrate.

CMD4 • 9:00 a.m.
Ultra-Low Threshold Lasing in a Quantum Dot Microdisk Cavity, *Glenn Solomon[1,2,3], Stephan Goetzinger[2,4], Wei Fang[1,5], Zhigang Xie[3], Hui Cao[5]; [1]NIST, USA, [2]Ginzton Lab, Stanford Univ., USA, [3]Solid-State Photonics Lab, Stanford Univ., USA, [4]ETH Zurich, Switzerland, [5]Dept. of Physics and Astronomy, Northwestern Univ., USA.* We describe microdisk lasers exhibiting submicrowatt CW lasing thresholds from a small number of QD emitters. Changes in the cavity linewidth, second-order correlation measurements, and output emission versus input pumping are used to verify lasing.

CME • UV and Visible Semiconductor Optoelectronic Materials—Continued

CME3 • 8:30 a.m.
MOCVD Epitaxy and Optical Properties of Self-Assembled InGaN Quantum Dots via Stranski-Kastranow Growth Mode Emitting at 520-nm, *Yik-Khoon Ee, Ronald A. Arif, Muhammad Jamil, Nelson Tansu; Lehigh Univ., USA.* Self-assembled $In_{0.35}Ga_{0.65}N$ quantum dots emitting at λ ~510-520 nm were realized by metalorganic chemical vapor deposition via Stranski-Kastranow growth mode, with quantum dots density of 4×10^9 cm^{-2}.

CME4 • 8:45 a.m.
High Resolution Utraviolet to Visible Image Conversion Using Self-Assembled CdSe/ZnCdMgSe Quantum Dots Photoluminescence, *Iosif Zeylikovich[1], Maria C. Tamargo[2], R. R. Alfano[1]; [1]Inst. for Ultrafast Spectroscopy and Lasers, Dept. of Physics, City College and Graduate Ctr. of the City Univ. of New York., USA, [2]Dept. of Chemistry, City College and Graduate Ctr. of the City Univ. of New York, USA.* High resolution UV-to-visible image conversion using photoluminescence emitted by quantum dots is presented. The resolution limitations are discussed and a high resolution optical system for the UV-to-visible image conversion is proposed.

CME5 • 9:00 a.m.
Angle Resolved Transmission Spectroscopy of ZnSe Based Microcavities Fabricated Using Epitaxial Liftoff Technique, *Arran Curran, Jessica K. Morrod, Kevin A. Prior, Ajoy K. Kar, Richard J. Warburton; Heriot-Watt Univ., UK.* We demonstrate level-repulsion of exciton-polaritons in ZnSe/$Zn_{0.9}Cd_{0.1}Se$ quantum wells transferred to SiO_2/Ta_2O_5 mirrors using epitaxial liftoff to fabricate our microcavities. The heavy-hole exciton oscillator strength is calculated to be 5.7×10^{12} cm^{-2}.

CMF • 100 Years of LEDs: Past, Present and Future—Continued

CMF2 • 8:30 a.m.
Micro-Pixellated Flip-Chip InGaN and AlInGaN Light-Emitting Diodes, *Chris Griffin, Haoxiang Zhang, Benoit Guilhabert, David Massoubre, Erdan Gu, Martin D. Dawson; Inst. of Photonics, Univ. of Strathclyde, UK.* Flip-chip GaN-based micro-LED arrays have been fabricated consisting of 256 (16 x 16) micropixels, each of diameter 72μm. Output characteristics are compared to broad-area reference LED devices fabricated from the same wafers.

CMF3 • 8:45 a.m.
HVPE-Grown n-InGaN/p-GaN Single Heterostructure LED with p-Side down, *Meredith L. Reed[1], Eric D. Readinger[1], Anand V. Sampath[1], Gregory G. Garrett[1], Paul Shen[1], Michael Wraback[1], Alexander Syrkin[2], Alexander Usikov[2], Vladimir A. Dmitriev[2]; [1]ARL, USA, [2]Technology Device Intl., Inc., USA.* An HVPE-grown n-InGaN/p-GaN single heterojunction LED with p-side down and emission at ~480nm has been demonstrated. Benefits of the p-down geometry for such an LED associated with polarity are discussed.

CMF4 • 9:00 a.m.
The Characteristics of a High-*Q* GaN Micro-Cavity Light Emitting Diode, *Chih-Chiang Kao, Tien-Chang Lu, Tsung-Ting Kao, Li-Fan Lin, Hao-Chung Kuo, Shing-Chung Wang; Dept. of Photonics and Inst. of Electro-Optical Engineering, Natl. Chiao Tung Univ., Taiwan.* We report the characteristics of a GaN high-*Q* micro-cavity light-emitting diode (MCLED). The GaN MCLED showed a very narrow linewidth of 0.52 nm at 10 mA and a dominant emission peak wavelength at 465.3 nm.

QMA • Ultrafast Dynamics in Quantum Wells—Continued

QMA3 • 8:30 a.m.
Theory of Optical Gain from Four-Wave Mixing Instabilities in Quantum Wells, *Stefan Schumacher[1], Nai H. Kwong[1], Rolf Binder[1], Arthur L. Smirl[2]; [1]College of Optical Sciences, Univ. of Arizona, USA, [2]Lab for Photonics and Quantum Electronics, Univ. of Iowa, USA.* We predict that in a typical pump-probe setup four-wave mixing instabilities associated with biexcitonic correlations in a single semiconductor quantum well can yield large optical gain in the probe and background-free four-wave mixing directions.

QMA4 • 8:45 a.m.
Experimental and Theoretical Studies of Exciton Correlations Using Optical Two-Dimensional Fourier Transform Spectroscopy, *Tianbao Zhang[1,2], Xiaoqin Li[1,2], S. T. Cundiff[1,2], R. P. Mirin[2], I. Kuznetsova[3], P. Thomas[3], T. Meier[3], Tianbao Zhang[1]; [1]JILA, Univ. of Colorado, USA, [2]NIST, USA, [3]Dept. of Physics, Philipps Univ., Germany.* Many-body correlations of excitons in semiconductors are explored experimentally with two-dimensional Fourier transform spectroscopy and modeled by a microscopic coherent $\chi^{(3)}$ theory beyond the Hartree-Fock approximation with qualitative agreements under different excitation conditions.

QMA5 • 9:00 a.m.
Coulomb-Enhanced Shift Currents from Symmetry Reduction in GaAs/AlGaAs Quantum Wells, *Mark Bieler[4], Klaus Pierz[1], Philip Dauson[2], Uwe Siegner[4]; [1]Physikalisch-Technische Bundesanstalt, Germany, [2]Univ. of Manchester, UK.* We report a new shift current tensor element resulting from symmetry reduction in semiconductor quantum wells. The shift current is strongly enhanced by Coulomb interaction and shows a pronounced maximum at the light-hole exciton resonance.

QMB • Spatial Solitons—Continued

QMB3 • 8:30 a.m.
Quadratic Solitons in 2-D Nonlinear Photonic Crystals, *Katia Gallo[1], Alessia Pasquazi[2], Salvatore Stivala[2], Gaetano Assanto[2]; [1]Optoelectronics Res. Ctr., UK, Univ. of Southampton, [2]Nonlinear Optics and Optoelectronics Lab, Univ. Roma Tre, Italy.* We report on the first observation of spatial solitons in a 2-D nonlinear photonic crystal. The experiments were performed in an hexagonally poled $LiNbO_3$ waveguide designed for second harmonic generation from ~1.55 μm.

QMB4 • 8:45 a.m.
Cusp Solitons in Exponentially Nonlinear Nanosuspensions, *Ramy A. El-Ganainy[1], Konstantinos Makris[1], Demetrios Christodoulides[1], Carmel Rotschild[2], Mordechai Segev[2]; [1]College of Optics and Photonics, CREOL and FPCE, USA, [2]Physics Dept., Technion-Israel Inst. of Technology, Israel.* We show that cusp-like solitons are possible in exponentially nonlinear nanoparticle suspensions. The dynamics and stability properties of this new class of waves are examined in detail.

QMB5 • 9:00 a.m.
Spontaneous Pattern Formation upon Incoherent Waves: From Modulation-Instability to Dynamic Equilibrium, *Liad Levi, Tal Schwartz, Ofer Manela, Mordechai Segev; Technion–Israel Inst. of Technology, Israel.* We study long-range propagation of spatially-incoherent light in non-instantaneous nonlinearities, and show that the system eventually reaches dynamic equilibrium, which depends only on the initial coherence, and not on the strength of the nonlinearity.

QMC • EIT and Slow Light—Continued

QMC3 • 8:30 a.m.
An Ultra-Dispersive Optically Controlled Atomic Prism, *Hebin Li, Vladimir A. Sautenkov, Yuri V. Rostovtsev, Marlan O. Scully; Dept. of Physics, Texas A&M Univ., USA.* We have experimentally demonstrated an ultra-dispersive atomic prism with the highest spectral angular dispersion ever shown (six orders of magnitude higher than glass prism). Its dispersion is optically controlled by a coherent driving field.

QMC4 • 8:45 a.m.
Laser-Noise-Induced Correlations in Electromagnetically Induced Transparency, *Paulo Valente[1], Luciano S. Cruz[1], Daniel Felinto[1], Katiuscia N. Cassemiro[1], Marcelo Martinelli[1], José G. Aguirre Gomez[1], Arturo Lezama[2], Paulo A. Nussenzveig[1]; [1]Inst. de Fisica, Univ. de Sao Paulo, Brazil, [2]Inst. de Fisica, Facultad de Ingenieria, Univ. de la Republica, Uruguay.* We observed a change from correlation to anti-correlation between pump and probe fields in Electromagnetic Induced Transparency (EIT) in Rb vapor, and explain it by competition between EIT and Raman processes.

QMC5 • 9:00 a.m.
An Atomic Clock Based on a VCSEL-Driven CPT Resonance and a Small ^{87}Rb Vapor Cell, *Matan Kabanov, Ido Ben-Aroya, Gadi Eisenstein; Technion, Israel.* We report a high performance frequency standard based on Coherent Population Trapping, incited by a modulated VCSEL in the ^{87}Rb-D_2 line. Short-term stabilities of $\sigma y=3\times10^{-11}/\sqrt{\tau}$ and relative frequency deviations below 10^{-11}/day were demonstrated.

CMG • Filters—Continued

CMG3 • 8:30 a.m.
Active Narrowband Multiple Wavelength Filters and Frequency Doublers in Aperiodically Poled Lithium Niobates, *Chao-Hung Lin[1], S. W. Lin[1], Yen-Hung Chen[1], C. L. Chang[1], Yen-Chieh Huang[2], Jenq-Yang Chang[1]; [1]Dept. of Optics and Photonics, Natl. Central Univ., Taiwan, [2]Inst. of Photonics Technologies, Natl. Tsing-Hua Univ., Taiwan.* We report the first experimental demonstration of active narrowband multiple wavelength filters in aperiodically poled lithium niobate (APLN) crystals. Simultaneous transmission of >90% (~100% in design) of 8 telecom wavelengths was achieved in this device.

CMG4 • 8:45 a.m.
Bandwidth-Tunable Add-Drop Filters Based on MEMS-Actuated Single-Crystalline Silicon Microtoroidal Resonators, *Jin Yao, Ming C. Wu; Univ. of California at Berkeley, USA.* A bandwidth-tunable filter has been demonstrated by MEMS-actuated single-crystalline silicon microtoroidal resonator. Bandwidth is tuned from 2.8 to 78.4 GHz by voltage control. A 21.8 dB extinction ratio is attained as a dynamic add-drop filter.

CMG5 • 9:00 a.m.
Synthesis of the Transfer Function of a Spectral Bragg Filter Using Electro-Optical Phase-Shift Keying, *Poonam Arora[1,2], A. S. Kozlov[2], I. V. Il'icbev[2], A. V. Chamray[2], V. M. Petrov[1,2], J. Petter[1], T. Tschudi[1], M. P. Petrov[2]; [1]Inst. of Applied Physics, TU Darmstadt, Germany, [2]A.F. Ioffe Physical Technical Inst., Russian Federation.* The synthesis of the transfer function of an integrated spectral Bragg filter using the technique of electro-optical phase-shift keying is reported. The demonstrated time of synthesis is less than 1 μs.

CMH • Advanced Modulation Formats—Continued

CMH2 • 8:30 a.m.
Performance Comparison of Duobinary and DQPSK Modulation Formats for Mixed 10/40-Gbit/s WDM Transmission on SMF and LEAF Fibers, *Antoine Tan, Erwan Pincemin; France Telecom, France.* Duobinary and DQPSK are considered as the best candidates for deployment of 40Gb/s technology on existing 10Gb/s transmission systems. We show that DQPSK (duobinary) is more adapted for mixed 10/40-Gb/s transmission on SMF (LEAF).

CMH3 • 8:45 a.m.
Bi-Directional DPSK Transmission over 230-km SSMF Employing Innovative Bi-Directional Amplification, *Ming Fang Huang[1,2], Jianjun Yu[3], Gee-Kung Chang[1], Jason (Jyebong) Chen[2], Sien Chi[2,4]; [1]School of Electrical and Computer Engineering, Georgia Tech, USA, [2]Dept. of Photonics, Natl. Chiao-Tung Univ., Taiwan, [3]NEC Lab America, USA, [4]Dept. of Electrical Engineering, Yuan Ze Univ., Taiwan.* A novel bi-directional DPSK transmission system with 50-GHz channel spacing is experimentally demonstrated using a four-port interleaver to enable uni-directional amplification. After 230-km SSMF, RZ-DPSK transmission improved power penalty by 2-dB than NRZ-DPSK at 10-Gb/s.

CMH4 • 9:00 a.m.
QPSK-Homodyne Transmission Using a Multi-Wavelength Fabry-Perot Laser Diode, *Moriya Nakamura, Yukiyoshi Kamio, Tetsuya Miyazaki; Natl. Inst. of Information and Communications Technology (NICT), Japan.* We demonstrate ultimate linewidth-tolerant 20-Gbps QPSK homodyne transmission using a spectrum sliced Fabry-Perot laser diode signal light source. DGD tolerance was clarified, and BER characteristics less than 10-8 after 80-km transmission was successfully attained.

CMI • Precision Spectroscopy I—Continued

CMI2 • 8:30 a.m.
Experimental Study Comparing EIT in V and L Schemes in Acetylene-Filled HC-PCF, *Philip S. Light, Fetah Benabid, Francois Couny, Greg Pearce, David M. Bird; Univ. of Bath, UK.* We report detailed experimental and theoretical results comparing electromagnetically-induced-transparency obtained in V and Λ configurations in acetylene-filled-hollow-core PCF. For the same experimental conditions, the EIT in V-scheme shows a stronger peak but larger linewidth.

CMI3 • 8:45 a.m.
High Accuracy Photon-Counting Detector Calibration and Independent Verification of a Correlated-Photon Calibration Technique, *Sergey V. Polyakov[1,2], Alan L. Migdall[1,2]; [1]Optical Technology Div., NIST, USA, [2]Joint Quantum Inst., Univ. of Maryland, USA.* We characterized a two-photon method to calibrate photon-counting detectors. We verified this method by comparison to a national primary standard detector scale. This comparison showed agreement of the two methods to 0.14(14) % (k=1).

CMI4 • 9:00 a.m.
Magnetic Field-Induced Spectroscopy of Optical Clock Transitions in an Elliptically Polarized Lattice Field, *Aleksei V. Taichenachev[1,2], Valeriy I. Yudin[1,2], Chris W. Oates[3], Leo Hollberg[3]; [1]Inst. of Laser Physics SB Russian Academy of Sciences, Russian Federation, [2]Novosibirsk State Univ., Russian Federation, [3]NIST, USA.* We demonstrate a method to suppress potentially troublesome frequency shifts in lattice-based atomic clocks with alkaline-earth-like atoms. Suppression of these shifts would remove a potential barrier from path to the next generation of atomic clocks.

NOTES

ROOM 318-320 | ROOM 321-323 | ROOM 324-326 | ROOM 314 | ROOM 315 | ROOM 316 | ROOM 317 | ROOM 336

CLEO | JOINT | CLEO | QELS

JMA • Plasmonic Nanophotonics—Continued

JMA5 • 9:15 a.m.
Compensation of Loss in Propagating Surface Plasmon by Optical Gain, *G. Zhu[1], M. Mayy[1], M. Baboura[1], J. A. Adegoke[1], V. A. Podolskiy[2], M. A. Noginov[1]; [1]Norfolk State Univ., USA, [2]Oregon State Univ., USA.* We experimentally demonstrate ~30% elongation of the surface plasmon propagation length and show that the full compensation of the surface plasmon loss by optical gain is within the reach.

JMA6 • 9:30 a.m.
Plasmonic Quantum Cascade Laser Antenna, *Nanfang Yu, Ertugrul Cubukcu, Laurent Diehl, Kenneth Crozier, Federico Capasso; Harvard Univ., USA.* We demonstrate the plasmonic quantum cascade laser antenna, that can confine mid-infrared radiation beyond the diffraction limit, by integrating gold optical antennas on the laser facet.

CMB • Ultrafast Processes—Continued

CMB6 • 9:15 a.m.
Group Velocity Control by Atomic Nonlinear Response in a Laser Cavity, *Ladan Arissian, Jean-Claude Diels, Andreas Velten; Center for High Technology Materials, Univ. of New Mexico, USA.* Group velocity modification through nonlinear index of the atomic medium is used as a purely optical feedback in a mode locked ring laser. The dispersion associated with the dark line acts as an error signal.

CMB7 • 9:30 a.m.
High Pulse Energy Supercontinuum Radiation Generated in a Single-Mode Fibre and Its Application to Near-IR Absorption Spectroscopy, *Rosalynne S. Watt, Clemens F. Kaminski, Johan Hult; Univ. of Cambridge, UK.* High pulse energy, near-IR supercontinuum radiation is generated in a single-mode fibre. The supercontinuum pulses are dispersed to generate a rapid wavelength sweep, and employed to carry out broadband, real-time absorption measurements in gas samples.

CMC • Fiber Lasers I—Continued

CMC6 • 9:15 a.m.
Phase Locking of Nanosecond Pulses of Stimulated Brillouin Scattering in a Two-Element Fiber Laser Array, *Fanting Kong[1,2], Liping Liu[1,2], Charlotte E. Sanders[1,2], Ying-Chih Chen[1,2], Kotik K. Lee[3]; [1]Dept. of Physics and Astronomy, Hunter College , [2]Graduate School, The City Univ. of New York, USA, [3]Lockheed Martin Coherent Technology, USA.* Phase locking of nanosecond Brillouin backscattering pulses has been demonstrated through diffractive coupling and spatial filtering mechanisms in a two-element fiber laser array, despite the stochastic dynamics of short nonlinear pulse generation.

CMC7 • 9:30 a.m.
Spectral Beam Combining of Yb-Doped Fiber Amplifiers with Excellent Beam Quality, *Sandro Klingebiel[1], Fabian Röser[1], Bülent Ortac[1], Jens Limpert[1], Andreas Tünnermann[1,2]; [1]Friedrich Schiller Univ. Jena, Germany, [2]Fraunhofer Inst. for Applied Optics and Precision Engineering, Germany.* We present a setup for spectral combination of three individual fiber laser beams with a total output power of 153 W and beam quality of 1.2. Thus this setup provides excellent opportunities for brightness scaling.

CMD • Semiconductor Quantum Dot Lasers I—Continued

CMD5 • 9:15 a.m.
Low-Threshold Current-Injection Single-Mode Lasing in T-Shaped Quantum Wires with Parallel Doping Layers, *Shuman Liu[1], Masabiro Yoshita[1], Makoto Okano[1], Toshiyuki Ihara[1], Hirotake Itoh[1], Hidefumi Akiyama[1,2], Loren N. Pfeiffer[2], Ken W. West[2], Kirk W. Baldwin[2]; [1]Inst. for Solid State Physics, Univ. of Tokyo, Japan, [2]Bell Labs, Lucent Technologies, USA.* CW single-mode lasing from 30K to 70K with the lowest threshold current of 0.27mA has been demonstrated in 20-period T-shaped quantum-wire laser diodes with parallel p and n doping layers.

CMD6 • 9:30 a.m.
InP/AlGaInP on GaAs Quantum Dot Lasers, *Peter M. Smowton[1], Mohammed Al-Ghamdi[1], Andrey B. Krysa[2]; [1]Cardiff Univ., UK, [2]Sheffield Univ., UK.* MOVPE grown InP q-dot lasers have low 300K threshold current density (195 Acm^{-2} for 2000μm long device) and T_0=105K (10-85°C) for 725-740nm emission. Homogenous broadening appears to be more pronounced than in InGaAs q-dots.

CME • UV and Visible Semiconductor Optoelectronic Materials—Continued

CME6 • 9:15 a.m.
Nanophotonic Switch Using One-Dimensional ZnO Double-Quantum-Well Structures, *Takashi Yatsui[1], Suguru Sangu[2], Tadashi Kawazoe[1], Motoichi Ohtsu[3], Sungfin An[4], Jinkyoung Yoo[4], Gyu-Chul Yi[4]; [1]Japan Science and Technology Agency, Japan, [2]Ricoh Co., Ltd., Japan, [3]Univ. of Tokyo, Japan, [4]POSTECH, Republic of Korea.* We observed spectral switching and evaluated its dynamics by controlling the dipole-forbidden optical near-field energy transfer among resonant exciton states using 1D-ZnO nanorod double-quantum-well structures.

CME7 • 9:30 a.m.
ZnO p-n Junction Photodetectors, *Linghui Li[1], Jorge Lubgunan[1], Ping Yu[1], Henry White[1], Yungryel Ryu[2], Tae-Seok Lee[2]; [1]Dept. of Physics and Astronomy, Univ. of Missouri-Columbia, USA, [2]MOXtronics Inc., USA.* We report optical and electrical characterizations of newly developed ZnO p-n junction photodiode detectors. The spectral photoresponse and I-V properties show the detector is a promise candidate for UV detection.

CMF • 100 Years of LEDs: Past, Present and Future—Continued

CMF5 • 9:15 a.m.
Enhancement of Radiative Efficiency of Nitride-Based LEDs via Staggered InGaN Quantum Wells Emitting at 420-500 nm, *Ronald A. Arif, Yik-Kboon Ee, Nelson Tansu; Lehigh Univ., USA.* Polarization band engineering via staggered InGaN quantum well allows enhancement of radiative recombination rate, leading to significant improvement of luminescence and LEDs output power by > ~4 times.

