EXHIBIT HALL, 100 LEVEL

JOINT

8:00 a.m. – 10:30 a.m. CLEO/QELS PLENARY SESSION, BALLROOMS III/IV

10:00 p.m. – 5:00 p.m. EXHIBIT HALL OPEN

10:00 a.m. – 12:00 p.m. EXHIBIT ONLY, EXHIBIT HALL, 100 LEVEL

10:30 a.m. – 12:00 p.m. COFFEE BREAK, EXHIBIT HALL, 100 LEVEL

11:00 a.m. – 12:00 p.m. LUNCH BREAK (concessions available on show floor)

12:00 p.m. – 1:30 p.m.
JWA • Poster Session II

JWA1
Weak Coupling Interactions of Silicon Photonic Crystals with Lead Sulphide Nanocrystals at Room Temperature, *Ranojoy Bose, Rohit Chatterjee, Xiaodong Yang, Jie Gao, Chee Wei Wong; Columbia Univ., USA.* We demonstrate weak coupling interactions of silicon photonic crystals with PbS nanocrystals at room temperature. Coupling is verified through cold-cavity integrated waveguide measurements, with polarization extinction of 1.7 and emission enhancements that match simulations.

JWA2
Semiclassical Theory of the Hyperlens, *Zubin Jacob, Leonid V. Alekseyev, Evgenii Narimanov; Princeton Univ., USA.* We study ray dynamics inside the Hyperlens, a device recently demonstrated as capable of sub-diffraction-limited far-field imaging.The obtained semiclassical result of spiraling rays is confirmed by numerical simulations of gaussian beam scattering from the hyperlens.

JWA3
Exciton Dressing and Capture by a Photonic Band Edge, *Shengjun Yang, Sajeev John; Dept. of Physics, Univ. of Toronto, Canada.* We demonstrate electromagnetically-induced anomalous quantum dynamics of an exciton in a PBG QW heterostructure. The exciton can be captured in wavevector space by emission and re-absorption of virtual photons near a photonic band edge.

JWA4
Directional Output from GaAs Micro-stadium Lasers, *Wei Fang[1,2], G. Alon[2], Glenn Solomon[1], Hui Cao[2]; [1]NIST, USA, [2]Northwestern Univ., USA.* We observed the directional output from GaAs micro-stadium lasers at low temperature, by the scatted emission on a ring enclosure structure. Our numerical simulation shows the directionality of the laser emission fit classical ray dynamics.

JWA5
Experimental Observation of Modulational Instability in the 1st and 2nd Band of a Self-Defocusing Nonlinear Waveguide Array, *Christian E. Rüter, Jürgen Wisniewski, Detlef Kip; TU Clausthal, Germany.* We observed experimentally discrete modulational instability within the first two bands in a permanent nonlinear waveguide array fabricated in an iron-doped photorefractive lithium niobate crystal.

JWA6
All-Optical Bistable Switching in a Metal-Dielectric Multilayer Structure Due to Intensity-Dependent Sign of the Effective Dielectric Constant, *Anton Husakou, Joachim Herrmann; Max Born Inst., Germany.* We numerically study light propagation through a nonlinear metal-dielectric multilayer structure, and predict all-optical bistable switching due to change of the effective dielectric constant from negative (low-transmission state) to positive (high-transmission state) values.

JWA7
Explicit Formulae for the Medium Parameters of Optically-Active Molecules and Crystals from the Microscopic Theory, *G. Hugh Song, S. Nam; GIST, Republic of Korea.* Dyadic formulae for the medium parameters of the electromagnetic point-localized constitutive relations from the microscopic theory of optically-active molecules and crystals have been newly found, which clears out long-held controversy on reciprocity and equivalence.

JWA8
Exact Modeling of Generalised Defect Modes in Photonic Crystals, *Lindsay C. Botten[1], Kokou B. Dossou[1], Ara A. Asatryan[1], Stewart Wilcox[2], Ross C. McPhedran[2], C. Martijn de Sterke[2]; [1]Univ. of Technology, Sydney, Australia, [2]Univ. of Sydney, Australia.* We present an exact method for modeling modes of general defects with infinite cladding. It handles the pathological case of highly extended modes and establishes the fundamental mode of a conventional PCF has no cutoff.

JWA9
Superradiance and Motional Narrowing of Exciton-Polaritons in J-Aggregate Thin Films, *M. Scott Bradley, Jonathan R. Tischler, Yasuhiro Shirasaki, Vladimir Bulovic; MIT, USA.* We investigate dispersion of J-aggregate thin films of varying thickness. Reflectance measurements and simulations suggest a "superradiance" effect in thick films similar to that observed in multiple-quantum wells in addition to evidence of motional narrowing.

JWA10
New Gap Solitons in Two-Dimensional Photonic Lattices, *Zuoqiang Shi[1], Jianke Yang[1,2], Cibo Lou[3,4], Zhigang Chen[3,4]; [1]Tsinghua Univ., China, [2]Univ. of Vermont, USA, [3]San Francisco State Univ., USA, [4]Nankai Univ., China.* We theoretically predict and experimentally demonstrate new types of gap solitons in 2-D photonic lattices such as dipole-array gap solitons. These solitons bifurcate from a superposition of Bloch modes at edges of higher Bloch bands.

JWA11
Transformation of Surface States from Shockley-like to Tamm-like in Photonic Crystals, *Natalia Malkova[1,2], Cun-Zheng Ning[2]; [1]NASA Ames Res. Ctr., USA, [2]Ctr. for Nanophotonics and Dept. of Electrical Engineering, Arizona State Univ., USA.* We investigate how the asymmetry of surface potential affects the Shockley surface states in photonic crystals and demonstrate the transformation of the Shockley surface states into the Tamm states for the first time.

JWA12
Interaction of Counterpropagating Discrete Solitons and Nonlinear Surface Tamm States in 1-D Waveguide Arrays, *Eugene Smirnov, Christian E. Rüter, Milutin Stepic, Detlef Kip; TU Clausthal, Germany.* We investigate interaction of counterpropagating solitons and nonlinear surface Tamm states in a waveguide array in photorefractive lithium niobate. For sufficient input power a growing instability results in discrete lateral shifting of solitons.

JWA13
Control of Photon Tunneling Decay in Engineered Optical Waveguide Arrays, *Stefano Longhi; Politecnico di Milano, Italy.* Acceleration and deceleration of photon tunneling decay is theoretically demonstrated in an engineered waveguide-array structure, which provides an optical realization of quantum mechanical decay control proposed for macroscopic quantum tunneling.

JWA14
Interaction-Induced Localization of Self-Defocusing Discrete Solitons, *Yoav Linzon[1], Yonatan Sivan[1], Shimshon Barad[1], Michael Zaezjev[2], Roberto Morandotti[2], Boris Malomed[3]; [1]School of Physics and Astronomy, Tel Aviv Univ., Israel, [2]INRS-Energie et Materiaux, Univ. of Quebec, Canada, [3]School of Engineering, Tel Aviv Univ., Israel.* Tilted beams, propagating in the self-defocusing regime of a waveguide array, away from a soliton, are shown to refocus due to the nonlinear interaction, emerging in intermediate sites as function of the relative phase.

JWA15
Negative Index Bands in Sub-Wavelength Metallic Gratings, *Mihaela Dinu, Howard R. Stuart; Bell Labs, Lucent Technologies, USA.* We describe negative group index surface plasmons in nano-structured metallic gratings. The periods and amplitudes of silver gratings exhibiting negative group index, as well as the attenuation lengths of the negative-index surface waves, are derived.

JWA16
Slow-Light Trapping in a Photonic Crystal Slab, *Frédéric Bordas[1], Christian Seassal[2], Michael J. Steel[1,3], Adel Rahmani[2]; [1]Inst. des Nanotechnologies de Lyon, France, France, [2]Macquarie Univ., Australia, [3]RSoft Design Group, Inc., Australia.* We present a general scheme to trap slow-light in a photonic crystal slab and achieve high *Q*/V ratio with a fabrication tolerant design, well suited for low-threshold microlasers and cavity quantum electrodynamics.

JWA17
Periodic Surface Plasmon-Enhanced Diffraction in Cholesteric Liquid Crystal Grating, *Wen-Chi Hung[1], Ming-Shan Tsai[2], Yi-Chung Juan[2], I-Min Jiang[3], Wood-Hi Cheng[1]; [1]Electro-Optical Engineering, Taiwan, [2]Dept. of Applied Physics, Natl. Chiayi Univ., Taiwan, [3]Natl. Sun Yat-Sen Univ., Taiwan.* Periodic surface plasmon-enhanced diffraction effect in cholesteric liquid crystal (CLC) grating is demonstrated.

JWA18
Hollow Nano-Magnetic Resonators Mediated by Photo-Thermal Effects: Towards the Realization of Highly-Tunable Mid-Infrared Negative Permeability, *Nikolaos J. Florous, Kunimasa Saitoh, Kuniaki Maeda, Masanori Koshiba; Div. of Media and Network Technologies, Hokkaido Univ., Japan.* Using a rigorous-coupled-wave analysis combined with a thermo-optical sensitivity prediction scheme, we show that nano-engineered magnetic resonators exhibit strong tunable magnetic response in mid-infrared, which can be effectively used for realizing a negative magnetic permeability.

JWA19
Localization by Random Apertures in a Metal Film, *Matthew C. Hughes, Reuven Gordon; Univ. of Victoria, Canada.* The transmission through random subwavelength rectangular apertures in a gold film is studied. Enhanced loss is shown to arise from localization of light at the surface of the film, which increases with aperture density.

JWA20
Saturable Absorption in Nanocomposite Gold-Silica Materials with High Gold Fill Fraction, *Giovanni Piredda[1], David D. Smith[2], Youngkwoon Yoon[1], Robert W. Boyd[1], Rongfu Xiao[3], Bettina Wendling[4]; [1]Inst. of Optics, USA, [2]NASA Marshall Space Flight Ctr., USA, [3]Dept. of Physics, Hong Kong Univ. of Science and Technology, Hong Kong, [4]Inst. of Physics, Univ. of Stuttgart, Germany.* We present frequency-resolved measurements of the nonlinear absorption coefficient in gold-silica nanocomposite materials with high gold fill fraction.

JWA21
Second Harmonic Generation in AlGaAs/AlO_x Random Structures, *Marco Centini[1], Didier Felbacq[2], Diederick S. Wiersma[3], Concita Sibilia[1], Michael Scalora[4], Mario Bertolotti[1]; [1]Dept. di Energetica, Univ. di Roma-La Sapienza, Italy, [2]Groupe d'Etude des Semi-Conducteurs, France, [3]European Lab for Non-linear Spectroscopy (LENS) and INFM-Matis, Italy, [4]Charles M. Bowden Res. Ctr., AMSMI-RD-WS-ST RDECOM, Redstone Arsenal, USA.* We applied our theoretical results to design, realize and experimentally verify the predicted second harmonic enhanced efficiency on a sample made of AlGaAs/AlO_x random layers grown in a GaAs substrate.

JWA22
High Repetition Rate Two-Color Pump-Probe System Based on Optical Parametric Generation in PPLN Crystals, *Marco Marangoni[1], Roberto Osellame[1], Dario Polli[1], Roberta Ramponi[1], Uwe Morgner[2], Giulio Cerullo[1]; [1]Politecnico di Milano, Italy, [2]Univ. of Hannover, Germany.* By exploiting optical parametric generation in PPLN crystals driven by a cavity-dumped Yb:KYW mode-locked laser, we realized a two-color pump-probe system tunable in the near-infrared with 1-MHz repetition rate and 100-fs temporal resolution.

JWA23
Theoretical and Experimental Study of Third Order Difference Frequency Generation, *Fabien Gravier, Benoît Boulanger; Inst. Néel-CNRS, France.* We performed several experimental validations of a model based on Jacobi elliptic functions describing collinear phase-matched Third Order Difference Frequency Generation without spatial and temporal walk-off. The experiments used KTP crystals and sub-nanosecond laser beams.

JWA24
Effect of Raman-Induced Refractive Index Change on Multi-Pump Raman-Assisted Four-Wave Mixing, *S. H. Wang[1], Lixin Xu[1,2], P. K. A. Wai[1]; [1]Hong Kong Polytechnic Univ., Hong Kong, [2]Univ. of Science and Technology of China, China.* We investigated the contribution of Raman-induced refractive index change on the conversion efficiency bandwidth in Raman-assisted four-wave mixing. The contribution of the Raman-induced refractive index change can be significant when multi-Raman pumps are used.

JWA25
Tunable Single-to-Single and Single-to-Dual Channel Wavelength Conversions of Ps-Pulses Using PPLN-Based Double-Ring Fiber Laser, *Jian Wang, Junqiang Sun, Qizhen Sun; Huazhong Univ. of Science and Technology, China.* We propose and demonstrate a novel scheme of tunable single-to-single and single-to-dual channel wavelength conversions using a double-ring fiber laser incorporating a periodically poled lithium niobate waveguide. No external pump and control sources are required.

JWA26
Mid-Infrared Optical Upconversion by Integrating an InAsSb Photodetector with a GaAs Light Emitting Diode, *Boucherif Abderraouf[1], Dayan Ban[1], Hui Luo[2], Emmanuel Dupont[2], H.C Liu[2], Z. R. Wasilewski[2], Yossi Paltiel[3]; [1]Dept. of Electrical and Computer Engineering, Univ. of Waterloo, Canada, [2]Inst. for Microstructural Sciences, Canada, [3]Electro-Optics Div., Soreq NRC, Israel.* We report the fabrication and experimental results of a midinfrared optical up-converter that was fabricated using wafer fusion technology. Midinfrared optical upconversion from 4.0 to 0.84 µm was demonstrated at temperatures up to 200 K.

JWA27
Time-Resolved Third Harmonic Generation from Laser-Melted Semiconductors, *Will Grigsby, Michael C. Downer, Todd Ditmire; Texas Ctr. for High Intensity Laser Science, USA.* To develop shock melting diagnostics, we are studying laser melted semiconductors using nonlinear optical probes. We find a rapid response in THG from Si and GaAs, with both linearly and circularly polarized incident radiation.

JWA28
Mid-IR Entangled-Cavity Doubly Resonant OPO with Back-Conversion Minimization and Automated Tuning, *Antoine Berrou, Antoine Godard, Michel Lefebvre; ONERA, France.* Entangled cavity optical parametric oscillators are known as powerful devices to fulfill requirements for high resolution spectroscopy. We demonstrate here that output performances can be strongly improved by using a partial pump beam reflection.

JWA29
Two-Wave Mixing in a Broad-Area Semiconductor Amplifier, *Mingjun Chi[1], Søren Blaaberg Jensen[1], Jean-Pierre Huignard[2], Paul Michael Petersen[1]; [1]Risø Natl. Lab, Denmark, [2]Thales Res. and Technology, France.* The two-wave mixing in the broad-area semiconductor amplifier was investigated, both theoretically and experimentally. The experimental results obtained in an 810 nm, 200 µm wide GaAlAs amplifier show good agreement with the theory.

JWA30
Nonlinear Optical Properties of Stimulated Brillouin Scattering to Submerged Objects Detecting, *Lu Yuelan; Harbin Engineering Univ., China.* Nonlinear Optical Properties of Stimulated Brillouin Scattering to submerged objects detecting are analyzed. The delay time of echo signal to pump signal can give the location of submerged object.

JWA • Poster Session II—Continued

JWA31
Ti:Sapphire-Pumped Infrared Femtosecond Optical Parametric Oscillator Based on BiB_3O_6, *Masood Ghotbi, Adolfo Esteban-Martin, Majid Ebrahim-Zadeh; ICFO, Spain.* A femtosecond optical parametric oscillator based on the nonlinear material BiB_3O_6 pumped by a Kerr-lens-mode-locked Ti:sapphire laser is reported. Continuous tuning across the spectral range of 1.2-1.6 µm is demonstrated.

JWA32
Transient Fluorescence Excited by Oscillating Interference Pattern in Er-Doped Fiber, *Serguei Stepanov, Eliseo Hernández; CICESE, Mexico.* Experiments on transverse detection of transient fluorescence excited by oscillating interference pattern in Er-doped fiber in spectral range 1480-1600nm are reported. This technique is used for evaluation of local amplitude of the recorded population grating.

JWA33
Evaluation of a 486 nm Single Frequency Source Using an MgO:PPLN Waveguide Doubled Semiconductor Laser, *Ali Khademian, David C. Shiner; Univ. of North Texas, USA.* A 972 nm semiconductor butterfly laser is stabilized with a fiber grating to single frequency (600 mW) and doubled in a MgO:PPLN waveguide (90 mW) for characterization as a simple laser source for precision spectroscopy.

JWA34
Simultaneous Generation of Two Pairs of Entangled Photons in Periodically Poled Lithium Niobate Crystals, *Shiming Gao, Ying Gao; Ctr. for Optical and Electromagnetic Res., Zhejiang Univ., China.* We propose that two pairs of entangled photons will be generated simultaneously through spontaneous parametric down-conversion pumped by a monochromatic light only in periodically poled lithium niobate crystals without more complex crystal structures.

JWA35
Internal Second Harmonics of an Injection-Locked Laser Diode and Its Application to Laser Frequency Stabilization, *Che-Chung Chou, Chia-Hung Sun, I-Hao Chien, Tyson Lin; Dept. of Photonics, Feng Chia Univ., Taiwan.* Features of internal second harmonics (ISH) originated from a laser diode injection-locked by a distribution feedback laser were experimentally observed. As an application of this injection-locked ISH, its frequency was locked to rubidium D2 line.

JWA36
Optical Flip-Flop Operation Using an AR-coated Distributed Feedback Laser Diode, *Koen Huybrechts, Wouter D'Oosterlinck, Geert Morthier, Roel Baets; Dept. of Information Technology, Ghent Univ. - IMEC, Belgium.* A new concept for all-optical flip-flops is introduced using a single DFB laser diode. When injecting external light into the laser, two stable states can be obtained. We show numerically that optical pulses allow switching.

JWA37
Tunable Polarization and Power Anti-Stokes Line Generation in Birefringent Photonic Crystal Fiber, *Bing Zhou, Yongliang Jiang, Yuxin Leng, Ruxin Li, Zhizhan Xu; State Key Lab of High Field Laser Physics, Shanghai Inst. of Optics and Fine Mechanics, China.* By changing the polarization of less than 7fs input pulses,that was coupled into the single mode birefringent photonic crystal fiber, we achieved both polarization and power modulation of the anti-stokes line simultaneously.

JWA38
Green and Ultraviolet Pulse Generation Using a Low-Repetition-Rate Mode-Locked Yb-Doped Fiber Laser, *Janet W. Lou[1,2], Marc Currie[1]; [1]NRL, USA, [2]SFA, Inc., USA.* Using a compact 1-µm mode-locked fiber source, we demonstrate 2nd harmonic generation (540 nm) of 0.4 W and 4th harmonic generation (270 nm) of 0.1 W with subpicosecond pulse durations.

JWA39
Multimode Silicon Raman Amplifier, *Varun Raghunathan[1], Hagen Renner[2], Robert Rice[3], Michael Krauss[2], Ernst Brinkmeyer[2], Bahram Jalali[1]; [1]Univ. of California at Los Angeles, USA, [2]Technische Univ. Hamburg-Harburg, Germany, [3]Northrop Grumman Space Technology, USA.* We propose a novel multimode silicon Raman amplifier consisting of collinearly propagating pump and amplified Stokes beams with self-imaging of Stokes beam due to Talbot effect. Application of this device as image preamplifier is discussed.

JWA40
Experimental Demonstration of a L-Band to S-Band Wavelength Conversion, *David Méchin[1], Richard Provo[1], Douglas A. Reid[1], John D. Harvey[1], Colin J. McKinstrie[2]; [1]Dept. of Physics, Univ. of Auckland, New Zealand, [2]Lucent Technologies, USA.* 50nm optical wavelength conversion based on the potentially noise-free Bragg Scattering process in an optical fiber is demonstrated experimentally. 2.5-Gb/s output waveforms and eye diagrams for the initial and converted signal are presented.

JWA41
Fast Light Using Multiple Cascaded Quantum-Well Semiconductor Optical Amplifiers, *Piotr K. Kondratko, Hui Su, Shun-Lien Chuang; Univ. of Illinois at Urbana-Champaign, USA.* We demonstrate variable fast light at room temperature using multiple cascaded quantum-well semiconductor optical amplifiers. Controllable delay is achieved both electrically and optically, or by varying the number of amplifiers or amplifier-to-amplifier attenuation.

JWA42
Plasma Density inside Femtosecond Laser Filaments in Air, *Jens Bernhardt[1], Weiwei Liu[1], Francis Théberge[1], Marc Châteauneuf[2], Jacques Dubois[2], See Leang Chin[1]; [1]Ctr. d'Optique, Photonique et Laser (COPL), Univ. Laval, Canada, [2]Defense Res. and Development Canada, Valcartier, Canada.* We present a spectroscopic way to measure the plasma density of femtosecond laser filaments in air by using Stark broadening of the oxygen atomic fluorescence line. This method could also be applied to multiple filamentation.

JWA43
Enhanced Cascade χ^2 SHG+DFG Interactions Based on Chirp Period Quasi-Phase-Matched Waveguide, *Shih-Chiang Lin[1], Nai-Hsiang Sun[2]; [1]Dept. of Communication Engineering, I-Shou Univ., Taiwan, [2]Dept. of Electrical Engineering, I-Shou Univ., Taiwan.* A theoretic study about a 170% conversion efficiency enhancement of cascade χ^2 SHG+DFG interactions by using a chirp period quasi-phase-matched waveguide.

JWA44
Powerful High Repetition Rate Nanosecond Optical Parametric Generator in MgO:PPLN Tunable from 3.5 µm to 4.6 µm, *Martin Nittmann[1], Thorsten Bauer[1], Johannes L'Huillier[1], Gregor Anstett[2], Patric von Löwis of Menar[3], Juergen Bartschke[3], Michael Raab[4]; [1]Univ. of Kaiserslautern, Germany, [2]FGAN-FOM, Germany, [3]Xiton Photonics GmbH, Germany, [4]Diehl BGT Defence, Germany.* We report on a nanosecond MgO:PPLN OPG tunable in the MIR from 3.5 to 4.6 µm with an average output power of 600 mW at 3.8 µm and more than 100 mW at 4.6 µm.

JWA45
Generation of Simultaneous Red, Green and Blue Light in Periodically Poled Lithium Niobate with Broad Quasi-Phase Matching Band, *Hwan-Hong Lim, Oc-Yeub Jeon, Byoung-Joo Kim, Krishnamoorthy Pandiyan, Myoungsik Cha; Pusan Natl. Univ., Republic of Korea.* We demonstrated simultaneous red, green and blue light generation in periodically poled lithium niobate pumped with single picosecond laser. The primary color peaks were temperature-insensitive owing to broadband optical parametric generation of participating infrared frequencies.

JWA46
Tunable Repetition-Rate Ultrawideband Monocycle Pulse Generation by Using Optical Parametric Amplifier, *Bill P. P. Kuo, P. C. Chui, Kenneth K. Y. Wong; Univ. of Hong Kong, Hong Kong.* We demonstrate a novel technique for generating ultrawideband monocycle pulse with repetition-rate tuning capability based on fiber optical parametric amplifier. High quality monocycle pulse with repetition rate up to 4.2GHz is successfully generated.

JWA47
A Scheme to Realize Class B Slow Light Buffer in Semiconductor Optical Amplifiers, *Ming Xin, Minghua Chen, Hongwei Chen, Shizhong Xie; Tsinghua Univ., China.* We proposed a scheme to realize Class B slow-light buffer in semiconductor optical amplifiers. With three electrical control signals, good characteristics of Class B buffer can be approached in SOA.

JWA48
Investigation of Fast Light in Long Optical Fibers Based on Stimulated Brillouin Scattering, *Kai-Uwe Lauterbach[1], Thomas Schneider[1], Ronny Henker[1], Markus Junker[1], Max James Ammann[2], Andreas Thomas Schwarzbacher[2]; [1]Deutsche Telekom Fachhochschule Leipzig, Germany, [2]Dublin Inst. of Technology, Ireland.* A simple method to generate a negative time delay in SBS-based fast-light systems using Brillouin gain and loss is shown. We achieved a maximum negative time delay of 32.4 ns in one long fiber segment.

JWA49
Wideband SBS Slow Light in a Single Mode Fiber Using a Phase-Modulated Pump, *Alan Cheng, Mable P. Fok, Chester Shu; Dept. of Electronic Engineering and Ctr. for Advanced Res. in Photonics, Chinese Univ. of Hong Kong, Hong Kong.* Using a 10-Gb/s PRBS phase-modulated pump, we achieve SBS slow light of 10-GHz, 26.6-ps pulses by 10.6 ps. The correlation between the pulse width and the amount of phase modulation is reported.

JWA50
Reciprocating Optical Modulation on Erbium Doped $LiNbO_3$ for Harmonic Generation, *So Kogahara[1], Satoshi Shinada[2], Shinya Nakajima[2], Tetsuya Kawanishi[2], Hirochika Nakajima[1], Masayuki Izutsu[2]; [1]Waseda Univ., Japan, [2]Natl. Inst. of Information and Communications Technology, Japan.* We demonstrated reciprocating optical modulation with Er-doped $LiNbO_3$ for high-order sideband generation, where reciprocating modulation process can be selectively amplified. The sideband component of 50 GHz was successfully enhanced. The gain was 8 dB.

JWA51
Low Power Optical Bistability in 1550 nm VCSOAs, *Douglas R. Jorgesen, Christopher F. Marki, Haijiang Zhang, Pengyue Wen, Sadik Esener; Univ. of California at San Diego, USA.* Clockwise and counter-clockwise bistability is demonstrated in 1550 nm VCSOAs at input powers two orders of magnitude lower than previously reported. Butterfly bistability is also observed for the first time in VCSOAs.

JWA52
Highly Efficient Two-Photon Absorption Cross-Sections and Their Frequency Dependence in Small Organic Molecules, *Joshua C. May[1], Ivan Biaggio[1], Filip Bures[2], François Diederich[2]; [1]Lehigh Univ., USA, [2]ETH Zürich, Hönggerberg, Switzerland.* We report on the frequency dependence of the high two-photon absorption (TPA) cross-sections (σ_{TPA}) measured in small organic molecules. The best molecule has a σ_{TPA}=9±3x10^{-48} cm^{4}s/photon, up to 10 times that of AF-50.

JWA53
Nonlinear Switching in a Bragg Grating with Periodic $\chi^{(3)}$, *Jacques M. Laniel, Nicolas Bélanger, Alain Villeneuve; INRS - Énergie, Matériaux et Télécommunications, Canada.* We demonstrate numerically the nonlinear switching in a Bragg grating with a periodically modulated nonlinearity. Improved functionalities can be obtained through a π phase-shift between the linear and nonlinear gratings.

JWA54
Designing Dispersion- and Mode-Area-Decreasing Holey Fibers for Soliton Compression, *Ming-Leung V. Tse, Peter Horak, Francesco Poletti, David J. Richardson; Optoelectronics Res. Ctr., Univ. of Southampton, UK.* We investigate numerically the adiabatic compression of solitons at 1.55 µm in holey fibers which exhibit simultaneously decreasing dispersion and effective mode area. Compression factors >10 are achieved for optimum fiber parameters.

JWA55
"Photon Emission by Photon" Model for Spontaneous Frequency Conversion in Dispersive Dielectric Microcavities, *Alex Hayat, Meir Orenstein; Dept. of Electrical Engineering, Technion, Israel.* We develop a quantum-field model for photon conversion in dispersive cavity, incorporating dispersion into spatial eigenmodes. Direct calculations of spontaneous photon-to-photon decay rates that cannot be done conventionally are reported.

JWA56
CEP Stabilization and Measurement in the Highly Nonlinear Regime, *Samuel B P Radnor, Paul Kinsler, Geoff H C New; Imperial College, UK.* CEP stabilization of few-cycle pulses experiencing strong nonlinearities is investigated. Phase stable difference frequency generation is numerically demonstrated in the presence of SPM. Absolute CEP measurement via harmonic interference and sub-cycle CEP are also studied.

JWA57
Light Emitting Diodes with Extremely High Extraction-Efficiency for Electroluminescence Refrigeration, *Shuiqing Yu, Nicholas Rider, Ding Ding, Jiangbo Wang, Shane R. Johnson, Yonghang Zhang; Arizona State Univ., USA.* InGaAs light emitting diodes with extremely high light extraction efficiency are fabricated by monolithically integrating the light emitting region with a suspended GaAs hemispherical lens. This design is being developed for electroluminescence refrigeration applications.

JWA58
Stopping and Time Reversal of Light Pulses in Dynamic Coupled-Resonator Optical Waveguides via Bloch Oscillations, *Stefano Longhi; Politecnico di Milano, Italy.* The possibility to stop or time-reverse optical pulses in a dynamically-tuned CROW structure with broken translational-invariance is theoretically demonstrated. Pulse stopping and reversal exploits an optical analog of Bloch particle motion.

JWA59
Matrices and Necklaces of Solitons in Nonlocal Nonlinear Media, *Daniel Buccoliero, Anton S. Desyatnikov, Wieslaw Krolikowski, Yuri S. Kivshar; Australian Natl. Univ., Australia.* We introduce novel classes of higher-order spatial optical solitons, analogous to Laguerre-Gaussian (LG) and Hermite-Gaussian (HG) linear eigenmodes, and demonstrate numerically that modulational instability can lead to nontrivial transformations between solitons of different symmetries.

JWA60
New Collapsing Solutions of the Time-Dispersive Nonlinear Schrodinger Equation, *Nir Gavish[1], Gadi Fibich[1], Luat Vuong[2], Alexander L. Gaeta[2]; [1]Tel-Aviv Univ., Israel, [2]Cornell Univ., USA.* We show that super-Gaussian pulses with anomalous dispersion collapse with a three-dimensional shell-type profile. These pulses undergo pulse splitting in space and time, and subsequently break into collapsing 3-D wavepackets.

JWA61
Controlling the Excited State Charge Transfer in DMABN Using Shaped Femtosecond Pulses, *Christine L. Kalcic, D. Ahmasi Harris, Marcos Dantus; Michigan State Univ., USA.* The ability of multiphoton intrapulse interference (MII) to regulate the formation of the twisted charge transfer state in DMABN upon three-photon excitation is explored and monitored via fluorescence.

JWA • Poster Session II—Continued

JWA62
Optical Field Enhancement in Tweezer Trapping, *Mark J. Kendrick, Mark Blanding, David H. McIntyre, Oksana Ostroverkhova; Oregon State Univ., USA.* Near-resonant light can be used to enhance optical trapping of particles with wavelength dependent optical responses. We present results from our study of optically enhanced forces acting on dielectric and metal nanoparticles in tweezers trapping.

JWA63
Light Grating Storage, *Jose W. Tabosa[1], Arturo Lezama[2]; [1]Univ. Federal de Pernambuco, Brazil, [2]Inst. de Física, Facultad de Ingeniería, Uruguay.* Light grating storage and retrieval is reported in cold cesium atoms employing non-collinear beam configuration. The stored grating is retrieved in the forward and backward directions after a controllable storage time up to 4 µs.

JWA64
Electron Spin Beat Nonlinear Susceptibility in Semiconductor Quantum Wells, *Nai H. Kwong, Stefan Schumacher, Rolf Binder; Univ. of Arizona, USA.* We present a comprehensive theory of optically probing electron spin precession in low-density quantum well exciton populations. We trace the microscopic origins of features observed in differential transmission and Faraday rotation measurements to exciton interactions.

JWA65
Incoherent Solitons in Fast and Local Nonlinear Media, *Oren Cohen[1], Henry C. Kapteyn[1], Margaret M. Murnane[1], LipFab Chong[2]; [1]JILA, Univ. of Colorado at Boulder, USA, [2]Inst. of Material Res. and Engineering, Singapore.* We predict randomly fragmented coherent breathers and partially-coherent spatial solitons in instantaneous and local (e.g. Kerr) nonlinear media.

JWA66
Fast Photorefractive Self-Focusing in InP:Fe Semi-Conductor at Infrared Wavelengths, *Naïma Khelfaoui[1], Delphine Wolfersberger[1], Cristian Dan[1], Hervé Leblond[2], Nicolas Fressengeas[1]; [1]SUPELEC, LMOPS, France, [2]Lab POMA, France.* The fast self-trapping behaviour of an infrared beam in photorefractive InP:Fe is studied experimentally and theoretically versus the intensity. The laser is shown to be self-focused in less than a millisecond at telecommunications intensities.

JWA67
Parametric Frequency Conversion of Optical Simulton Pulses, *Matteo Conforti[1], Fabio Baronio[1], Stefan Wabnitz[2], Antonio Degasperis[3]; [1]Universita di Brescia, Italy, [2]Universite de Bourgogne, France, [3]Univ. di Roma I, Italy.* We present an analytical description of the parametric frequency conversion of short solitary wave optical pulses in quadratic nonlinear crystals controlled by means of a continuous wave background.

JWA68
Two-Dimensional Defect Modes in Optically Induced Photonic Lattices, *Jianke Yang[1,2], Jiandong Wang[1], Zhigang Chen[3,4]; [1]Dept. of Mathematics and Statistics, Univ. of Vermont, USA, [2]Tsinghua Univ., China, [3]Dept. of Physics and Astronomy, San Francisco State Univ., USA, [4]Nankai Univ., China.* Localized linear modes due to bandgap guidance in two-dimensional photonic lattices with a repulsive defect are investigated theoretically. It is shown that the negative defect can guide fundamental modes, dipole modes and vortex modes.

JWA69
Atomic Frequency References Based on Dark Resonances in Micrometric Thin Cells, *Lorenzo Lenci, Arturo Lezama, Horacio Failache; Inst. de Física, Uruguay.* Coherent population trapping resonances in pure alkaline micrometric thin cells are considered as an interesting alternative for the development of miniaturized atomic frequency references. Theoretical and experimental results are presented.

JWA70
Simulation of the Propagation of a UV Filament in the Air, *Olivier J. Chalus[1], Alexey Sukhinin[2], Alain Bourdier[3], Daniel Mirell[1], Alejandro Aceves[2], Jean-Claude Diels[1]; [1]Ctr. for High Technology Materials, Univ. of New Mexico, USA, [2]Dept. of Mathematics, Univ. of New Mexico, USA, [3]CEA/DAM, France.* We present two simplified models for the propagation of a long pulse UV filament in air, predicting the evolution of the beam diameter with distance, and the beam profile.

JWA71
Analytical Dynamics of Optical Similaritons, *Stefan Wabnitz; Univ. de Bourgogne, France.* We analytically describe the attraction of parabolic pulses towards a self-similar state in weakly dispersive nonlinear fibers with linear gain.

JWA72
Linewidth Broadening in Single-Mode Sub-kHz Fiber Ring Laser with Unpumped Er-Doped Sagnac Loop, *Jae-Ho Han, Yi Yang, Jin U. Kang; Johns Hopkins Univ., USA.* We investigated a power dependent laser linewidth broadening effect in a sub-kHz single-longitudinal mode Er-doped fiber ring laser using an intra-cavity unpumped Erbium doped fiber loop.

JWA73
Laser Based Continuous-Wave Excitonic Lyman Spectroscopy of Spin-Forbidden Excitons in Cu_2O, *Kosuke Yoshioka, Takuro Ideguchi, Makoto Kuwata-Gonokami; Dept. of Applied Physics, Univ. of Tokyo, and Solution-Oriented Res. for Science and Technology (SORST), JST, Japan.* We developed a sensitive method to detect 1s paraexcitons in Cu_2O by using cw laser-based excitonic Lyman spectroscopy with a tunable CO_2 laser. The paraexcitons were found to have a lifetime of microseconds.

JWA74
Modeling Sub-Nanosecond Pulsed Laser Dynamics Using the Exponential Time Difference Method, *Xin Liu, Ivan T. Lima, Orven F. Swenson; North Dakota State Univ., USA.* The authors show that the exponential time difference method is orders of magnitude faster than the standard finite difference time domain method to model the dynamics of longitudinally pumped sub-nanosecond pulsed dye lasers.

JWA75
A High-Power, Single-Frequency Ti:Sapphire Laser for Water-Vapor DIAL, *Max Schiller, Gerd Wagner, Volker Wulfmeyer; Inst. of Physics and Meteorology, Germany.* A high-power Ti:Sapphire ring laser with injection seeding at 820 nm is presented. Pumping a Brewster-cut crystal with 23-W pump power at 532 nm resulted in single-frequency operation with average power of 6 W.

JWA76
The Quantum Noise Limits to Simultaneous Intensity and Frequency Stabilization of Solid-State Lasers, *Elanor Huntington[1], Charles C. Harb[1], M. Heurs[2], Timothy C. Ralph[3]; [1]Univ. College, Univ. of New South Wales, Australia, [2]Max-Planck-Inst. fur Gravitationsphysik (Albert-Einstein-Inst.) and Inst. fur Gravitationsphysik, Univ. Hannover, Germany, [3]Univ. of Queensland, Australia.* We incorporate the coupling between pump intensity and laser frequency noise into a quantum mechanical model for a solid-state laser. A frequency feedback loop can reduce laser intensity noise to below the quantum noise limit.

JWA77
Theoretical Study of Mutual Injection Locking of Two Individual Lasers, *Qiang Wang, Li Yan; Univ. of Maryland, Baltimore County, USA.* Mutual Injection-locking of two individual lasers through an external combining section was theoretically studied. We found that larger lockable range can be obtained with lower Q-factors for individual lasers.

JWA78
Intracavity Beam Addition for Energy Scaling with a Six-Mirror Cavity, *Ming Lei, Mali Gong, Qiang Liu, Yunxiang Wang; Tsinghua Univ., China.* We present a novel and compact six-mirror cavity configuration to combine four beams intracavity for energy scaling. A single beam output exceeding 453mJ with 165µs duration is obtained, with the combination efficiency of 90.7%.

JWA79
Co^{2+}:GSGG as a Saturable Absorber for Resonantly Laser Pumped 1.6 µm Er:YAG Laser, *Kelly L. Nash[1], Raylon M. Yow[1], John B. Gruber[1], Anmol S. Nijjar[2], Bahram Zandi[3], Milan R. Kokta[4], Dhiraj K. Sardar[1]; [1]Univ. of Texas at San Antonio, USA, [2]nLight Photonics, USA, [3]ARL/Adelphi Lab Ctr., USA, [4]Saint Gobain Crystals, USA.* Co:GSGG has excellent spectroscopic properties as a saturable absorber for resonantly laser-pumped 1.6 µm ErYAG at 1620 nm (RT). Absorption, emission cross sections, lifetimes, modeling results are reported for 3-level gain/4-level absorber.

JWA80
Minimizing Non-Radiative Losses in Erbium Laser Systems, *Richard S. Quimby[1], Nicholas J. Condon[2], Shawn P. O'Connor[2], Subrat Biswal[2], Steven R. Bowman[2]; [1]Worcester Polytechnic Inst., USA, [2]U.S. NRL, USA.* Very low rates of excited-state absorption and upconversion were measured from the $4I_{13/2}$ level in Er^{3+} doped KPb_2Cl_5 crystals. Comparisons with other hosts suggest significant potential improvements in laser performance.

JWA81
Low Quantum-Defect Laser Oscillation by High Intensity Pumping at Room Temperature, *Shinichi Matsubara[1], Kyousuke Uno[1], Yoshiaki Nakajima[1], Sakae Kawato[1], Takao Kobayashi[1], Akira Shirakawa[2]; [1]Fiber Amenity Engineering, Graduate School of Engineering, Japan, [2]Inst. for Laser Science, Univ. of Electro-Communications, Japan.* Ytterbium laser oscillations at 980.6 nm and 983.0 nm are observed by high intensity 978.1 nm pumping of around 1 MW/cm^2 at room temperature. Corresponding quantum defects are 0.26 % and 0.50 %, respectively.

JWA82
Compact, 65 W, 10-30 kHz, TEM_{00}-Mode, Q-Switched, Side-Diode-Pumped Yb:YAG Laser, *Mikhail A. Yakshin, Viktor A. Fromzel, Coorg R. Prasad; Science and Engineering Services, Inc., USA.* We have developed a compact, side-diode-pumped, TEM_{00}- mode Yb:YAG laser capable of delivering 65 W of Q-switched output power at 10-30 kHz. Induced lensing in the composite crystal is compensated by the choice of resonator.

JWA83
Optically Pumped Potassium Vapor Laser, *Boris Zhdanov, Carl F. Maes, Thomas Ehrenreich, Andrew Havko, Nicholaus R. Koval, Edward T. Meeker, Ben Worker, Brian Flusche, Randall J. Knize; US Air Force Acad., USA.* We present an optically pumped continuous wave Potassium vapor laser operating in a single longitudinal and a single transverse mode at 770 nm. The measured value of the slope efficiency was 20%.

JWA84
Rapidly Tunable, Narrow Linewidth, 1W, 1 kHz Ce:LiCAF Laser Pumped by the Fourth Harmonic of a Diode-Pumped Nd:YLF Laser for Ozone DIAL Measurements, *Viktor A. Fromzel[1], Coorg R. Prasad[1], Karina B. Petrosyan[1], Yishinn Liaw[1], Shi Wenbui[1], Mikhail A. Yakshin[1], Russell DeYoung[2]; [1]Science and Engineering Services, Inc., USA, [2]NASA Langley Res. Ctr., USA.* A compact, rapidly tunable (282-315 nm), narrow line-width (0.2 nm) Ce:LiCAF laser pumped by the fourth harmonic of a diode-pumped Nd:YLF laser is capable of delivering 1mJ/pulse at a pulse repetition frequency of 1 kHz.