CMF6 • 9:30 a.m.
Influence of the Quantum-Confined Stark Effect of an InGaN/GaN Quantum Well on Its Coupling with Surface Plasmons for Emission Enhancement, *Cheng-Yen Chen, Dong-Ming Yeh, Yen-Cheng Lu, Chi-Feng Huang, Tsung-Yi Tang, Jeng-Jie Huang, C. C. Yang; Natl. Taiwan Univ., Taiwan.* The effects of the screening of the quantum-confined Stark effect in an InGaN/GaN quantum well, in which the photoluminescence spectrum blue shifts with excited carrier density, on the surface plasmon coupling are identified and quantified.

QMA • Ultrafast Dynamics in Quantum Wells—Continued

QMA6 • 9:15 a.m.
Coherent Nonlinear Optical Effects in Semiconductor QWs Induced by Intense Single-Cycle THz Pulses, *Yun-Shik Lee[1], Jeremy R. Danielson[1], Johannes Steiner[2], Mackillo Kira[2], Stephan Koch[2], John P. Prineas[3]; [1]Oregon State Univ., USA, [2]Philipps Univ., Germany, [3]Univ. of Iowa, USA.* We investigate coherent THz-induced dynamics for optical excitation in semiconductor quantum-wells via THz-pump and optical-probe experiments. Strong single-cycle THz pulses induce transient spectral-shifts and broadening of the light-hole and heavy-hole excitonic resonances in GaAs/AlGaAs quantum-wells.

QMA7 • 9:30 a.m.
Superfluorescence from High-Density Magneto-Plasmas: Mixing, Temperature, and Excitation Pulsewidth Dependence, *Young-Dahl Jho[1], X. Wang[1], J.H. Lee[1], D.H. Reitze[1], J. Kono[2], A.A. Belyanin[3], V. V. Kocharovsky[3], G.S. Solomon[4]; [1]Univ. of Florida, USA, [2]Rice Univ., USA, [3]Texas A&M, USA, [4]Stanford Univ., USA.* Cooperative recombination from dense electron-hole plasmas in quantum wells is reported as a function of energy level mixing, temperature, and excitation pulse width under strong magnetic fields (up to 31 T).

9:45 a.m. – 10:15 a.m. COFFEE BREAK, 300 LEVEL FOYER

QELS

CLEO

QMB • Spatial Solitons—Continued

QMB6 • 9:15 a.m.
Soliton Transitions in Optical Lattices, *Konstantinos Makris[1], Demetrios Christodoulides[1], Or Peleg[2], Mordechai Segev[2]; [1]College of Optics/CREOL, USA, [2]Technion-Israel Inst. of Technology, Israel.* It is theoretically shown that Bloch (band to band) and soliton (gap to gap) transitions are possible in optical lattices. This can be achieved in waveguide arrays with modulated channel widths along the propagation direction.

QMB7 • 9:30 a.m.
On-Axis Excitation of Two-Dimensional Gap Solitons and Gap Soliton Trains, *Jianke Yang[1], Cibo Lou[2,3], Xiosheng Wang[2], Liqin Tang[3], Jingjun Xu[3], Zbigang Chen[2,3]; [1]Univ. of Vermont, USA, [2]San Francisco State Univ., USA, [3]TEDA Applied Physical School, Nankai Univ., China.* We demonstrate two-dimensional gap solitons/soliton-trains by single-beam on-axis excitation in a self-defocusing "backbone" photonic lattice. Interferograms and k-space spectra indicate staggered structure of the gap solitons arising from M-symmetry points of the first Bloch band.

QMC • EIT and Slow Light—Continued

QMC6 • 9:15 a.m.
Low Light Level Saturated Absorption in Tapered Fiber Embedded in Alkali Vapor, *Gour Pati[1], Sean Spillane[2], Raymond Beausoleil[2], Kenneth Salit[1], Matthew Hall[1], Prem Kumar[1,2], Selim M. Shahriar[1]; [1]Northwestern Univ., USA, [2]HP Labs, USA.* We demonstrate ultra-low light level saturated absorption in a tapered fiber embedded in an atomic vapor. This shows the potential for extremely low light level optical switching and quantum information processing with such a device.

QMC7 • 9:30 a.m.
EIT with Counter Propagating Probe-Coupling Beams in Acetylene Filled HC-PCF, *Philip S. Light, Fetab Benabid, Francois Couny, Greg J. Pearce, David M. Bird; Univ. of Bath, UK.* We present experimental results demonstrating for the first time to our knowledge the observation of electromagnetically-induced-transparency using a counter-propagating beam configuration in an acetylene filled hollow-core PCF gas-cell, in both V and Λ energy-level schemes.

CMG • Filters—Continued

CMG6 • 9:15 a.m.
Group Delay Ripple in Fiber Bragg Gratings: Electronic Equalization, *Kasyapa Balemarthy[1], Stephen E. Ralph[1], Paul Westbrook[2], Robert L. Lingle[2]; [1]Georgia Tech, USA, [2]OFS, USA.* We systematically investigate the impact of electronic equalization on fiber Bragg gratings (FBG) with group delay ripple at 40Gbit/s. Correlating with measured FBGs, we report that the associated penalty reduction may be limited in practice.

CMG7 • 9:30 a.m.
Apodisation of Photo-Induced Waveguide Gratings with Double-Exposure of Reversely Varied Duty Cycles, *Xuewen Shu, Kate Sugden, Ian Bennion; Aston Univ., UK.* We present a novel apodisation scheme for photo-induced waveguide gratings. The apodisation is implemented with double exposures that have reversely varying duty-cycles. We have successfully applied the scheme to remove the sidelobes of long-period gratings.

CMG8 • 9:45 a.m.
Analysis of Filter-Assisted 160 Gb/s Wavelength Converter Using a Single Semiconductor Optical Amplifier, *Zhonggui Li[1], Javier Molina Vázquez[1], Yong Liu[1], Eduward Tangdiongga[1], Shaoxian Zhang[1], Djan Khoe[1], Harm Dorren[1], Daan Lenstra[2]; [1]Eindhoven Univ. of Technology, Netherlands, [2]Delft Univ. of Technology, Netherlands.* We present for the first time a systematic analysis of the Q-factor and eye opening for wavelength conversion based on a single semiconductor optical amplifier and a detuned filter at 160 Gb/s.

CMH • Advanced Modulation Formats—Continued

CMH5 • 9:15 a.m.
Parameters Affecting the Performance of WDM-DPSK Systems Based on SOA Amplifiers, *Ernesto Ciaramella, Valentina Donzella, Antonio D'Errico; Scuola Superiore Sant'Anna, Italy.* We determine the key physical parameters affecting the design of SOA-based WDM-DPSK systems. System limitations critically depend on the interplay of accumulated fiber dispersion, the SOA input power and the DPSK detection technique.

CMH6 • 9:30 a.m.
Noise-Induced Spectral Shifts in Pseudo-Linear Fiber-Optic Communication Systems, *Armando N. Pinto[1], Govind P. Agrawal[2]; [1]Inst. of Telecommunications, Univ. of Aveiro, Portugal, [2]Inst. of Optics, Univ. of Rochester, USA.* Signal and noise interaction mediated by the Kerr effect in fibers produces random pulse central frequency shifts. We show that strong correlation between signal and noise evolution makes this effect noteworthy even in pseudo-linear systems.

CMI • Precision Spectroscopy I—Continued

CMI5 • 9:15 a.m.
Optical Frequency Measurements in the Far- and Mid-infrared Range, *Peter Gaal[1], Markus B. Raschke[1,2], Klaus Reimann[1], Michael Woerner[1]; [1]Max-Born-Inst. Berlin, Germany, [2]Univ. of Washington, USA.* Optical frequencies in the mid- and far-infrared spectral range are directly measured by electro-optic sampling with a femtosecond oscillator. This technique is demonstrated for the case of a cw CO_2 laser.

CMI6 • 9:30 a.m.
A Broadband Circular Dichroism Spectroscopy Using a Femtosecond White-Light Continuum, *Anton A. Trifonov, Ivan C. Buchvarov, Torsten Fiebig; Boston College, USA.* We demonstrate a new approach to broad band circular dichroism spectroscopy using polarization controlled femtosecond white-light generation. The proposed method is evaluated by measuring the ground state circular dichroism spectrum of $[Ru(bpy)_3]^{2+}$.

9:45 a.m. – 10:15 a.m. COFFEE BREAK, 300 LEVEL FOYER

NOTES

ROOM 318-320 — CLEO

10:15 a.m. – 12:00 p.m.
CMJ • Parametric Devices
Presider to Be Announced

CMJ1 • 10:15 a.m. Invited

New Light from Gallium Arsenide: Micro-Structured GaAs for Mid-IR and THz-Wave Generation, *Konstantin Vodopyanov[1], J. E. Schaar[1], P. S. Kuo[1], M. M. Fejer[1], X. Yu[1], J. S. Harris[1], V. Kozlov[2], W. C. Hurlbut[2], Y-s Lee[3], C. Lynch[4], D. Bliss[4]; [1]Stanford Univ., USA, [2]Microtech Instruments, Inc., USA, [3]Oregon State Univ., USA, [4]AFRL, USA.* We review nonlinear-optical applications of micro-structured quasi-phasematched GaAs. These include new sources of mid-IR coherent radiation, pump-polarization-insensitive devices, as well as sources of tunable terahertz radiation, based on optical rectification or intracavity frequency mixing.

ROOM 321-323 — JOINT

10:15 a.m. – 12:00 p.m.
JMB • Resonators and Photonic Crystals
Presider to Be Announced

JMB1 • 10:15 a.m. Invited

Micro- and Nano-Photonics for Chip-Scale Solid-State and Atomic Cavity QED, *Oskar Painter, Caltech, USA.* In this talk I will describe our progress in developing integrated atom-photon chips and monolithic semiconductor quantum dot-microcavity systems for chip-scale cavity QED.

ROOM 324-326 — CLEO

10:15 a.m. – 12:00 p.m.
CMK • Ultrafast Parametric Amplification I
Brent C. Stuart; LLNL, USA, Presider

CMK1 • 10:15 a.m. Tutorial

Optical Parametric Amplifiers: Towards Ultrashort Light Pulses of Extreme Power, *Algis Piskarskas; Vilnius Univ., Lithuania.* Abstract not available.

ROOM 314 — CLEO

10:15 a.m. – 12:00 p.m.
CML • Fiber Lasers II
Jens Limpert; Inst. of Applied Physics, Germany, Presider

CML1 • 10:15 a.m.

Synchronised Pulsed Pumped Fiber Amplifiers, *Christian Bobling[1], Hartmut Zimmermann[2], Konrad Hohmann[1], Wolfgang Schippers[1], Wolfgang Schade[1]; [1]Technische Univ. Claustbal, Germany, [2]Crylas GmbH, Germany.* An Yb fiber amplifier is seeded by a $Cr^{4+}Nd^{3+}$:YAG microchip laser. Due to improvement of the slope efficiency and suppression of ASE a pulsed diode laser is used as pump source of the active fiber.

CML2 • 10:30 a.m.

Pulsed, Fiber-Based Laser with Widely Tunable Repetition Rate, Fixed Pulse Duration, and Minimal Nonlinear Effects, *Jean-Philippe Feve[1], Paul E. Schrader[2], Roger L. Farrow[2], Dahv A. Kliner[2], Nicolas Landru[1]; [1]Teem Photonics, France, [2]Sandia Natl. Labs, USA.* We report a pulsed, fiber-amplified microlaser providing high peak and average powers, widely tunable repetition rate (7.1-27 kHz), constant pulse duration (1.0 ns), linear output polarization, diffraction-limited beam quality, and minimal distortion by nonlinear effects.

ROOM 315 — CLEO

10:15 a.m. – 12:00 p.m.
CMM • Semiconductor Quantum Dot Lasers II
Edward Sargent; Univ. of Toronto, Canada, Presider

CMM1 • 10:15 a.m.

Two-Section Quantum Dot Lasers with 20-dB Modulation Efficiency Improvement, *Yan Li[1], Nader A. Naderi[1], Yongchun Xin[1], Vassilios Kovanis[2], Luke F. Lester[1]; [1]Univ. of New Mexico, USA, [2]AFRL/SNDP, USA.* A 20-dB enhancement in the amplitude modulation efficiency and a gain lever of 30 is observed in a two-section quantum dot laser. A novel modulation response equation is derived to explain the device behavior.

CMM2 • 10:30 a.m.

Dynamics of Quantum Dot Photonic Crystal Lasers, *Bryan C. Ellis, Ilya Fushman, Dirk Englund, Bingyang Zhang, Yosbibisa Yamamoto, Jelena Vuckovic; Stanford Univ., USA.* A rate equation model is used to predict the maximum modulation rate of a quantum dot photonic crystal laser. We predict that the modulation rate is limited by the carrier capture rate into the dots.

ROOM 316 — CLEO

10:15 a.m. – 12:00 p.m.
CMN • Near-Infrared Semiconductor Materials
John Prineas; Univ. of Iowa, USA, Presider

CMN1 • 10:15 a.m.

Angle-Resolved Entanglement Spectroscopy for Semiconductor Applications, *Walter Hoyer, Peter Bozsoki, Mackillo Kira, Peter Thomas, Stephan W. Koch; Philipps-Univ. Marburg, Germany.* Angle and energy resolved single-photon correlation measurements of luminescence emitted from semiconductor nanostructures are modeled. A simple reconstruction procedure is shown to yield the long-range disorder fluctuations with high fidelity.

CMN2 • 10:30 a.m.

Strong Lateral Confinment in Ga(AsSb)/GaAs/(AlGa)As Heterostructures, *Swantje Horst[1], Sangam Chatterjee[1], Kristian Hantke[1], Peter J. Klar[1], Igor Nemeth[1], Wolfgang Stolz[1], Kerstin Volz[1], Christina Bückers[1], Angela Thränbardt[1], Stephan W. Koch[1], Gunnar Blume[1], Gerhard Weiser[1], Wolfgang Rühle[1], Shane R. Johnson[2], Jiangbo Wang[2], Yong -Hang Zhang[2]; [1]Philipps Univ. Marburg, Germany, [2]Arizona State Univ., USA.* We investigate a series of Ga(AsSb)/GaAs/AlGaAs quantum wells, that show an additional inplane confinement. This is attributed to the formation of self-organized GaAsSb quantum-islands during growth with confinement energies of several hundred meV.

ROOM 317 — CLEO

10:15 a.m. – 12:00 p.m.
CMO • Nanocrystalline and Organic Light Emitters
Michael Wraback; ARL, USA, Presider

CMO1 • 10:15 a.m.

Efficient All-Inorganic Colloidal Quantum Dot LEDs, *Vanessa Wood, Jean-Michel Caruge, Jonathan E. Halpert, Moungi G. Bawendi, Vladimir Bulovic; MIT, USA.* We present the first all-inorganic QD-LEDs consisting of radio-frequency sputtered metal-oxide charge transport layers and a colloidal quantum dot electroluminescent region. These devices manifest a 100-fold increase in external quantum efficiency over previously reported structures.

CMO2 • 10:30 a.m.

Synthesis and Characterization of ZnO Colloidal Nanocrystals, *Melisa R. Greenberg[1], Gennady A. Smolyakov[1], Timothy J. Boyle[2], Marek Osinski[1]; [1]Univ. of New Mexico, USA, [2]Sandia Natl. Labs, USA.* Colloidal synthesis of ZnO nanocrystals (NCs) from zinc alkoxide precursors in the 1-methyl imidazole/H_2O coordinating solvent is reported. The results of NC structural and optical characterization are presented.

ROOM 336 — QELS

10:15 a.m. – 12:00 p.m.
QMD • Nonlinear Optics of Semiconductors
Federico Capasso; Harvard Univ., USA, Presider

QMD1 • 10:15 a.m.

Superfluorescence of Biexcitons in CuCl Quantum Dots under Two-Photon Resonant Excitation, *Kensuke Miyajima[1,2], Yuji Kagotani[1], Koubei Sakurai[1], Shingo Saito[3], Masaaki Asbida[1,2], Tadasbi Itob[1,2]; [1]Graduate School of Engineering Science, Osaka Univ., Japan, [2]CREST, Japan Science and Technology Agency, Japan, [3]Natl. Inst. of Information and Communications Technology, Japan.* Time-resolved photoluminescence of biexcitons in CuCl quantum dots has been performed by optical Kerr-gate method. Pulse-shaped luminescence like superfluorescence has been observed under resonant two-photon excitation of the biexcitons.

QMD2 • 10:30 a.m.

100X Enhancement of the Nonlinear Refractive Index of Sulfur-Doped CS_2 over Pure CS_2, *Raymond Edziah[1], Elaine N. Lalanne[1], Anthony M. Johnson[1], Sudbir Trivedi[2]; [1]Univ. of Maryland, Baltimore County, USA, [2]Brimrose Corp. of America, USA.* Preliminary Z-scan measurements of variable concentration sulfur-doped CS_2 indicate a two-order of magnitude enhancement of the nonlinear index (n_2) over CS_2. The laser repetition rate will be varied to determine any thermal contribution to n_2.

QELS

CLEO

10:15 a.m. – 12:00 p.m.
QME • Spatial Confinement and Microcavity
Stefan Wabnitz; Univ. de Bourgogne, France, Presider

QME1 • 10:15 a.m.
Nonlinear Scattering and Trapping by Local Photonic Potentials, *Yoav Linzon[1], Shimshon Barad[1], Roberto Morandotti[2], Maite Volatier[3], Vincent Aimez[3], Richard Ares[3]; [1]School of Physics and Astronomy, Tel Aviv Univ., Israel, [2]INRS-Energie et Materiaux, Univ. of Quebec, Canada, [3]Univ. de Sherbrooke, Canada.* We experimentally study nonlinear scattering by local photonic potentials embedded in continuous Kerr media, and demonstrate nonlinear trapping in guiding potentials and resonant transmission in anti-guiding potentials. The results are verified by numerical simulations.

QME2 • 10:30 a.m.
Dispersive, Superfluid-like Shock Waves in Nonlinear Optics: Properties and Interactions, *Wenjie Wan, Shu Jia, Jason W. Fleischer; Princeton Univ., USA.* We experimentally demonstrate dispersive optical shock waves in 1-D and 2-D, characterize their nonlinear properties, and observe the complex interactions when two such shocks collide.

10:15 a.m. – 12:00 p.m.
QMF • Cavity QED I
Luis A. Orozco; Univ. of Maryland, College Park, USA, Presider

QMF1 • 10:15 a.m. Tutorial
Scalable Quantum Networks with Atoms and Photons, *H. Jeff Kimble; Caltech, USA.* Scalable quantum networks for quantum computation, communication, and metrology require new capabilities for interfacing quantum states of matter and light. I will provide an overview of recent theoretical and experimental progress in this area.

10:15 a.m. – 12:15 p.m.
CMP • Switches and Modulators
Patrick LiKamWa; Univ. of Central Florida, USA, Presider

CMP1 • 10:15 a.m.
Novel Si-Based Optoelectronic Switching Device: Light to Latch, *Ali K. Okyay, Abhijit J. Pethe, Duygu Kuzum, Salman Latif, David A. Miller, Krishna C. Saraswat; Stanford Univ., USA.* A novel, high performance optoelectronic switch is introduced. The device is a Si-MOSFET with Ge gate that can be fabricated at the nanoscale with very low capacitance. Current gain of up to 1000× is demonstrated.

CMP2 • 10:30 a.m. Invited
High-Speed MEMS Micromirror Switching, *Gregory N. Nielson, Roy H. Olsson, Paul R. Resnick, Olga B. Spahn; Sandia Natl. Labs, USA.* We report a high-speed MEMS micromirror that switches in 225 ns using 22 V. Switch repetition rates of up to 100 kHz have been demonstrated. These performance characteristics significantly extend the application space of micromirrors.

10:15 a.m. – 11:45 a.m.
CMQ • Signal Processing for Optical Communications
David Moss; JDS Uniphase Corp., Canada, Presider

CMQ1 • 10:15 a.m.
First 10Gb/s Small Form Factor Pluggable (XFP) Optical Transceiver for 140km DWDM Transmission, *Sunil Priyadarshi, Hsu-Feng Chou, Sheng Z. Zhang, Hua Yang, Todd Rope, Near Margalit, Alexis Black; LuminentOIC Inc, USA.* A 10Gb/s EDC-based optical transceiver module for DWDM application is realized within the small-form-factor-pluggable (XFP) platform. The developed transceiver meets 140km (2400 ps/nm) transmission in uncompensated SSMF and has low power consumption and small footprint.

CMQ2 • 10:30 a.m. Invited
Advanced Modulation Formats and Digital Signal Processing in Optical Communications, *Joseph Kahn, Ezra Ip; Stanford Univ., USA.* Performance and implementation complexity of various modulation and detection techniques are compared. Non-binary modulation with coherent detection maximizes spectral efficiency and enables effective, low-complexity digital compensation of chromatic and polarization-mode dispersions and other transmission impairments.

10:15 a.m. – 12:00 p.m.
CMR • Precision Spectroscopy II
Gesine Grosche; PTB, Germany, Presider

CMR1 • 10:15 a.m. Invited
Accurate Optical Clocks Based on Single Trapped Ion, *Jim Bergquist; NIST, USA.* Optical clocks based on narrow transitions of single ions have long promised unprecedented stability and accuracy but only lately has this potential begun to be realized. We will report our latest results.

NOTES

ROOM 318-320	ROOM 321-323	ROOM 324-326	ROOM 314	ROOM 315	ROOM 316	ROOM 317	ROOM 336
CLEO	JOINT	CLEO					QELS

CMJ • Parametric Devices—Continued

CMJ2 • 10:45 a.m.
GaAs Optical Parametric Oscillator with a Circularly Polarized Pump, *Paulina S. Kuo[1], Konstantin L. Vodopyanov[1], Martin M. Fejer[1], Xiaojun Yu[1], Angie C. Lin[1], James S. Harris[1], David F. Bliss[2], Candace L. Lynch[2]; [1]Stanford Univ., USA, [2]AFRL, USA.* We demonstrated an optical parametric oscillator based on GaAs with a circularly polarized pump. The threshold was lower and conversion efficiency was higher than with a [001]-linearly polarized pump, which is consistent with GaAs symmetry.