JWA85
Development of 50J Class Repetitive Laser Based on Nd-Doped Silica Glass, *Takahiro Sato[1], Yasushi Fujimoto[1], Hajime Okada[1], Hidetsugu Yoshida[1], Masahiro Nakatsuka[1], Tetuji Ueda[2], Akira Fujinoki[2]; [1]Inst. of Laser Engineering, Osaka Univ., Japan, [2]Res. and Application Lab, Shin-Etsu Quartz Products Co., Ltd., Japan.* We demonstrate a high energy laser oscillation (29 J) in Nd doped silica glass (Nd_2O_3: 1.34wt%, f30 mm x 300 mm) with high thermal shock parameter (12W/cm).

JWA86
2.5 MHz Line-Width High-Energy, 2µm Coherent Wind Lidar Transmitter, *Mulugeta Petros[1], Jirong Yu[2], Bo Trieu[2], Yingxin Bai[3], Paul Petzar[3], Upendra N. Singh[2], Karl Reithmaier[3]; [1]Science and Technology Corp., USA, [2]NASA Langley Res. Ctr., USA, [3]SAIC, USA.* The design of a diode pumped, injection seeded MOPA with a transform limited line width and diffraction limited beam quality is presented. This lidar transmitter produces over 300mJ energy at 10 Hz repetition rate.

JWA87
Thermo-Optical and -Mechanical Parameters of $Nd:GdVO_4$ and $Nd:YVO_4$, *Yoichi Sato, Takunori Taira; Laser Res. Ctr. for Molecular Science, Inst. for Molecular Science, Japan.* We measured thermal conductivity, thermal expansion coefficient, and thermal refractive index coefficient of $Nd:GdVO_4$ and $Nd:YVO_4$. Superiority comparisons of laser media under high power laser operations were also discussed from the viewpoints of thermal characteristics.

JWA88
100 mJ Q-Switched, High Efficiency, High Brightness Nd:YAG Oscillator: Wavefront Analysis, *Demetrios Poulios[1], Paul Stysley[1], Richard Kay[1], Barry Coyle[2]; [1]American Univ., USA, [2]NASA Goddard Space Flight Ctr., USA.* A diode-pumped, 100 mJ/pulse, Nd:YAG oscillator employing a dual pump head design aligned orthogonally in an unstable resonator configuration producing aperture-free TEM_{00} beams is presented.

JWA89
Gain Grating in a $Nd:YVO_4$ Microlaser, *Aurélie Moreau[1], Qiong He[1], Isabelle Zaquine[1], Alain Maruani[1], Robert Frey[2,3]; [1]GET/Telecom Paris, CNRS/LTCI, France, [2]GET/Telecom Paris, France, [3]CNRS/ LCFIO et Univ. Paris Sud, France.* Intracavity gain gratings are theoretically demonstrated to exhibit diffraction efficiencies much larger than unity at pumping powers below lasing threshold. Experiments performed using a $Nd-YVO_4$ microlaser demonstrate huge enhancements of diffraction efficiency and angular selectivity.

JWA90
Nd-Vanadate Thin-Disk Lasers under Diode Pumping into the $^4F_{5/2}$ and $^4F_{3/2}$ Levels, *Nicolaie Pavel[1,2], Kai Lünstedt[2], Klaus Petermann[2], Günter Huber[2]; [1]Natl. Inst. for Lasers, Plasma and Radiation Physics, Romania, [2]Inst. of Laser Physics, Univ. of Hamburg, Germany.* We report on continuous-wave 532-nm $Nd:YVO_4$ thin-disk lasers with powers of 6.4 W and 4.4 W with pumping at 808 nm and 880 nm, respectively. Deep-blue emission in the watt-regime was achieved from Nd-doped vanadates.

JWA91
Gain Dynamics and Frequency Pulling in Mode-Locked Lasers, *Curtis R. Menyuk[1], Jared K. Wahlstrand[2], John T. Willits[2], Ryan P. Smith[2], Thomas R. Schibli[2], Steven T. Cundiff[2]; [1]Univ. of Maryland, Baltimore County, USA, [2]JILA, USA.* Observations of the response of a mode-locked Ti:sapphire laser to an abrupt change in pump power show that gain dynamics should be included in a complete theory of its response to perturbations.

JWA92
Development of a Sodium Laser Guide Star for Astronomical Adaptive Optics Systems, *Thomas P. Rutten, Peter J. Veitch, Jesper Munch; Univ. of Adelaide, Australia.* We describe a new laser design for a 50 W laser guide star source, suitable for large telescopes employing MCAO systems. Design verification experiments will be presented showing bandwidth control and progress towards power scaling.

JWA93
Temporal Dynamics of Optical-to-Terahertz Conversion in Electro-Optic Crystal, *Michael I. Bakunov[1,2], Sergey B. Bodrov[1,2], Alex V. Maslov[3]; [1]Dept. of Radiophysics, Univ. of Nizhny Novgorod, Russian Federation, [2]Inst. of Applied Physics, Russian Acad. of Sciences, Russian Federation, [3]Ctr. for Nanotechnology, NASA Ames Res. Ctr., USA.* We developed a theory of the optical-to-terahertz conversion of a femtosecond laser pulse with finite width in a slab of nonlinear crystal. This theory explains previous experiments and reveals new schemes for terahertz generation.

JWA • Poster Session II—Continued

JWA94
THz-Wave Fiber Generator for 1-15THz Band, *Yoshie Ohta, Tomoyu Yamashita, Yuji Matsuura, Hiromasa Ito; Tohoku Univ., Japan.* We demonstrated ultra wideband terahertz (THz) transmission through inner silver-coated hollow fiber using widely tunable THz-wave generator. The inner diameter of 304mm long silver-coated hollow fiber was 1mm. THz-wave transmission in 1-15THz was almost uniform.

JWA95
Efficient Terahertz Generation from Nanolayers to Microlayers of InN, *Xiaodong Mu[1], Yujie J. Ding[1], Kejia Wang[2], Debdeep Jena[2], Yuliya B. Zotova[3]; [1]Lehigh Univ., USA, [2]Univ. of Notre Dame, USA, [3]ArkLight, USA.* Efficient terahertz pulses have been generated based on resonant optical rectification using sub-picosecond laser pulses at 790 nm from nanolayers to microlayers of InN with the layer thicknesses in the range of 25-1270 nm.

JWA96
Optimal Cd Molar Fraction in $Zn_{1-x}Cd_xTe$ Terahertz Emitters, *Minwoo Yi[1], Kyeongjin Jang[1], Jaewook Ahn[1], Inbee Maeng[2], Joo-Hiuk Son[2]; [1]KAIST, Republic of Korea, [2]Univ. of Seoul, Republic of Korea.* The influence of Cd molar fraction on the terahertz generation from $Zn_{1-x}Cd_xTe$ has been studied. The optimal Cd compositions have been obtained as x=0.10 at λ=820nm and x=0.65 at λ=850nm.

JWA97
Design and Simulation of a Terahertz Negative Permeability Metamaterial with Connected Metallic Discs, *Zhongyan Sheng; Wheaton College, USA.* A negative permeability metamaterial is designed with 2 connected metallic discs inside a unit cell. It can be fabricated through thin-film processes. A negative permeability at ~1 THz is shown in the simulation result.

JWA98
Narrow-Line, High-Repetition-Rate THz-Wave Generation from Collinearly Phase-Matched Difference-Frequency Mixing in Periodically Poled Lithium Niobate, *Tsong-Dong Wang, Han-Lung Chang, Shou-Tai Lin, Yen-Yin Lin, An-Chung Chiang, Yen-Chieh Huang, Huei-Lung Lu, Fan-Yi Lin; Natl. Tsinghua Univ., Taiwan.* We report difference frequency generation of THz waves from collinearly phase-matched, periodically poled lithium niobate crystals. Transform-limited THz-wave pulses with a wavelength range between 190~210 µm were generated at a kHz repetition rate.

JWA99
Optical-Pump-THz-Probe Studies of Carrier Dynamics in Hg-Based High-Temperature Superconducting Thin Films, *Xia Li[1], Xuemei Zheng[2], Paul Cunningham[2], L.Michael Hayden[2], M. Valerianova[3,4], Štefan Chromik[3], V. Štrbík[3], P. Odier[4], D. De Barros[4], Roman Sobolewski[1]; [1]Univ. of Rochester, USA, [2]Univ. of Maryland, Baltimore County, USA, [3]Slovak Acad. of Science, Slovakia, [4]Lab de Cristallographie-CNRS, France.* We report time-resolved carrier dynamics in Hg-Ba-Ca-Cu-O high-temperature superconductors using optical excitation and THz probe femtosecond spectroscopy. Picosecond quasiparticle dynamics observed in our experiments suggests that Hg-based materials are attractive candidates for high-speed photodetectors.

JWA100
Radially Polarized Terahertz Beam Emission by Difference Frequency Generation in GaAs, *Yuri H. Avetisyan, Karo Khachatryan; Yerevan State Univ., Armenia.* It is shown that using quasi-phase-matched GaAs crystal in the scheme of Cherenkov-type difference frequency generation allows controlling the direction of terahertz emission and by that way achieving significant increase in the output power.

JWA101
Three-Dimensional Characterisation of the Non-Gaussian Focused Beam from a Terahertz Quantum Cascade Laser, *Paul Dean, Muhamed U. Shaukat, Edmund H. Linfield, Alexander G. Davies; Inst. of Microwaves and Photonics, Univ. of Leeds, UK.* A fast, accurate technique for the three-dimensional characterisation of terahertz beams is presented. Using gold-on-glass resolution targets the beam profile, depth of focus and astigmatism of a quantum cascade laser-based imaging system have been measured.

JWA102
LT-GaAsSb Photomixer for THz Generation with a Two-Color Nd:LSB Microchiplaser, *Ulrike Willer[1,2], Rafal Wilk[3], Wolfgang Schippers[1], Stefan Böttger[1], Dirk Nodop[1], Tobias Schossig[1], Wolfgang Schade[1], Martin Mikulics[3], Martin Koch[3], Martin Walther[4], Henning Niemann[5], Bernd Güttler[5]; [1]Inst. für Physik und Physikalische Technologien, Germany, [2]Technische Univ. Clausthal Laser Anwendungs Centrum, Germany, [3]Technische Univ. Braunschweig, Germany, [4]Fraunhofer Inst. für Angewandte Festkörperphysik, Germany, [5]Physikalisch-Technische Bundesanstalt, Germany.* Photomixing is performed with a novel two-color Nd:LSB laser that simultaneously emits at 1061.3 nm and 1063.9 nm in LT-GaAsSb antennas.

JWA103
Revisiting Chirped Probe Pulse Electro-Optic Terahertz Detection, *Balakishore Yellampalle, Kiyong Kim, George Rodriguez, James H. Glownia, Antoinette J. Taylor; Los Alamos Natl. Lab, USA.* The correct equation for terahertz pulse detection schemes employing a chirped optical probe pulse is derived and experimentally verified. The derived equation differs from the conventional expression through a phase factor.

JWA104
Scaling of Line Excitation THz Array Source, *Joong H. Kim[1], Doug Denison[2], Michael Knotts[2], Stephen E. Ralph[1]; [1]Georgia Tech, USA, [2]Georgia Tech Res. Ctr., USA.* A new THz array method is proposed based on the photoconductive line excitation. We present experimental demonstration of the scalability of the radiated THz power based on the number of antenna elements illuminated.

JWA105
Low Loss, Low Dispersion T-Ray Transmission in Microwires, *Shabraam Afshar, Shaghik Atakaramians, Bernd M. Fischera, Heike Ebendorff-Heidepriemb, Tanya Monro, Derek Abbott; Univ. of Adelaide, Australia.* We present low loss, < 0.01 1/cm, and dispersion, < 10 ps/(km.nm), properties of microwires for terahertz transmission. These wires have diameters smaller than the operating wavelength, resulting in the propagation of enhanced evanescent fields.

JWA106
Observation of Long-Lived Screening in Low-Temperature-Grown GaAs Photoconductive Switches, *Gabriel Loata, Torsten Löffler, Mark D. Thomson, Alvydas Lisauskas, Hartmut G. Roskos; Johann Wolfgang Goethe-Univ., Frankfurt, Germany.* A subgroup of photoexcited carriers in biased few-mm-sized LT-GaAs switches is shown to recombine on a time scale of nanoseconds. This can induce field screening amounting to tens of percent of the applied field.

JWA107
Spectral Loss Characteristics of Subwavelength THz Fibers, *Hung-Wen Chen[1], Ja-Yu Lu[1], Li-Jin Chen[1], Yu-Tai Li[2], Ci-Ling Pan[2], Chi-Kuang Sun[3]; [1]Graduate Inst. of Electro-Optical Engineering, Natl. Taiwan Univ., Taiwan, [2]Dept. of Photonics and Inst. of Electro-Optical Engineering, Natl. Chiao Tung Univ., Taiwan, [3]Dept. of Electrical Engineering and Graduate Inst. of Electro-Optical Engineering, Natl. Taiwan Univ., Taiwan.* From the spectral loss characteristics of subwavelength-diameter THz fibers, our study supports the recent theory proposed by M. Sumetsky that diameter-variation-induced-radiation is a dominant loss mechanism for subwavelength fibers which limits the lowest guidable frequency.

JWA108
Single-shot THz Pulse Characterization with Dual Echelons, *Ki-Yong Kim, Balakishore Yellampalle, Antoinette J. Taylor, George Rodriguez, James H. Glownia; Los Alamos Natl. Lab, USA.* Dual echelon optics is implemented to enable single-shot terahertz pulse characterization. This reported embodiment produces sequentially delayed multi-beamlets allowing two-dimensional electro-optic imaging with a time window of >10 ps and <25 fs temporal step size.

JWA109
Limits of Strong Mode Confinement in Microdisk Terahertz Quantum-Cascade Lasers, *Gernot Fasching[1], Alexander Benz[1], Aaron Maxwell Andrews[1], Karl Unterrainer[1], Reinhard Zobl[2], Tomas Roch[2], Werner Schrenk[2], Gottfried Strasser[2], Vincas Tamosiunas[3,4]; [1]Photonics Inst. and Ctr. for Micro- and Nanostructures, Vienna Univ., Austria, [2]Solid-State Electronics Inst. and Ctr. for Micro- and Nanostructures, Vienna Univ., Austria, [3]Semiconductor Physics Inst., Lithuania, [4]Vilnius Gediminas Technical Univ., Lithuania.* We present microdisk terahertz quantum-cascade lasers with dimensions comparable to the spatial mode distribution inside the microcavity and present 3-D Finite-Difference Time-Domaine simulations which are in good agreement with our experimental findings.

JWA110
Highly Accurate Material Parameter Extraction from THz Time Domain Spectroscopy Data, *Ioachim Pupeza, Rafal Wilk, Frank Rutz, Martin Koch; Inst. fuer Hochfrequenztechnik, Germany.* We present a novel optical parameter extraction algorithm for THz time domain spectroscopy signal processing. To demonstrate the potential of our algorithm we investigate thin low index samples and samples with sharp absorption features.

JWA111
Pressure-Broadening Coefficient of Water Vapor Measured with a High Resolution, Coherent Tunable THz-Wave Spectrometer, *GUO Ruixiang[1], Hiroaki Minamide[1], Seigo Ohno[1], Hiromasa Ito[1,2]; [1]RIKEN Sendai, Japan, [2]Res. Inst. of Electrical Communication (RIEC), Tohoku Univ., Japan.* We developed a table-top, coherent tunable THz-wave spectrometer based on an injection-seeded THz-wave parametric generator, which was employed to study the far-infrared rotational spectrum of water vapor, N_2 collision-broadening coefficient of water vapor is measured.

JWA112
Time Domain Terahertz Non-Destructive Evaluation of Water Intrusion in Composites and Corrosion under Insulation, *Jeffrey S. White, David A. Zimdars; Picometrix, LLC., USA.* Time domain terahertz (a.k.a. T-Ray or THz) imaging is used to detect water intrusion and delamination in composite structures used in radomes. Corrosion is detected on pipes beneath opaque insulation.

JWA113
Combining of Modes of Broad Area Laser Diode into Single Mode Spot, *Nikolai M. Stelmakh; Univ. of Texas at Arlington, USA.* Multi-mode laser diode emission is reshaped into single-mode circular spot with the help of grating spectrometer and amplitude/phase spatial modulator. Paper investigates optical design and shows results on lateral modes combining.

JWA114
Growth Studies of Quantum Cascade Lasers with Current-Blocking Structures, *Liwei Cheng[1], Xiaoming Ji[1], Fow-Sen Choa[1], Zhijun Fan[2], Claire F. Gmachl[2], Jenyu Fan[3], Xiaojun Wang[3], Rich Leavitt[4], John Bruno[4], John Bradshaw[4]; [1]Univ. of Maryland, Baltimore County, USA, [2]Princeton Univ., USA, [3]AdTech Optics, USA, [4]Maxion Technologies Inc., USA.* Buried-heterosturcture regrowths have very significant impact on quantum-cascade-laser (QCL) threshold, output power, and reliability. We report detailed BH regrowth studies on QCLs along different crystal orientations. Low-leakage blocking layers were successfully developed for high-performance QCLs.

JWA115
Detection of Gold in the Facet of a Failed Semiconductor Laser Diode, *John A. Chaney[1], Terence S. Yeoh[1], Neil A. Ives[1], Martin Leung[1], Zack Feinberg[1], James G. Ho[2]; [1]Aerospace Corp., USA, [2]Northrop Grumman Corp., Space Technology, USA.* We analyzed the damaged region of a failed semiconductor laser diode using FIB nanotomography and 3-DTOF-SIMS. Gold, a deep level trap, was found between the antireflective coating and the semiconductor facet.

JWA116
Closed-Loop Design and Demonstration of an 1178nm Multi-Watt VECSEL for a Sodium Guidestar Source, *Jerome V. Moloney[1], Joerg Hader[1], Armis R. Zakharian[1], Li Fan[2], Chris Hessenius[2], Mahmoud Fallahi[2], Stephan W. Koch[3], Wolfgang Stolz[3]; [1]Nonlinear Control Strategies, USA, [2]Univ. of Arizona, USA, [3]Univ. of Marburg, Germany.* The first closed-loop demonstration of a multi-watt vertical-external-cavity-semiconductor laser designed for yellow emission at 589 nm via intra-cavity second harmonic generation will be discussed.

JWA117
Structural Dependence of Optical Gain and Carrier Losses in InGaN Quantum Well Lasers, *Jorg Hader[1], Jerome V. Moloney[1], Stephan W. Koch[2]; [1]College of Optical Sciences, Univ. of Arizona, USA, [2]Dept. of Physics, Philipps Univ., Germany.* Using fully microscopic models it is shown that piezoelectric fields in InGaN/GaN quantum well structures lead to complex structural dependencies of the optical gain and carrier losses resulting in non-trivial minima for the threshold current.

JWA118
Diode Laser MOPA System for the Generation of 920 nm Femtosecond Pulses with 65 W Peak Power, *Thorsten Ulm, Harry Fuchs, Richard Wallenstein; Technical Univ. of Kaiserslautern, Germany.* A master oscillator power amplifier (MOPA) generates chirped 3ps pulses at 920nm with a repetition rate of 4GHz. Without requiring CPA the pulses are compressed to 600fs with a peak power of up to 65W.

JWA119
Detailed Comparison of Injection-Seeded and Self-Seeded Performance of a Gain-Switched Laser Diode, *Khu T. Vu, Andrew Malinowski, Michael A.F. Roelens, Morten Ibsen, David J. Richardson; Southampton Univ., UK.* We investigate the performance of a gain-switched picosecond laser diode operating at 1.06 µm when either injection- or self- seeded. We conclude that the much simpler self-seeding arrangement leads to no degradation of performance.

JWA120
Spectral and Spatial Mode Control in Self-Seeded Semiconductor Disk Laser Using Optical Feedback from Fiber Bragg Grating, *Dionisio A. Pereira, Jussi Rautiainen, Antti Härkönen, Oleg G. Okhotnikov; Optoelectronics Res. Ctr., Tampere Univ. of Technology, Finland.* Semiconductor disk laser with mode control using the feedback from a fiber Bragg grating. With seed signal, the wavelength is locked to the Bragg wavelength and beam quality factor M^2 decreases from 1.6 to below 1.05.

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JWA121
Metal-Encased Semiconductor Nanowires as Waveguides for Ultrasmall Lasers, *Alexey V. Maslov[1], Cun-Zheng Ning[1,2]; [1]NASA Ames Res. Ctr., USA, [2]Ctr. for Nanophotonics and Dept. of Electrical Engineering, Arizona State Univ., USA.* We show that a semiconductor nanowire encased by a metal offers the smallest laser waveguide, despite the large Joule loss. The TM_{01} mode immediately above its cut-off is most advantageous for making sub-wavelength lasers.