CMJ3 • 11:00 a.m.
Energy Scaling of a White-Light-Seeded Noncollinear Optical Parametric Amplifier, *Jiaan Zheng[1], Mark Mero[1], Pancho Tzankov[1], Dario Polli[2], Cristian Manzoni[2], Giulio Cerullo[2]; [1]Max Born Inst. for Nonlinear Optics and Short Pulse Spectroscopy, Germany, [2]Dept. di Fisica, Politecnico de Milano, Italy.* Scaling of the pulse energy of a white-light-continuum-seeded two-stage noncollinear optical parametric amplifier to the 300-μJ level is demonstrated. Sub-25-fs pulses tunable between 520 and 650 nm were generated at 1 kHz.

JMB • Resonators and Photonic Crystals—Continued

JMB2 • 10:45 a.m.
Opto-Mechanical Modal Spectroscopy: Opto-Excited Vibrations of a Micron-Scale On-Chip Resonator, *Tal Carmon, Kerry J. Vahala; Caltech, USA.* Centrifugal radiation pressure excites vibrational modes of cavity at the GHz range. Many spectral lines associated with high-order vibrational modes are measured. Perturbation is observed to induce fine split of the spectral line.

JMB3 • 11:00 a.m.
Measurement of Optical Forces within a High-*Q* Microcavity-Waveguide System, *Matt Eichenfield, Oskar Painter; Caltech, USA.* Optical forces arising from the intense stored field within a high-*Q* microdisk cavity are measured through the displacement of a moveable, micron-scale fiber taper input waveguide. Tunable waveguide-cavity coupling is demonstrated at sub-mW input powers.

CMK • Ultrafast Parametric Amplification I—Continued

CML • Fiber Lasers II—Continued

CML3 • 10:45 a.m.
Shot Noise Limited Fiber Laser Source by Frequency Locking to a Fiber Ring Cavity, *Jong H. Chow, David E. McClelland, Malcolm B. Gray; Australian Natl. Univ., Australia.* We present experimental results using a passive, high *Q*, fiber ring resonator to suppress laser intensity noise, resulting in a stabilized fiber laser output that approaches the shot noise limit over most of its spectrum.

CML4 • 11:00 a.m.
Dye-Doped Microstructured Polymer Optical Fibre Laser with High Numerical Aperture Air-Clad, *Kang Li, Xingbua Yang, Lili Wang, Wei Zhao; State Key Lab of Transient Optics and Photonics, Xi'an Inst. of Optics and Precision Mechanics, China.* We demonstrated a Hemicyanine dye-doped microstructured polymer optical fibre laser generating up to 200 mW output power with a slope efficiency of 20% and a high numerical aperture air-clad at the wavelength of 578 nm.

CMM • Semiconductor Quantum Dot Lasers II—Continued

CMM3 • 10:45 a.m.
Characterization of the Static and Dynamic Parameters in a 1.3-μm Quantum Dot Mode-Locked Laser, *Yongchun Xin[1], Luke F. Lester[1], Allen L. Gray[2], Lei Zhang[2]; [1]Univ. of New Mexico, USA, [2]Zia Laser Inc., USA.* The static and dynamic parameters governing pulse width in the Haus Master-Equation are measured using LI curves, pulsed performance and the segmented-contact method. The relationship between QD-MLL performance and QD parameters is studied.

CMM4 • 11:00 a.m.
Gain Dynamics after Ultrashort Pulse Trains in Quantum Dot Based Semiconductor Optical Amplifiers, *Sabine Dommers[1], Vasily V. Temnov[1], Ulrike Woggon[1], Jordi Gomis Bresco[2], Juan Martínez Pastor[2], Matthias Laemmlin[3], Dieter Bimberg[3]; [1]Univ. Dortmund, Germany, [2]Univ. de València, Spain, [3]Technische Univ. Berlin, Germany.* We study the gain dynamics in QD-based SOAs after excitation with fs-pulse trains of up to THz repetition rates. A complete ground-state gain recovery is found for 200GHz repetition rates and injection currents around 90mA.

CMN • Near-Infrared Semiconductor Materials—Continued

CMN3 • 10:45 a.m.
Time-Resolved Photoluminescence of Nitrogen-Cluster States in Diluted Ga(NAs)/GaAs Heterostructures, *Kristian Hantke[1], Swantje Horst[1], Kapil Kohli[1], Sangam Chatterjee[1], Peter J. Klar[1], Wolfgang Stolz[1], Wolfgang W. Rühle[1], Francesco Masia[2], Giorgio Pettinari[2], Antonio Polimeni[2], Mario Capizzi[2]; [1]Philipps-Univ. Marburg, Germany, [2]Sapienza Univ. di Roma, Italy.* We investigate time-resolved photoluminescence in Ga(NAs)/GaAs. We find that energy relaxation of optically excited carriers from the conduction band into nitrogen-related cluster states depends on temperature, excitation density, and effective nitrogen concentration after hydrogenation.

CMN4 • 11:00 a.m.
N-Rich and Dilute-Nitride $GaN_x(AsSb)_{1-x}$ on InP Substrates, *Luke J. Mawst[1], Dapeng Xu[1], Juno Yu-Ting Huang[1], Joo Hyung Park[1], Manish Rathi[2], Thomas F. Kuech[2]; [1]Dept. of Electrical and Computer Engineering, Univ. of Wisconsin at Madison, USA, [2]Dept. of Chemical and Biological Engineering, Univ. of Wisconsin at Madison, USA.* GaAsNSb alloys have been demonstrated using MOCVD growth over the entire span of nitrogen composition. Dilute-nitride alloys hold potential for mid-IR emission using GaAsSbN/GaAsSb type-II QWs.

CMO • Nanocrystalline and Organic Light Emitters—Continued

CMO3 • 10:45 a.m.
InGaN/GaN MQW Nanorods LED Fabricated by ICP-RIE and PEC Oxidation Processes, *Fang-I Lai[1], H. W. Huang[2], Ching-Hua Chiu[2], C. F. Lai[2], T. C. Lu[2], H. C. Kuo[2], S. C. Wang[2]; [1]Dept. of Electrical Engineering, Yuan-Ze Univ., Taiwan, [2]Dept. of Photonics and Inst. of Electro-Optical Engineering, Natl. Chiao Tung Univ., Taiwan.* The InGaN/GaN nanorods LED was successfully fabricated by ICP-RIE and PEC processes. Compared with as-grown sample, the PL and EL peak-wavelengths of the nanorods with PEC show 8.6 and 10.5 nm blue-shift, respectively.

CMO4 • 11:00 a.m. Invited
Recent Progress in Phosphorescent White Organic Light-Emitting Devices for Displays and Lighting, *Vadim Adamovich, B. W. D'Andrade, M. S. Weaver, J. J. Brown; Universal Display Corp., USA.* A phosphorescent white organic light-emitting device (WOLED™) with 14% η_{eqe} at 1,000 cd/m^2 (25% EQE with outcoupling enhancements), CIE coordinates (0.46±0.01, 0.46±0.01) and a 50% lifetime 21,000 hours at an initial luminance of 1,000 cd/m^2 has been demonstrated.

QMD • Nonlinear Optics of Semiconductors—Continued

QMD3 • 10:45 a.m.
Nonlinear Optical Interactions on Oxidized Birefringent Porous Silicon, *Georgi Petrov[1], Vladislav V. Yakovlev[1], Leonid Golovan[2], Dmitriy Ivanov[2], Vasiliy Melnikov[2], Yuriy Timoshenko[2], Alexei Zheltikov[2], Pavel Kashkarov[2]; [1]Univ. of Wisconsin at Milwaukee, USA, [2]Moscow State Univ., Russian Federation.* Nonlinear optical interactions in a novel optical material, oxydized birefringent porous silicon, are studied for the first time. The controlled birefringence and broad transparency range of this material lead to the phase-matched nonlinear-optical interactions.

QMD4 • 11:00 a.m.
Evidence of Many-Body, Fermi-Energy Edge Singularity in InN Films Grown on GaN Buffer Layers, *Xiaodong Mu[1], Yujie J. Ding[1], Kejia Wang[2], Debdeep Jena[2], Jacob B. Khurgin[3]; [1]Lehigh Univ., USA, [2]Univ. of Notre Dame, USA, [3]Johns Hopkins Univ., USA.* We observed the strong enhancement of photoluminescence intensities close to electron Fermi energy as the result of the breakdown of k-selection rule for radiaitive recombination due to the localization of holes in InN films.

QELS

CLEO

QME • Spatial Confinement and Microcavity—Continued

QME3 • 10:45 a.m.
Collapse and Stability of Necklace Beams in Kerr Media, *Taylor D. Grow, Amiel A. Isbaaya, Luat T. Vuong, Alexander L. Gaeta; Cornell Univ., USA.* We experimentally investigate necklace beams in Kerr media. For powers greater than one critical power for self-focusing per bead, we observe a transition from collective behavior to independent collapse of each of the beads.

QME4 • 11:00 a.m.
Vector Pi Pulse Soliton in Coherent Optical Amplifiers, *Elena V. Kazantseva[1], Andrei I. Maimistov[2], Sergei O. Elyutin[2], Stefan Wabnitz[1]; [1]Univ. de Bourgogne, France, [2]Moscow Engineering Physics Inst., Russian Federation.* We found a novel type of vector soliton pulse in a medium with linear loss and nonlinear gain from the coherent resonant interaction of light with two-level atoms exhibiting a degenerate upper state.

QMF • Cavity QED I—Continued

CMP • Switches and Modulators—Continued

CMP3 • 11:00 a.m.
GaAs/AlGaAs Five-Layer Asymmetric Coupled Quantum Well (FACQW) Mach-Zehnder Modulator, *Taro Arakawa[1], Koji Takada[1], Fumiyuki Tadano[1], Takehiro Arima[1], Joo-Hyong Noh[2], Kunio Tada[3]; [1]Yokohama Natl. Univ., Japan, [2]Yokogawa Electric Corp., Japan, [3]Kanazawa Inst. of Technology, Japan.* Two types of Mach-Zehnder modulators with GaAs FACQWs were fabricated, and their static modulation characteristics were measured. A half-wave voltage and estimated $|dn/dF|$ in the FACQW were 1.7 V and 3.3 x 10^{-5} cm/kV, respectively.

CMQ • Signal Processing for Optical Communications—Continued

CMQ3 • 11:00 a.m.
PMD Compensation Using LDPC Coding Based Turbo Equalization, *Ivan B. Djordjevic[1], Hussam Batshon[1], Milorad Cvijetic[2], Lei Xu[3], Ting Wang[3]; [1]Univ. of Arizona, USA, [2]NEC Corp. of America, USA, [3]NEC Labs America, USA.* An iterative equalization scheme suitable for electronic PMD-compensation based on BCJR-equalizer and a novel class of LDPC codes is proposed. The first order PMD with differential-group-delay up to two bit-periods can be completely compensated for.

CMR • Precision Spectroscopy II—Continued

CMR2 • 10:45 a.m.
A 4-Hz Fundamental Linewidth On-Chip Microlaser, *Lan Yang, Tao Lu, Tal Carmon, Bumki Min, Kerry J. Vahala; Caltech, USA.* A compact laser source on a silicon chip with Shawlow-Townes linewidth (i.e., quantum limited) down to a few Hertz is demonstrated in this work. The fundamental linewidth is observed to decrease with inverse optical power.

CMR3 • 11:00 a.m.
Low Phase Noise 250 MHz Repetition Rate Fiber fs Laser for Frequency Comb Applications, *Tobias Wilken[1], Theodor W. Hänsch[1], Ronald Holzwarth[1], Peter Adel[2], Michael Mei[2]; [1]Max-Planck-Inst., Germany, [2]Menlo Systems GmbH, Germany.* Er^{3+}-doped fiber-lasers efficiently generate frequency-combs for optical frequency metrology. We succeeded for the first time in increasing the repetition rate to 250 MHz and decreasing the carrier envelope offset phase noise well below 1 rad.

NOTES

ROOM 318-320	ROOM 321-323	ROOM 324-326	ROOM 314	ROOM 315	ROOM 316	ROOM 317	ROOM 336
CLEO	JOINT	CLEO					QELS

CMJ • Parametric Devices—Continued

CMJ4 • 11:15 a.m.
A Very Simple and Versatile Dual-Signal Wave Optical Parametric Oscillator, *Luca Tartara; Univ. degli Studi di Pavia, Italy.* A picosecond optical parametric oscillator able to deliver a signal pulse at two different wavelengths either simultaneously or even one at a time is presented. The operation relies on a simple cavity-length adjustment.

CMJ5 • 11:30 a.m.
Deep Domain Inversions in X-Cut MgO:$LiNbO_3$ for Efficient Infrared Generation, *Francis Genereux[1,2], Georges Baldenberger[1], Bruno Bourliaguet[1], Réal Vallée[2]; [1]INO, Canada, [2]Univ. Laval, Canada.* A new technique is presented to improve the depth of domains formed in x-cut MgO doped $LiNbO_3$. Based on this approach, a second harmonic conversion efficiency in excess of 36%/W/cm^2 was achieved near 1.5 µm.

JMB • Resonators and Photonic Crystals—Continued

JMB4 • 11:15 a.m.
Nanowire Coupling to Photonic Crystal Nanocavities for Single Photon Sources, *Christian Grillet[1], Christelle Monat[1], Cameron Smith[1], Benjamin J. Eggleton[1], David D. Moss[2], Simon Frederick[3,4], Dan Dalacu[3], Philip Poole[3], Jean Lapointe[3], Geof Aers[3], Robin L. Williams[3,4]; [1]Ctr. for Ultra-high-Bandwidth Devices for Optical Systems, Univ. of Sydney, Australia, [2]Inst. Natl. de la Recherche Scientifique, Univ. du Quebec, Canada, [3]Inst. for Microstructurale Sciences, Univ. of Quebec, Canada, [4]Physics Dept., Univ. of Ottawa, Canada.* We demonstrate highly efficient evanescent coupling via a silica loop-nanowire, to ultra-small quantum-dot photonic-crystal cavities. It enables the tuning of both the Q-factor and the wavelength of the cavity mode independently.

JMB5 • 11:30 a.m.
Three-Dimensional Photonic Crystals Fabricated by Double-Angled Plasma Etching, *Shigeki Takahashi, Takeshi Nakamori, Makoto Okano, Masabiro Imada, Susumu Noda; Dept. of Electronic Science and Engineering, Kyoto Univ., Japan.* Three-dimensional photonic crystals with a depth of two lattice constants are successfully fabricated by a two-stage angled plasma etching method. The sample showed ~90% reflectance and ~10dB attenuation around the photonic bandgap wavelength region.

CMK • Ultrafast Parametric Amplification I—Continued

CMK2 • 11:15 a.m.
Development of a Few-Cycle Infrared OPCPA System and Its Use in High-Harmonic Generation, *Nobubisa Ishii[1], Xun Gu[1], Takao Fuji[1,2], Martin Schultze[1], V. Pervak[1], Ronald Holzwarth[1], Rytis Butkus[3], H. Ishizuki[4], T. Taira[4], R. Hartmann[5], Stefan Roither[6], Markus Kitzler[6], A. Baltuska[6,1], A. Piskarskas[3], Ferenc Krausz[1]; [1]Max-Planck-Inst. für Quantenoptik, Germany, [2]RIKEN, Japan, [3]Vilnius Univ., Lithuania, [4]Inst. for Molecular Science, Japan, [5]MPI Halbleiterlabor, Germany, [6]Technische Univ. Wien, Austria.* We report the latest progress on the development of a 1-kHz OPCPA system, generating carrier-envelope-phase-stabilized 350-µJ 20-fs pulses at 2.1 µm with suppressed superfluorescence. A proof-of-principle high-harmonic generation experiment in argon was conducted.

CMK3 • 11:30 a.m.
1.2-mJ, 1-kHz OPCPA System toward Few-Cycle Pulse, *Shunsuke Adachi, Hiroki Ishii, Teruto Kanai, Shuntaro Watanabe; Inst. for Solid State Physics, Univ. of Tokyo, Japan.* We demonstrate an optical parametric chirped-pulse amplification (OPCPA) system with the pulse energy of 1.2 mJ at a 1-kHz repetition rate, and its spectrum is broad enough toward a few-cycle regime.

CML • Fiber Lasers II—Continued

CML5 • 11:15 a.m.
Dynamic Surface Emitting Fiber Laser, *Ofer Shapira[1], Alexander Stolyarov[1], Nicholas D. Orf[1], Ken Kuriki[2], Ayman F. Abouraddy[1], John D. Joannopoulos[1], Yoel Fink[1]; [1]MIT, USA, [2]General Electric, Japan.* We report on the conceptual framework and development of a radially surface-emitting fiber laser that is capable of dynamic tuning of both the gain medium position along the fiber axis and the direction of emission.

CML6 • 11:30 a.m.
Evanescent-Wave Pumped Microfiber Knot Laser, *Xiaosbun Jiang[1], Limin Tong[1], Qinghai Song[2], Lei Xu[2]; [1]Zhejiang Univ., China, [2]Fudan Univ., China.* We demonstrate a microfiber laser formed by immersing a microfiber knot in a rhodamine 6G dye solution. When the dye is evanescently pumped at 532-nm wavelength, laser output around 570- and 580-nm wavelength is observed.

CMM • Semiconductor Quantum Dot Lasers II—Continued

CMM5 • 11:15 a.m.
All-Epitaxial VCSELs with Tunnel-Coupled QDs-QW InAs-InGaAs Active Medium, *Vadim Tokranov, Michael Yakimov, Jobert van Eisden, Serge R. Oktyabrsky; College of Nanoscale Science and Engineering, USA.* Tunnel-coupled pairs of InGaAs quantum well (QW) grown on top of InAs quantum dots (QDs) were optimized. All-epitaxial QDs-QW VCSELs demonstrated CW-mode lasing (Ith= 1.8mA, Pmax.= 0.7mW) at QD ground state emission wavelength, 1135nm.

CMM6 • 11:30 a.m.
Selectively Populating a Quantum Dot Ensemble Using a Tunnel Injection Structure, *Adrian A. George[1], Peter M. Smowton[1], Zetian Mi[2], Pallab Bhattacharya[2]; [1]Cardiff Univ., UK, [2]Univ. of Michigan, USA.* We have analysed the carrier distribution of a tunnel injection quantum dot laser to reveal features which suggest dots of a particular size are preferentially populated during the tunnel injection process.

CMN • Near-Infrared Semiconductor Materials—Continued

CMN5 • 11:15 a.m.
Photovoltaic Detectors in the GaN/AlN Intersubbandsystem Operating at 1.55 µm, *Esther Baumann[1], Fabrizio R. Giorgetta[1], Fabien Guillot[2], Eva Monroy[2], Daniel Hofstetter[1]; [1]Univ. of Neuchatel, Switzerland, [2]CEA Grenoble, France.* We present a nitride prototype photovoltaic intersubband detector operating in the telecommunication wavelength range. At room temperature the device was capable of detecting a sinusoidally modulated laser beam at frequencies up to 2.37 GHz.

CMN6 • 11:30 a.m.
Sub-Band Energy Level Controlling of QDs Using InGaAs Gradient Composition Strain-Reducing Layer, *Takeru Amano[1], Shohgo Yamauchi[2], Takeyoshi Sugaya[1], Kazushiro Komori[1,2]; [1]AIST, Japan, [2]CREST-JST, Japan.* We propose the sub-band energy level controlling of QDs using an InGaAs GC-SRL. We were able to realize a large sub-band shift of 70 meV using a GC-SRL at the fourth-order energy level.

CMO • Nanocrystalline and Organic Light Emitters—Continued

CMO5 • 11:30 a.m.
White Light Generation with Azide Functionalized Polyfluorene Hybridized on Near-UV Light Emitting Diode, *Ozge Ilkem Huyal, Tuncay Ozel, Sedat Nizamoglu, Unsal Koldemir, Donus Tuncel, Hilmi Volkan Demir; Bilkent Univ., Turkey.* We present white light generation using poly[(9,9-dihexylfluorene)-co-alt-(9,9-bis-(6-azidohexyl)fluorene] (PFA) for the first time. Hybridizing PFA on near-UV LED, we demonstrate high color rendering index up to 91.0.

QMD • Nonlinear Optics of Semiconductors—Continued

QMD5 • 11:15 a.m.
Anti-Stokes Raman Scattering of Photoluminescence Phonon Replica in GaN Heterostructures: An Effective Technique for Probing Hot Phonons, *Suvranta K. Tripathy[1], Xiaodong Mu[1], Yujie J. Ding[1], Kejia Wang[2], Debdeep Jena[2], Jacob B. Khurgin[3]; [1]Lehigh Univ., USA, [2]Univ. of Notre Dame, USA, [3]Johns Hopkins Univ., USA.* We have observed anti-Stokes Raman scattering of photoluminescence phonon replica in GaN heterostructures by non-equilibrium longitudinal-optical phonons. We demonstrate that such a process can be used to monitor the distribution of hot longitudinal-optical phonons.

QMD6 • 11:30 a.m.
Bistability and Cavity Solitons in Semiconductor Resonator with Exciton-Polariton Nonlinearity, *Yevgeniya Larionova[1], Wolfgang Stolz[2], Carl Otto Weiss[1]; [1]Physikalisch-Technische Bundesanstalt, Germany, [2]Philipps Univ., Germany.* Optical bistability and observation of bright and dark spatial resonator solitons are reported for a semiconductor microresonator in which the nonlinearity stems from exciton polaritons.

QME • Spatial Confinement and Microcavity—Continued

QME5 • 11:15 a.m.
Multiple-Beam Collapse in Kerr Media, *Amiel A. Ishaaya, Taylor D. Grow, Luat T. Vuong, Alexander L. Gaeta; Cornell Univ., USA.* We investigate the spatial collapse dynamics of several coupled beams in Kerr media. Depending on the initial beam configuration, we observe sharp transitions to either fusion or annihilation of the collapsing beams.

QME6 • 11:30 a.m.
"Instantaneous" Frequency Shift of a High *Q* Planar Photonic Crystal Microcavity Mode, *Murray W. McCutcheon[1], Georg W. Rieger[1], Alexandre M. Zagoskin[1,2], Jeff F. Young[1]; [1]Dept. of Physics and Astronomy, Univ. of British Columbia, Canada, [2]DML, FRS, RIKEN, Japan.* A high *Q* mode in a silicon planar photonic crystal microcavity is dynamically perturbed by injection of free carriers, and modelled by a damped harmonic oscillator which undergoes an instantaneous frequency and lifetime shift.

QMF • Cavity QED I—Continued

QMF2 • 11:15 a.m.
Cross-Correlations and Entanglement in a Cavity QED System, *Matthew L. Terraciano[1], Rebecca Olson[1], David Norris[1], Jietai Jing[1], Luis A. Orozco[1], James P. Clemens[2], Perry R. Rice[2]; [1]Univ. of Maryland, USA, [2]Miami Univ., USA.* We measure the cross-correlation between transmitted light out of a cavity QED system and spontaneous emission into the orthogonal polarization cavity mode. The result is an entanglement witness between the two modes of the cavity.

QMF3 • 11:30 a.m.
Cooling Atoms in a Bistable Optical Resonator, *Mark Y. Vilensky, Yehiam Prior, Ilya Sh. Averbukh; Dept. of Chemical Physics, Weizmann Inst. of Science, Israel.* We propose a generic approach for nonresonant laser cooling of atoms/molecules based on their interaction with a bistable optical cavity. The cooling mechanism is of Sisyphus type, and it does not require high-finesse cavities.

CMP • Switches and Modulators—Continued

CMP4 • 11:15 a.m.
1.3 µm Quantum-Dot Electro-Absorption Modulator, *Yuanliang Chu[1], Mark G. Thompson[1], Richard V. Penty[1], Ian H. White[1], Alexey R. Kovsh[2]; [1]Cambridge Univ., UK, [2]NL Nanosemiconductor GmbH, Germany.* The electro-absorption properties and Stark-shift of 1.3µm InGaAs quantum dot waveguide modulators are characterized under reverse bias. 2.5Gb/s data modulation is demonstrated for the first time with clear eye diagrams and error-free back-to-back performance.

CMP5 • 11:30 a.m.
Duty-Cycle and Chirp Diagnosis of All-Optical Format Conversion Data in Multi- and Single-Wavelength Inverse Optical Comb Injected Semiconductor Optical Amplifier, *Kun-Chieh Yu[1], Yu-Sheng Liao[1], Gong-Ru Lin[2]; [1]Dept. of Photonics and Inst. of Electro-Optical Engineering, Natl. Chiao Tung Univ., Taiwan, [2]Graduate Inst. of Electro-Optical Engineering, Natl. Taiwan Univ., Taiwan.* Comparison on shortened falling-time, reduced chirp and improved on/off extinction ratio of 10Gbit/s all-optical data-format converted pulse-stream in single- and multi-wavelength inverse-optical-comb injected semiconductor optical amplifiers with temporally reshaped gain-window is demonstrated.

CMQ • Signal Processing for Optical Communications—Continued

CMQ4 • 11:15 a.m.
Massively Parallel Transmission over Multimode Fiber Applied to 100 Gigabit Ethernet with Random-Coding, *Maxim Y. Greenberg, Moshe Nazarathy, Meir Orenstein; Technion, Israel.* We propose a novel MIMO multimode fiber technique realizing for the first time random coding motivated by Shanon's noisy channel theorem, using silicon photonics in the transmitter and maximum likelihood electronic detection in the receiver.

CMQ5 • 11:30 a.m.
Optical Error Correction Using Passive Optical Logic Gates Demodulators in Differential Demodulation, *Yannick K. Lize[1,2,3], Louis C. Christen[1], Scott Nuccio[1], Xiaoxia Wu[1], Alan E. Willner[1], Raman Kashyap[3], Mathieu Faucher[2]; [1]Dept. of Electrical Engineering, Univ. of Southern California, USA, [2]ITF Labs-Advanced Modulation Formats Devices, Canada, [3]École Polytechnique de Montréal, Canada.* We propose and demonstrate an error-correction technique with no overhead for differentially encoded modulation formats. The method improves FEC equipped systems, increasing chromatic dispersion tolerance by 25% while reducing the penalty of imperfect optical filtering.

CMR • Precision Spectroscopy II—Continued

CMR4 • 11:15 a.m.
Laser-Mode Dynamics Measurement and Control of Mode-Locked Er-Fiber Lasers, *Yohei Kobayashi[1], Dai Yoshitomi[1], Youichi Sakakibara[1], Hiromichi Kataura[1], Hideyuki Takada[1], Masayuki Kakehata[1], Kenji Torizuka[1], Taketo Onuma[2], Hideki Yokoi[2], Takuro Sekiguchi[3], Shinki Nakamura[3]; [1]Natl. Inst. of Advanced Industrial Science and Technology (AIST), Japan, [2]Shibaura Inst. of Technology, Japan, [3]Ibaraki Univ., Japan.* Dynamics of laser mode of femtosecond Er-fiber lasers were investigated by using a beat signal between two mode-locked lasers. The beat linewidth was controlled to 8 mHz.

CMR5 • 11:30 a.m.
Terahertz Frequency Comb for High-Accuracy, High-Resolution Terahertz Spectroscopy, *Shuko Yokoyama, Yasuhiro Kabetani, Takeshi Yasui, Tsutomu Araki; Osaka Univ., Japan.* We report a terahertz frequency-comb technique for high-accuracy, high-resolution terahertz spectroscopy by combination of two mode-locked-frequency-stabilized femtosecond lasers and multi-frequency-heterodyning photoconductive detection.

NOTES

ROOM 318-320	ROOM 321-323	ROOM 324-326	ROOM 314	ROOM 315	ROOM 316	ROOM 317	ROOM 336
CLEO	JOINT	CLEO					QELS

CMJ • Parametric Devices—Continued

CMJ6 • 11:45 a.m.
Ultrafast Pump-Probe Experiment Based on Extremely Broadband Second-Harmonic Generation, *Yen-Cheng Lu, Hsiang-Chen Wang, Cheng-Yen Chen, C. C. Yang; Natl. Taiwan Univ., Taiwan.* We use a non-degenerate pump-probe scheme of an extremely broad probe spectrum to monitor the ultrafast carrier relaxation process from the excitation levels down to the free-carrier and the localized states in an InGaN thin-film.

JMB • Resonators and Photonic Crystals—Continued

JMB6 • 11:45 a.m.
Experimental Observation of Inflection-Point Slow Light Modes in Photonic Crystal Coupled Waveguides, *Shih-Chieh Huang[1], Masao Kato[2], Eiichi Kuramochi[2], Chien-Ping Lee[1], Masaya Notomi[2]; [1]Natl. Chiao Tung Univ., Taiwan, [2]NTT Basic Res. Labs, Japan.* We report on the time-domain measurement of inflection-point slow light modes in a photonic crystal coupled waveguide. The S type band structure for the waveguide mode allows a unique opportunity for slow light measurement.

CMK • Ultrafast Parametric Amplification I—Continued

CMK4 • 11:45 a.m.
Generation of High Repetition Rate Few-Cycle Pulses from a Noncollinear Optical Parametric Amplifier, *Andy Steinmann, Guido Palmer, Uwe Morgner; Inst. für Quantenoptik, Leibniz Univ. Hannover, Germany.* We demonstrate the generation of few-cycle pulses with 45 nJ pulse energy from a noncollinear optical parametric amplifier (NOPA) with a repetition rate of 1 MHz based on a diode-pumped Yb:KYW laser oscillator with cavity-dumping.

CML • Fiber Lasers II—Continued

CML7 • 11:45 a.m.
2.1 μm CW Raman Source in GeO_2 Fiber, *B. A. Cumberland[1], J. C. Travers[1], S. V. Popov[1], J. R. Taylor[1], O. I. Medvedkov[2], S. A. Vasiliev[2], E. M. Dianov[2]; [1]Femtosecond Optics Group, Physics Dept., Imperial College London, UK, [2]General Physics Inst., Russian Federation.* We report a Raman laser with an output power of 4.2W at 2.1μm based upon a 75 mol.% GeO_2 doped fiber pumped with CW Thulium doped fiber laser. Potential of 2.3μm operation is discussed.

CMM • Semiconductor Quantum Dot Lasers II—Continued

CMM7 • 11:45 a.m.
Y-Junction-Coupled S-Section InAs/InGaAs/GaAs Quantum-Dot Ring Lasers with High Unidirectionality, *Nathan Withers[1], Hongjun Cao [1], Gennady A. Smolyakov[1], Allen L. Gray[2], Luke F. Lester[1], Marek Osinski[1]; [1]Univ. of New Mexico, USA, [2]Zia Laser, Inc., USA.* Fabrication and characterization of Y-junction-coupled S-section InAs/InGaAs/GaAs quantum dot ring lasers with high unidirectionality is reported. The new design suppresses the unwanted counterpropagating modes more effectively than in the previous S-section-racetrack design.

CMN • Near-Infrared Semiconductor Materials—Continued

CMN7 • 11:45 a.m.
InAs/GaAs Quantum Dot Saturable Absorber Mirror for Passive Mode-Locking of Nd:YVO_4 Lasers at 1064 nm, *C. Scurtescu[1], Z. Y. Zhang[1], A. J. Alcock[2], R. Fedosejevs[1], M. Blumin[3], I. Savelievi[3], S. Yang[3], H. E. Ruda[3], Y. Y. Tsui[1]; [1]Univ. of Alberta, Canada, [2]Natl. Res. Council of Canada, Canada, [3]Univ. of Toronto, Canada.* An InAs/GaAs Quantum Dot Saturable Absorber Mirror was developed to passively mode-lock a Nd:YVO_4 laser at the wavelength of 1064.6nm. CW mode-locked pulses of 24ps duration at a repetition rate of 65 MHz were obtained.

CMO • Nanocrystalline and Organic Light Emitters—Continued

CMO6 • 11:45 a.m.
Inorganic/Organic Hybrid Optical Upconversion Device, *Dayan Ban[1], Sijin Han[2], Z. H. Lu[2], A. J. SpringThorpe[3], H. C. Liu[3]; [1]Univ. of Waterloo, Canada, [2]Univ. of Toronto, Canada, [3]Natl. Res. Council of Canada, Canada.* We report a hybrid optical upconversion device that emits visible light upon the detection of input near infrared light through direct tandem integration of an inorganic InGaAs/InP photodetector with an organic light emitting diode.

QMD • Nonlinear Optics of Semiconductors—Continued

QMD7 • 11:45 a.m.
Pulse-Induced Mutual Coherence of the Self-Assembled Quantum Dots Photoluminescence, *Iosif Zeylikovich[1,2], R. R. Alfano[1,2]; [1]Inst. for Ultrafast Spectroscopy and Lasers, Dept. of Physics, City College, USA, [2]Graduate Ctr. of the City Univ. of New York, USA.* Experiments show that a quantum dots ensemble's emission is partially mutually coherent under a laser excitation pulses with duration shorter than 600 fs. A possible pulse-induced coherent superradiance predicted by Dicke is discussed.

12:00 p.m. – 1:30 p.m. LUNCH BREAK (on your own)

QELS

QME • Spatial Confinement and Microcavity—Continued

QME7 • 11:45 a.m.
Strongly Nondegenerate Parametric Oscillations in a Whispering Gallery Mode Resonator, *Anatoliy A. Savchenkov, Andrey B. Matsko, Makan Mohageg, Dmitry Strekalov, Lute Maleki; JPL, USA.* We demonstrate optical continuous wave parametric oscillations in crystalline whispering gallery mode resonators fabricated with lithium niobate. The required phase matching is achieved by geometrical confinement of the whispering gallery modes.

QMF • Cavity QED I—Continued

QMF4 • 11:45 a.m.
Integration of a Tunable Optical Micro-Cavity for Single Atom Detection on an Atom Chip, *Carsten O. Gollasch[1], Zakaria Moktadir[1], Gareth Lewis[1], Michael Kraft[1], Michael Trupke[2], Stefan Eriksson[2], Ed A. Hinds[2]; [1]Univ. of Southampton, UK, [2]Imperial College, UK.* Recent experiments demonstrated single-atom detection using microscopic optical cavities. Here we present an optical micro-cavity whose length can be tuned using an electrostatic comb-drive. This design is suitable for integration into a silicon atom chip.

CLEO

CMP • Switches and Modulators—Continued

CMP6 • 11:45 a.m.
High Speed Response of Optical Nonlinear Phase Shifter Based on 1.55 μm VCSEL, *Satoshi Suda[1], Fumio Koyama[1], Nobuhiko Nishiyama[2], Catherine Caneau[3], Chung-En Zah[3]; [1]Tokyo Inst. of Technology, Japan, [2] Dept. of Electrical and Electronic Engineering, Tokyo Inst. of Technology , Japan, [3]Corning Inc., USA.* We demonstrate the fast transient response of a nonlinear optical phase-shifter based on a reverse-biased 1.55μm InGaAlAs QW VCSEL. The modeling and experiment on the nonlinear phase-shift show a dynamic response time of below 10ps.

CMP7 • 12:00 p.m.
Electro-Optic Ti:PPLN Waveguides as Efficient Optical Wavelength Filters and Mode Polarization Converters, *C. Y. Huang[1], Chao-Hung Lin[1], Yen-Hung Chen[1], Yen-Chieh Huang[2]; [1]Dept. of Optics and Photonics, Natl. Central Univ., Taiwan, [2]Inst. of Photonics Technologies, Natl. Tsing-Hua Univ., Taiwan.* We report the first experimentally demonstrated active Šolc-type optical wavelength filters based on Ti:PPLN waveguides. A peak spectral transmittance of ~99% at a bandwidth of ~2.6 nm in telecom bands was obtained in this device.

CMR • Precision Spectroscopy II—Continued

CMR6 • 11:45 a.m.
Doubly Modulated Interferometry for Trace Gas Detection, *Steven M. Hughes, Dana Z. Anderson; JILA, Univ. of Colorado, USA.* A double modulation scheme enhances low-frequency trace-gas-induced path-length changes in a miniature (2 cm^3) adaptive interferometer. Path-length sensitivity is 0.2 $pm/Hz^{1/2}$ while ethanol vapor sensitivity is 2 $ppm/Hz^{1/2}$.

12:00 p.m. – 1:30 p.m. LUNCH BREAK (on your own)

NOTES

ROOM 318-320	ROOM 321-323	ROOM 324-326	ROOM 314	ROOM 315	ROOM 316	ROOM 317	ROOM 336
CLEO	JOINT	CLEO					QELS

1:30 p.m. – 3:15 p.m.
CMS • Cubic Nonlinearity and Applications
Vladimir V. Shkunov; Raytheon Corp., USA, Presider

CMS1 • 1:30 p.m.
Degenerate Four-Wave Mixing with Defocusing Nonlinearity, *Shu Jia, Wenjie Wan, Jason W. Fleischer, Princeton Univ., USA.* We experimentally demonstrate degenerate four-wave mixing effects in a defocusing nonlinear photorefractive medium, in both one and two transverse dimensions.

CMS2 • 1:45 p.m.
Transient Two-Wave Mixing via Dynamic Phase Gratings in Yb-Doped Fibers with Saturable Absorption, *Serguei Stepanov[1], Andrei A. Fotiadi[2], Patrice Mégret[2]; [1]CICESE, Mexico, [2]Faculté Polytechnique de Mons, Belgium.* Two-wave mixing of phase modulated waves via dynamic population gratings in Yb-doped fibers is reported. The unshifted gratings recorded at 1064nm were predominantly of phase type, which ensured efficient linear energy exchange at mW-scale power.

CMS3 • 2:00 p.m.
2-kW Average Power CW Phase-Conjugate Solid-State Laser, *Yuri A. Zakharenkov, Todd O. Clatterbuck, Vladimir V. Shkunov, Alexandr A. Betin, David M. Filgas, Eric P. Ostby, Fritz P. Strohkendl, David A. Rockwell, Robert S. Baltimore; Raytheon Corp., USA.* We report the first demonstration of a kW-class CW-input solid-state phase-conjugate master oscillator, power amplifier system. The 2-kW Yb:YAG system included a 200 W loop phase-conjugate mirror, and it produced a nearly diffraction-limited output beam.

1:30 p.m. – 3:15 p.m.
JMC • Integrated Nanophotonics
Mikhail Noginov; Norfolk State Univ., USA, Presider

JMC1 • 1:30 p.m. Invited
Nanostructured Optics and Optoelectronics for Dense Optical Interconnects, *David A. Miller, Stanford Univ., USA.* Quantum well structures in germanium and nanophotonic structures in dielectrics and metals promise future optics, optoelectronics and electronics, all possibly combined in one silicon-compatible platform. Challenges, approaches and recent progress are summarized.

JMC2 • 2:00 p.m.
Visible 2-Dimensional Photonic Crystal Laser, *Zhaoyu Zhang[1], Tomoyuki Yoshie[2], Victor Liu[1], Ting Hong[1], Axel Scherer[1]; [1]Caltech, USA, [2]Duke Univ., USA.* Visible 2-dimensional photonic crystal lasers were fabricated within membranes of InGaP/InGaAlP quantum well material emitting around 670nm. These red photonic crystal lasers with ultra-small mode volumes (~ 0.01μm3) are ideally useful for spectroscopic sources.

1:30 p.m. – 3:15 p.m.
CMT • Ultrafast Parametric Amplification II
Igor Jovanovic; LLNL, USA, Presider

CMT1 • 1:30 p.m. Invited
Generation of Terawatt Sub-10 fs Laser Pulses Using Optical Parametric Chirped Pulse Amplification, *Kjeld S. Eikema; Laser Ctr. Vrije Univ., FEW, Netherlands.* Generation of 2 TW few-cycle laser pulses (7.6 fs) is demonstrated using optical parametric chirped pulse amplification at a 30 Hz repetition rate. Aspects such as fluorescence, pulse contrast, phase stability and applications are discussed.

CMT2 • 2:00 p.m.
1 mJ, Multi-kHz, Sub-500 fs Diode-Pumped Ytterbium Laser Amplifier, *Martin Delaigue[1], Inka Manek-Hönninger[1], Clemens Hönninger[2], Antoine Courjaud[2], Eric Mottay[2]; [1]CELIA-PALA, France, [2]Amplitude Systèmes, France.* We demonstrate a directly diode-pumped Yb:KYW femtosecond laser amplifier with > 1 mJ pulse energy and pulse repetition rates higher than 5 kHz. The pulse duration was 480 fs and the M^2 better than 1.2.

1:30 p.m. – 3:15 p.m.
CMU • Femtosecond Fiber Oscillators and Applications
Jay E. Sharping; Cornell Univ., USA, Presider

CMU1 • 1:30 p.m. Invited
Fiber Laser Frequency Combs, *Nathan R. Newbury, W. C. Swann; NIST, USA.* We discuss the contributions to the linewidth and frequency noise of the individual modes of a mode-locked fiber laser. Much of this noise can be suppressed through feedback to form a stable frequency comb.

CMU2 • 2:00 p.m.
Self-Referenced Yb-Fiber-Laser Frequency Comb Using a Dispersion Micromanaged Tapered Holey Fiber, *Ingmar Hartl[1], Martin E. Fermann[1], Parama Pal[2], Wayne H. Knox[2]; [1]IMRA America, Inc., USA, [2]Inst. of Optics, USA.* We simultaneously phase-lock the repetition frequency and carrier-envelope-offset frequency of a Yb-fiber laser CPA system to a stable RF reference to demonstrate a Yb-fiber laser based frequency comb centered at 1040nm.

1:30 p.m. – 3:15 p.m.
CMV • Semiconductor Photonic Crystal Lasers
Igor Vurgaftman; NRL, USA, Presider

CMV1 • 1:30 p.m. Invited
Electrically Pumped Photonic Crystal Lasers, *Yong Hee Lee; KAIST, Republic of Korea.* Electrically-driven single-cell photonic crystal lasers operating at room temperature are discussed. Two nondegenerate resonant modes with a central node are investigated. Several schemes suitable for efficient photon out-coupling will also be discussed.

CMV2 • 2:00 p.m.
Room-Temperature CW Lasing Characteristics in Photonic Crystal Nanolasers and Their Thresholdless Behavior, *Kengo Nozaki, Shota Kita, Toshibiko Baba; Yokohama Natl. Univ., Japan.* We report the detail of the ultralow threshold CW lasing characteristics in two types of photonic crystal nanolasers. The thresholdless behavior was obtained by a moderately low Q as well as the Purcell effect.

1:30 p.m. – 3:15 p.m.
CMW • Lasers and Laser Materials
William S. Brocklesby; Univ. of Southampton, UK, Presider

CMW1 • 1:30 p.m.
All Taper Coupled Novel Fluoride Glass Microspherical Light Source for Microphotonics, *Danny G. O'Shea[1,2], Jonathan M. Ward[2,3], Brian J. Shortt[2,3], Síle Nic Chormaic[1,2]; [1]Univ. College Cork, Ireland, [2]Tyndall Natl. Inst., Ireland, [3]Cork Inst. of Technology, Ireland.* We theoretically study and experimentally demonstrate a novel fibered multicolor light source in the range 320-850 nm in Er^{3+} doped ZBLALiP and 405-850 nm in Er^{3+} doped ZBNA fluoride glass microspheres.

CMW2 • 1:45 p.m.
Rare Earth Doped Silver Halide Crystals: A New Candidate for Mid-IR Solid State Lasers and Fiber Lasers and Amplifiers, *Ofer Gayer, Irena Shafir, Ariel Nause, Lev Nagli, Abraham Katzir; Tel Aviv Univ., Israel.* The optical properties of rare earth doped silver halide crystals were studied in the middle infrared spectral range. The results indicate that these materials are promising candidates for development of mid-IR fiber lasers and amplifiers.

CMW3 • 2:00 p.m.
Energy Transfer Analysis between Tb^{3+} and Yb^{3+} Codoped in Silicate Glasses under the 0.98 μm Excitation, *Tatsuya Yamashita[1,2], Yasutake Ohishi[1]; [1]Toyota Technological Insititute, Japan, [2]Toyota Central R&D Labs Inc., Japan.* The energy transfer efficiency as high as 68 % between Tb^{3+} and Yb^{3+} in Tb^{3+}-Yb^{3+}-codoped silicate glasses was obtained for green emission. The energy transfer mechanisms were analyzed by rate equation formalism.

1:30 p.m. – 3:15 p.m.
CMX • Attosecond Metrology and Wavepacket Dynamics
Ronald Holzwarth; Menlo Systems GmbH, Germany, Presider

CMX1 • 1:30 p.m. Tutorial
Attosecond Metrology, *Paul Corkum; Natl. Res. Council of Canada, Canada.* Light and electrons interact coherently in attosecond technology and metrology. As well as opening a new time domain, optics gains the ability to measure Angstrom scale features. I will describe both aspects of attosecond metrology.