JWA122
Analysis of Ring-Metal-Aperture VCSELs for Single-Lateral-Mode Operation, *Gennady A. Smolyakov, Marek Osinski; Univ. of New Mexico, USA.* The role of metal apertures in lateral-mode confinement in VCSELs is clarified by a detailed effective-frequency-method analysis of an oxide-confined VCSEL structure. The conditions for suppression of higher-order lateral modes using metal apertures are established.

JWA123
Single-Contact Multi-Spatial-Mode Mode-Locking Fabry-Perot Semiconductor Laser Diodes, *Weiguo Yang; Bell Labs, USA.* A time-domain analysis of single-contact multi-spatial-mode mode-locking semiconductor lasers is presented with simplified treatments of material gain that captures the picoseconds laser dynamics. The equivalent saturable absorption is shown resulting from active multi-spatial-mode coupling.

JWA124
Emission Characteristics of InGaN/GaN Vertical-Cavity Surface-Emitting Lasers, *Jung-Tang Chu, Tien-chang Lu, Hao-Chung Kuo, Shing-Chung Wang; Dept. of Photonics and Inst. of Electro-Optical Engineering, Natl. Chiao Tung Univ., Taiwan.* Lasing characteristics of optically pumped GaN-based vertical-cavity surface-emitting lasers were investigated. The laser emission showed single and multiple spots emission patterns with spectral and spatial variation under different pumping conditions.

JWA125
Transient Thermal Properties of High-Power Diode Laser Bars, *Mathias Ziegler[1], Fritz Weik[1], Jens W. Tomm[1], Thomas Elsaesser[1], Włodzimierz Nakwaski[2], Robert P. Sarzała[2]; [1]Max-Born-Inst. fuer Nichtlineare Optik und Kurzzeitspektroskopie, Germany, [2]Lab of Computer Physics, Inst. of Physics, Technical Univ. of Łódź, Poland.* The transient thermal properties of high-power diode laser bars with active and passive cooling are analyzed experimentally with thermal imaging and through their thermal wavelength tuning behavior and modeled with the finite element method.

JWA126
Carrier Capture and Recombination in 2.4µm GaSb-Based Type-I Quantum Well High Power Diode Lasers, *Leon Shterengas, Dmitry Donetsky, Michael Kisin, Gregory Belenky; State Univ. of New York at Stony Brook, USA.* Carrier lifetime of 2ns was measured in GaSb-based type-I quantum-well high power laser heterostructures at threshold carrier concentration. Increased carrier capture rate was observed in laser heterostructures with reduced waveguide thickness.

JWA127
Axis and Ring Mode Switching in Multi-Electrode GaAs Quasi-Stadium Laser Diodes, *Takehiro Fukushima[1], Takahisa Haramaya[2]; [1]Dept. of Communication Engineering, Okayama Prefectural Univ., Japan, [2]Dept. of Nonlinear Science, ATR Wave Engineering Labs, Japan.* We fabricated and tested multi-electrode quasi-stadium laser diodes having GaAs/AlGaAs GRIN-SCH-SQW structures. Axis and ring mode switching was achieved under CW operation for output powers up to 15 mW by selecting the electrode used.

JWA128
Photon Coupling Mechanism in 1.3-µm Quantum-Dot Lasers, *Chaoyuan Jin, Huiyun Liu, Kristian M. Groom, Mark Hopkinson, Tom J. Badcock, Richard J. Royce, David J. Mowbray; Univ. of Sheffield, UK.* A room-temperature negative characteristic temperature is demonstrated for a p-type modulation doped 1.3-µm quantum dot laser. A photon coupling mechanism is purposed to explain the temperature-dependent Jth for both p-doped and un-doped QD lasers.

JWA129
Narrow Spectral Linewidth of Al-Free Active Region DFB Laser Diodes Operating at 852nm, *Vincent Ligeret[1], Shailendra Bansropun[2], Michel Lecomte[1], Michel Calligaro[1], Olivier Parillaud[1], Michel Krakowski[1]; [1]Alcatel-Thales III-V Lab, France, [2]Thales Res. and Technology, France.* We have developed single frequency and single spatial mode laser structures with stable narrow linewidth (<1MHz) and high optical power (40mW), using an aluminium free active region for Cs pumping at 852nm.

JWA130
Nanosecond to Microsecond Dynamics of 1040nm Semiconductor Disk Lasers, *Sangam Chatterjee[1], Wolfgang Diehl[1,2], Swantje Horst[1], Kristian Hantke[1], Wolfgang Stolz[1], Angela Thränhardt[1], Stephan W. Koch[1], Peter Brick[2], Michael Furitsch[2], Stefan Illek[2], Ines Pietzonka[2], Johann Luft[2], Wolfgang W. Rühle[1]; [1]Faculty of Physics and Material Sciences Ctr., Philipps-Univ. Marburg, Germany, [2]Osram Opto Semiconductors GmbH, Germany.* We report on the lasing dynamics of semiconductor disk lasers following well and barrier pumping with both 500ns and 5µs pulses. The dynamics are explained using rate-equations.

JWA131
Development of a Clock Laser of Ca^+ Ion for the Optical Frequency Standards, *Ying Li, Shigeo Nagano, Hiroyuki Ito, Kensuke Matsubara, Masatoshi Kajita, Mizuhiko Hosokawa; Natl. Inst. of Information and Communications Technology, Japan.* A narrow linewidth diode laser is being developed. The laser linewidth is reduced to 66 Hz. The long term frequency drift is reduced 0.5 Hz per second, measured by Gigajet 20W optical frequency comb.

JWA132
Highly Efficient and Compact Green VECSEL by Novel Optical End-Pumping Scheme, *Soohaeng Cho, Gi Bum Kim, Junho Lee, Jun-Youn Kim, Jaeryung Yoo, Ki-Sung Kim, Sang-Moon Lee, Taek Kim, Yongjo Park; Samsung Inst. of Technology, Republic of Korea.* We report on the development and demonstration of the watt-level operation of a compact green vertical external cavity surface emitting laser optically end-pumped by a single chip laser diode without any focusing lenses.

JWA133
Pulsed High Duty-Cycle Operation of λ ~ 8µm Quantum Cascade Lasers, *Tiffany Ko, Zhijun Liu, Claire Gmachl; Princeton Univ., USA.* We report on high duty-cycle pulsed and burst-mode operation of λ~8µm quantum cascade lasers under ambient conditions for photo-acoustic spectroscopy. An optimum in average optical power and efficiency is seen around 800kHz and 50% duty-cycle.

JWA134
Temperature-Stable Operating Current of Surface Plasmon VCSELs with Metal Nanohole Arrays, *Tatsuya Tanigawa, Toshikazu Onishi, Jun Shimizu, Tetsuzo Ueda, Daisuke Ueda; Semiconductor Device Res. Ctr., Semiconductor Co., Matsushita Electric Industrial Co., Ltd., Japan.* Temperature-stable operation of 850nm VCSELs with sub-micron metal hole arrays are presented. The resultant variation of the operating current from 10°C to 90°C is as small as 0.65mA at the output power of 1mW.

JWA135
Nonlinear Carrier Waves and Gain Oscillations in Infrared and Terahertz Quantum Cascade Lasers, *Carsten Weber[1], Fouad Banit[1], Andreas Wacker[2], Andreas Knorr[1]; [1]Inst. für Theoretische Physik, Technische Univ. Berlin, Germany, [2]Fysiska Inst., Lunds Univ., Sweden.* The pump pulse induced charge dynamics in quantum cascade laser structures is analyzed for typical examples of infrared and terahertz lasers in pump-probe spectra and electronic wave packet propagation using a density-matrix approach.

JWA136
Above Room-Temperature Operation of InAs/AlSb Quantum Cascade Lasers, *Yoshitaka Moriyasu[1,2], Keita Ohtani[1,3], Hidekazu Ohnishi[1], Hideo Ohno[1]; [1]Res. Inst. of Electrical Communication, Tohoku Univ., Japan, [2]AsahiKASEI EMD Corp., Japan, [3]Japan Science and Technology Agency, Japan.* Above room temperature operation of InAs/AlSb quantum cascade lasers emitting at around 6 µm are reported. The threshold current in pulsed mode is 5.3 kA/cm^2 at 300 K and maximum operating temperature is 373 K.

JWA137
Single-Mode Surface-Emitting Terahertz Quantum Cascade Lasers Operating up to ~ 150 K, *Sushil Kumar[1], Benjamin S. Williams[1], Qi Qin[1], Alan W. M. Lee[1], Qing Hu[1], John L. Reno[2]; [1]MIT, USA, [2]Sandia Natl. Labs, USA.* We report robust single-mode operation of surface-emitting distributed-feedback terahertz quantum-cascade lasers in metal-metal waveguides. Grating devices span a range of 0.35THz around 2.9THz, with 149K maximum pulsed operating temperature, and >6mW continuous-wave power at 5K.

JWA138
Difference Frequency Generation from Integrated Nonlinearities in Two-Wavelength Quantum Cascade Lasers, *Daniel Wasserman[1], Scott S. Howard[1], Claire Gmachl[1], Alexey Belyanin[2], Deborah Sivco[3]; [1]Princeton Univ., USA, [2]Texas A&M Univ., USA, [3]Bell Labs, Lucent Technologies, USA.* Evidence for Difference Frequency Generation in Quantum Cascade Lasers with integrated nonlinearities is presented. Light at the difference frequency (λ=13.3µm) is detected from a two-wavelength (λ= 5.3µm and 8.8µm) laser processed with a split-ridge configuration.

JWA139
Very Low-Threshold-Current-Density 1.34-µm GaInNAs/GaAs Quantum Well Lasers with a Quaternary-Barrier Structure, *Chaoyuan Jin, Huiyun Liu, Shiyong Zhang, Robert Airey, Mark Hopkinson; Univ. of Sheffield, UK.* A quaternary-barrier structure is employed to reduce the strain at the interface between the quantum well and barriers for GaInNAs/GaAs materials. A very-low room-temperature threshold current density of 178A/cm^2 is demonstrated with 1.34µm GaInNAs/GaAs lasers.

JWA140
High Performance 800-1000nm Single Mode Lasers Using an Asymmetric Waveguide, *Bocang Qiu, Stewart D. McDougall, John H. Marsh; Intense Ltd, UK.* We report on the design and fabrication of high performance 800-1000 nm high power lasers using an asymmetric waveguide structure. The structure offers lower beam divergence, improved power kink and reduced resistively.

ROOM 318-320 — CLEO

1:30 p.m. – 3:15 p.m.
CWA • Mode-Locked Semiconductor Lasers I
Cun-Zheng Ning; NASA Ames Res. Ctr., USA, Presider

CWA1 • 1:30 p.m. Tutorial
Monolithic Mode-Locked Quantum Dot Lasers, *Ian H. White, Mark G. Thompson, Richard V. Penty; Univ. of Cambridge, UK.* Quantum-dot active material systems are proving to be an excellent choice for mode-locked laser applications. High-power, high repetition-rate picosecond and sub-picosecond pulse generation is now readily achievable with promising results for ultra-low jitter performance.

ROOM 321-323 — QELS

1:30 p.m. – 3:15 p.m.
QWA • Symposium on Degenerate Fermi Gases
Phillip Gould; Univ. of Connecticut, USA, Presider

QWA1 • 1:30 p.m. Invited
Superfluid Ultracold Fermi Gases, *Wolfgang Ketterle; MIT, USA.* We have explored several aspects of superfluidity of ultracold fermionic atoms, including superfluidity of rotating clouds, of clouds with an imbalance in the population of the two components, and of atoms in an optical lattice.

ROOM 324-326 — JOINT

1:30 p.m. – 3:15 p.m.
JWC • Large High-Intensity Lasers
Craig Siders; LLNL, USA, Presider

JWC1 • 1:30 p.m. Invited
MegaJoule NIF, *Edward I. Moses; LLNL, USA.* Commissioning of the first 48 of 192 laser beams at the National Ignition Facility has resulted in the first-ever operational MegaJoule laser. A review of the laser performance and experimental campaign plans will be presented.

ROOM 314 — CLEO

1:30 p.m. – 3:15 p.m.
CWB • Ultrafast Optical Parametric Amplifiers
Jean-Jacques Zondy; Observatoire de Paris, France, Presider

CWB1 • 1:30 p.m.
Variational and WKB Descriptions of Laterally Localized Eigenmodes in Non-Collinear Optical Parametric Amplifiers, *Bedros Afeyan[1], Mathieu Charbonneau-Lefort[2], Martin M. Fejer[2]; [1]Polymath Res. Inc., USA, [2]Ginzton Lab, Stanford Univ., USA.* With a finite transverse width pump, non-collinear interactions result in metastable or stable laterally localized bound states. The physical processes involved are group velocity walk-off, diffraction, chirped QPM gratings and different pump shapes.

ROOM 315 — CLEO

1:30 p.m. – 3:15 p.m.
CWC • Plasmonics and Metamaterials
Hatice Altug; Stanford Univ., USA, Presider

CWC1 • 1:30 p.m. Invited
Metamaterial Nanophotonics, *Nader Engheta; Univ. of Pennsylvania, USA.* Fundamental properties of the concept of optical "lumped" nanocircuit elements using optical metamaterial/plasmonic structures are discussed, and several cases of more complex nanophotonic circuits and systems using these lumped elements are studied using full-wave simulations.

ROOM 316 — CLEO

1:30 p.m. – 3:15 p.m.
CWD • Beam Combination and Regenerative Amplifiers
Hagop Injeyan; Northrop Grumman Corp, USA, Presider

CWD1 • 1:30 p.m.
First Experimental Demonstration of Fiber Amplifier Array Phase Locking without an External Reference Beam, *Thomas M. Shay[1], Vincent Benham[2], Jeffrey T. Baker[1], Anthony D. Sanchez[1], Sgt. Daniel Pilkington[1], Lt. Douglas Nelson[1], Lt. Chunte A. Lu[1]; [1]AFRL, USA, [2]IIT Industries, USA, [3]Boeing LTS Inc., USA.* A novel, highly accurate, all electronic architecture for phase locking arrays of optical fibers without a reference beam is demonstrated. The measured phase error is $\lambda/20$ for both passive fibers and for fiber amplifier arrays.

ROOM 317 — QELS

1:30 p.m. – 3:15 p.m.
QWB • Pulse Shaping
Alexei Sokolov; Texas A&M Univ., USA, Presider

QWB1 • 1:30 p.m. Tutorial
Temporally Focused Pulses and Coherent Control for Nonlinear Microscopy, *Yaron Silberberg; Weizmann Inst. of Science, Israel.* Nonlinear microscopy with femtosecond lasers is enhanced by pulse shaping using concepts of coherent control. We review some of these ideas, including the replacement of spatial scanning by temporal focusing.

ROOM 336 — QELS

1:30 p.m. – 3:15 p.m.
QWC • Dynamic Phenomena and Chaos
Alexander E. Kaplan; Johns Hopkins Univ., USA, Presider

QWC1 • 1:30 p.m. Invited
Synchronization and Chaos, *Rajarshi Roy; Univ. of Maryland, USA.* Identical synchronization of the chaotic fluctuations of nonlinear optical systems leads to schemes for communication. Extensions to new phenomena including generalized synchronization and mutually coupled nonlinear system dynamics will be described.

QELS

ROOM 337

1:30 p.m. – 3:15 p.m.
QWD • Photonic Crystals
Won Park; Univ. of Colorado, USA, Presider

QWD1 • 1:30 p.m. Invited
Enhancement of Light Emission in Silicon Photonic Crystal Slabs, *Lucio Claudio Andreani[1], Michele Belotti[1], Matteo Galli[1], Dario Gerace[1], Marco Liscidini[1], Maddalena Patrini[1], Alberto Politi[1], Alessia Irrera[2], Maria Miritello[2], Francesco Priolo[2], Yong Chen[3,4]; [1]Univ. of Pavia, Italy, [2]MATIS CNR-INFM and Univ. of Catania, Italy, [3]LPN-CNRS, France, [4]Ecole Normale Supérieure, France.* Silicon-on-insulator photonic crystal waveguides with an active layer containing Er^{3+} ions displays strong enhancement of 1.54 µm emission at room temperature. A theory of photonic dispersion and spontaneous emission is discussed.

ROOM 338

1:30 p.m. – 3:15 p.m.
QWE • Dynamics of Magnetic and Strongly Correlated Materials
Presider to Be Announced

QWE1 • 1:30 p.m.
Multi-THz Conductivity and Lattice Dynamics during a Femtosecond Insulator-Metal Transition in VO_2, *Carl Kübler[1], Henri Ehrke[1], Rupert Huber[1], Alfred Leitenstorfer[1], Rene Lopez[2,3], Andrej Halabica[2], Richard F. Haglund[2]; [1]Univ. of Konstanz, Germany, [2]Vanderbilt Univ., USA, [3]Univ. of North Carolina, USA.* Ultrabroadband THz spectroscopy directly monitors the femtosecond onset of conductivity during the photoinduced insulator-to-metal phase transition in vanadium dioxide. We observe coherent structural distortions via anharmonic phonon coupling and fluence-dependent self-trapping of excitons.

CLEO

ROOM 339

1:30 p.m. – 3:15 p.m.
CWE • Cavity-Based Optical Sensing
James Gord; US Air Force, USA, Presider

CWE1 • 1:30 p.m.
Stimulated Raman Gain Spectroscopy with Continuous-Wave Cavity Ringdown Detection, *Florian V. Englich, Yabai He, Brian J. Orr; Macquarie Univ., Australia.* A novel form of continuous-wave laser spectroscopy entails cavity-ringdown detection of stimulated Raman gain, with co-propagating pump and Stokes beams to minimise Doppler broadening. Molecular rovibrational Raman spectra of methane gas are recorded.

ROOM 340

1:30 p.m. – 3:15 p.m.
CWF • Photonic Bandgap Fibers
Jean Toulouse; Lehigh Univ., USA, Presider

CWF1 • 1:30 p.m.
Large Pitch Kagome-Structured Hollow-Core PCF, *Francois Couny, Fetah Benabid, Philip S. Light; Univ. of Bath, UK.* A new type of hollow-core-PCF based on large pitch (~12µm) kagome-lattice cladding is reported. The fiber exhibits broad visible and IR transmission bands with low loss, low chromatic dispersion and high core-light confinement.

ROOM 341

1:30 p.m. – 3:15 p.m.
CWG • Joint Symposium on THz QCLs I
Rui Q. Yang; JPL, USA, Presider

CWG1 • 1:30 p.m. Invited
Terahertz Quantum Cascade Lasers, *Benjamin Williams[1], Sushil Kumar[1], Qi Qin[1], Alan Wei Min Lee[1], Qing Hu[1], John L. Reno[2], Z. R. Wasilewski[3], H. C. Liu[3]; [1]MIT, USA, [2]Sandia Natl. Labs, Ctr. for Integrated Nanotechnologies, USA, [3]Natl. Res. Council, Canada.* We provide an overview of terahertz quantum cascade lasers based on resonant-phonon depopulation and metal-metal waveguides, including two-phonon resonant-phonon depopulation schemes, long wavelength operation, and real time terahertz imaging.

JOINT

PhAST ROOM 1 (EXHIBIT FLOOR)

12:30 p.m. – 2:30 p.m.
JWB • Regional Overviews of the Status of Laser Applications
Bo Gu; GSI Lumonics Inc., USA, Presider

JWB1 • 12:30 p.m. Invited
A View from a Leading Chinese Laser System Manufacturer, *Rangda Wu; Wuhan Chutian Laser (Group) Corp., China.* General description of the industrial laser processing market in China, prospect and developing trend of the china industrial laser processing market, introduction of Chutian Laser group and its products.

JWB2 • 1:00 p.m. Invited
Overview and Recent Topics in Industrial Laser Applications in Japan, *Kunihiko Washio; Paradigm Laser Res. Ltd., Japan.* This paper presents overview on trends of domestic production of laser materials processing equipment and introduces some recently achieved technological advances in industrial laser applications in Japan with a slighly emphasis on micro-processing applications.

JWB3 • 1:30 p.m. Invited
Industrial Applications of Laser Direct-Write Processing: A Review, *Andrew Holmes[1], Koji Sugioka[2], Bo Gu[3]; [1]Imperial College, UK, [2]RIKEN, Japan, [3]GSI Group, USA.* The use of laser direct-write (LDW) in advanced manufacturing processes is on the increase. This paper will review current industrial applications of LDW worldwide, and discuss the future prospects for LDW technologies.

PhAST

PhAST ROOM 2 (EXHIBIT FLOOR)

12:30 p.m. – 2:15 p.m.
PWA • Stand-off and Point Detection
Ruth Woodward; HT Consulting (England), UK, Presider

PWA1 • 12:30 p.m. Invited
Development of a LIDAR Controlled Air-space Scanner for Bio-Aerosol Detection, *Jack Bufton; Science & Engineering Services, Inc., USA.* A standoff bio-aerosol-sensor is in prototype development and test for short-range building-interior applications. It measures elastic backscatter at ultraviolet and near-infrared laser wavelengths to detect respirable aerosol clouds and measures ultraviolet fluorescence for aerosol discrimination.