1:30 p.m. – 3:15 p.m.
QMG • Dispersion Engineering
Mark I. Stockman; Georgia State Univ., USA, Presider

QMG1 • 1:30 p.m.
"Slow" Light in Media of "Zero" Dimension, *Nikitas Papasimakis[1], Vassili A. Fedotov[1], Nikolay I. Zheludev[1], Sergey L. Prosvirnin[2]; [1]EPSRC Nanophotonics Portfolio Ctr., Optoelectronics Res. Ctr., Univ. of Southampton, UK, [2]Inst. of Radio Astronomy, Natl. Acad. of Sciences of Ukraine, Ukraine.* Electromagnetic pulses propagating through a thin metal film, structured on the sub-wavelength scale, are significantly delayed and re-shaped.

QMG2 • 1:45 p.m.
Observation of Heavy Photon State in Ultrahigh-*Q* Photonic Crystal Coupled Resonator Chain, *Eiichi Kuramochi[1,2], Takasumi Tanabe[1,2], Hideaki Taniyama[1,2], Masao Kato[1,2], Masaya Notomi[1,2]; [1]NTT Basic Res. Labs, Japan, [2]CREST-JST, Japan.* Ultrahigh-*Q* (10^5-10^6) resonant modes of 10 sequentially coupled photonic crystal resonators are successfully demonstrated. Evaluated dispersion curves reveal a very small coupling factor (~0.0003), which corresponds to a very slow light mode.

QMG3 • 2:00 p.m.
Dispersion and Loss Limitation on the Performance of Optical Delay Lines Based on Coupled Resonant Structures, *Jacob B. Khurgin; Johns Hopkins Univ., USA.* Relative importance of group velocity dispersion and loss in limiting performance of optical delay lines based on coupled resonator structures is investigated. Both factors play roughly comparable role for the bit rates of 2.5-40GBs.

ROOM 337	ROOM 338	ROOM 339	ROOM 340	ROOM 341
QELS		CLEO		

1:30 p.m. – 3:15 p.m.
QMH • THz and Other χ^2 Effects
Chi H. Lee; Univ. of Maryland, USA, Presider

QMH1 • 1:30 p.m.
THz Radiation from Optically-Induced Magnetization in GaAs, *Ryan W. Newson, Jens Hübner, Henry M. van Driel, Fred Nastos, John E. Sipe; Univ. of Toronto, Canada.* A transient magnetization is induced in a semiconductor via optical spin injection by 100 fs, 800 nm circularly polarized pulses. The weak emitted THz radiation is identified against that from a much stronger photogalvanic source.

QMH2 • 1:45 p.m.
Terahertz Field Induced Midinfrared Gain and Absorption in n-type GaAs, *Peter Gaal[1], Klaus Reimann[1], Michael Woerner[1], Thomas Elsaesser[1], Rudolf Hey[2], Klaus H. Ploog[2]; [1]Max-Born-Inst. Berlin, Germany, [2]Paul-Drude-Inst., Germany.* Ultrafast acceleration of free carriers in a strong THz field results in an oscillatory occurrence of midinfrared gain/absorption with the LO phonon frequency. This quantum kinetic phenomenon is studied in nonlinear THz-pump—midinfrared-probe experiments.

QMH3 • 2:00 p.m. Invited
Terahertz Difference Frequency Generation in Quantum Cascade Lasers, *Mikhail A. Belkin[1], Federico Capasso[1], Alexey Belyanin[2], Deborah L. Sivco[3]; [1]DEAS, USA, [2]Texas A&M, USA, [3]Bell Labs, USA.* We demonstrate intra-cavity terahertz difference-frequency generation in quantum cascade lasers. A two-wavelength quantum cascade laser with monolithically integrated optical nonlinearity emitting at 7.6 and 8.7 µm was used to generate difference frequency at 62 µm.

1:30 p.m. – 3:15 p.m.
QMI • Cavity QED II
Presider to Be Announced

QMI1 • 1:30 p.m. Invited
Strong-Coupling Cavity QED with Nitrogen Vacancy Centers and Silica Microspheres, *Hailin Wang, Young-Shin Park, Yumin Shen, Ansrew Cook; Univ. of Oregon, USA.* We report experimental demonstration of strong-coupling in a cavity QED system, in which nitrogen vacancy centers in diamond nanocrystals are coupled to whispering gallery modes in a deformed silica microsphere.

QMI2 • 2:00 p.m.
Normal Mode Splitting and Purcell Enhancement of Local Rayleigh Scattering in a Microsphere Resonator, *Andrea Mazzei[1], Oliver Benson[1], Leonardo de S. Menezes[2], Stephan Götzinger[3], Vahid Sandoghdar[3]; [1]Humboldt Univ. of Berlin, Germany, [2]Univ. Federal de Pernambuco, Brazil, [3]ETH Zürich, Switzerland.* Induced coupling between counterpropagating modes in a microresonator is studied under controllable conditions. Transition from weak to strong coupling is observed, similar to coupled systems composed of a single atom and a single cavity mode.

1:30 p.m. – 3:00 p.m.
CMY • Photodetectors
Michael Krainak; NASA Goddard Space Flight Ctr., USA, Presider

CMY1 • 1:30 p.m.
Characterization of a Sub-THz Photonic Transmitter Based on a Separated-Transport-Recombination Photodiode, *Jin-Wei Shi[1], Yu-Tai Li[2], Ci-Ling Pan[2], C.-H. Chiu[1], W.- S. Liu[1], J.-I. Chyi[1]; [1]Dept. of Electrical Engineering,. Natl. Central Univ., Taiwan, [2]Dept. of Photonics, Natl. Chaio Tung Univ., Taiwan.* By incorporating low-temperature-grown GaAs based separated-transport-recombination photodiode with micromachined antenna, such photonic-transmitter can radiate strong sub-THz waves at designed frequency (~500GHz) without using Si-lens. Problems of device saturation under high bias voltage were also eliminated.

CMY2 • 1:45 p.m.
High Gain ZnO Nanowire Phototransistor, *Arthur Zhang, Cesare Soci, Bin Xiang, Jung Park, Deli Wang, Yu-Hwa Lo; Univ. of California at San Diego, USA.* We demonstrate the potential of nanowires as phototransistors with internal gain. Two-terminal single ZnO nanowire devices have been fabricated, which under UV illumination, show high photoconductive gain (approaching 10^{10}) due to hole-trapping at surface states.

CMY3 • 2:00 p.m.
Silicon-Germanium p-i-n Photodetectors at Telecommunication Wavelengths Grown Directly on Silicon, *Dyan Ali[1], Phillip Thompson[2], Julius Goldbar[1], Joseph DiPasquale III[1], Christopher J.K. Richardson[1]; [1]Lab for Physical Sciences, Univ. of Maryland, USA, [2]NRL, USA.* We report on Si-rich $Si_{1-x}Ge_x$ p-i-n waveguide detectors with responsivities greater than 0.74A/W at 1.3µm and 20K. We present two photodetector designs for 1.3µm detection on Silicon without virtual buffer relaxation layers.

1:30 p.m. – 3:15 p.m.
CMZ • Optical Regeneration
Scott A. Hamilton; MIT Lincoln Lab, USA, Presider

CMZ1 • 1:30 p.m. Invited
Regeneration Using an SOA-MZI in a 100-Pass 10,000-km Recirculating Fiber Loop, *Jade P. Wang[1], Shelby J. Savage[1], Bryan S. Robinson[1], Scott A. Hamilton[1], Erich P. Ippen[2], Ruomei Mu[3], Hongsheng Wang[3], Leo Spiekman[3], Boris B. Stefanov[3]; [1]MIT Lincoln Lab, USA, [2]MIT, USA, [3]Alphion Corp., USA.* We demonstrate all-optical regeneration in an SOA-MZI on a 10-Gb/s picosecond pulse train over 10,000 km in a 100-km recirculating loop. The bit-error rate after 100 loop-passes shows a 0.5-dB penalty.

CMZ2 • 2:00 p.m.
Coherent Interference 2R Regeneration of Optical CDMA Based on MZI SOA, *Tiago G. Silveira[1], Antonio Teixeira[2], Nobuyuki Kataoka[3], Ana Ferreira[2], Naoya Wada[3], Xu Wang[3], Tetsuya Miyazaki[3], Paulo Monteiro[1]; [1]SIEMENS SA, Portugal, [2]Inst. de Telecomunicações, Portugal, [3]NICT, Japan.* We demonstrate 2R regeneration using a SOA based MZI for OCDMA signal with distortion caused by coherent Multiple Access Interference. Experimental regeneration of a 10 Gb/s OCDMA signal is achieved.

1:30 p.m. – 3:15 p.m.
CMAA • Optical Manipulation of Cells
Changhuei Yang; Caltech, USA, Presider

CMAA1 • 1:30 p.m. Invited
The Guiding Light: Holographic Manipulation of Mesoscopic Systems, *David G. Grier; New York Univ., USA.* Optical trapping offers exceptional control over matter ranging in scale from nanometers to millimeters. This talk describes new applications for extensive three-dimensional optical trapping arrays created with computer-generated holography.

CMAA2 • 2:00 p.m.
Optofluidic Transport in Liquid Core Photonic Crystal Fibers, *Sudeep Mandal, David Erickson; Cornell Univ., USA.* We describe optofluidic transport of polystyrene spheres in liquid core photonic crystal fibers (LC-PCFs). The collection of particles into distinct bands is demonstrated and we report the first measurements of the velocity distribution.

NOTES

ROOM 318-320 | ROOM 321-323 | ROOM 324-326 | ROOM 314 | ROOM 315 | ROOM 316 | ROOM 317 | ROOM 336

CLEO | JOINT | CLEO | CLEO | CLEO | CLEO | CLEO | QELS

CMS • Cubic Nonlinearity and Applications—Continued

CMS4 • 2:15 p.m.
Stability of Polarization Vortices in Self-Focusing Kerr Media, *Amiel A. Ishaaya, Luat T. Vuong, Taylor D. Grow, Alexander L. Gaeta; Cornell Univ., USA.* We investigate the collapse dynamics and polarization stability of radially and azimuthally polarized vortex beams in Kerr media. The beams break up into distinct collapsing filaments with the initial local polarization distribution being maintained.

CMS5 • 2:30 p.m.
Nonlinear Diffractive Optical Elements, *Ofer Manela, Mordechai Segev; Technion–Israel Inst. of Technology, Israel.* We propose diffractive optical elements with spatially-varying nonlinear refractive index. As specific examples, we study three types of nonlinear Fresnel phase zone plates.

CMS6 • 2:45 p.m.
Optical Limiting in Solid-Core Photonic Crystal Fibers, *James J. Butler[1], Stacey R. Sueoka[1], Steven R. Montgomery[2], Steven R. Flom[3], Richard G.S. Pong[3], James S. Shirk[3], Thierry E. Taunay[3], Barbara M. Wright[3], Jonathan Hu[4], Curtis R. Menyuk[4]; [1]Pacific Univ., USA, [2]United States Naval Acad., USA, [3]NRL, USA, [4]Univ. of Maryland, Baltimore County, USA.* Optical limiting in solid-core photonic crystal fibers filled with reverse-saturable absorbers has been observed. A sharp change in limiting threshold was found for materials in the fiber holes with refractive indices near n = 1.44.

JMC • Integrated Nanophotonics—Continued

JMC3 • 2:15 p.m.
Photonic Crystal Surface Mode Laser, *Hatice Altug[1,2], Dirk Englund[1], Jelena Vuckovic[1]; [1]Stanford Univ., USA, [2]Boston Univ., USA.* We demonstrated lasing from a high quality-factor photonic crystal surface mode, which brings several advantages for easy fabrication and efficient coupling. Temporal measurements indicate nearly ring-down time limited response.

JMC4 • 2:30 p.m.
Single Photon Source on Demand Based on Single-Colloidal-Quantum-Dot Fluorescence in Chiral Photonic Bandgap Liquid Crystal Hosts, *Luke J. Bissell, Zhimin Shi, Heedeuk Shin, Svetlana G. Lukishova, Sean White, Robert W. Boyd, Carlos R. Stroud; Inst. of Optics, Univ. USA.* A single-photon source based on single CdSe quantum-dot fluorescence in a chiral-photonic-bandgap liquid-crystal host manifests itself in observed fluorescence antibunching. Chiral-photonic-bandgap structures will provide deterministically handed, circular-polarized fluorescence, even for emitters without a dipole moment.

JMC5 • 2:45 p.m. Invited
Near-Field Characterization of Plasmon Polariton Propagation along Periodically Nano-Structured Metal Thin Films, *J. C. Weeber; Univ.de Bourgogne, France.* We operate a near-field optical microscope to investigate the properties of periodically nano-structured metal thin films designed to control at the micron scale the propagation or the excitation of surface plasmon polaritons.

CMT • Ultrafast Parametric Amplification II—Continued

CMT3 • 2:15 p.m.
Ultrabroadband Femtosecond Continuum Amplification in Crystals of Bismuth Triborate, *Ivailo Nikolov[1], Ivan Buchvarov[1], Frank Noack[2], Valentin Petrov[2], Pancho Tzankov[2]; [1]Sofia Univ., Bulgaria, [2]Max-Born-Inst., Germany.* Ultrabroadband amplification of white-light continuum in the near-IR (~100 THz, 1.2-2.4 μm) is demonstrated in BiB_3O_6, pumped by 45 fs long pulses at 800 nm, achieving an energy of 50 μJ at 1 kHz.

CMT4 • 2:30 p.m.
Tunable Phase-Stable Few-Optical-Cycle Visible Pulses by Parametric Amplification of a Self-Phase-Stabilized Seed, *Cristian Manzoni, Dario Polli, Giovanni Cirmi, Daniele Brida, Sandro De Silvestri, Giulio Cerullo; Physics Dept., Politecnico di Milano, Italy.* The passively phase-stabilized idler of an IR optical parametric amplifier is spectrally broadened and seeds a blue-pumped non-collinear optical parametric amplifier. Few-optical cycle phase-stable pulses with broad tunability in the visible are generated.

CMT5 • 2:45 p.m.
Tunable 20 fs Red Pulses with up to 200 nJ Energy from a 2 MHz Yb-Doped Fiber Oscillator/Amplifier System, *Christian Schriever, Stefan Lochbrunner, Eberhard Riedle; LS BioMolekulare Optik, LMU München, Germany.* We demonstrate the efficient generation of 20 fs pulses tunable from 700 to 950 nm in a noncollinear optical parametric amplifier pumped by 10μJ pulses at 1035nm with a repetition rate of up to 2MHz.

CMU • Femtosecond Fiber Oscillators and Applications—Continued

CMU3 • 2:15 p.m.
91 fs Pulses from an Yb-Doped Figure-Eight Fiber-Laser Dispersion Compensated with Higher-Order-Mode Fiber, *Jeffrey W. Nicholson, Siddharth Ramachandran, Samir Ghalmi; OFS Labs, USA.* Modelocking in Yb-doped figure-eight fiber lasers is demonstrated utilizing dispersion compensation from a higher-order-mode module with anomalous dispersion. Pulses were compressed to 91 fs, the shortest demonstrated pulses for a Yb-doped figure-eight fiber laser.

CMU4 • 2:30 p.m.
Properties of All-Normal-Dispersion Femtosecond Fiber Lasers, *Andy Chong, William H. Renninger, Frank W. Wise; Cornell Univ., USA.* The behavior and performance of femtosecond fiber lasers without any anomalous dispersion in the cavity is presented. Experimental results agree with numerical simulations. 8-nJ and 210-fs pulses are generated, and significant performance improvements are expected.

CMU5 • 2:45 p.m.
Subpicosecond Soliton Outputs from an Entirely Normal-Dispersion Fiber Laser, *Janet W. Lou[1,2], Marc Currie[1], Fredrik K. Fatemi[1]; [1]NRL, USA, [2]SFA, Inc., USA.* We experimentally demonstrate chirped solitary pulses from an entirely normal dispersion mode-locked Yb-doped fiber laser. Using frequency-resolved optical gating, we study the pulse amplitude and phase before and after the mode-locker and after pulse compression.

CMV • Semiconductor Photonic Crystal Lasers—Continued

CMV3 • 2:15 p.m.
60 MicroWatts of Fiber-Coupled Peak Output Power from an Edge-Emitting Photonic Crystal Heterostructure Laser, *Ling Lu, Tian Yang, Adam Mock, Min Hsiung Shih, Eui Hyun Hwang, Mahmood Bagheri, Andrew Stapleton, Stephan Farrell, John O'Brien, P. Daniel Dapkus; Univ. of Southern California, USA.* An array of double-heterostructure photonic crystal QW membrane lasers was fabricated in which number of cladding periods was varied. 60μW peak output power was collected from the facet of one device by a bare fiber.

CMV4 • 2:30 p.m.
Radially Polarized Doughnut Beam Emitted by a Two-Dimensional Photonic-Crystal Laser, *Kyosuke Sakai[1], Kyoko Kitamura[1], Eiji Miyai[1], Dai Ohnishi[1,2], Wataru Kunishi[1,2], Susumu Noda[1]; [1]Kyoto Univ., Japan, [2]ROHM Co., Ltd., Japan.* Direct generation of a radially polarized doughnut beam from a single-chip semiconductor laser is demonstrated for the first time by using a two-dimensional photonic crystal, which leads to various super-resolution applications in compact optical systems.

CMV5 • 2:45 p.m.
Experimental Observation of Band-Edge Lasing in Broad Planar 2-D Photonic Crystal Waveguides, *Cyril Cambournac[1], Omer Khayam[1], Melanie Ayre[1], Lucio Martinelli[1], Henri Benisty[1], Romain Brenot[2], F. Pommereau[2], F. Poingt[2], E. Derouin[2], O. Drisse[2], O. Le Gouezigou[2], L. Le Gouezigou[2], Guanghua Duan[2]; [1]LCFIO, CNRS, Univ Paris-Sud, France, [2]Alcatel-Thalès III-V Lab, France.* We report preliminary experiments on in-plane lasing in large-area planar 2-D photonic crystal waveguides used as open resonators. Lasing is attributed to an unexpected feedback mechanism originating from Littrow diffraction at the photonic crystal walls.

CMW • Lasers and Laser Materials—Continued

CMW4 • 2:15 p.m.
Confocal Micro-Fluorescence and Raman Spectroscopy across Grain Boundaries in Transparent Nd:YAG Ceramics Laser Gain Media, *Mariola O. Ramirez, Adam Stevenson, Joe Stitt, Gary L. Messing, Venkatraman Gopalan; Pennsylvania State Univ., USA.* Confocal Micro-Raman and Micro-Fluorescence studies have been performed on unetched Nd^{3+}:YAG transparent ceramic laser media. Evidence of Nd^{3+} segregation at grain boundaries and the possibility of generating 3-D spatial mapping across the sample are demonstrated.

CMW5 • 2:30 p.m.
Low-Loss Al_2O_3 Waveguides for Active Integrated Optics, *Kerstin Worhoff, Jonathan DB Bradley, Feridun Ay, Markus Pollnau; Univ. of Twente, Netherlands.* Reactively co-sputtered amorphous aluminum oxide layers with low loss (0.11 dB/cm at NIR wavelength) have been fabricated. Channel waveguides with steep, smooth side walls have been etched by a dry process.

CMW6 • 2:45 p.m.
Ultraviolet Emission in Doped α-Nano-Alumina, *Samuel L. Oliveira, Bin Li, Stephen C. Rand; Univ. of Michigan, USA.* Ultraviolet emission properties of Al_2O_3 nanopowders with Mg, Cr, and Sc are investigated. We show that in Sc-doped alumina, efficient UV-C luminescence can be achieved by minimizing color center concentration and controlling the alumina phase.

CMX • Attosecond Metrology and Wavepacket Dynamics—Continued

CMX2 • 2:30 p.m. Invited
Rydberg Wavepacket Metrology and Dynamics, *Robert Jones; Univ. of Virginia, USA.* The ability to characterize and manipulate Rydberg electron wavepackets is a key capability for exploiting their exaggerated properties to investigate a variety of problems, from time-dependent electron-electron correlation in atoms to quantum decoherence suppression.

QMG • Dispersion Engineering—Continued

QMG4 • 2:15 p.m.
Optical Isolator/Polarizer Based on a Rectangular Waveguide with Helical Grooves, *Gennady Shvets, Simeon Trendafilov; Univ. of Texas at Austin, USA.* Rectangular waveguide with slanted grooves in its sidewalls can be used as an optical isolator/polarizer due to the chirality effect. Even the crudest implementations of chirality are shown to exhibit high circular dichroism.

QMG5 • 2:30 p.m.
Far-Field Investigation of Slow-Light Propagating below the Light Cone in Planar Photonic Structures, *Nicolas Le Thomas[1], Romuald Houdré[1], Lars H. Frandsen[2], Jacob Fage-Pedersen[2], Andrei Lavrinenko[2], Peter Borel[2]; [1]Ecole Polytechnique Federale de Lausanne (EPFL), Switzerland, [2]COM.DTU, Denmark.* A far-field technique is used to investigate the properties of optical waves propagating below the light cone in nanophotonic structures. As an example, dispersion curves for slow-light in photonic crystal waveguides are retrieved.

QMG6 • 2:45 p.m.
Observation of Fast and Slow Light in a Microsphere-Optical Fiber System, *Kouki Totsuka, Makoto Tomita; Shizuoka Univ., Japan.* We observed both -8ns negative and 21ns positive delays in the optical pulse propagation through a microsphere-fiber system on the under and over coupling conditions, respectively, which are explained by a directional coupling theory.

QMH • THz and Other χ^2 Effects—Continued

QMI • Cavity QED II—Continued

QMI3 • 2:15 p.m.
Microcavities Using Holey Fibers, *Scott Hendrickson, T. B. Pittman, J. D. Franson; Univ. of Maryland, Baltimore County, USA.* Microcavities have been formed by placing mirrors on the ends of a short section of holey fiber. These microcavities may be useful for enhancing nonlinear effects at single-photon intensities.

QMH4 • 2:30 p.m.
Cerenkov THz Emission from Femtosecond Filamentation in Air, *Aurélien Houard[1], Ciro D'Amico[1], Michel Franco[1], Bernard Prade[1], Andre Mysyrowicz[1], Arnaud Couairon[2], Vladimir Tikhonchuk[3]; [1]Lab d'Optique Appliquée, ENSTA - Ecole Polytechnique, France, [2]Ctr. de Physique Théorique, CNRS, Ecole Polytechnique, France, [3]CELIA, Univ. Bordeaux [1], France.* We measure a strong forward THz emission from femtosecond filaments in air and we attribute it to a Cerenkov emission from the ionization front moving at superluminal velocity.