PWA2 • 1:00 p.m. Invited
Hyperspectral Imaging Detection of CBE Threat Materials, *Patrick Treado; ChemImage Corp., USA.* Chemical imaging, a multi-mode hyperspectral imaging approach combining Raman, fluorescence and NIR spectroscopies, is being evaluated for point and standoff detection of chemical, biological and explosive (CBE) threats. Results from sponsored studies will be presented.

PWA3 • 1:30 p.m.
A Fiber-Coupled Eye Safe Spectrometer for the Stand-off Detection of Explosives, *Christoph Bauer[1], Jörg Burgmeier[2], Gerhard Holl[3], Wolfgang Schade[2]; [1]LAC TU Clausthal, Germany, [2]IPPT TU Clausthal, Germany, [3]WIWEB, Germany.* A compact laser spectrometer for the detection of explosives from a safe spot is presented. This laser setup also opens the possibility for the trace detection of explosives.

PhAST ROOM 3 (EXHIBIT FLOOR)

12:30 p.m. – 2:30 p.m.
PWB • Solid-State Lighting I
Ian Ferguson; Georgia Tech, USA, Presider

PWB1 • 12:30 p.m. Invited
LEDs, *Volker Haerle; Osram Opto Semiconductors GmbH, Germany.* Abstract not available.

PWB2 • 1:00 p.m. Invited
Development of GaN Substrates for GaN Based Laser Diodes, *Keith Evans; Kyma, USA.* Abstract not available.

PWB3 • 1:30 p.m. Invited
Can We Fabricate Efficient White-Light InGaN/GaN Quantum-Well Light-Emitting Diodes without Using Phosphors? *C. C. Yang, Chi-Feng Huang, Dong-Ming Yeh, Cheng-Yen Chen, Chih-Feng Lu, Tsung-Yi Tang, Jeng-Ji Huang, Yen-Cheng Lu, Yung-Shen Chen, Wen-Yu Shiao, Kun-Ching Shen, Yun-Li Li, J. J. Huang; Natl. Taiwan Univ., Taiwan.* We report some recent developments in all-semiconductor multi-color and white-light light-emitting diodes. The potential of the development of phosphor-free all-InGaN/GaN quantum-well white-light light-emitting diode will be evaluated.

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

CWA • Mode-Locked Semiconductor Lasers I—Continued

QWA • Symposium on Degenerate Fermi Gases—Continued

QWA2 • 2:00 p.m. Invited
Collective Excitation Modes in the BEC-BCS Crossover, *Rudolf Grimm[1,2]; [1]Inst. of Experimental Physics and Ctr. for Quantum Physics, Univ. of Innsbruck, Austria, [2]Inst. for Quantum Optics and Quantum Information, Austrian Acad. of Sciences, Austria.* We report on recent developments in our experiments on ultracold Fermi gases. This includes measurements of collective modes in the BEC-BCS crossover in ^{6}Li, and first experiments on a Fermi-Fermi mixture of ^{6}Li and ^{40}K.

JWC • Large High-Intensity Lasers—Continued

JWC2 • 2:00 p.m.
A 355 TW Femtosecond Ti:sapphire Laser Facility with Three Stage Amplifiers, *Zhi Y. Wei[1], Zhaohua Wang[1], Jie Zhang[1], Peng Wang[1], Weijun Ling[2], Jiangfeng Zhu[1], Jinrong Tian[1]; [1]Beijing Natl. Lab for Condensed Matter Physics, Inst. of Physics, Chinese Acad. of Sciences, China, [2]Xian Inst. of Optics and Precision Mechanics, Chinese Acad. of Sciences, China.* A compact femtosecond Ti:sapphire laser facility with three stage amplifiers was developed. By eliminating ASE and shaping spectrum, we generated 11J laser pluse at duration of 31fs, which corresponds to peak power of about 355TW.

JWC3 • 2:15 p.m.
Generation and Characterization of Femtosecond Petawatt Ti:Sapphire Laser, *Xiaoyan Liang[1], Yuxin Leng[1], Cheng Wang[1], Lihuang Lin[1], Chuang Li[1], Baozhen Zhao[1], Yunhua Jiang[1], Xiaoming Lu[1], Mingyun Hu[1], Haihe Lu[1], Dingjun Yin[1], Yongliang Jiang[1], Chunmei Zhang[1], Xingqiang Lu[2], Hui Wei[2], Jianqiang Zhu[2], Ruxin Li[1], Zhizhan Xu[1]; [1]State Key Lab of High Field Laser Physics, Shanghai Inst. of Optics and Fine Mechanics, China, [2]Joint Lab of High Power Laser Physics, Shanghai Inst. of Optics and Fine Mechanics, China.* A Ti:sapphire laser with output of 0.89PW/29.0fs based on the scheme of chirped pulse amplification has been developed. The high gain amplification was achieved in large aperture amplifiers by effective suppression of parasitic lasing.

CWB • Ultrafast Optical Parametric Amplifiers—Continued

CWB2 • 1:45 p.m.
A Simple Scalable Solid-State 589nm Laser Guide Star Source Based on Optical Parametric Amplifiers, *Barry Luther-Davies[1], Vesselin Kolev[1], Malte Duering[2]; [1]Australian Natl. Univ., Australia, [2]Fraunhofer Inst. fur Laser Technik, Germany.* We describe a method for producing high power coherent light at 589nm based on a scalable, passively mode-locked, Nd:YVO_4 laser and a seeded optical parametric amplifier. Average powers of 4.6W at 589nm have been produced.

CWB4 • 2:15 p.m.
Highly Efficient, Widely Tunable, Picosecond Optical Parametric Generation and Amplification in BiB_3O_6, *Zhipei Sun, Masood Ghotbi, Stefano Minardi, Majid Ebrahim-Zadeh; ICFO- Inst. of Photonic Sciences, Spain.* Broadly tunable picosecond pulses from the ultraviolet to infrared (370-2497nm) have been obtained by optical parametric generation and amplification in BiB_3O_6. Pulse energies of 48.6µJ at conversion efficiencies as high as 30% have been generated.

CWC • Plasmonics and Metamaterials—Continued

CWC2 • 2:00 p.m.
Compact Couplers between Dielectric and Metal-Dielectric-Metal Plasmonic Waveguides, *Georgios Veronis, Wonseok Shin, Shanhui Fan; Stanford Univ., USA.* We theoretically investigate the properties of compact couplers between high-index-contrast dielectric waveguides and metal-dielectric-metal subwavelength plasmonic waveguides. We show that they can be designed to have high transmission efficiency over a broad range of wavelengths.

CWC3 • 2:15 p.m.
Enhanced Optical Trapping through Localized Surface Plasmon Resonance of Au Nanoparticle Array, *Xiaoyu Miao, Lih Y. Lin; Univ. of Washington, USA.* Localized surface plasmon resonance is excited on Au nanoparticle array. The radiation field of the resonant oscillating dipoles is utilized to realize the trapping of polystyrene spheres with lower optical intensity than conventional optical tweezers.

CWD • Beam Combination and Regenerative Amplifiers—Continued

CWD2 • 1:45 p.m.
Theoretical Model for Self-Synchronous Locking of Optical Coherence by Single-Detector Electronic-Frequency Tagging, *Thomas M. Shay; AFRL, USA.* The first theory for a novel coherent beam combination architectures that completely eliminate the separate reference beam are presented. These architectures greatly simplify the phase locking system without compromising phase locking performance.

CWD3 • 2:00 p.m.
Laser Beam Combing for High-Power, Broadband Sources Using Two-Step Refractive Grating, *Mona Mayeh, Faramarz Farahi; Ctr. of Optoelectronics and Optical Communications, Univ. of North Carolina at Charlotte, USA.* An efficient method for addition of mutually incoherent laser sources in a two-step diffractive grating. Multiple laser beams in different range of wavelength could be combined with the efficiency greater than 70%.

CWD4 • 2:15 p.m.
Upscaling Coherent Addition of Laser Distributions, *Liran Shimshi, Vardit Eckhouse, Amiel A. Ishaaya, Nir Davidson, Asher A. Friesem; Weizmann Inst. of Science, Israel.* A unique approach for coherently adding a multiplicity of separate and independent laser distributions with intra-cavity interferometric combiners is developed. The approach which can be scalable is demonstrated with coherent addition of 25 laser distributions.

QWB • Pulse Shaping—Continued

QWC • Dynamic Phenomena and Chaos—Continued

QWC2 • 2:00 p.m.
Nonlinear Dynamics in Zinc-Porphyrin Microcavities, *Pavlos G. Savvidis[1,2], L. G. Connolly[3], Maurice S. Skolnick[3], David G. Lidzey[3], Jeremy J. Baumberg[4]; [1]Univ. Of Crete, Greece, [2]FORTH, Greece, [3]Dept. of Physics and Astronomy, Univ. of Sheffield, UK, [4]School of Physics and Astronomy, Univ. of Southampton, UK.* We report on ultrafast dynamics of polaritons in organic microcavities. Polariton dynamics is found to be governed by fast vibronic relaxation and intersystem crossing. Lower polariton branch blue-shift indicates the presence of nonlinear interactions.

QWC3 • 2:15 p.m.
Wave Kinetic Instabilities in Nonlinear, Statistical Optics, *Dmitry V. Dylov, Jason W. Fleischer; Dept. of Electrical Engineering, Princeton Univ., USA.* We experimentally demonstrate wave-kinetic instabilities in the nonlinear coupling of two partially-coherent beams. We report pure momentum-space energy transfer, without intensity modulations, below the (joint) MI threshold and full {**x,k**} phase space dynamics above it.

ROOM 337	ROOM 338	ROOM 339	ROOM 340	ROOM 341	*PhAST* ROOM 1 (EXHIBIT FLOOR)	*PhAST* ROOM 2 (EXHIBIT FLOOR)	*PhAST* ROOM 3 (EXHIBIT FLOOR)
QELS		CLEO			JOINT	PhAST	

ROOM 337 — QWD • Photonic Crystals—Continued

QWD2 • 2:00 p.m.
Mode Control by Lattice Deforming in InGaAsP/InP Photonic Crystal Laser, *Wanbua Zheng[1], Mingxin Xing[1], Gang Ren[1], Xiaoyu Du[1], Ke Wang[1], Lianghui Chen[1], Kengo Nozaki[2], Toshihiko Baba[2]; [1]Nano-Optoelectronic Lab, Inst. of Semiconductors, China, [2]Yokohama Natl. Univ., Japan.* The dipole mode in point defect photonic crystal shows the characteristics of nondegenerate by deforming lattice structure. Lasing action with single mode, y-mode, is obtained in the elongated point defect cavity in our experiment.

QWD3 • 2:15 p.m.
Modal Analysis of Coherent Linear Photonic Crystal VCSEL Arrays, *Ann C. Lehman, P. Scott Carney, Kent D. Choquette; Univ. of Illinois at Urbana-Champaign, USA.* Formalism from Young's two-pinhole experiment is used to study the lasing modes of coupled 2x1 photonic crystal vertical cavity laser arrays. The eigenmodes of the system as well as the coherence change with injection current.

ROOM 338 — QWE • Dynamics of Magnetic and Strongly Correlated Materials—Continued

QWE2 • 1:45 p.m.
Acoustic Phonon Dynamics in Exciton Self-Trapping, *F. X. Morrissey, Susan L. Dexheimer; Washington State Univ., USA.* We probe the vibrational dynamics associated with the formation of self-trapped excitons at low temperature. The early-time oscillatory response provides evidence for acoustic phonon dynamics as an integral part of the localization process.

QWE3 • 2:00 p.m. Invited
Femtosecond Opto-Magnetism, *Alexey Kimel, A. Kirilyuk, Th. Rasing; Radboud Univ. Nijmegen, Netherlands.* We demonstrate that circularly polarized laser pulses may selectively excite different modes of magnetic resonance, realize quantum control of magnons, trigger magnetic phase transitions and switch spins in a controllable way on a subpicosecond timescale.

ROOM 339 — CWE • Cavity-Based Optical Sensing—Continued

CWE2 • 1:45 p.m.
Sensitive Trace Gas Detection in a Jet Expansion Using cw OPO-based Cavity Ringdown Spectroscopy, *Anthony Ngai[1], Stefan Persijn[1], Frans Harren[1], Harald Verbraak[2], Harold Linnartz[2]; [1]Radboud Univ., Netherlands, [2]Sackler Lab for Astrophysics, Leiden Observatory, Netherlands.* We present a novel approach to trace gas detection of more complex molecules, based upon a combination of continuous cavity ringdown spectroscopy using a cw infrared OPO system and supersonic planar jet.

CWE3 • 2:00 p.m. Invited
Recent Advances in Cavity Ring-Down Spectroscopy, *Kevin Lehmann; Univ. of Virginia, USA.* Abstract not available.

ROOM 340 — CWF • Photonic Bandgap Fibers—Continued

CWF2 • 1:45 p.m.
Control of Dispersion in Hollow Core Photonic Crystal Fibers, *Peter J. Roberts; Dept. of Communications, Optics and Materials, Danish Technical Univ., Denmark.* The dispersion of hollow core photonic crystal fibers can be tailored by modifying a single ring of holes in the cladding. The dispersion can be lowered and flattened, or alternatively increased, in a controlled manner.

CWF3 • 2:00 p.m.
Bandwidth Enhancement by Differential Mode Attenuation in Multimode Photonic Crystal Bragg Fibers, *Maksim Skorobogatiy, Ning Guo; Ecole Polytechnique de Montreal, Canada.* In multimode bandgap guiding fibers higher order modes have high radiation losses. Thus, after a short propagation distance effective intermodal dispersion is reduced and bandwidth is dramatically enhanced compared to that of step index fibers.

CWF4 • 2:15 p.m.
Transmission of Different Angular-Momentum Modes in Cylindrically Symmetric Photonic Bandgap Fibers in the Near-Infrared, *Ayman F. Abouraddy, Qichao Hu, Ofer Shapira, Jeff Viens, John D. Joannopoulos, Yoel Fink; MIT, USA.* We report the first controllable transmission of TE_{01} and HE_{11} modes (angular momenta 0 and 1, respectively) in cylindrically symmetric photonic bandgap fibers in the near-infrared and confirm that TE_{01} has lower losses than HE_{11}.

ROOM 341 — CWG • Joint Symposium on THz QCLs I—Continued

CWG2 • 2:00 p.m.
Limiting Factors for High Temperature Operation of THz Quantum Cascade Lasers, *Christian Jirauschek, Paolo Lugli; TU München, Germany.* We theoretically investigate the temperature dependence of the carrier transport in GaAs-based THz quantum cascade lasers and identify the factors restricting high-temperature operation. In this context, we compare a single- to a double-resonant-phonon depopulation design.

CWG3 • 2:15 p.m.
Thermally Activated Absorption in TerahertzSemiconductor Heterostructure Lasers, *J. Kröll[1], J. Darmo[1], K. Unterrainer[1], S. S. Dhillon[2,3], C. Sirtori[2,3], X. Marcadet[3], M. Calligaro[3]; [1]Vienna Univ. of Technology, Austria, [2]Univ. Paris 7, France, [3]Thales Res. and Technology, France.* We present thermally activated absorption in a terahertz semiconductor heterostructure laser based on the bound-to-continuum design. By sensing broadband terahertz pulses transmitted through such laser structure the losses and the real device temperature are sensed.

PhAST ROOM 1 — JWB • Regional Overviews of the Status of Laser Applications—Continued

JWB4 • 2:00 p.m. Invited
3-D Photofabrication by Femtosecond Laser Pulses and Its Applications in Photonics and Biomedicine, *Aleksandr Ovsianikov, Boris N. Chichkov; Laser Zentrum Hannover e.V., Germany.* Recent advances in two-photon activated laser processing, properties of applied materials, and applications of this technology are discussed. This presentation is supported by numerous examples of fabricated structures.

PhAST ROOM 2 — PWA • Stand-off and Point Detection—Continued

PWA4 • 1:45 p.m.
Novel Distributed Fiber Temperature and Strain Sensor Using Coherent Radio-Frequency Detection of Spontaneous Brillouin Scattering, *Jihong Geng, Sean Staines, Mike Blake, Shibin Jiang; NP Photonics, USA.* A novel technique that enables coherent detection of spontaneous Brillouin scattering in radio-frequency region has been demonstrated for distributed measurements of temperature and strain in long fiber by using a CW single-frequency Brillouin fiber laser.

PWA5 • 2:00 p.m.
Long Fiber-Optic Perimeter Sensor: Signature Analysis, *Christi Madsen, Taehan Bae, Robert Atkins; Texas A&M Univ., USA.* A phase-sensitive OTDR provides a cost-effective and highly sensitive solution for monitoring of long perimeters. Signature analysis of the f-OTDR signal allows the identification of intruders on foot as well as vehicles.

PhAST ROOM 3 — PWB • Solid-State Lighting I—Continued

PWB4 • 2:00 p.m. Invited
Development of High Efficiency Green and Deep Green Light Emitters in Piezoelectric Group-III Nitrides, *Christian Wetzel; Rensselaer Polytechnic Inst., USA.* Green and deep-green light emitting diodes are still the weakest link in energy efficient Solid-State Lighting. We analyze the limiting factors of the external quantum efficiency and summarize our approach of dislocation and polarization control.

ROOM 318-320 — CLEO

CWA • Mode-Locked Semiconductor Lasers I—Continued

CWA2 • 2:30 p.m.
High Repetition Rate Monolithic Passively Mode-Locked Semiconductor Quantum-Dot Laser: Investigation of the Locking Regimes and the RF Linewidth, *Fabien Kéfélian[1,2,3], Shane O'Donoghue[1,2,3], Maria Teresa Todaro[1,3], John G. McInerney[1,3], Guillaume Huyet[1,2]; [1]Tyndall Natl. Inst., Ireland, [2]Cork Inst. of Technology, Ireland, [3]Dept. of Physics, Univ. College Cork, Ireland.* We investigate global mode-locked regimes of a passively mode-locked quantum-dot GaAs/InAs laser at 1300 nm. Detailed RF linewidth studies demonstrate the possibility of obtaining 1.9 ps pulses with a pulse-to-pulse timing jitter of 6.5 fs/cycle.

CWA3 • 2:45 p.m.
High-Power and Low-Noise 10-GHz All-Active Monolithic Mode-Locked Lasers with Surface Etched Bragg Grating, *David Larsson, Kresten Yvind, Jørn M. Hvam; COM•DTU, Inst. of Communications, Optics and Materials, Nano•DTU, Technical Univ. of Denmark, Denmark.* We have fabricated 4.4 mm long monolithic InAlGaAsP/InP mode-locked lasers with integrated deeply surface etched DBR-mirrors. The lasers produce 3.7 ps transform-limited Gaussian pulses with 10 mW average power and 250 fs timing jitter.

ROOM 321-323 — QELS

QWA • Symposium on Degenerate Fermi Gases—Continued

QWA3 • 2:30 p.m. Invited
Phases of a Paired Fermi Gas with Unequal Spin Populations, *Guthrie B. Partridge, Wenhui Li, Yean-an Liao, Randall G. Hulet; Rice Univ., USA.* We have produced a two-component gas of ultracold, fermionic ^{6}Li atoms with unequal spin populations. The real-space densities reveal two distinct superfluid phases, both with an evenly paired central core.

ROOM 324-326 — JOINT

JWC • Large High-Intensity Lasers—Continued

JWC4 • 2:30 p.m.
ILE 25PW Single Laser Beamline: The French Step for the European Extreme Light Infrastructure (ELI), *Jean-Paul Chambaret[1], Federico Canova[1], Rodrigo Lopez-Martens[1], Gilles Chériaux[1], Gérard Mourou[1], Arnaud Cotel[2], Catherine Le Blanc[2], Frederic Druon[3], Patrick Georges[3], Nicolas Forget[4], Fabien Plé[5], Moana Pittman[5]; [1]Lab d'Optique Appliquee - LOA, France, [2]LULI, France, [3]LCFIO, France, [4]FASTLITE, France, [5]LIXAM, France.* We present the design of a single ultra intense laser beamline delivering 25PW pulses at one shot per minute as a first step of an Ultra Intense High Field Science European project (Extreme Light Infrastructure).

JWC5 • 2:45 p.m.
Electra: An Electron Beam Pumped 730 J Rep-Rate KrF Laser, *Matthew F. Wolford[1], John D. Sethian[1], John L. Giuliani[1], Matthew C. Myers[1], Stephen P. Obenschain[1], Frank Hegeler[2], Moshe Friedman[2], Patrick M. Burns[3], Robert H. Lehmberg[3], Reginald Jaynes[4]; [1]NRL, USA, [2]Commonwealth Technologies Inc., USA, [3]Res. Support Instruments, USA, [4]Science Applications Intl. Corp., USA.* Electra has operated in oscillator mode for multi-thousand shot runs continuously at 1, 2.5 and 5 Hz. The Electra single pass pre-amplifier produces 23 Joules and is being incorporated into the laser system.