QMI4 • 2:30 p.m.
Coupling of Single InAs Quantum Dots at 1.3μm to a Photonic Crystal Defect Cavity Mode, *Laurent Balet[1], Marco Francardi[2], Annamaria Gerardino[2], Nicolas Chauvin[1], Blandine Alloing[1], Carl Zinoni[1], Christelle Monat[1], Lianbe H. Li[1], Nicolas Le Thomas[1], Romuald Houdré[1], Andrea Fiore[1,2]; [1]Inst. of Photonics and Quantum Electronics, EPFL, Switzerland, [2]Inst. of Photonics and Nanotechnology, CNR, Italy.* We show coupling between single 1.3 μm InAs quantum dots (QDs) and photonic crystal nanocavities with quality factors up to 16500. We demonstrate increased spontaneous emission rate for the first time in telecommunication wavelengths QDs.

QMH5 • 2:45 p.m.
Enhanced Second Order Nonlinearity in AlGaAs Microring Resonators, *Zhensban Yang, Philip Chak, Rajiv Iyer, J. Stewart Aitchison, John Sipe; Univ. of Toronto, Canada.* Second order nonlinear effects, such as second harmonic generation and parametric amplification, can be dramatically enhanced in microring resonator structures. The quasi-phase-matching is achieved based on the position dependence of polarization inside the ring resonator.

QMI5 • 2:45 p.m.
Generation of Quantum Correlated Photon Pairs from a Vertical Triple Microcavity, *Carole Diederichs[1], Charles Leyder[1], David Taj[1], Jerome Tignon[1], Alberto Bramati[1], Elisabeth Giacobino[1], Cristiano Ciuti[1], Aristide Lemaître[2], Jacqueline Bloch[2], Philippe Roussignol[1], Claude Delalande[1]; [1]Ecole Normale Supérieure, France, [2]CNRS, France.* We study the statistics of twin photons emitted by a vertical triple microcavity. We measured the intensity correlations of the signal and idler by measuring the noise spectra. Quantum correlated photon modes are observed.

CMY • Photodetectors—Continued

CMY4 • 2:15 p.m.
Si/SiGe-Based Photodiode on a Standard Silicon Substrate for 10-Gbit/s Short-Reach Fiber Communication at 830nm Wavelength, *Y.S. Wu, Jin-Wei Shi, Z.L. Li; Dept. of Electrical Engineering., Natl. Central Univ., Taiwan.* We report a Si/SiGe-based vertical-illuminated photodiode at 830nm wavelength. Wide 3-dB bandwidth (>10GHz), high responsivity (1.38A/W), and high output current (2.35mA) under avalanche operation can be achieved simultaneously without using silicon-on-insulator (SOI) substrate.

CMY5 • 2:30 p.m.
Germanium-on-SOI Photo-Detector Based on an FET Structure, *Subal Sahni[1], Eli Yablonovitch[1], Jian Liu[2], Ya-hong Xie[2]; [1]Dept. of Electrical Engineering, Univ. of California at Los Angeles, USA, [2]Dept. of Materials Science and Engineering, Univ. of California at Los Angeles, USA.* An integrated Ge-on-SOI photo-detector with an FET structure, based on secondary photo-conductivity is demonstrated. The Ge gate absorbs ~100nW of 1.55μm light, thereby modulating the conductance of the Silicon channel by a factor of 25.

CMY6 • 2:45 p.m.
Enhancing Infrared Photodetection with a Circular Metal Grating, *Ravi D. R. Bhat[1], Nicolae C. Panoiu[1], Richard M. Osgood[1], Steven R. J. Brueck[2]; [1]Columbia Univ., USA, [2]Univ. of New Mexico, USA.* We use finite-difference time-domain simulations to demonstrate enhanced infrared absorption in a photodetector topped with a metal film having a hole and a circular grating. The enhancement far exceeds comparable linear gratings.

CMZ • Optical Regeneration—Continued

CMZ3 • 2:15 p.m.
Recirculating-Loop Study of Dispersion-Managed 2R Regeneration, *Pallavi G. Patki[1], Veronika Stelmakh[1], Muthiah Annamalai[1], Taras I. Lakoba[2], Michael Vasilyev[1]; [1]Univ. of Texas at Arlington, USA, [2]Univ. of Vermont, USA.* We develop an ultra-short recirculating loop that emulates a modified Mamyshev's regenerator comprised of multiple "nonlinear fiber + dispersion compensation" sections (1 loop = 1 section), and experimentally demonstrate eye-opening improvement by this regenerator.

CMZ4 • 2:30 p.m.
Phase Regeneration of DPSK Signals Based on Symmetric-Pump Phase-Sensitive Amplification in Bismuth Oxide Highly Nonlinear Fiber, *Kevin A. Croussore, Guifang Li; College of Optics and Photonics, Univ. of Central Florida, USA.* Phase regeneration of a phase-noise degraded NRZ-DPSK signal is demonstrated experimentally using a symmetric-pump phase-sensitive amplifier in bismuth oxide highly nonlinear fiber. Record phase-sensitive gain of more than 12 dB is obtained.

CMZ5 • 2:45 p.m.
Using a Newly Developed Long-Period Grating Filter to Improve the Timing Tolerance of a 320 Gb/s Demultiplexer, *Leif K. Oxenlowe[1], Michael Galili[1], Hans C.H. Mulvad[1], Palle Jeppesen[1], Radan Slavik[2], Josè Azana[3], Yongwoo Park[3]; [1]COM-DTU, Denmark, [2]Inst. of Radio Engineering and Electronics, Acad. of Sciences of the Czech Republic, Czech Republic, [3]Inst. Natl. de la Recherche Scientifique—Énergie, Matériaux et Télécommunications (EMT-INRS), Canada.* A 0.8 ps flat top pulse is generated using a long-period fibre grating and used as control pulse for the first time in a 320 Gb/s demultiplexer. The effect is an increased error-free timing tolerance.

CMAA • Optical Manipulation of Cells—Continued

CMAA3 • 2:15 p.m.
Mega-Pixel Laser Chips of Photonic Quantum Ring Holes for Optical Manipulation of Biological Cells, *S. E. Lee, J. H. Yoon, J. K. Ku, O'Dae Kwon; Pohang Univ. of Science and Technology, Republic of Korea.* We report on a new, simple, effective and fast cell sorting method for massive micro-manipulation of biological cells or small particles in microfluidic channel involving a sorter-on-mega photonic quantum ring (PQR) hole laser chip scheme.

CMAA4 • 2:30 p.m.
Circulating Optical Particle Trapping through the Integration of Fiber Optics and Microfluidics, *J. Thomas Blakely, Reuwen Gordon, David Sinton; Univ. of Victoria, Canada.* A dual-fiber optic trap is integrated with microfluidics, and stable circulatory particle trapping is observed. The unique circulating and flow-dependant nature of the trap enables active microfluidic mixing as well as particle sorting and control.

CMAA5 • 2:45 p.m.
Integrated, All-Optical, Particle Characterization and Sorting in Microfluidic Systems, *Robert W. Applegate[1], Jeff Squier[1], Tor Vestad[2], John Oakey[2], David W. M. Marr[2], Philippe Bado[3], Mark A. Dugan[3], Ali A. Said[3]; [1]Colorado School of Mines, USA, [2]Metafluidics, USA, [3]Translume Inc, USA.* We demonstrate an integrated, microfluidic, all-optical characterization and sorting system. The integrated optical system is created by femtosecond micromachining, and the particle manipulation is performed with a novel optical trapping system.

NOTES

ROOM 318-320	ROOM 321-323	ROOM 324-326	ROOM 314	ROOM 315	ROOM 316	ROOM 317	ROOM 336
CLEO	JOINT	CLEO					QELS

CMS • Cubic Nonlinearity and Applications—Continued

CMS7 • 3:00 p.m.
Dynamics of Thermally Induced Optical Bistability in Yb^{3+}-Er^{3+} Co-Doped Phosphate Glass Microspherical Lasers, *Danny G. O'Shea[1,2], Jonathan M. Ward[2,3], Brian J. Shortt[2,3], Síle G. Nic Chormaic[1,2]; [1]Univ. College Cork, Ireland, [2]Tyndall Natl. Inst., Ireland, [3]Cork Inst. of Technology, Ireland.* We theoretically study and experimentally demonstrate thermally induced optical bistability in Yb^{3+}-Er^{3+} phosphate glass microspheres at 295K. Thermal avalanche in Yb^{3+} ions is concomitant with bistability in Er^{3+} fluorescence and lasing behavior, and chromatic switching.

CMT • Ultrafast Parametric Amplification II—Continued

CMT6 • 3:00 p.m.
An 11-fs, 5-kHz Optical Parametric/Ti:sapphire Hybrid Chirped Pulse Amplification System, *Xiangyu Zhou, H. Lee, T. Kanai, S. Adachi, S. Watanabe; Inst. for Solid State Physics, Japan.* A high average power (1.5 W), 11-fs source has been developed at 5 kHz by a non-collinear optical parametric/Ti:sapphire hybrid system with adaptive phase control.

CMU • Femtosecond Fiber Oscillators and Applications—Continued

CMU6 • 3:00 p.m.
Optically Assisted Deposition of Carbon Nanotube Saturable Absorbers, *Jeffrey W. Nicholson; OFS Labs, USA.* We demonstrate a simple and practical method for incorporating carbon nanotubes on the end-face of optical fibers enabled by optical radiation propagating in the fiber. Modelocking is shown in both Erbium and Ytterbium-doped fiber lasers.

CMV • Semiconductor Photonic Crystal Lasers—Continued

CMV6 • 3:00 p.m.
Single Mode Operation of Integrated Photonic Crystal Nanocavity Coupled Surface Emitting Lasers, *Shih-Chieh Huang, Tsung-Hua Yang, Chien-Ping Lee, Sheng-Di Lin; Dept. of Electronics Engineering, Natl. Chiao Tung Univ., Taiwan.* We demonstrate integrated surface emitting lasers with coupled photonic crystal nanocavities. Single mode emission with high *Q* factors was obtained with electrical pumping. Dual wavelength emission from two side-by-side photonic crystal nanocavities was also demonstrate.

CMW • Lasers and Laser Materials—Continued

CMW7 • 3:00 p.m.
$NaLa(WO_4)_2$ and $NaY(WO_4)_2$ Raman Converters for Picosecond Pulses, *Valdas Pasiskevicius[1], Stefan Bjursbagen[1], María D. Serrano[2], Alberto García[2], Mauricio Rico[2], Carlos Zaldo[2]; [1]Royal Inst. of Technology, Sweden, [2]Inst. de Ciencia de Materiales, Spain.* Quasi-steady state SRS with 1.7 ps pulses is investigated in tetragonal $NaY(WO_4)_2$ and $NaLa(WO_4)_2$ crystals in the regimes of collinear and noncollinear SRS-assisted four-wave-mixing. Single-pass conversion efficiency of 31% is reported.

CMX • Attosecond Metrology and Wavepacket Dynamics—Continued

CMX3 • 3:00 p.m.
Table Top Extreme Ultraviolet Holography, *Przemyslaw W. Wachulak, Randy A. Bartels, Mario C. Marconi, Carmen S. Menoni, Jorge J. Rocca; Colorado State Univ., USA.* Table top holography with EUV laser was demonstrated. The hologram recorded in a photoresist was digitized with an AFM. The image was reconstructed achieving 380 nm spatial resolution determined using wavelet analysis and image correlation.

QMG • Dispersion Engineering—Continued

QMG7 • 3:00 p.m.
Diffraction and Trapping of Light at the Interface between Two Discrete Media, *Sergiy Suntsov[1], Konstantinos Makris[1], Demetrios Christodoulides[1], George Stegeman[1], Roberto Morandotti[2], Maïte Volatier[3], Vincent Aimez[3], Richard Arès[3]; [1]College of Optics and Photonics, CREOL and FPCE, USA, [2]Univ. du Quebec, Canada, [3]Univ. de Sherbrooke, Canada.* We have studied numerically and experimentally the linear diffraction and trapping of light at the hetero-interface between two different 1-D AlGaAs waveguide arrays. A new "breather" state guided by the interface was observed.

3:15 p.m. – 3:45 p.m. COFFEE BREAK, 300 LEVEL FOYER

NOTES

QELS

QMH • THz and Other χ^2 Effects—Continued

QMH6 • 3:00 p.m.
Second-Order Nonlinear Optical Susceptibilities of Surface and Bulk of Glass, *Francisco J. Rodríguez, Fuxiang Wang, Brian K. Canfield, Stefano Cattaneo, Martti Kauranen; Tampere Univ. of Technology, Finland*. We determine all the components of the surface susceptibility tensor and the separable part of the bulk tensor for optical second-harmonic generation in centrosymmetric and isotropic glass and calibrate the results against quartz crystal.

QMI • Cavity QED II—Continued

QMI6 • 3:00 p.m.
Exciton-Polaritons at Room Temperature in Dielectric Microcavities Exhibiting Rabi-Splitting Exceeding ΩR>100 meV, *Jonathan R. Tischler, M. Scott Bradley, Yasuhiro Shirasaki, Vladimir Bulovic; MIT, USA*. Exciton-Polaritons states are generated at room temperature in planar sputter-coated dielectric microcavities containing a 5 nm thick film of J-aggregated dye as excitonic layer exhibiting Rabi-splitting > 100meV and empty cavity Q factor > 700.

C L E O

CMZ • Optical Regeneration—Continued

CMZ6 • 3:00 p.m.
Experimental Demonstration of Optical TTL Based Selective-3R in OLS Network Testbed with Label Rewriting, *Bo Xiang, Zuqing Zhu, Haijun Yang, S. J. Ben Yoo; Dept. of Electrical and Computer Engineering, Univ. of California at Davis, USA*. We demonstrate optical-TTL-based selective-3R regeneration in an OLS testbed with OLS routers, which intelligently apply 3R only when necessary. The experiment achieves error-free operation with all-optical burst-mode clock recovery.

CMAA • Optical Manipulation of Cells—Continued

CMAA6 • 3:00 p.m.
Fiber Optical Tweezers for Cell Manipulation and Force Sensing, *Yuxiang Liu, Miao Yu; Univ. of Maryland, USA*. We investigated the cell manipulation using single and three-dimentional dual fiber tweezers. The effective spring constant of the dual fiber tweezers was obtained. This setup can be used to perform force sensing with sub-picoNewton resolutions.

3:15 p.m. – 3:45 p.m. COFFEE BREAK, 300 LEVEL FOYER

NOTES

ROOM 318-320	ROOM 321-323	ROOM 324-326	ROOM 314	ROOM 315	ROOM 316	ROOM 317	ROOM 336
CLEO							QELS

3:45 p.m. – 5:30 p.m.
CMBB • Second Harmonic Generation
Yujie J. Ding; Lehigh Univ., USA, Presider

CMBB1 • 3:45 p.m.
Ultraviolet Second Harmonic Generation in beta-BaB_2O_4 Waveguides, *Riccardo Degl'Innocenti, Gorazd Poberaj, Peter Günter; ETH Zürich, Inst. of Quantum Electronics, Switzerland.* Continuous-wave UV laser light at 278 nm has been generated by optical second harmonic generation in β-BaB_2O_4 waveguides produced by He^+ ion implantation with 0.1 % W^{-1} conversion efficiency.

CMBB2 • 4:00 p.m.
Observation of Second-Harmonic Generation from Wurzite $Al_xGa_{1-x}N$ Multilayers in Reflection Geometry, *Zhan Fu[1], Yujie J. Ding[1], Jeremy D. Acord[2], Joan M. Redwing[2]; [1]Lehigh Univ., USA, [2]Pennsylvania State Univ., USA.* We have observed second-harmonic generation from $Al_xGa_{1-x}N$ multilayers in reflection geometry and measured the ratio between two elements of the second-order susceptibility tensor.

3:45 p.m. – 5:30 p.m.
CMCC • Nanoparticles and Rheology
James Tunnell; Univ. of Texas at Austin, USA, Presider

CMCC1 • 3:45 p.m. Tutorial
Microrheology and the Mechanics of Cells and Biopolymers, *Scot Kuo; Johns Hopkins Univ., USA.* Microrheology measures the microscopic mechanical properties of various materials, including cells and biopolymers. Current methodologies, including laser-based and video-based approaches, and their limitations will be discussed, with emphasis on biological applications.

3:45 p.m. – 5:30 p.m.
CMDD • Nonlinear Ultrafast Propagation
Presider to Be Announced

CMDD1 • 3:45 p.m.
Generation of 5fs, 0.7mJ Two-Cycle Pulses at 1kHz with CEP Controlled through Cascade Filamentation, *Xiaowei Chen, Xiaofang Li, Jun Liu, Pengfei Wei, Ruxin Li, Zhizhan Xu; Shanghai Inst. of Optics and Fine Mechanics, China.* Two-cycle optical pulses with duration of 5fs and energy of 0.7mJ have been generated at 1kHz by compressing the 38fs output pulses directly from a CEP controlled Ti:sapphire laser system through cascade filament compression technique.

CMDD2 • 4:00 p.m.
Spatio-Temporal Structure of Sub-10-fs Pulses Generated in a Self-Compressed White-Light Filament, *Stefan Skupin[1], Gero Stibenz[2], Luc Bergé[1], Falk Lederer[3], Thomas Sokollik[2], Matthias Schnürer[2], Nickolai Zhavoronkov[2], Günter Steinmeyer[2]; [1]Dept. de Physique Théorique et Appliquée, CEA/DAM, Ile de France, France, [2]Max-Born-Inst., Germany, [3]Inst. for Condensed Matter Theory and Solid State Optics, Germany.* Self-compression in white-light filaments offers a remarkably simple way for generation of multi-mJ pulses with sub-10-fs duration. We show that optimum compression is achieved at the verge of spatial and temporal break-up of the pulse.

3:45 p.m. – 5:30 p.m.
CMEE • Ultrashort Pulse Fiber Amplification
Ingmar Hartl; IMRA America, Inc., USA, Presider

CMEE1 • 3:45 p.m.
Bi_2O_3-Based Erbium Doped Double Core Fiber for Short Pulse Amplification, *Seiki Obara, Tatsuo Nagashima, Naoki Sugimoto; Asahi Glass Co., Ltd., Japan.* We have developed Bi_2O_3-based Erbium doped double core fiber and demonstrate short pulse amplification and compared with silica-based EDF. The short length of Bi_2O_3-based EDF shows highly nonlinear tolerance and superior short pulse amplification performances.

CMEE2 • 4:00 p.m.
Diffraction Limited Amplification of Picosecond Pulses at 1.55 µm Wavelength to 14 kW Peak Power in a Single Stage Core-Pumped Er Fiber Amplifier, *Jayesh C. Jasapara, Matt Andrejco, Jeff W. Nicholson, Andrew D. Yablon; OFS Labs, USA.* Amplification by >30-dB of 6-ps, 70-pJ pulses at 1.55-um wavelength in a core pumped single stage fiber amplifier consisting of a record 875-µm² effective area Erbium fiber generates record peak powers >14-kW with M^2~1.1.

3:45 p.m. – 5:30 p.m.
CMFF • GaInNAs and Interband Cascade and GaSb-Based Lasers
Adrienne D. Stiff-Roberts; Duke Univ., USA, Presider

CMFF1 • 3:45 p.m.
GaInNAs Distributed Feedback (DFB) Laser Diode, *Jun-ichi Hasbimoto, Kenji Koyama, Takashi Ishizuka, Yukihiro Tsuji, Kousuke Fujii, Takashi Yamada, Chie Fukuda, Yutaka Onishi, Tsukuru Katsuyama; Sumitomo Electric Industries, Ltd., Japan.* First successful operation of a buried-ridge-type GaInNAs-DFB laser was realized. Under CW condition, it could oscillate up to 110 °C with good I-L linearity and with SMSR > 40 dB.

CMFF2 • 4:00 p.m.
Tunable Red Laser Emission by Intra-Cavity Frequency-Doubling of a GaInNAs VECSEL, *Stephane Calvez[1], Stephanie Giet[1], Alan J. Kemp[1], Jennifer E. Hastie[1], Martin D. Dawson[1], Tomi Jouhti[2], Janne Konttinen[2], Markus Pessa[2]; [1]Inst. of Photonics, Univ. of Strathclyde, UK, [2]ORC, Tampere Univ. of Technology, Finland.* We report wavelength-tunable CW red laser emission by intra-cavity frequency-doubling of a 1320nm GaInNAs semiconductor thin-disk laser. Initial results show tuning over 16.4nm with up to 4.9mW of output power.

3:45 p.m. – 5:30 p.m.
CMGG • Electro-Optic and Nonlinear Optic Materials
A. H. Kung; Inst. of Atomic and Molecular Sciences, Taiwan, Presider

CMGG1 • 3:45 p.m.
Large-Angle, Low-Voltage Electro-Optic Beam Scanner by Kerr Effect and Space-Charge-Controlled Electrical Conduction in $KTa_{1-x}Nb_xO_3$, *Koichiro Nakamura, Jun Miyazu, Masahiro Sasaura, Kazuo Fujiura; NTT Photonics Labs, Japan.* An electro-optic beam scanner with an unprecedented performance is demonstrated. Full deflection angle of 250 mrad has been achieved by applying only ±250 V to 0.5-mm-thick $KTa_{1-x}Nb_xO_3$ crystal with an interaction length of 5.0 mm.

CMGG2 • 4:00 p.m.
Highly Electro-Optical Calcium Barium Niobate Thin Films, *Luca Razzari, Robin Helsten, Marcello Ferrera, Paul F. Ndione, Mounir Gaidi, Christophe Durand, Hamid Chaker, Yongwoo Park, José Azaña, Roberto Morandotti; INRS-EMT, Canada.* The r_{33} coefficient of a Calcium Barium Niobate thin film is estimated using a single beam set-up. Our measures show that the value of r_{33} in this material is as large as 100 pm/V.

3:45 p.m. – 5:30 p.m.
CMHH • Nonlinearities in Photonic Structures
Jay E. Sharping; Cornell Univ., USA, Presider

CMHH1 • 3:45 p.m.
All-Optical Nonlinear Switching in Active Microdisks, *Kuldeep Amarnath, Tie-Nan Ding, Ping-Tong Ho; Univ. of Maryland, USA.* We demonstrate all-optical pump-probe switching in electrically-pumped microdisks fabricated on InGaAsP/InP using gain-saturation optical non-linearity to achieve switching at lower powers than in passive devices. A pseudo-microdisk design combines the best of microrings and disks.