ROOM 314 — CLEO

CWB • Ultrafast Optical Parametric Amplifiers—Continued

CWB5 • 2:30 p.m.
High-Power Femtosecond Optical Parametric Amplifier in the Near-IR Based on BiB_3O_6, *Valentin Petrov[1], Frank Noack[1], Pancho Tzankov[1], Masood Ghotbi[2], Majid Ebrahim-Zadeh[2], Ivailo Nikolov[3], Ivan Buchvarov[3]; [1]Max-Born-Inst., Germany, [2]ICFO, Spain, [3]Sofia Univ., Bulgaria.* Power scaling to >1 mJ is demonstrated for a tunable (1.1-2.9 µm) femtosecond (<140 fs) optical parametric amplifier based on the monoclinic crystal BiB_3O_6, pumped near 800 nm by a 1 kHz Ti:sapphire laser amplifier.

CWB6 • 2:45 p.m.
Optical Pulse Generation Using Two-Stage Compression Based on Optical Parametric Amplifier, *Henry K. Y. Cheung, Rebecca W. L. Fung, David M. F. Lai, P. C. Chui, Kenneth K. Y. Wong; Univ. of Hong Kong, Hong Kong.* We demonstrate a simple, two-stage optical pulse compressor based on optical parametric amplifier using single spool of highly nonlinear dispersion-shifted fiber. 112-ps-wide pulses are compressed to 24-ps Gaussian-shaped pulses with clear eye openings.

ROOM 315 — CLEO

CWC • Plasmonics and Metamaterials—Continued

CWC4 • 2:30 p.m.
High Quality 3-D Virtual Nanocavity by Fringing Near-Fields of a Plasmonic Cylinder, *David Arbel, Eyal Feigenbaum, Meir Orenstein; Technion, Israel.* A 50nm diameter gold cylinder loaded on a semiconductor surface creates sub-wavelength field confinement in 3-D. The virtual nano-cavity exhibits 180nm^3 modal volume with Q-factor of few hundreds, suitable for realizing a semiconductor based nano-laser.

CWC5 • 2:45 p.m.
Focusing of Surface Plasmon Polaritons by Surface Parabolic Dielectric Gratings, *Yu-Ju Hung, Igor I. Smolyaninov, Christopher C. Davis; Dept. of Electrical Engineering, Univ. of Maryland, College Park, USA.* Focusing of surface plasmon polaritons by parabolic dielectric gratings formed on top of a 100nm thick Au film has been studied. Complex interference effects are observed in a "cavity" between two sets of parabolic gratings.

ROOM 316 — CLEO

CWD • Beam Combination and Regenerative Amplifiers—Continued

CWD5 • 2:30 p.m.
High Average Power Phase-Coded Laser System for the CTF3 Photoinjector, *Gabor Kurdi, Ian O. Musgrave, Marta Divall, Emma Springate, Graeme Hirst, Ian Ross, William Martin; Central Laser Facility, Rutherford Appleton Lab, UK.* In this paper we present the results of a diode-pumped high average power high repetition rate laser system delivering 50 Hz macropulses of 1.5GHz 1047nm pulses with a mean power of 9 kW per macropulse.

CWD6 • 2:45 p.m.
High-Energy, Diode-Pumped, Picosecond Yb:YAG Chirped-Pulse Regenerative Amplifier as a Pump Source for Optical Parametric Chirped-Pulse Amplification, *Yutaka Akahane[1], Makoto Aoyama[1], Kanade Ogawa[1,2], Koichi Tsuji[1], Koichi Yamakawa[1], Shigeki Tokita[2], Junji Kawanaka[2], Hajime Nishioka[3]; [1]Japan Atomic Energy Agency, Japan, [2]Inst. of Laser Engineering, Osaka Univiersity, Japan, [3]Inst. for Laser Science, Univ. of Electro-Communications, Japan.* A diode-pumped Yb:YAG regenerative amplifier utilizing gain-narrowing has been developed. A chirped-seed pulse was amplified and compressed in the regenerative amplifier, simultaneously, which generated the picosecond pulses with ~8-mJ of energy without a pulse compressor.

ROOM 317 — QELS

QWB • Pulse Shaping—Continued

QWB2 • 2:30 p.m.
Temporal Soliton Molecules: Experimentally Determined Phase Profiles, *Alexander Hause, Haldor Hartwig, Michael Boehm, Fedor Mitschke; Univ. Rostock, Germany.* Temporal soliton molecules in dispersion-managed fibers are characterized with an advanced FROG technique. This technique reveals phase and power profiles for complex pulse shapes where conventional techniques fail.

QWB3 • 2:45 p.m.
High Resolution Two Photon Excitation Spectroscopy by Pulse Shaping an Ultrabroad Bandwidth Femtosecond Laser, *Bingwei Xu, Yves Coello, Vadim V. Lozovoy, Marcos Dantus; Michigan State Univ., USA.* High-resolution two-photon excitation spectroscopy of natural and synthetic fluorescent biological molecules is demonstrated using an ultra-broad-bandwidth (over 400 nm) femtosecond laser. Selective excitation was achieved using a series of specially designed phase and amplitude masks.

ROOM 336 — QELS

QWC • Dynamic Phenomena and Chaos—Continued

QWC4 • 2:30 p.m.
Ultra-Slow Dynamics of an Ultra-Fast Laser, *Andreas Schmitt-Sody, Jean-Claude Diels, Ladan Arissian; Ctr. for High Technology Materials, Univ. of New Mexico, USA.* The population transfer between the two pulses in a mode locked ring laser is a direct analogy of the population oscillation (Rabi cycle) in a two-level atom.

QWC5 • 2:45 p.m.
Phase-Matched Non-Degenerate Four-Wave Mixing in One-Dimensional Photonic Crystals, *Christiane Becker[1], Martin Wegener[2], Sean Wong[1], Georg von Freymann[1]; [1]Forschungszentrum Karlsruhe, Germany, [2]Univ. Karlsruhe, Germany.* We report on non-degenerate four-wave mixing in the near-infrared using a 76 layer thick one-dimensional chalcogenide-glass based photonic crystal. A 3.5-fold enhancement of the mixing signal with respect to the optimum-thickness bulk film is observed.

QWD • Photonic Crystals—Continued

QWD4 • 2:30 p.m.
Modes of the L3 Defect Cavity in InAs Quantum Dot Photonic Crystals, *Alexander R. Chalcraft[1], Sang Lam[1], Mehmet Sabin[1], Dominik M. Szymanski[1], Daniele Sanvitto[1], Ruth Oulton[1], Maurice S. Skolnick[1], A. Mark Fox[1], David M. Whittaker[1], Abbes Tabraoui[1], Hui-Yun Liu[1], Paul W. Fry[1], Mark Hopkinson[1], David O'Brien[2], Thomas F. Krauss[2]; [1]Univ. of Sheffield, UK, [2]Univ. of St Andrews, UK.* We investigate the longest wavelength modes of an L3 photonic crystal cavity. Reordering of modes due to hole displacement is shown theoretically and experimentally. Cavity optimization is explained in terms of dipolar emission cancellation.

QWD5 • 2:45 p.m.
Far-Field Control of the Radiative Lifetime of an Individual Optical Nanocavity, *Jacob T. Robinson, Michal Lipson; Cornell Univ., USA.* Using a scanning metallic probe we demonstrate the first long-range control of the radiative lifetime of an optical nanocavity resonant near 1.5 microns. Changes in lifetime are observed for probe-cavity separations up to 70 microns.

QWE • Dynamics of Magnetic and Strongly Correlated Materials—Continued

QWE4 • 2:30 p.m.
Ultrafast Observation of the Coexistence of Antiferromagnetism and Superconductivity in a High-Tc Superconductor, *Elbert E. M. Chia[1], Jian-Xin Zhu[1], Diyar Talbayev[1], In-Sun Jo[2], Kyu-Hwan Oh[2], Sung-Ik Lee[2], Antoinette J. Taylor[1], Richard D. Averitt[1]; [1]Los Alamos Natl. Lab, USA, [2]Pohang Univ. of Science and Technology, Republic of Korea.* Ultrafast dynamics of the high-Tc superconductor $Tl_2Ba_2Ca_2Cu_3Oy$ were probed using all-optical pump-probe technique. Our results are consistent with the coexistence of antiferromagnetism and superconductivity at low temperatures, resulting in the depression of the superconducting gap.

QWE5 • 2:45 p.m.
Giant Magnetoelastic Effect in Multiferroic $Ba_{0.6}Sr_{1.4}Zn_2Fe_{12}O_{22}$, *Diyar Talbayev[1], Richard D. Averitt[1], Antoinette J. Taylor[1], Tsuyoshi Kimura[2]; [1]Los Alamos Natl. Lab, USA, [2]Bell Labs, Lucent Technologies, USA.* We report a giant magnetoelastic effect in multiferroic $Ba_{0.6}Sr_{1.4}Zn_2Fe_{12}O_{22}$ measured by ultrafast pump-probe spectroscopy. Coherent phonon excitation allows to measure the field-induced changes in the speed of sound and the corresponding elastic stiffness.

CWE • Cavity-Based Optical Sensing—Continued

CWE4 • 2:30 p.m.
Optical Microring Resonator Sensors with Selective Membrane Surface Customization, *Sang-Yeon Cho[1], Gary Dobbs[2], Nan Marie Jokerst[1], Boris Mizaikoff[2], Tray Cooper[2]; [1]Duke Univ., USA, [2]Georgia Tech, USA.* Optical microresonator sensors with surface customization using chemically selective membranes have been demonstrated for the first time. The ethylene/propylene copolymer membrane enriches o-xylene representing an organic contaminant from water, which was sensed by the microresonator.

CWE5 • 2:45 p.m.
Enhancing the Sensitivity Limit of a Whispering Gallery Mode Biosensor through Sub-Wavelength Confinement of Light, *Ophir Gaathon, Jelena Culic-Viskota, Momchil Mihnev, Iwao Teraoka, Stephen Arnold; Microparticle Photophysics Lab, Polytechnic Univ., USA.* We demonstrate an optical means for enhancing the sensitivity of a whispering gallery mode biosensor by more than 700% through sub-wavelength confinement produced by drawing light closer to the surface using a high index nano-layer.

CWF • Photonic Bandgap Fibers—Continued

CWF5 • 2:30 p.m.
Fresnel Zone Imaging of Bloch-Modes from a Hollow-Core Photonic Crystal Fiber Cladding, *Francois Couny[1], Fetah Benabid[1], Peter John Roberts[2], Philip S. Light[1]; [1]Physics Dept., Univ. of Bath, UK, [2]COM, Technical Univ. of Denmark, Denmark.* A Fresnel zone imaging technique at the output of a short length of hollow core photonic crystal fiber allows the identification of the photonic crystal cladding Bloch-modes. The experimental results show excellent agreement with theory.

CWF6 • 2:45 p.m.
Sub-Wavelength Intensity Profiles and Field Enhancement within an Optical Fiber, *Gustavo S. Wiederhecker[1,2], Cristiano M. B. Cordeiro[1,2], Francois Couny[2], Fetah Benabid[2], Stefan A. Maier[2], Jonathan C. Knight[2], Carlos H. B. Cruz[1], Hugo L. Fragnito[1]; [1]Univ. Estadual de Campinas, Brazil, [2]Ctr. for Photonics and Photonic Materials, Univ. of Bath, UK.* We demonstrate concentration of optical energy within a sub-wavelength air hole running the length of an optical fiber. The fiber core resembles a tiny tube with a bore diameter of 200 nm or less.

CWG • Joint Symposium on THz QCLs I—Continued

CWG4 • 2:30 p.m.
Experimental Measurement of the Wall-Plug Efficiency in THz Quantum Cascade Lasers, *Miriam S. Vitiello[1], Gaetano Scamarcio[1], Vincenzo Spagnolo[2]; [1]CNR-INFM Regional Lab LIT3 Univ. of Bari, Italy, [2]Politecnico of Bari, Italy.* The wall-plug efficiency and the thermal resistance of bound-to-continuum THz quantum-cascade lasers are extracted from the analysis of micro-probe photoluminescence spectra, via the direct measurement of the lattice temperature as a function of the electrical-power.

CWG5 • 2:45 p.m.
Low-Divergence Surface-Emitting Terahertz Quantum Cascade Lasers, *Jonathan Fan[1], Mikhail Belkin[1], Federico Capasso[1,2], Suraj Khanna[2], Mohammed Lachab[2], Giles Davies[2], Edmund Linfield[2]; [1]Harvard Univ., USA, [2]Univ. of Leeds, UK.* We investigate surface-emission via a second-order grating in terahertz quantum cascade lasers. We optimize grating design and suppress facet reflectivity with absorbing waveguide edges. Single-mode lasing, small beam divergence, and improved slope efficiency are observed.

NOTES

ROOM 318-320

CLEO

CWA • Mode-Locked Semiconductor Lasers I—Continued

CWA4 • 3:00 p.m.
Linewidth Enhancement Factor Reduction on the Blue Side of the Gain Peak from a Quantum Dot Mode-Locked Laser, *Jimyung Kim, Myoung-Taek Choi, Peter J. Delfyett; College of Optics and Photonics,CREOL and FPCE, USA.* We observed above threshold linewidth enhancement factor reduction at blue side lasing wavelengths from a quantum dot mode-locked laser. The linewidth and pulse width become narrower as the lasing wavelength is tuned to blue side.

ROOM 321-323

QELS

QWA • Symposium on Degenerate Fermi Gases—Continued

QWA4 • 3:00 p.m.
Momentum Distribution Dynamics of a Tonks-Girardeau Gas: Bragg Reflections of a Quantum Many-Body Wavepacket, *Robert Pezer, Hrvoje Buljan; Dept. of Physics, Univ. of Zagreb, Croatia.* The dynamics of the momentum distribution and the reduced single-particle density matrix of a Tonks-Girardeau gas is studied in the context of Bragg-reflections of a many-body wavepacket.

ROOM 324-326

JOINT

JWC • Large High-Intensity Lasers—Continued

JWC6 • 3:00 p.m.
Interferometric Tiling of Large-Aperture Gratings for Petawatt Laser Systems, *Jie Qiao[1], John H. Kelly[1], David Canning[1], Mark J. Guardalben[1], Geoffrey King[1], John Price[2], Adam Kalb[1], Robert Jungquist[1], Amy Rigatti[1]; [1]Lab for Laser Energetics, Univ. of Rochester, USA, [2]Helicos BioSciences Corp, USA.* A tiled-grating assembly with three large-scale gratings is developed with real-time interferometric tiling control for a petawatt laser system. Tiling-parameters sensitivity and focal-spot degradation are analyzed for a compressor composed of four such assemblies.

ROOM 314

CLEO

CWB • Ultrafast Optical Parametric Amplifiers—Continued

CWB7 • 3:00 p.m.
PPLN OPCPA Based on Spectrally Addressed Amplification, *Ambre Nelet[1,2], Gediminas Jonusauskas[1], Jérôme Degert[1], Eric Freysz[1]; [1]Univ. Bordeaux I, Ctr. de Physique Moléculaire Optique et Herzienne, France, [2]CEA/ CESTA, France.* We propose and demonstrate the concept of OPCPA based on spectrally addressed amplification in a periodically poled Lithium Niobate.

ROOM 315

CWC • Plasmonics and Metamaterials—Continued

CWC6 • 3:00 p.m.
Guided Modes in Arrays of Metallic Nanowires, *Christopher G. Poulton, Marcus Schmidt, Greg Pearce, George Kakarantzas, Philip St. J. Russell; Max Planck Res. Group (IOIP), Germany.* We study numerically the formation of photonic band gaps and guided "defect" modes within two dimensional arrays of metallic nanowires. Attenuations as low as 1.7 dB/cm are predicted for silver wires at 1550 nm wavelength.

ROOM 316

CWD • Beam Combination and Regenerative Amplifiers—Continued

CWD7 • 3:00 p.m.
Multi-Millijoule, Diode-Pumped, Chirped-Pulse Yb:KY(WO_4)$_2$ Regenerative Amplifier, *Kanade Ogawa[1], Yutaka Akabane[1], Makoto Aoyama[1], Koichi Tsuji[1], Koichi Yamakawa[1], Shigeki Tokita[2], Junji Kawanaka[2], Hajime Nishioka[3]; [1]Japan Atomic Energy Agency, Japan, [2]Inst. of Laser Engineering, Osaka Univ., Japan, [3]Inst. for Laser Science, Univ. of Electro-Communications, Japan.* A diode-pumped, cryogenically-cooled Yb:KYW regenerative amplifier utilizing regenerative pulse shaping has been developed. An amplified pulse with an energy of 5.5 mJ and a broad bandwidth of 3.4 nm is achieved.

ROOM 317

QELS

QWB • Pulse Shaping—Continued

QWB4 • 3:00 p.m.
Memory in Nonlinear Ionization of Transparent Dielectrics, *Rajeev Pattathil[1], Marina Gertsvolf[1], Ravi Bhardwaj[2], Eli Simova[1], Cyril Hnatovsky[1], Rod Taylor[1], David Rayner[1], Paul Corkum[1]; [1]Natl. Res. Council, Canada, [2]Univ. of Ottawa, Canada.* We show a reduction in the ionization threshold at previously ionized regions inside transparent solids. This forms a shot-to-shot memory that can lead to several unique nonlinear phenomena including the formation of nanostructures.

ROOM 336

QWC • Dynamic Phenomena and Chaos—Continued

QWC6 • 3:00 p.m.
A Tunable-Bandwidth White Light Interferometer Using Bi-Frequency Raman Gain in Atomic Vapor, *Gour Pati, Mary Messall, Kenneth Salit, Selim M. Shahriar; Northwestern Univ., USA.* A White Light Cavity is of considerable interest in broadband gravitational-wave detection. This paper presents a demonstration of the such a system in a meter long ring-cavity using bi-frequency Raman gain in the intra-cavity medium.

3:15 p.m. – 3:45 p.m. COFFEE BREAK AND LIGHT REFRESHMENTS, EXHIBIT HALL, 100 LEVEL

3:15 p.m. – 4:45 p.m. EXHIBIT ONLY, EXHIBIT HALL, 100 LEVEL

ROOM 337	ROOM 338	ROOM 339	ROOM 340	ROOM 341	*PhAST* ROOM 1 (EXHIBIT FLOOR)	*PhAST* ROOM 2 (EXHIBIT FLOOR)	*PhAST* ROOM 3 (EXHIBIT FLOOR)
QELS		CLEO			JOINT	*PhAST*	

ROOM 337 — QELS

QWD • Photonic Crystals—Continued

QWD6 • 3:00 p.m.
Anomalous-Refraction-Induced Strong Resonances and Enhancement of Absorption in Thin-Film Photonic Crystals, *Alongkarn Chutinan, Sajeev John; Univ. of Toronto, Canada.* We demonstrate strong resonances and absorption enhancement in thin-film photonic crystals due to distinguished anomalous refraction (parallel interface refraction), where off-normal incident beams are refracted to directions nearly parallel to the surfaces of thin film.

ROOM 338 — QELS

QWE • Dynamics of Magnetic and Strongly Correlated Materials—Continued

QWE6 • 3:00 p.m.
Ultrafast Structure and Polarization Dynamics in Nanolayered Perovskites Studied by Femtosecond X-Ray Diffraction, *Clemens von Korff Schmising[1], Matias Bargheer[1], Mareike Kiel[1], Nikolai Zhavoronkov[1], Michael Woerner[1], Thomas Elsaesser[1], Ionela Vrejoiu[2], Dietrich Hesse[2], Marin Alexe[2]; [1]Max Born Inst., Germany, [2]Max-Planck-Inst. für Mikrostrukturphysik, Germany.* The polarization and lattice dynamics in a metal/ferroelectric/metal nanolayer system is analyzed by femtosecond X-ray diffraction. Optically induced giant stress in the metal layers can switch off the ferroelectric polarization within 2 ps.

ROOM 339 — CLEO

CWE • Cavity-Based Optical Sensing—Continued

CWE6 • 3:00 p.m.
Prism-Coupled Silica Micro-Tube Resonator as a Bio-Sensor, *Tao Ling, L.Jay Guo; Dept. of Electrical Engineering and Computer Science, Univ. of Michigan, USA.* Prism coupled silica micro-tubes were studied as optical bio-sensing elements. We demonstrated to sense the glucose concentration change in the micro-tube and the smallest concentration change can be detected in our system is 0.3 mM.

ROOM 340 — CLEO

CWF • Photonic Bandgap Fibers—Continued

CWF7 • 3:00 p.m.
Numerical Study of Heterogeneously-Indexed Photonic Bandgap Fibers, *Tsinghua Her[1], Min Hyung Cho[2], Wei Cai[1]; [1]Univ. of North Carolina at Charlotte, USA, [2]Quantum Photonic Science Res. Ctr., Hanyang Univ., Republic of Korea.* We propose a new ARROW-like bandgap fiber composed of high-index rods with two different refractive indexes. Numerical study shows its spectral properties are determined by superposition of those of individual rods at short wavelength region.

ROOM 341 — CLEO

CWG • Joint Symposium on THz QCLs I—Continued

CWG6 • 3:00 p.m.
High-Power Metal-Metal Waveguide Terahertz Quantum-Cascade Laser with a Hyperhemispherical Lens, *Alan W. M. Lee[1], Qi Qin[1], Sushil Kumar[1], Benjamin S. Williams[1], Qing Hu[1], John L. Reno[2]; [1]MIT, USA, [2]Sandia Natl. Labs, USA.* We demonstrate an ~85 mW (pulsed, 5 K), metal-metal waveguide, terahertz quantum-cascade laser using an optically coupled lens. The device has a FWHM of ~6 Deg. and a maximum pulsed operating temperature of 155 K.

3:15 p.m. – 3:45 p.m. COFFEE BREAK AND LIGHT REFRESHMENTS, EXHIBIT HALL, 100 LEVEL

3:15 p.m. – 4:45 p.m. EXHIBIT ONLY, EXHIBIT HALL, 100 LEVEL

PhAST ROOM 1 (EXHIBIT FLOOR) — JOINT

3:00 p.m. – 5:00 p.m.
JWD • New Industrial Lasers
Heinrich Endert; Newport Corp., USA, Presider

JWD1 • 3:00 p.m. Invited
Double Pulse Laser Machining, *Andrew Forsman; General Atomics, USA.* Abstract not available.

JWD2 • 3:30 p.m.
A 142-W Diffraction-Limited Q-Switched Rotary Disk Yb-YAG Laser for Material Procesing, *Santanu Basu; Sparkle Optics Corp., USA.* The average power of a diffraction-limited Q-switched diode pumped solid state laser was scaled to 142 W. At 100 W, the laser drilled 44 µm diameter holes in 3-mm thick stainless steel in 3.4 s.

JWD3 • 3:45 p.m.
Industrial Applications of New Disk Lasers, *Mike Heglin; LMH Technologies, USA.* Abstract not available.

JWD4 • 4:00 p.m.
Refractive Gauss-to-Tophat Beam Shapers Improve Structure Quality and Speed in Micromachining, *Oliver Homburg, Frank Toennissen, Heiko Ganser, Thomas Mitra, Vitalij Lissotschenko; LIMO Lissotschenko Mikrooptik GmbH, Germany.* The transformation principle of a Gaussian beam into a homogeneous top-hat profile by means of free-form refractive micro-optics is reviewed. Various flat-top profiles achieved with different laser sources as well as micro-machining results are demonstrated.

PhAST ROOM 2 (EXHIBIT FLOOR) — *PhAST*

3:00 p.m. – 4:45 p.m.
PWC • Detection and Identification Systems
William Gunning; Rockwell Science Co. LLC, USA, Presider

PWC1 • 3:00 p.m. Invited
BAND Sensor for BioDefense, *David Robbins; SAIC, USA.* SAIC's BAND sensor is an automated system for collecting and analyzing urban air samples to detect airborne biological threats. Microbial threat detection uses highly-multiplexed PCR with microarray fluorescence readout. Toxin detection employs an antibody assay.

PWC2 • 3:30 p.m. Invited
Detection of Bio-Aerosol Threats with a UV Scattering Trigger and Rapid DNA- and Antibody-Based Confirmation, *Roland Stoughton; GHC Technologies, USA.* An economical sensor for airborne pathogens consists of a continuous "reagentless" UV scattering trigger followed by a confirmer that analyzes air filtrate for characteristic pathogen molecular markers.

PWC3 • 4:00 p.m.
Laser-Induced Breakdown Spectroscopy Infrared Emission from Inorganic and Organic Substances, *Clayton S.-C. Yang[1], E. Brown[2], U. Hommerich[2], S. Trivedi[3], A. P. Snyder[4], A. C. Samuels[4]; [1]Battelle, USA, [2]Hampton Univ., USA, [3]Brimrose, USA, [4]Army Edgewood Chemical Biological Ctr., USA.* The mid-infrared emission from a laser-induced-breakdown process between 2 to 5.75 µm was probed for the first time. Emission features from oxygenated carbon-containing breakdown fragments and from alkali metal-containing breakdown fragments have been successfully identified.

PhAST ROOM 3 (EXHIBIT FLOOR) — *PhAST*

3:00 p.m. – 5:00 p.m.
PWD • Solid-State Lighting II
Ian Ferguson; Georgia Tech, USA, Presider

PWD1 • 3:00 p.m. Invited
Limitations to be Aware of When Using LEDs in Lighting System Designs, *John W. Curran; Dialight, USA.* LED technology offers the lighting industry an exciting tool. The longer lifetimes, higher monochromatic efficiencies and greater reliability come with some design limitations. This presentation will provide a guide to some of the major restrictions.

PWD2 • 3:30 p.m. Invited
Thermal Analysis and Reliability of LED Light Sources, *Samuel Graham; Georgia Tech, USA.* Abstract not available.

PWD3 • 4:00 p.m. Invited
InGaN HVPE Technology for Solid-State Lighting, *Vladimir Dmitriev; TDII, USA.* Abstract not available.

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

4:45 p.m. – 6:30 p.m.
CWH • Organic Optoelectronics
Steven R. Flom; NRL, USA, Presider

CWH1 • 4:45 p.m. Tutorial
Organic Photovoltaics, *Bernard Kippelen; Georgia Tech, USA.* Organic photovoltaic technologies are emerging and maturing with reports of power conversion efficiencies close to 5%. This tutorial will provide an overview of the chemistry, physics and engineering of solar cells based on organic materials.

4:45 p.m. – 6:30 p.m.
CWI • Mode-Locked Semiconductor Lasers II
Peter Blood; Cardiff Univ., UK, Presider

CWI1 • 4:45 p.m. Invited
First Demonstration of a Modelocked Integrated External-Cavity Surface Emitting Laser (MIXSEL), *Aude-Reine Bellancourt, Benjamin Rudin, Deran J.H.C. Maas, Matthias Golling, Heiko J. Unold, Thomas Sudmeyer, Ursula Keller; ETH, Switzerland.* For the first time we have successfully demonstrated a novel concept of a passively modelocked vertical-external-cavity surface-emitting semiconductor laser with an integrated saturable absorber. This MIXSEL will be ultimately suitable for cost-effective high-volume wafer-scale fabrication.

4:45 p.m. – 6:30 p.m.
JWE • High-Power Few-Cycle Sources
Mauro Nisoli; Politecnico di Milano, Italy, Presider

JWE1 • 4:45 p.m.
Optimal Pulse Compression via Sequential Filamentation, *Luat T. Vuong[1], Rodrigo B. Lopez-Martens[2], Christoph P. Hauri[2], Mark A. Foster[1], Anne L'Huillier[3], Thierry Ruchon[3], Alexander L. Gaeta[1]; [1]Dept. of Applied and Engineering Physics, Cornell Univ., USA, [2]Lab d'Optique Appliquée, ENSTA-CNRS-École Polytechnique, France, [3]Atomic Physics Div., Univ. of Lund, Sweden.* We demonstrate theoretically and experimentally a robust method based on sequential filamentation to optimize compression of high-energy pulses in gases. We gain insight into this process by comparing compression dynamics for linear- and circularly-polarized pulses.

4:45 p.m. – 6:30 p.m.
CWJ • Ultrafast Dynamics and Optical Switching
Antoinette J. Taylor; Los Alamos Natl. Lab, USA, Presider

CWJ1 • 4:45 p.m.
Quantum Interference Control of Electrical Currents in Silicon, *Louis Costa, Marko Spasenovic, Markus Betz, Alan D. Bristow, Henry M. van Driel; Univ. of Toronto, Canada.* Electrical currents are generated in clean silicon at T=300K using quantum interference of femtosecond fundamental and second-harmonic pulses. This efficient photoinjection of ballistic currents across the indirect bandgap is detected by the emitted terahertz radiation.

4:45 p.m. – 6:30 p.m.
CWK • Biosensors
Changhuei Yang; Caltech, USA, Presider

CWK1 • 4:45 p.m.
Molecular Interferometric Imaging Biosensor, *Ming Zhao, David D. Nolte; Purdue Univ., USA.* We present molecular interferometric imaging (MI2) as a new sensing technique for direct detection of biomolecules that is easier and more sensitive than surface plasmon resonance and scalable to hundreds of assays per chip.

4:45 p.m. – 6:30 p.m.
CWL • Panel on Solid-State Laser Power Scaling through Beam Combination
Don Seeley; HEL-JTO, USA, Moderator

Panelists:
Anthony Siegman, Stanford Univ., USA; Tso Yee Fan, MIT Lincoln Lab, USA; Robert Rice, Northrop Grumman, USA; Iain McKinnie, Coherent Technologies, Inc., USA; Arnaud Brignon; Thales Res. and Technology, France.

4:45 p.m. – 6:30 p.m.
QWF • Entanglement
Julio Gea-Banacloche; Univ. of Arkansas, USA, Presider

QWF1 • 4:45 p.m. Tutorial
Quantum Entanglement and Metrology, *Carlton Caves; Univ. of New Mexico, USA.* For linear couplings of N systems to a parameter, quantum entanglement can improve the precision of parameter estimation from $1/\sqrt{N}$ shot-noise limit to $1/N$ Heisenburg limit. Intrinsic k-body couplings improve this scaling further to $1/N^k$.

4:45 p.m. – 6:30 p.m.
QWG • Laser Cooling and Other Effects in Semiconductors
Kevin Malloy; Univ. of New Mexico, USA, Presider

QWG1 • 4:45 p.m. Invited
Laser Cooling in Solids, *Mansoor Sheik-Bahae; Univ. of New Mexico, USA.* Laser cooling in optical solids can lead to the realization of all-solid state cryocoolers. We present new results on Yb- and Tm-doped glasses and crystals and describe progress toward achieving net cooling in GaAs heterostructures.

ROOM 337	ROOM 338	ROOM 339	ROOM 340	ROOM 341	*PhAST* ROOM 1 (EXHIBIT FLOOR)	*PhAST* ROOM 2 (EXHIBIT FLOOR)	*PhAST* ROOM 3 (EXHIBIT FLOOR)
QELS	CLEO				JOINT	PhAST	

QELS — Room 337

4:45 p.m. – 6:30 p.m.
QWH • Photonic Metamaterials
Samuel L. Oliveira; Univ. of Michigan, USA, Presider

QWH1 • 4:45 p.m.
Experimental Comparison of Circular, Elliptical and Rectangular (Fishnet) Negative-Index Metamaterials, *Zahyun Ku, S. R. J. Brueck; Univ. of New Mexico, USA.* Negative index materials consisting of Au-Al_2O_3-Au films with a 2-D array of apertures have been fabricated. Circular, elliptical and rectangular apertures are compared. Comparable figures of merit [-Re(n)/Im(n)] are observed for all three geometries.

CLEO — Room 338

4:45 p.m. – 6:30 p.m.
CWM • Free-Space and Multi-Mode Fiber Transmission
Scott A. Hamilton; MIT Lincoln Lab, USA, Presider

CWM1 • 4:45 p.m. Invited
Ultra-Long Distance Free Space Laser Communications, *David O. Caplan, Mark L. Stevens, Bryan S. Robinson, Steven Constantine, Don M. Boroson; MIT Lincoln Lab, USA.* We present a survey of state-of-the-art free space laser communication transmitter and receiver designs and technologies for ultra-long-distance high-speed links. High-performance power-efficient implementations for photon-counting, coherent, and optically-preamplified receivers are discussed.

CLEO — Room 339

4:45 p.m. – 6:30 p.m.
CWN • III-IV Nanophotonics
Boon-Siew Ooi; Lehigh Univ., USA, Presider

CWN1 • 4:45 p.m.
Integration of an Electrically Driven InGaAsP Based Microdisk Laser with a Silicon Based Passive Photonic Circuit, *Pedro Rojo-Romeo[1], Joris Van Campenhout[2], Fabien Mandorlo[1], Christian Seassal[1], Xavier Letartre[1], Philippe Regreny[1], Dries Van Thourhout[2], Roel Baets[2], Lea Di Cioccio[3], Jean-Marc Fedeli[3]; [1]INL-CNRS, France, [2]IMEC, Belgium, [3]CEA, France.* Electrically driven InGaAsP based microdisk lasers are bonded on a 200 mm SOI Wafer with submicron Silicon waveguides. Experimental results at room temperature of electrically pumped lasers coupled to a Si waveguide are exposed.

CLEO — Room 340

4:45 p.m. – 6:30 p.m.
CWO • Microstructured Fibers and Applications
Jesper Laegsgaard; DTU Technical Knowledge Ctr., Denmark, Presider

CWO1 • 4:45 p.m.
Control of the Transient Regime of Stimulated Raman Scattering in Hollow-Core Photonic Crystal Fiber, *Francois Couny, Fetah Benabid, Philip S. Light; Ctr. for Photonics and Photonic Materials, Univ. of Bath, UK.* A detailed experimental results on the evolution of stimulated Raman scattering amplification regimes in H_2 filled hollow-core PCF are reported. The role of the fiber length and the gas pressure is highlighted.

CLEO — Room 341

4:45 p.m. – 6:30 p.m.
CWP • Joint Symposium on THz QCLs II
Benjamin Williams; MIT, USA, Presider

CWP1 • 4:45 p.m.
Quantum-Cascade Lasers with One-Well Injector Operating at 1.59 THz (λ = 188.5 μm), *Sushil Kumar[1], Qi Qin[1], Benjamin S. Williams[1], Qing Hu[1], Zbig R. Wasilewski[2], Xiaohua Wu[2], Hui C. Liu[2]; [1]MIT, USA, [2]Inst. of Microstructural Sciences, Natl. Res. Council, Canada.* We report quantum-cascade lasers operating at 1.59 THz using a single quantum-well injector, which significantly reduces photon re-absorption losses in the active-region. Continuous-wave operation up to 71K, and >0.65mW optical-power at 30K is demonstrated.

JOINT — PhAST Room 1 (Exhibit Floor)

JWD • New Industrial Lasers—Continued

JWD5 • 4:15 p.m.
Advances in High Efficiency Diode Laser Pump Sources Suitable for Pumping Nd:YAG Systems, *Paul A. Crump, Rob Martinsen; nLight Photonics Corp., USA.* Nd:YAG systems are conventionally pumped at 808-nm. Direct upper-level pumping at 885-nm leads to lower heat. Diode laser pumps sources now provide power with efficiency close to 70% at both wavelengths, offering significant system benefits.

JWD6 • 4:30 p.m.
30W CW Operation of Single-Chip Laser Diodes, *Wei Gao, Zuntu Xu, Lisen Cheng, Kejian Luo, Andre Marstrovito, Kun Shen; Axcel Photonics, Inc., USA.* We report CW operation of 30W from single-chip laser diodes at 808 nm, with an estimated lifetime of over 40,000 hours. They are designed with broad waveguides using InAlGaAs/AlGaAs/GaAs material system grown by MOCVD.

JWD7 • 4:45 p.m.
Evaluating Micromachining Capabilities of High Power Diode Pumped Solid-State Mode-Locked and Q-Switched Ultraviolet Laser, *Rajesh S. Patel, James Bovatsek; Spectra Physics, USA.* The micromachining capabilities of two newly developed DPSS mode-locked and q-switched UV lasers have been evaluated by studying ablation of commonly used materials in semiconductor, microelectronics, and solar cell industry.

PhAST — PhAST Room 2 (Exhibit Floor)

PWC • Detection and Identification Systems—Continued

PWC4 • 4:15 p.m.
Biological Substance Characterization in Water Matrices with Raman Microscopy, *Rabih E. Jabbour[1], Ashish Tripathi[1], Patrick J. Treado[2], Matthew P. Nelson[2], Janet L. Jensen[3], A. Peter Snyder[3]; [1]SAIC, USA, [2]ChemImage, Inc., USA, [3]US Army, USA.* Raman microspectroscopy is investigated for spectral information from bacteria and protein biological substances in distilled and tap water matrices. Laser energy flux, multivariate dataspace biological differentiation, and substance aging in water matrices were investigated.

PWC5 • 4:30 p.m.
Detection and Identification of a Water Mixture of *E. coli* Cells and *B. subtilis* Spores with Raman Chemical Imaging Microscopy, *Ashish Tripathi[1], Rabih E. Jabbour[1], Patrick J. Treado[2], Matthew P. Nelson[2], Janet L. Jensen[3], A. Peter Snyder[3]; [1]SAIC, USA, [2]ChemImage, Inc., USA, [3]US Army, USA.* Raman chemical imaging microscopy was used to visualize and discriminate between biological substances with Raman spectral database identification. Water suspensions were investigated for mixtures of different concentrations of *E. coli* and *Bacillus subtilis* spores.

PhAST — PhAST Room 3 (Exhibit Floor)

PWD • Solid-State Lighting II—Continued

PWD4 • 4:30 p.m. Invited
Organic LEDs for Solid-State Lighting, *Chung-Chih Wu; Natl. Taiwan Univ., Taiwan.* Abstract not available.

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

CLEO | JOINT | CLEO | QELS

CWH • Organic Optoelectronics—Continued

CWI • Mode-Locked Semiconductor Lasers II—Continued

CWI2 • 5:15 p.m.
Injection Locking of a Broad Area Laser Diode by Use of Holographic Four-Wave Mixing in a Photorefractive Polymer, *Peter D. van Voorst[1], Herman L. Offerhaus[1], Marten R. de Wit[1], Savas Tay[2], Jayan Thomas[2], Nasser Peyghambarian[2], Klaus J. Boller[1]; [1]Twente Univ., Netherlands, [2]College of Optical Sciences, USA.* We report on holographic injection locking using a novel photorefractive polymer introducing a new method to improve the beam quality of a broad area laser diode.

CWI3 • 5:30 p.m.
Self-Injection Locking on Brillouin-Amplified Radiation in Long Optical Fiber Feedback, *Vasily V. Spirin, Marcial Castro; CICESE, Mexico.* We report a novel optical injection-locking configuration that utilized Brillouin amplification in optical fiber feedback. Proposed structure exhibits properties inherent in two phenomena, self-injection locking and injection locking in master-slave configuration at the same time.

JWE • High-Power Few-Cycle Sources—Continued

JWE2 • 5:00 p.m.
High-Energy Few-Cycle Pulse Generation in a Filament for Relativistic Applications at kHz Repetition Rate, *Christoph P. Hauri, Michele Merano, Alexandre Trisorio, Gerard Mourou; Lab d'Optique Appliquee, France.* We demonstrate efficient generation of 9.5-fs 1.8 mJ pulses by filamentation. The pulse wavefront, the low energy fluctuations and the good temporal contrast make this source suited for relativistic laser-solid experiments at kHz repetition rate.

JWE3 • 5:15 p.m.
Organizing and Characterizing Multiple Filaments in Space and Time, *Alexandre Trisorio, Christoph P. Hauri; Lab d'Optique Appliquee, France.* Multiple femtosecond filamentation(MF) are spatially organized by polarization control. Spatio-temporal characterization demonstrates a stable multi-filament pattern and compression to ultrashort pulses in each individual filament.

JWE4 • 5:30 p.m. Invited
Intense Self-Compressed Carrier-Envelope Phase-Locked Few-Cycle Pulses at 2 µm, *Christoph P. Hauri[1], Cosmin Blaga[2], Erik Power[3], James Cryan[2], Razvan Chirla[2], Philip Colosimo[2], Gilles Doumy[2], Anne-Marie March[2], Chris Roedig[2], Emily Sistrunk[2], Jennifer Tate[2], Jonathan Wheeler[2], Rodrigo Lopez-Martens[1], Kevin Schultz[2], Louis DiMauro[2]; [1]Lab d'Optique Appliquee, France, [2]Ohio State Univ., USA, [3]Ctr. for Ultrafast Optical Science, USA.* We demonstrate filamentation at 2 µm using carrier-envelope phase (CEP) stabilized 55 fs, 330 µJ pulses from an OPA. The ultra-broadband output is self-compressed below 3-optical cycles with 270 µJ and preserves the CEP offset.

CWJ • Ultrafast Dynamics and Optical Switching—Continued

CWJ2 • 5:00 p.m.
Ultrafast Optical Response of InAs Quantum Dots for Photoconductive Applications, *Amartya Sengupta[1], Prashanth C. Upadhya[1], Mohammed Lachab[1], Wenhui Fan[1], John E. Cunningham[1], A. G. Davies[1], Edmund H. Linfield[1,2], Mohammed Missous[2]; [1]Univ. of Leeds, UK, [2]Univ. of Manchester, UK.* Optical pump-probe measurements have been performed on superlattices of self-organised InAs quantum dots embedded in GaAs. These structures exhibit subpicosecond photocarrier lifetimes when excited at 800 nm, which increase with the *ex situ* annealing temperature.