CMHH2 • 4:00 p.m.
Integrated Optical Regenerator on a Silicon Chip, *Reza Salem, Mark A. Foster, Amy C. Turner, David F. Geraghty, Michal Lipson, Alexander L. Gaeta; Cornell Univ., USA.* We demonstrate all-optical regeneration in a silicon device consisting of a nanowaveguide followed by an integrated bandpass filter. Nonlinear power transfer function was measured showing the device can operate at peak powers < 5W.

3:45 p.m. – 5:30 p.m.
QMJ • Fundamentals of Metamaterials
Evgenii Narimanov; Princeton Univ., USA, Presider

QMJ1 • 3:45 p.m. Invited
Fabrication and Characterization of a Negative-Index Photonic Metamaterial with Three Functional Layers, *Stefan Linden[1], Gunnar Dolling[1], Martin Wegener[1], Costas M. Soukoulis[2]; [1]Univ. Karlsrube, Germany, [2]Iowa State Univ., USA.* We report on the fabrication and characterization of negative-index photonic metamaterials with up to three functional layers. The effective material properties of the photonic metamaterials do not change significantly with the number of functional layers.

QELS

CLEO

3:45 p.m. – 5:30 p.m.
QMK • Quantum Dots
Carlo Piermarocchi; Michigan State Univ., USA, Presider

QMK1 • 3:45 p.m.
Electron Tunnelling Limited Coherence Time of Single Quantum Dot Photodiode Based Qubit, *Roman S. Kolodka[1], Andrew J. Ramsay[1], Joanna Skiba-Szymanska[1], Paul W. Fry[2], Hui-Yun Liu[2], D. M. Whittaker[1], A. Mark Fox[1], Maurice S. Skolnick[1]; [1]Dept. of Physics and Astronomy, Univ. of Sheffield, UK, [2]Dept. of Electrical and Electronic Engineering, Univ. of Sheffield, UK.* We demonstrate technique to time-resolve the population inversion of a quantum dot exciton, and measure T_1. Combined with measurements of the coherence time T_2. T_2 is limited by electron tunnelling from the dot.

QMK2 • 4:00 p.m.
Phonon-Induced Dephasing of Optical Spin Control in Single-Charged Quantum Dots, *Carsten Weber[1], Anna Grodecka[1,2], Pawel Machnikowski[2], Andreas Knorr[1]; [1]Inst. für Theoretische Physik, Technische Univ. Berlin, Germany, [2]Inst. of Physics, Wroclaw Univ. of Technology, Poland.* Within a density-matrix approach, we study the phonon-induced decoherence effects on the nonlinear dynamics and pump-probe spectra for the optical control of a spin in a single-charged quantum dot proposed recently.

3:45 p.m. – 5:30 p.m.
QML • Quantum Key Distribution
Aephraim Steinberg; Univ. of Toronto, Canada, Presider

QML1 • 3:45 p.m.
Experimental Decoy State Quantum Key Distribution, *Danna Rosenberg[1], Jim W. Harrington[1], Patrick R. Rice[1], Philip A. Hiskett[1], Charles G. Peterson[1], Richard J. Hughes[1], Adriana E. Lita[2], Sae Woo Nam[2], Jane E. Nordholt[1]; [1]Los Alamos Natl. Lab, USA, [2]NIST, USA.* We have implemented decoy state quantum key distribution over a record-setting 107 km of dark optical fiber in a switched interferometer phase-encoding system utilizing ultra-low-noise, high-efficiency transition-edge sensors.

QML2 • 4:00 p.m.
Experimental Quantum Key Distribution with Active Phase Randomization, *Yi Zhao, Bing Qi, Hoi-Kwong Lo; Ctr. of Quantum Information and Quantum Control, Univ. of Toronto, Canada.* Phase-randomization is an important assumption in many security proofs of practical quantum key distribution (QKD) systems. Here, we present the first experimental QKD with reliable active phase-randomization. A polarization-insensitive phase-modulator is designed for our experiment.

3:45 p.m. – 5:15 p.m.
CMII • Single Photon Detectors
Makoto Naruse; Natl. Inst. of Information and Communication, Japan, Presider

CMII1 • 3:45 p.m. Invited
Geiger-Mode Avalanche Photodiodes for Near-Infrared Photon Counting, *Mark A. Itzler, Rafael Ben-Michael, Xudong Jiang, Krystyna Slomkowski; Princeton Lightwave Inc., USA.* We present the design and characterization of InP-based avalanche photodiodes optimized for single photon counting for wavelengths between 1.0 and 1.7 µm, and we discuss performance trade-offs and mechanisms responsible for present performance limits.

3:45 p.m. – 5:30 p.m.
CMJJ • Advanced Optical Receivers and Transmitters
Pak S. Cho; CeLight, Inc., USA, Presider

CMJJ1 • 3:45 p.m.
Optimization of Receiver Filter Bandwidth for Externally Modulated Optical MSK Data, *Jinyu Mo[1,2], Yang Jing Wen[1], Yixin Wang[1], Chao Lu[3], Wen-De Zhong[2]; [1]Inst. for Infocomm Res., Singapore, [2]Nanyang Technology Univ., Singapore, [3]Hong Kong Polytechnic Univ., Hong Kong.* This paper examines the optimum optical and electrical filter bandwidths of the optical MSK receiver. Results show that the MSK signal with low OSNR exhibits narrower optimal optical filter bandwidth compared with RZ-DPSK and RZ-OOK.

CMJJ2 • 4:00 p.m.
Stabilization of a 40 Gb/s DPSK Delay-Line Interferometer Using Half Bit-Rate AM Pilot Tone Monitoring, *Louis C. Christen[1,2], Scott R. Nuccio[1], Yannick K. Lize[1], Narender Jayachandran[1], Alan E. Willner[1], Loukas Paraschais[3]; [1]Univ. of Southern California, USA, [2]Northrop Grumman Space Technology, USA, [3]Cisco Systems, USA.* We demonstrate a new technique for frequency-offset-monitoring and stabilization in a DPSK delay-line-interferometer. High sensitivity and minimal penalty are achieved by using a 1/2-bit-rate AM pilot-tone. Real time demonstrations are performed at 40Gb/s for NRZ-DPSK.

3:45 p.m. – 5:30 p.m.
CMKK • Timing Stabilization and Transfer
Kaoru Minoshima; AIST, Japan, Presider

CMKK1 • 3:45 p.m.
Transmission of an Optical Carrier Frequency over a Telecommunication Fiber Link, *Gesine Grosche[1], Burghard Lipphardt[1], Harald Schnatz[1], Giorgio Santarelli[2], Pierre Lemonde[2], Sebastien Bize[2], Michel Lours[2], Francois Narbonneau[2], Andre Clairon[2], Olivier Lopez[3], Anne Amy-Klein[3], Christian Chardonnet[3]; [1]PTB, Germany, [2]LNE-SYRTE, France, [3]Lab de Physique de Laser, France.* We investigated the transfer of an ultra-stable optical frequency via an optical fiber link. We achieved an instability below $6x10^{-18}$ for a distance of 86 km, and < $2x10^{-17}$ over 211 km (integration time ~8000s).

CMKK2 • 4:00 p.m.
Long-Term Femtosecond Timing Link Stabilization Using a Single-Crystal Balanced Cross-Correlator, *Jungwon Kim[1], Florian Loehl[2], Jeff Chen[1], Zhigang Zhang[1], Holger Schlarb[2], Franco Wong[1], Franz Kärtner[1]; [1]MIT, USA, [2]DESY, Germany.* We demonstrate a self-aligned balanced cross-correlator based on a single type-II phase-matched PPKTP crystal and its use in timing link stabilization. We obtained long-term 10-fs timing stabilization of a 300-meter fiber link.

NOTES

CMBB • Second Harmonic Generation—Continued

CMBB3 • 4:15 p.m.
Widely Tunable SHG in a PPLN Using a Low Voltage, *Francis Genereux[1,2], Georges Baldenberger[1], Bruno Bourliaguet[1], Réal Vallée[2]; [1]INO, Canada, [2]Univ. Laval, Canada.* We report a new technique based on domain inversions in x-cut $LiNbO_3$ to tune the quasi-phasematching condition of a SHG process. The tuning range covers 58 nm with an applied voltage of ±150 V.

CMBB4 • 4:30 p.m.
Bandwidth Control of Second Harmonic Generation through Chirped Period Poling of Optical Fibres, *Albert Canagasabey, Costantino Corbari, Peter G. Kazansky, Morten Ibsen; Optoelectronics Res. Ctr., Univ. of Southampton,UK.* Precise control of the bandwidth of second harmonic generation in silica fibres is realised through chirped period poling. The control of the acceptance bandwidth allows the frequency doubling of ultra-short pulsed laser sources.

CMCC • Nanoparticles and Rheology—Continued

CMDD • Nonlinear Ultrafast Propagation—Continued

CMDD3 • 4:15 p.m. Invited
Ultrafast Imaging of Wakefields, *Michael Downer[1], N. Matlis[1], S. Kalmykov[1], G. Shvets[2], S. Reed[2], S. Bulanov[2], V. Chvykov[2], G. Kalintchenko[2], T. Matsuoka[2], P. Rousseau[2], V. Yanovsky[2], A. Maksimchuk[2]; [1]Univ. of Texas at Austin, USA, [2]Ctr. for Ultrafast Optics, Univ. of Michigan, USA.* We report holographic "snapshots" of laser-generated wakefields that capture transverse and longitudinal structure of multiple wake periods, detect structure variations as laser-plasma parameters change, and resolve wavefront curvature, features never previously observed.

CMEE • Ultrashort Pulse Fiber Amplification—Continued

CMEE3 • 4:15 p.m.
Direct Amplification of 3-ps Pulses to 80 nJ at 50-MHz Repetition Rate in Large-Mode-Area Yb-Fiber, *Dimitre G. Ouzounov, Shian Zhou, Charles K. Sinclair, Frank W. Wise; Cornell Univ., USA.* We study direct picosecond pulse amplification in large-mode area, double-clad Yb-fiber amplifier. We achieved good-quality 3-ps, 80-nJ pulses in a near diffraction-limited beam. 28-nJ pulses in the green (520 nm) are produced by second-harmonic generation.

CMEE4 • 4:30 p.m.
50-W Chirped-Volume-Bragg-Grating Based Fiber CPA at 1055-nm, *Guoqing Chang[1], Chi-Hung Liu[1], Kai-Hsiu Liao[1], Vadim Smirnov[2], Leon Glebov[3], Almantas Galvanauskas[1]; [1]Univ. of Michigan, USA, [2]OptiGrate, USA, [3] CREOL ,College of Optics and Photonics, Univ. of Central Florida , USA.* 50-W average power fiber-CPA at 1055-nm is demonstrated using chirped-volume-Bragg-gratings for pulse stretching and compression. This compact pulse compression technology is efficient (83% compression efficiency in the current demonstration) and suitable for further power scaling.

CMFF • GaInNAs and Interband Cascade and GaSb-Based Lasers—Continued

CMFF3 • 4:15 p.m. Invited
Interband Cascade Lasers: From Concept to Devices and Applications, *Rui Q. Yang[1,2]; [1]JPL, USA, [2]Caltech, USA.* The development of mid-infrared interband cascade lasers from concept to devices and applications will be reviewed. Their current status and future prospects will be discussed.

CMGG • Electro-Optic and Nonlinear Optic Materials—Continued

CMGG3 • 4:15 p.m.
Submerged Waveguide Constructed by the Implantation of ^{12}C Ions in Electrooptic Crystals, *Har'el Ilan, Alexander Gumennik, Roei Fatbei, Aharon J. Agranat; Hebrew Univ. of Jerusalem, Israel.* Submerged slab waveguide was fabricated in a KLTN crystal. The waveguide was produced by the implantation of ^{12}C ions at two energies, which created two cladding layers between which the guiding core is sandwiched.

CMGG4 • 4:30 p.m.
Transparent Conducting Oxide (TCO) Electrode Based High-Speed Organic Electro-Optic (EO) Modulator, *Shuai Wu[1], Fei Yi[1], Boyang Liu[1], Yingyan Huang[1], Seng-Tiong Ho[1], Yiliang Wang[2], Jun Liu[2], Hu Kang[2], Tobin J. Marks[2], Jingdong Luo[3], Neil Tucker[3], Alex K-y Jen[3]; [1]Dept. of Electrical Engineering and Computer Science, Northwestern Univ., USA, [2]Dept. of Chemistry, Northwestern Univ., USA, [3]Dept. of Material Science and Engineering, Univ. of Washington, USA.* A novel organic Mach Zehnder EO modulator using TCO as electrodes has been demonstrated. The simulation results show such structure is suitable for high frequency operation by engineering TCO material conductivity and loss.

CMHH • Nonlinearities in Photonic Structures—Continued

CMHH3 • 4:15 p.m.
Anisotropic Nonlinear Response of Silicon in the Near-Infrared Region, *Qiang Lin, Jidong Zhang, Giovanni Piredda, Robert W. Boyd, Philippe M. Fauchet, Govind P. Agrawal; Univ. of Rochester, USA.* We characterize experimentally the anisotropy of two-photon absorption and the Kerr nonlinearity in silicon over a broad spectral region.

CMHH4 • 4:30 p.m.
Determination of Third-Order Dispersion Coefficient and Observation of Soliton Radiation in Si-Wire Waveguides, *I-Wei Hsieh[1], Xiaogang Chen[1], Jerry I. Dadap[1], Nicolae C. Panoiu[1], Richard M. Osgood[1], Sharee J. McNab[2], Yurii A. Vlasov[2]; [1]Columbia Univ., USA, [2]IBM T. J. Watson Res. Ctr., USA.* Utilizing strong nonlinearity and dispersion engineering in silicon-wire waveguides, we observe development of soliton radiation at high power and ultrashort pulses. With this observation, we investigate a novel way to determine the third-order dispersion coefficient.

QMJ • Fundamentals of Metamaterials—Continued

QMJ2 • 4:15 p.m.
Fundamental Causality and a Criterion of Negative Refraction with Low Optical Losses, *Mark I. Stockman; Georgia State Univ., USA.* From the fundamental causality, we derive a rigorous criterion of negative refraction imposing the lower limits on losses. If these losses are eliminated or significantly reduced by any means, then the negative refraction will disappear.

QMJ3 • 4:30 p.m.
Optical Magnetism, *Samuel L. Oliveira, Stephen C. Rand; Univ. of Michigan, USA.* Magnetic dipole radiation one fourth as intense as electric dipole radiation, as well as a novel nonlinear magneto-optical effect are reported in dielectric media.

QELS

CLEO

QMK • Quantum Dots—Continued

QMK3 • 4:15 p.m.
Experimental Observation of Spontaneous Two-Photon Emission from Semiconductors, *Alex Hayat, Meir Orenstein; Dept. of Electrical Engineering, Technion, Israel.* We observe experimentally efficient spontaneous two-photon emission from semiconductors exhibiting wide two-photon spectrum only 4 orders of magnitude lower than the intensity of single-photon emission. Blue shift is interpreted by k-dependence of the matrix element.

QMK4 • 4:30 p.m.
Resonance Fluorescence from a Semiconductor Quantum Dot, *Andreas Muller[1], Edward B. Flagg[1], Xiaoyong Wang[1], Chih-Kang Shih[1], Dennis G. Deppe[2], W. Ma[3], Jiayu Zhang[3], Gregory J. Salamo[3], Min Xiao[3]; [1]Univ. of Texas at Austin, USA, [2]Univ. of Central Florida, USA, [3]Univ. of Arkansas, USA.* Orthogonal optical detection and excitation of quantum dots embedded in a microcavity allows, for the first time, for background-free measurement of their resonance fluorescence. The spectra and photon statistics of single dots were obtained.

QML • Quantum Key Distribution—Continued

QML3 • 4:15 p.m.
Unconditionally Secure One-Way Quantum Key Distribution Using Decoy States, *James F. Dynes, Zhiliang L. Yuan, Andrew W. Sharpe, Andrew J. Shields; Toshiba Res. Europe Ltd., UK.* Experimental one-way decoy quantum key distribution (QKD) is reported as a function of distance up to 25.3km. The high key rates obtained exceed one order of magnitude more than QKD performed without decoy pulse exchange.

QML4 • 4:30 p.m.
Quantum Key Distribution with High-Speed Superconducting Single-Photon Detectors, *Robert H. Hadfield[1], Jonathan L. Habif[2], Lijun Ma[1], Alan Mink[1], Xiao Tang[1], Sae Woo Nam[1]; [1]NIST, USA, [2]BBN Technologies, USA.* We explore the potential of high-speed nanowire superconducting single-photon detectors for quantum key distribution in fiber, over long distances (at 1550 nm) and at high bit rates (at 850 nm).

CMII • Single Photon Detectors—Continued

CMII2 • 4:15 p.m.
High Uniformity, Stability, and Reliability Large-Format InGaAs APD Arrays, *Xiucheng Wu[1], Yonglin Gu[2], Feng Yan[2], Fow-Sen Choa[2], Peter Shu[3]; [1]Adtech Optics, USA, [2]Univ. of Maryland, Baltimore County, USA, [3]NASA, USA.* The characteristics of both etched mesa and guard ring type of InGaAs APD arrays were compared. High uniformity, high stability, and high reliability guard-ring type of arrays with a size up to 64x64 were fabricated.

CMII3 • 4:30 p.m.
InGaAsP/InP Single Photon Avalanche Photodetectors for 1.06 μm Free-Running Photon Counting, *Mark A. Itzler[1], Xudong Jiang[1], Rafael Ben-Michael[1], Krystyna Slomkowski[1], Michael A. Krainak[2], Stewart Wu[2], Xiaoli Sun[2]; [1]Princeton Lightwave Inc., USA, [2]NASA Goddard Space Flight Ctr., USA.* We demonstrate large-area InP-based single photon avalanche diodes capable of free-running operation at 1.06 um with dark count rates below 1000 Hz, detection efficiencies greater than 10%, and single photon count rates exceeding 1 MHz.

CMJJ • Advanced Optical Receivers and Transmitters—Continued

CMJJ3 • 4:15 p.m.
Simultaneous Balanced DPSK Demodulation of Multiple 40 Gbit/s WDM Channels Using a Single Periodic FBG, *Louis C. Christen[1,2], Scot R. Nuccio[1], Yannick K. Lize[1], Alan E. Willner[1], Loukas Paraschais[3]; [1]Univ. of Southern California, USA, [2]Northrop Grumman Space Technology, USA, [3]Cisco Systems, USA.* We demonstrate simultaneous balanced-DPSK-demodulation of six 40Gb/s WDM-channels using a single periodic-sampled fiber-Bragg-grating. The reflection\transmission spectrum serves as the constructive\destructive port of a delay-line-interferometer. We observe 0.5dB OSNR variation across the band of the FBG.

CMJJ4 • 4:30 p.m.
Low-Loss S-, C- and L-Band Differential Phase Shift Keying Demodulator, *Yannick K. Lize[1,2,3], Mathieu Faucher[1], Érick Jarry[1], Patrick Ouellette[1], Alexandre Wetter[1], Raman Kashyap[2], Alan E. Willner[3]; [1]ITF Labs, Canada, [2]École Polytechnique de Montréal, Canada, [3]Univ. of Southern California, USA.* We developed an all-fiber delay-line interferometer DPSK demodulator for the S, C and L band with low insertion loss, low-birefringence and greater than 20dB of extinction ratio from 1460nm to 1640nm in a single device.

CMKK • Timing Stabilization and Transfer—Continued

CMKK3 • 4:15 p.m.
Multi-Octave Optical Coherence Spanning Hundreds of Meters, *Ian R. Coddington[1], Luca Lorini[1], William C. Swann[1], James C. Bergquist[1], Yann Le Coq[2], Chris W. Oates[1], Qudsia Quraishi[1], Jason Stalnaker[1], Scott A. Diddams[1], Nathan R. Newbury[1]; [1]NIST, USA, [2]LERMA, France.* We demonstrate coherent transfer of optical signals with radian level noise (in a 3.5 MHz bandwidth) through a series of laser systems spanning from 657 nm to 1535 nm and several hundred meter distances.

CMKK4 • 4:30 p.m.
Attosecond Timing Jitter Actively Modelocked Semiconductor Fiber Ring Laser with Normal Net Cavity Dispersion, *Sangyoun Gee[1], Sarper Ozharar[1], Franklyn Quinlan[1], Peter Delfyett[1], Jason Plant[2], Paul Juodawlkis[2]; [1]CREOL, College of Optics,Univ. of Central Florida, USA, [2]Lincoln Lab, MIT, USA.* We report the generation of optical pulse trains with timing jitter of 770 attosecond (1 Hz -10 MHz) and 17.5 fs (extrapolated to Nyquist frequency) from a modelocked laser, using slab coupled optical waveguide amplifier.

NOTES

CMBB • Second Harmonic Generation—Continued

CMBB5 • 4:45 p.m.
Thermal Managements for Highly Efficient SHG with Linear Input/Output Characteristics Using Periodically Poled Stoichiometric $LiTaO_3$, *Hideki Hatano[1,2], Shunji Takekawa[1,2], Sunao Kurimura[1], Oleg A. Louchev[3], Kenji Kitamura[1,2]; [1]Natl. Inst. for Materials Science, Japan, [2]SWING, Japan, [3]Megaopto Co., Ltd., Japan.* We demonstrate increased SHG efficiency in periodically-poled near-stoichiometric $LiTaO_3$ for 532nm emission at high power density (>1x10^{8}W/cm^2) by compensating temperature nonuniformity along the beam propagation using two-zone temperature control.

CMBB6 • 5:00 p.m.
Broadband Frequency Doubling in Unpoled SBN Crystals in the Thermal Focusing Regime, *Robert Fischer, Solomon M. Saltiel, Dragomir N. Nesbev, Wieslaw Krolikouski, Yuri S. Kivshar; Australian Natl. Univ., Australia.* We study experimentally broadband noncollinear second-harmonic generation in unpoled Strontium Barium Niobate crystals. We show the effects of thermal self-focusing on the parametric conversion, including spatial localization of the second-harmonic, increased efficiency, and spectral broadening.

CMCC • Nanoparticles and Rheology—Continued

CMCC2 • 4:45 p.m.
Molecular Imaging of EGFR Expression in Live Cancer Cells Using Immuno—targeted Nanoparticles, *Matthew J. Crow, Adam Curry, Adam Wax; Duke Univ., USA.* Using molecular imaging of immunolabeled plasmonic nanoparticles bound by cell surface receptors, we compare epidermal growth factor receptor expression, an indicator of cancerous activity, of both human epithelial carcinoma and brain tumor cell lines.

CMCC3 • 5:00 p.m.
Measuring Gold Nanoparticle Concentrations in Tissue Using Diffuse Optical Spectroscopy, *Raiyan T. Zaman[1], Parmeswaran Diagaradjane[2], Sunil Krishnan[2], James W. Tunnell[1]; [1]Univ. of Texas at Austin, USA, [2]Radiation Oncology, MD Anderson Cancer Ctr., USA.* We developed diffuse optical spectroscopy (DOS) to non-invasively measure gold nanoparticle concentrations within tissue. We demonstrate DOS's accuracy to quantify nanoparticle concentrations using tissue phantoms and an in vivo murine model.

CMDD • Nonlinear Ultrafast Propagation—Continued

CMDD4 • 4:45 p.m.
Angle-Dispersion Compensation of Multiple CARS Signals in $LiNbO_3$ towards Extremely-Short Optical Pulse Generation, *Eiichi Matsubara[1,2], Ryuji Morita[1,2], Taro Sekikawa[1,2], Mikio Yamashita[1,2]; [1]Hokkaido Univ., Japan, [2]Japan Science and Technology Agency (CREST), Japan.* We demonstrated angle-dispersion compensation of multiple coherent anti-Stokes Raman-scattering (CARS) signals from a noncollinearly-pumped $LiNbO_3$ crystal by modifying a conventional 4-f configuration. The beam of CARS signals up to the 20th-order was within sub-mrad divergence.

CMDD5 • 5:00 p.m.
Pulse Polarization Splitting in a Transient Wave Plate, *Klaus K. Hartinger, Randy A. Bartels; Colorado State Univ., USA.* We demonstrate propagation of ultrafast laser pulses through a molecular gas acting as a transient wave plate under conditions of strong phase modulation. A single, linearly polarized pulse is split into two distinct laser pulses.

CMEE • Ultrashort Pulse Fiber Amplification—Continued

CMEE5 • 4:45 p.m.
High Average Power, High Energy, Femto-second Fiber Chirped Pulse Amplification System, *Fei He[1], Jonathan H. V. Price[1], Andrew Malinowski[1], Andy Piper[1], Morten Ibsen[1], David J. Richardson[1], Jay W. Dawson[2], Craig W. Siders[2], Jerald A. Britten[2], Christopher P. J. Barty[2]; [1]Optoelectronics Res. Ctr., Univ. of Southampton, UK, [2]LLNL, USA.* We have demonstrated an Yb-fiber laser system incorporating a CFBG stretcher, bandwidth optimised amplifiers and dielectric grating compressor. The system produced 135W average power with pulse energy of 13.5µJ. The recompressed pulse duration was 360fs.

CMEE6 • 5:00 p.m.
High Quality Fiber CPA-System at a B-Integral of 16, *Damian N. Schimpf[1], Doreen Müller[1], Steffen Hädrich[1], Fabian Röser[1], Jens Limpert[1], Andreas Tünnermann[1,2]; [1]Inst. of Applied Physics, Germany, [2]Fraunhofer Inst. for Applied Optics and Precision Engineering, Germany.* We report on a CPA-system in which degradation of pulse profile due to fiber-nonlinearity is avoided by shaping the spectrum using a spatial light modulator. Clean recompressed pulses are obtained at a B-integral of 16.

CMFF • GaInNAs and Interband Cascade and GaSb-Based Lasers—Continued

CMFF4 • 4:45 p.m.
CW, High Power, Single-Longitudinal-Mode Operation of an Optically Pumped Mid-IR DFB Laser, *Liang Xue[1], Steven Roy Julien Brueck[1], Ron Kaspi[2]; [1]Ctr. for High Technology Materials, Univ. of New Mexico, USA, [2]AFRL, Directed Energy Directorate, USA.* A CW, single-longitudinal-mode, optically pumped mid-IR distributed-feedback antimonide-based type-II quantum-well laser at 3.62 µm is demonstrated. Record high output powers, > 300 mW per side, and tunability of 5.5 nm are obtained at 77 K.

CMFF5 • 5:00 p.m.
Pulsed Pumping of a 2.3µm InGaAsSb Semiconductor Disk Laser, *Nils Hempler[1], John-Mark Hopkins[1], Alan Kemp[1], Nico Sbultz[2], Marcel Rattunde[2], Joachim Wagner[2], Martin Dawson[1], David Burns[1]; [1]Inst. of Photonics, UK, [2]Fraunhofer Inst. fuer Angewandte Festkoerperphysik, Germany.* ~1.7W output power at 2.3µm is demonstrated from a semiconductor disk laser pumped by a 905nm high-power pulsed semiconductor laser. The thermal characteristics and wavelength shift are studied over the 100-200ns pump pulse.

CMGG • Electro-Optic and Nonlinear Optic Materials—Continued

CMGG5 • 4:45 p.m.
Higher Raman Scattering Cross-Sections, Bandwidths and Nonlinear Indices in the TeO_2-ZnO-Nb_2O_5-Mo_2O_3 Quarternary Glass System, *Rajan Jose, Yasutake Ohishi; Toyota Technological Inst., Japan.* We engineered a new quaternary glass system, TeO_2-ZnO-Nb_2O_5-Mo_2O_3, with higher linear and nonlinear indices, Raman gain coefficient and gain bandwidth, and third order optical susceptibility and is reported herewith.

CMGG6 • 5:00 p.m.
Solvent-Casting of Photo-Refractive Chalcogenide Glasses and Their Applications in Quantum Cascade Laser Tuning, *Shanshan Song, Claire F. Gmachl, Craig B. Arnold; Princeton Univ., USA.* We deposited photo-modifiable chalcogenide films through a low-temperature, solvent-casting technique. Their thermal and optical properties were characterized and these glasses were applied to Quantum Cascade lasers to realize all-optical room temperature tuning.

CMHH • Nonlinearities in Photonic Structures—Continued

CMHH5 • 4:45 p.m.
Spectral Measurements of the Third-Order Nonlinearity of Bulk Silicon in the near Infrared Region, *Jidong Zhang, Qiang Lin, Giovanni Piredda, Robert W. Boyd, Govind P. Agrawal, Philippe M. Fauchet; Univ. of Rochester, USA.* We report the first detailed characterization, to the best of our knowledge, of wavelength dependence of two-photon absorption and the Kerr nonlinearity in silicon over a spectral range extending from 1.2 to 2.4 µm.

CMHH6 • 5:00 p.m.
Pulse Compression and Modelocking by Using TPA in Silicon Waveguides, *En-Kuang Tien, Nub S. Yuksek, Feng Qian, Ozdal Boyraz; Univ. of California at Irvine, USA.* We demonstrate a novel broadband pulse compression and modelocking scheme in silicon waveguides. Experimentally we obtain 25 fold pulse compression and 400ps modelocked pulses. Results are limited by the RC time constant of the diode.

QMJ • Fundamentals of Metamaterials—Continued

QMJ4 • 4:45 p.m.
Chiral Photonic Metamaterial, *Vassili A. Fedotov[1], Eric Plum[1], Yifang Chen[2], Alexander S. Schwanecke[1], Nikolay I. Zheludev[1]; [1]Optoelectronics Res. Ctr., Univ. of Southampton, UK, [2]Central Microstructure Facility, Rutherford Appleton Lab, UK.* We demonstrate novel chiral photonic metamaterials consisting of physically separated mutually twisted planar metal patterns in parallel planes. Such metamaterials are shown to exhibit very strong gyrotropy (600°/mm) in the visible, near-IR and microwaves.

QMJ5 • 5:00 p.m.
Nano-Spheres Dispersed Nematic Liquid Crystals for Broadband Tunable Negative-Zero-Positive Index Materials, *Iam-Choon Khoo, Andres Diaz; Pennsylvania State Univ., USA.* It is demonstrated that by introducing gain and nano-spheres in aligned nematic liquid crystals, one can design metamaterials which possess broadband tunable negative-zero-positive index with relatively low loss compared to other material systems.

QELS

CLEO

QMK • Quantum Dots—Continued

QMK5 • 4:45 p.m.
Quantum Efficiency of Self-Assembled Quantum Dots Determined by a Modified Optical Local Density of States, *Jeppe Johansen[1], Søren Stobbe[1], Ivan S. Nikolaev[2,3], Toke Lund-Hansen[1], Philip T. Kristensen[1], Jørn M. Hvam[1], Willem L. Vos[2,3], Peter Lodahl[1]; [1]Technical Univ. of Denmark, Denmark, [2]FOM Inst. for Atomic and Molecular Physics, Netherlands, [3]Complex Photonic Systems, MESA+ Res. Inst., Univ. of Twente, Netherlands.* We have measured time-resolved spontaneous emission from quantum dots near a dielectric interface with known photonic local density of states. We thus experimentally determine the quantum efficiency and the dipole moment, important for quantum optics.

QMK6 • 5:00 p.m.
Optical-Fiber-Based Probing of Semiconductor Microcavity-Quantum-Dot Systems at Cryogenic Temperatures, *Kartik Srinivasan, Oskar Painter, Caltech, USA.* Ultrasmall volume (V_{eff}~2-6$(\lambda/n)^3$) microdisks with embedded quantum dots are studied at cryogenic temperatures through an optical fiber taper waveguide probe, and high-resolution cavity mode wavelength tuning by nitrogen gas adsorption is investigated.

QML • Quantum Key Distribution—Continued

QML5 • 4:45 p.m.
Toward All Semiconductor Quantum Repeaters, *Hideo Kosaka[1,2], Hideki Shigyo[1], Takeshi Kutsuwa[2], Yoshiaki Rikitake[3], Hiroshi Imamura[3,2], Yasuyoshi Mitsumori[1,2], Keiichi Edamatsu[1]; [1]Tohoku Univ., Japan, [2]CREST-JST, Japan, [3]AIST, Japan.* Deterministic quantum state transfer from a photonic qubit to an electron spin qubit is crucial for building all semiconductor quantum repeaters. We present the coherent state preparation of electron spins imprinted from the photon polarization.

QML6 • 5:00 p.m.
Complete Physical Simulation of the Entangling-Probe Attack on the BB84 Protocol, *Taebyun Kim, Ingo Stork genannt Wersborg, Franco N. C. Wong, Jeffrey H. Shapiro; MIT, USA.* We have implemented the most powerful individual-photon attack against the Bennett-Brassard 1984 quantum key distribution protocol. Our measurement results are in good agreement with theoretical predictions for the eavesdropper's R´enyi information.

CMII • Single Photon Detectors—Continued

CMII4 • 4:45 p.m. Invited
Demonstration of a Wavelength-Converter-Based 1550-nm Photon-Counting Receiver with Better than 2 Incident Photon/Bit Sensitivity, *Matthew E. Grein[1], Laura E. Elgin[1], Bryan S. Robinson[1], Scott A. Hamilton[1], Don M. Boroson[1], Carsten Langrock[2], Martin M. Fejer[2]; [1]MIT Lincoln Lab, USA, [2]Stanford Univ., USA.* We implemented a photon-counting optical receiver at 1550nm with periodically-poled lithium niobate and a silicon Geiger-mode avalanche photodiode. We measured a sensitivity of 1.9 incident photon/bit at 18.8 Mb/s for a single detector.

CMJJ • Advanced Optical Receivers and Transmitters—Continued

CMJJ5 • 4:45 p.m.
Automatic All-Optical Detection in Polarization-Division-Multiplexing System Using Power Unbalanced Transmission, *Liansban Yan[1], Bo Zhang[1,2], A. Belisle[1], Alan Willner[2], X. Steve Yao[1]; [1]General Photonics Corp., USA, [2]Univ. of Southern California, USA.* We demonstrate a novel, automatic all-optical detection scheme in a polarization-division-multiplexing system using power unbalanced transmission. Concept proof with >30-dB ER between orthogonal polarization states and 1.12-Tb/s (14x2x40-Gb/s) PDM transmission over 62-km link is demonstrated.

CMJJ6 • 5:00 p.m.
Polarization-Based 43 Gb/s RZ-DQPSK Receiver Design Employing a Single Delay-Line Interferometer, *Louis C. Christen, Scott R. Nuccio, Xiaoxia Wu, Alan Willner; Univ. of Southern California, USA.* We demonstrate a polarizaton-based DQPSK-receiver design requiring only one delay-line-interferometer. Demodulation of 43-Gb/s RZ-DQPSK is experimentally demonstrated with no penalty compared to a traditional receiver using two interferometers. Receiver alignment tolerances are quantified via simulation.

CMKK • Timing Stabilization and Transfer—Continued

CMKK5 • 4:45 p.m.
Long-Term Stable Microwave Signal Extraction from Mode-Locked Lasers, *Jungwon Kim[1], Frank Ludwig[2], Matthias Felber[2], Holger Schlarb[2], Franz Kärtner[1]; [1]MIT, USA, [2]DESY, Germany.* Long-term synchronization [13-fs (10 Hz-10 MHz), <50 fs (for one hour)] between two 10.225-GHz microwave signals at +10 dBm referenced to a 44-MHz repetition rate mode-locked fiber laser is demonstrated using balanced optical-microwave phase detectors.

CMKK6 • 5:00 p.m.
Ultralow-Litter Passive Timing Stabilization of a Mode-Locked Fiber Laser by Injection of Reference Pulses, *Dai Yoshitomi[1], Yohei Kobayashi[1], Masayuki Kakehata[1], Hideyuki Takada[1], Kenji Torizuka[1], Taketo Onuma[2], Hideki Yokoi[2], Takuro Sekiguchi[3], Shinki Nakamura[3]; [1]Natl. Inst. of Advanced Industrial Science and Technology (AIST), Japan, [2]Shibaura Inst. of Technology, Japan, [3]Ibaraki Univ., Japan.* Passive timing stabilization of Er-doped fiber laser was demonstrated by injection of reference pulses, resulting in a timing jitter of 3.7 fs in a frequency range from 1Hz to 100 kHz.

NOTES

ROOM 318-320	ROOM 321-323	ROOM 324-326	ROOM 314	ROOM 315	ROOM 316	ROOM 317	ROOM 336
CLEO							QELS

CMBB • Second Harmonic Generation—Continued

CMBB7 • 5:15 p.m.
Three-Primary-Color Laser Efficiently Generated from the Second Harmonic Emission of a Nd:YAG Laser, *Teppei Sotoda, Shin-ichi Zaitsu, Totaro Imasaka; Kyusbu Univ., Japan.* A three-primary-color laser is generated by frequency conversion of the second harmonic emission of a Nd:YAG laser by means of stimulated Raman scattering (SRS) and subsequent four-wave Raman mixing (FWRM) in molecular deuterium.

CMCC • Nanoparticles and Rheology—Continued

CMCC4 • 5:15 p.m.
Molecular Imaging Using CdSe/ZnS/Lipid Quantum Dots as Contrast Agents of Third Harmonic Generation Microscopy, *Shih-Peng Tai[1], Che-Hang Yu[1], Chao-Yu Chen[2], Fu-Hsiung Chang[2], Chi-Kuang Sun[1]; [1]Graduate Inst. of Electro-Optical Engineering, Natl. Taiwan Univ., Taiwan, [2]Graduate Inst. of Biochemistry and Molecularbiology, Natl. Taiwan Univ., Taiwan.* We demonstrate molecular-specific third-harmonic-generation microscopy in cultured Hela cells and hamster oral cavity by using CdSe/ZnS/lipid quantum dots as contrast agent.

CMDD • Nonlinear Ultrafast Propagation—Continued

CMDD6 • 5:15 p.m.
High-Order Enhancement of Multi-Frequency Raman Generation in a Hollow Fibre, *Fraser C. Turner, Donna Strickland; Univ. of Waterloo, Canada.* Stimulated Raman scattering with resonant pumping can produce coherent bandwidths spanning the visible spectrum. By balancing the dispersion of the Raman-active gas with that of a hollow waveguide, the anti-Stokes orders are greatly enhanced.

CMEE • Ultrashort Pulse Fiber Amplification—Continued

CMEE7 • 5:15 p.m.
Chirped-Pulse Amplification near the Gain-Narrowing Limit of an Yb-Doped Fiber Amplifier Using a Reflection Grism Compressor, *Lyuba Kuznetsova[1], Frank W. Wise[1], Steve Kane[2], Jeff Squier[3]; [1]Dept. of Applied and Engineering Physics, Cornell Univ., USA, [2]HORIBA Jobin Yvon, Inc., USA, [3]Dept. of Physics, Colorado School of Mines, USA.* Chirped-pulse amplification near the Yb gain-narrowing limit is studied numerically and experimentally. An inhomogeneous gain lineshape is consistent with experiments. With a grism compressor, transform-limited 120-fs pulses are generated with energy up to 0.7 μJ.

CMFF • GaInNAs and Interband Cascade and GaSb-Based Lasers—Continued

CMFF6 • 5:15 p.m.
Resonant In-Well Pumping of GaSb-Based VECSELs Emitting in the 2.X μm Wavelength Regime, *Nicola Schulz[1], Marcel Rattunde[1], Christian Manz[1], Klaus Köhler[1], Joachim Wagner[1], John-Mark Hopkins[2], David Burns[2]; [1]Fraunhofer Inst. for Applied Solid State Physics, Germany, [2]Inst. of Photonics, Univ. of Strathclyde, UK.* We report on the epi-layer design and lasing characteristics of GaSb-based VECSELs emitting at 2.35μm optimized for resonant optical in-well pumping around 1.95μm. Compared to conventional barrier-pumped devices, the power conversion efficiency is significantly increased.

CMGG • Electro-Optic and Nonlinear Optic Materials—Continued

CMGG7 • 5:15 p.m.
Optical Properties and Structural Transitions in Ge-As-Se Glasses, *Barry Luther-Davies, Zha Congji, Amrita Prasad, Anita Smith; Australian Natl. Univ., Australia.* The optical and structural properties of Ge-As-Se glasses have been studied using Raman, UV-Vis-IR, Z-scan and DSC techniques, and the effect of composition on structural transition, optical band gap and nonlinearity is described.

CMHH • Nonlinearities in Photonic Structures—Continued

CMHH7 • 5:15 p.m.
Two-Dimensional Nonlinear Photonic Crystal in $KTiOPO_4$ for CW Second Harmonic Blue Light Generation, *Carlota Canalias, Mats Nordlöf, Valdas Pasiskevicius, Fredrik Laurell; Royal Inst. of Technology, Sweden.* We report on fabrication and characterization of a nonlinear photonic crystal with a rectangular lattice in a $KTiOPO_4$ crystal. The structure was used to demonstrate CW tunable second harmonic generation in the blue regime.

QMJ • Fundamentals of Metamaterials—Continued

QMJ6 • 5:15 p.m.
Doubly Negative Metamaterials with Subwavelength Unit Cells in Visible and Near Infrared, *Vitaliy Lomakin[1], Yasbayahu Fainman[1], Yaroslav Urzhumov[2], Gennady Shvets[2]; [1]Univ. of California at San Diego, USA, [2]Univ. of Texas at Austin, USA.* A doubly negative metamaterial that can be tuned to operate in the visible and near infrared spectra, comprises deeply subwavelength periodic unit cells, and can be manufactured easily is presented. The underlying physics is elucidated.

5:30 p.m. – 6:00 p.m. DINNER BREAK (on your own)

6:00 p.m. – 9:00 p.m. CLEO/*PhAST* PLENARY SESSION, Ballrooms III/IV

ROOM 337 | ROOM 338 | ROOM 339 | ROOM 340 | ROOM 341

QELS

QMK • Quantum Dots—Continued

QMK7 • 5:15 p.m.
Photon-Number-Resolving Capabilities of a Semiconductor Quantum Dot, Optically Gated, Field-Effect Transistor, *Eric J. Gansen[1], Mary A. Rowe[1], Marion Greene[1], Danna Rosenberg[2], Todd E. Harvey[1], Mark Y. Su[1], Robert H. Hadfield[1], Sae Woo Nam[1], Richard P. Mirin[1]; [1]NIST, USA, [2]Los Alamos Natl. Lab, USA.* We demonstrate the photon-number-resolving capabilities of a novel quantum dot, optically gated, field-effect transistor cooled to 4 K. Peaks are observed in the detector's response to highly attenuated laser pulses in accordance with Poisson statistics.

QML • Quantum Key Distribution—Continued

QML7 • 5:15 p.m.
Secret Key Distribution Using Differential-Phase-Shift Keyed Macroscopic Coherent Light, *Kyo Inoue[1,2,3], Shusaku Hayashi[1,3]; [1]Osaka Univ., Japan, [2]NTT Basic Res. Labs, Japan, [3]JST-CREST, Japan.* A quantum key distribution scheme utilizing quantum noise is proposed. It uses macroscopic coherent light that is phase-modulated by |-δ, δ| and direct differential detection. It has possibility for high data rate.

CLEO

CMJJ • Advanced Optical Receivers and Transmitters—Continued

CMJJ7 • 5:15 p.m.
Multi-Channel High-Speed Optical Pulse Train Generation Based on Phase Modulation at Half Frequency, *Changyuan Yu[1,2], Zhaohui Li[3], Jing Yang[1], Yixin Wang[2]; [1]Dept. of Electrical and Computer Engineering, Natl. Univ. of Singapore, Singapore, [2]A*STAR Inst. for Infocomm Res. (I²R), Singapore, [3]School of Electrical and Electronic Engineering, Nanyang Technological Univ., Singapore.* We demonstrate ITU-grid multi-channel high-speed (40-GHz experimentally, and 80-GHz in simulation) chirp-free return-to-zero optical pulse train generation by a single phase modulator driven by an electrical clock at half frequency and a PM fiber.

CMKK • Timing Stabilization and Transfer—Continued

CMKK7 • 5:15 p.m.
Phase-Stabilized Prism Based Cr:Forsterite Laser Frequency Comb for Absolute Frequency Measurements, *Rajesh Thapa[1], Karl A. Tillman[1], Ahmer Naweed[1], Andrew Jones[1], Brian R. Washburn[1], Kristan L. Corwin[1], Jeffrey W. Nicholson[2], Man F. Yan[2]; [1]Kansas State Univ., USA, [2]OFS Labs, USA.* A prism-based Cr:forsterite frequency comb is stabilized, with a repetition rate of 116 MHz. The flexibility of the prism-based system aids in achieving the carrier-envelope-offset frequency (f_0) beat note width of ~1.5 MHz.

5:30 p.m. – 6:00 p.m. DINNER BREAK (on your own)

6:00 p.m. – 9:00 p.m. CLEO/*PhAST* PLENARY SESSION, Ballrooms III/IV

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