CWJ3 • 5:15 p.m.
Ultrafast Carrier Dynamics in an InAs/InGaAs Quantum-Dots-in-a-Well Mid-Infrared Photodetector, *Rohit P. Prasankumar[1], Ram S. Attaluri[2], Richard D. Averitt[1], Andreas Stintz[2], Sanjay Krishna[2], Antoinette J. Taylor[1]; [1]Los Alamos Natl. Lab, USA, [2]Univ. of New Mexico, USA.* Differential transmission spectroscopy is used to measure carrier dynamics in a quantum-dots-in-a-well heterostructure. This provides fundamental insight into carrier relaxation from three to two to zero dimensions and has significant implications for dots-in-a-well-based mid-infrared photodetectors.

CWJ4 • 5:30 p.m.
Ultra High Bandwidth THz Tunable Delays Using Cascaded Semiconductor Optical Amplifiers, *Bala Pesala, Forrest G. Sedgwick, Connie Chang-Hasnain; Univ. of California at Berkeley, USA.* Tunable delays at THz bandwidths are achieved using ultra-fast non-linearities in semiconductor optical amplifiers. In this paper, we report electrically controllable fractional delays of 330% for 600fs pulses propagating through two cascaded semiconductor optical amplifiers.

CWK • Biosensors—Continued

CWK2 • 5:00 p.m.
Virus Detection on a Planar Optofluidic Chip, *Mikhail I. Rudenko[1], Dongliang Yin[1], David W. Deamer[1], Holger Schmidt[1], Evan J. Lunt[2], Brian Phillips[2], Aaron R. Hawkins[2]; [1]School of Engineering, Univ. of California at Santa Cruz, USA, [2]Dept. of Electrical and Computer Engineering, Brigham Young Univ., USA.* We present the first detection of fluorescently labeled Qβ phage viruses on a planar integrated optofluidic chip. Detection sensitivities on the order of 1000 viruses within an 85 femtoliter excitation volume have been achieved.

CWK3 • 5:15 p.m.
Optical Characterization and Sensitivity Evaluation of Guided-Resonances in Photonic Crystal Slabs for Biosensing Applications, *Ofer Levi[1], Meredith M. Lee[1], Jingyu Zhang[2], Virginie Lousse[1], Steven R. J. Brueck[2], Shanhui Fan[1], James S. Harris[1]; [1]Stanford Univ., USA, [2]Univ. of New Mexico, USA.* Optical characterization and sensitivity evaluation of an all-dielectric photonic crystal based guided-resonance filter sensitive to index-of-refraction changes in aqueous solutions is presented. Measured quality factor values (Q=83, 181) corresponds to detectable index-change of $2x10^{-3}$.

CWK4 • 5:30 p.m.
Protein Microarray Analysis Using Surface Optical Wave Resonance in Photonic Band Gap Multilayers, *William M. Robertson, Stephen M. Wright, Andrienne C. Friedli, Travis R. Denton, Nate Brady, David Moore, Nicholas Major, Wesley Cline, Jennifer Freimund; Middle Tennessee State Univ., USA.* A label-free optical method of analyzing protein reactions in microarrays is demonstrated. The technique is based on the resonant excitation of surface optical waves in photonic band gap multilayers.

CWL • Panel on Solid-State Laser Power Scaling through Beam Combination—Continued

QWF • Entanglement—Continued

QWG • Laser Cooling and Other Effects in Semiconductors—Continued

QWG2 • 5:15 p.m.
Theory of Optical Refrigeration in p-doped Semiconductors, *Greg Rupper, Nai H. Kwong, Rolf Binder; Univ. of Arizona, USA.* We present a microscopic theory for luminescence of doped GaAs and its application to a study of optical refrigeration. We find that p-doping affects the temperature dependence of the cooling threshold in a complex way.

QWG3 • 5:30 p.m.
Cavity-Enhanced Resonant Absorption in Laser Cooling of Solids, *Denis Seletskiy[1], Michael P. Hasselbeck[1], Mansoor Sheik-Bahae[1], Richard I. Epstein[2]; [1]Univ. of New Mexico, USA, [2]Los Alamos Natl. Lab, USA.* We use an optical cavity to enhance the absorption of pump light in a laser cooling experiment. Nearly 90% pump absorption is obtained on resonance and cooling is demonstrated with Yb:ZBLAN glass.

ROOM 337 — QELS

QWH • Photonic Metamaterials—Continued

QWH2 • 5:00 p.m.
Negative Refraction in Mid-Infrared Semiconductor Metamaterials, *Anthony J. Hoffman[1], Leonid Alekseyev[1], Evgenii E. Narimanov[1], Claire Gmachl[1], Deborah L. Sivco[2]; [1]Princeton Univ., USA, [2]Bell Labs, Lucent Technologies, USA.* Semiconductor metamaterials consisting of n+-GaInAs/i-AlInAs heterostructures that support negative index modes in the mid-infrared are reported. We demonstrate negative refraction in these metamaterials for wavelengths from 9-15 µm over a wide range of incidence angles.

QWH3 • 5:15 p.m.
Circular Dichroism in Double-Layer Chiral Metamaterials, *Manuel Decker, Matthias Klein, Martin Wegener, Stefan Linden; Univ. Karlsruhe (TH), Germany.* We present experiments and numerical calculations for chiral metamaterials composed of double-layer gammadions. The excitation of anti-symmetric magnetic modes leads to pronounced circular dichroism. In contrast, polarization effects are negligible in corresponding single layer gammadions.

QWH4 • 5:30 p.m.
Achieving Sharp Resonances in Metamaterials via Engaging "Closed-Modes," *Vassili A. Fedotov[1], Michael Rose[1], Nikitas Papasimakis[1], Sergey L. Prosvirnin[2], Nikolay I. Zheludev[1]; [1]Univ. of Southampton, UK, [2]Inst. of Radio Astronomy, Natl. Acad. of Science, Ukraine.* We report on the new way of achieving sharp transmission and reflection resonances in sub-wavelength structured artificial materials.

ROOM 338 — CLEO

CWM • Free-Space and Multi-Mode Fiber Transmission—Continued

CWM2 • 5:15 p.m.
Receiver Sensitivity Improvement of Optical Wireless Channels with Delayed-Diversified Pulse-Position Modulation, *C. H. Kwok, F. K. Lau, R. V. Penty, I. H. White; Ctr. for Advanced Photonics and Electronics, Dept. of Engineering, Univ. of Cambridge, UK.* We propose a simple approach to improve the receiver sensitivity in a line-of-sight optical-channel using a delayed-diversified-pulse-position-modulation scheme. A 5-dB sensitivity improvement is achieved over the conventional RZ-OOK scheme in the presence of atmospheric turbulence.

CWM3 • 5:30 p.m.
Optimized Multi-Emitter Beams for Free-Space Optical Communications through Atmospheric Turbulence, *Pavel Polynkin[1], Laura Klein[2], Troy Rhoadarmer[2], Avner Peleg[3], Jerome Moloney[3]; [1]College of Optical Sciences, Univ. of Arizona, USA, [2]Starfire Optical Range, AFRL, USA, [3]Arizona Ctr. for Mathematical Sciences, USA.* We report an experimental study of scintillations in a free-space optical communication channel with turbulence. Using optimized multi-emitter beams results in substantial reduction of scintillation index. Experimental results agree with calculations based on Rytov theory.

ROOM 339 — CLEO

CWN • III-IV Nanophotonics—Continued

CWN2 • 5:00 p.m.
Temperature Insensitive Ultra Low Threshold Lasing in Quantum-Dot Photonic-Crystal Nanocavities, *Takehiko Tawara[1], Hidehiko Kamada[1], Yong-Hang Zhang[1,2], Nicholas Ian Cade[1], Takasumi Tanabe[1], Hideki Gotoh[1], Ding Ding[2], Shane Johnson[2], Eiichi Kuramochi[1], Masaya Notomi[1], Hidetoshi Nakano[1]; [1]NTT Basic Res. Labs, Japan, [2]Arizona State Univ., USA.* Temperature insensitive ultra low threshold lasing up to 90 K is observed in quantum dots in photonic crystal nanocavities, due to the fast radiative recombination of excitons and the suppression of the phonon scattering probability.

CWN3 • 5:15 p.m.
High Quality Factor with Fundamental Resonant Mode near the Bandedge of GaN Triangular Submicron Laser Cavity, *C.-m Lai[1], H.-M. Wu[2], P.-C. Huang[2], B.-C. Yeh[2], C.-L. Chou[2], L.-H. Peng[2]; [1]Dept. of Electronic Engineering, Ming Chuan Univ., Taiwan, [2]Inst. of Electro-Optical Engineering, Natl. Taiwan Univ., Taiwan.* Optically-pumped, single-mode stimulated emission was observed on GaN triangular submicron-cavity bounded by {10-10} facets. FDTD analysis indicates a high-*Q* factor (10^3) resultant from material's dispersion effect near the bandedge.

CWN4 • 5:30 p.m.
Growth of Localized InAs/InP Quantum Dots on Nano-Holes for Quantum Photonic Sources, *Pedro Rojo-Romeo, Artur Turala, Philippe Regreny, Fabien Mandorlo, Michel Gendry; INL - CNRS, France.* The localization of InAs Quantum Dots on nanostructured InP(001) surfaces is achieved. The sites for QDs nucleation are nanoholes defined by e-beam lithography. Photoluminescence results of QD area are exposed. Nanosource fabrication is described.

ROOM 340 — CLEO

CWO • Microstructured Fibers and Applications—Continued

CWO2 • 5:00 p.m.
Side Coupling Light into the Core of Photonic Crystal Fiber, *Graham D. Marshall[1], Dougal Kan[2], Ara A. Asatryan[2], Lindsay C. Botten[2], Michael J. Withford[1]; [1]Macquarie Univ., Australia, [2]Univ. of Technology, Australia.* The effect of the cladding region on coupling side-launched light into the core of photonic crystal fiber is studied experimentally and using a multipole computer model. The implications on grating writing in PCFs are discussed.

CWO3 • 5:15 p.m. Invited
Quantum Optics in Microstructured Fibers, *John G. Rarity[1], Jeremie Fulconis[1], Olivier Alibart[1], Jeremy L. O'Brien[1], William J. Wadsworth[2]; [1]Univ. of Bristol, UK, [2]Univ. of Bath, UK.* We have shown that four-wave mixing in micro-structured fibres can be a versatile source of photon pairs for quantum optics experiments. We will review the progress towards all fibre sources for various quantum information applications.

ROOM 341 — CLEO

CWP • Joint Symposium on THz QCLs II—Continued

CWP2 • 5:00 p.m.
Long Wavelength Terahertz Quantum Cascade Lasers, Emitting down to 1.2 THz, *Christoph Walther, Milan Fischer, Giacomo Scalari, Jérôme Faist; Inst. of Physics, Univ. of Neuchâtel, Switzerland.* We report operation of terahertz quantum cascade lasers at frequencies from 2.0 THz down to 1.2 THz by using a bound-to-continuum based lasing scheme which combines high injection efficiency and low intersubband absorption.

CWP3 • 5:15 p.m.
Optically-Assisted Electrically-Driven THz Generation: A New Approach for Efficient THz Quantum Cascade Lasers, *Ines Waldmueller, Weng W. Chow, Michael C. Wanke; Sandia Natl. Labs, USA.* The proposed optically-assisted electrically-driven laser keeps the advantages of optical conversion while overcoming its constraints by recycling the pump photons yielding conversion efficiencies exceeding the Manley-Rowe limit and a path to room temperature THz generation.

CWP4 • 5:30 p.m.
Integrated Horn Antenna for Microstrip Waveguide THz Quantum Cascade Lasers, *Stefano Barbieri[1], Jesse Alton[2], Sukhdeep Dhillon[1], Carlo Sirtori[1,3], Jean Francois Lampin[4], T. Akalin[4], E. Peytavit[4], Harvey Beere[5], David Ritchie[5]; [1]MPQ Lab, France, [2]Teraview Ltd., UK, [3]Thales Res. and Technology, France, [4]Inst. d'Electronique de Microélectronique et de Nanotechnologie, France, [5]Cavendish Lab, UK.* A horn-antenna is integrated on a microstrip waveguide QCL emitting at 2.0 THz. This allows a better impedance match to free space, which improves substantially the directivity of the beam and the radiation outcoupling.

NOTES

CLEO

ROOM 318-320

CWH • Organic Optoelectronics—Continued

CWH2 • 5:45 p.m.
High External Quantum Efficiency from Organic Bulk Heterojunction Photodetectors, *Younggu Kim, Dong H. Park, Min Du, Wei-lou Cao, Chi H. Lee, Warren N. Herman, Danilo B. Romero; Lab for Physical Sciences, Univ. of Maryland at College Park, USA.* From an organic bulk heterojunction photodetector fabricated from a blend of P3HT/PCBM-C_{60}, we report an external quantum efficiency of under an applied bias voltage of -10V, leading to an internal quantum efficiency of 97%.

CWH3 • 6:00 p.m.
Ultrahigh Electro-Optic Coefficient of 170pm/V and Low $V\pi$ of 1V at 1.55μm in Hybrid Polymer/Sol-Gel Waveguide Modulators, *Yasufumi Enami[1], C. T. DeRose[1], D. Mathine[1], C. Loychik[1], C. Greenlee[1], R. A. Norwood[1], R. Stegeman[1], T. D. Kim[2], J. Luo[2], Y. Tian[2], A. K-Y. Jen[2], N. Peyghambarian[1]; [1]College of Optical Sciences, Univ. of Arizona, USA, [2] Dept. of Material Science and Engineering, Univ. of Washington, USA.* We demonstrated the highest EO coefficient with the highest poling efficiency (~100%) in actual modulator devices. This breakthrough was accomplished with contact poling of a crosslinkable EO polymer with an electrically conductive sol-gel cladding.

ROOM 321-323

CWI • Mode-Locked Semiconductor Lasers II—Continued

CWI4 • 5:45 p.m.
Monolithic 1.55-μm GaInNAsSb Quantum Well Mode-Locked Lasers, *Yongchun Xin[1], Luke F. Lester[1], Seth R. Bank[2], H. P. Bae[2], Homan B. Yuen[2], Mark Wistey[2], James S. Harris[2]; [1]Univ. of New Mexico, USA, [2]Stanford Univ., USA.* The first monolithic GaInNAsSb/GaNAs 1550-nm mode-locked lasers are reported on a GaAs substrate. A repetition rate of 5.8 GHz has been realized.

CWI5 • 6:00 p.m.
Optically Injection-Locked Optoelectronic Oscillators with Low RF Threshold Gain, *Hyuk-Kee Sung, Erwin K. Lau, Xiaoxue Zhao, Devang Parekh, Connie J. Chang-Hasnain, Ming C. Wu; Univ. of California at Berkeley, USA.* We experimentally investigate the optical and RF characteristics of optically injection-locked optoelectronic oscillators. With strong optical injection and optimized frequency detuning, we have achieved a very low RF threshold gain of 7dB for optoelectronic oscillation.

JOINT

ROOM 324-326

JWE • High-Power Few-Cycle Sources—Continued

JWE5 • 6:00 p.m.
Multiterawatt Three-Cycle Optical Parametric Chirped Pulse Amplifier, *Franz Tavella, Laszlo Veisz, Andrius Marcinkevicius, Ferenc Krausz; Max Planck Inst. für Quantenoptik, Germany.* Optical parametric chirped pulse amplification is one of the most promising techniques for the amplification of few-cycle pulses. We show amplification and compression to the multiterawatt level of near transform-limited three-optical-cycle pulses.

CLEO

ROOM 314

CWJ • Ultrafast Dynamics and Optical Switching—Continued

CWJ5 • 5:45 p.m.
Multi-Fiber-Channel, Ultrafast, All-Optical Switch Utilizing a 2-D Fresnel Lens Array , *Darren Wu[1], Waleed Mohammed[1], Pradeep Srinivasan[2], Eric G. Johnson[2], Li Qian[1], Peter W.E. Smith[1]; [1]Univ. of Toronto, Canada, [2]College of Optics and Photonics, CREOL, Univ. of Central Florida, USA.* We demonstrate multi-fiber-channel, multi-wavelength operation of an ultrafast all-optical switch using a compact 2-D lens array and a commercial fiber array. Our objective is to demonstrate the device's potential for broadband multi-variable all-optical signal processing.

CWJ6 • 6:00 p.m.
Ultrafast Organic Photonic Crystal Optical Switching, *Xiaoyong Hu, Ping Jiang, Hong Yang, Gong Qihuang; Peking Univ., China.* An all-optical switching with an ultrafast response time of femtosecond order is demonstrated in a two-dimensional polystyrene photonic crystal excited by a 9.7 MW/cm^2 pump laser. High switching efficiency of about 70% is achieved.

ROOM 315

CWK • Biosensors—Continued

CWK5 • 5:45 p.m.
Biological Life Signs Detection Using High Sensitivity Pulsed Laser Vibrometer, *Chen-Chia Wang[1], Sudhir Trivedi[1], Feng Jin[1], Zhongyang Chen[2], Jacob Khurgin[2], Ponciano Rodriguez[3], Narasimha S. Prasad[4]; [1]Brimrose Corp, USA, [2]Johns Hopkins Univ., USA, [3]INAOE, Mexico, [4]NASA Langley Res. Ctr., USA.* We present remote detection of biological life signs, including heartbeat, breathing, gross physical movement, and blood circulation conditions using highly sensitive, speckle-tolerant pulsed laser vibrometer that allows interrogation from essentially anywhere of the subject's body.

CWK6 • 6:00 p.m.
Multilayer Polymer Optical Backplanes for Frequency Multiplexed Phase Fluorometry Arrays, *Kevin S. Lee, Rajeev J. Ram; MIT, USA.* Fluorescence detection with dense sensor arrays is realized in a multilayer large core polymer waveguide optical backplane. The multilayer backplane employs optical vias combined with frequency domain multiplexing to facilitate 4:1 multiplexing in the readout.

ROOM 316

CWL • Panel on Solid-State Laser Power Scaling through Beam Combination—Continued

QELS

ROOM 317

QWF • Entanglement—Continued

QWF2 • 5:45 p.m.
Effects of Turbulence on the Transverse Position-Momentum Entanglement of Biphotons, *Kam Wai Chan[1], Anand Jha[1], Malcolm N. O'Sullivan-Hale[1], Robert W. Boyd[1], Glenn A. Tyler[2]; [1]Inst. of Optics, Univ. of Rochester, USA, [2]Optical Sciences Co., USA.* Entangled biphotons propagating through a turbulent medium are studied. We analyze the dependence of the transverse position-momentum entanglement of the photons on coherence diameter by taking a quadratic approximation to the wave-structure function.

QWF3 • 6:00 p.m.
Generation of Entangled Photon Pairs Based on Intra-Cavity Four-Wave-Mixing in Dual-Wavelength Fiber Ring Laser, *Jae-Ho Han, Jin U. Kang; Johns Hopkins Univ., USA.* We have experimentally demonstrated a compact and efficient source of entangled photon pairs by using intra-cavity four wave mixing (FWM) in dual-wavelength Erbium doped fiber ring laser for the application in quantum key distribution systems.

ROOM 336

QWG • Laser Cooling and Other Effects in Semiconductors—Continued

QWG4 • 5:45 p.m.
Improvement of the Efficiency of Laser Cooling Using Type II Multiple QW's, *Jacob B. Khurgin; Johns Hopkins Univ., USA.* Type II multiple quantum wells exhibit strong anti-Stokes shift of the fluorescence. This phenomenon can used to achieve laser cooling with efficiency increased by a factor of few compared to bulk.

QWG5 • 6:00 p.m.
Ultrafast Radiative Decay of Confined Excitons Due to Long-Range Coherent Coupling with Radiation Wave, *Masayoshi Ichimiya[1,2], Masaaki Ashida[1,2], Hideki Yasuda[1,2,3], Hajime Ishihara[1,3], Tadashi Itoh[1,2]; [1]CREST, Japan Science and Technology Agency, Japan, [2]Graduate School of Engineering Science, Osaka Univ., Japan, [3]Graduate School of Engineering, Osaka Prefecture Univ., Japan.* Transient grating spectrum and the delay time dependence are investigated in a CuCl thin film. The structures for complex eigenmodes and the ultrafast radiative decay rates of excitons below 200 fs are observed.

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

QELS | CLEO

QWH • Photonic Metamaterials—Continued

QWH5 • 5:45 p.m.
Three-Dimensional Electromagnetic Metamaterials with Non-Maxwellian Effective Fields, *Jonghwa Shin, Jung-Tsung Shen, Shanhui Fan; Stanford Univ., USA.* We propose a new class of electromagnetic metamaterial systems, whose long-wavelength behaviors cannot be described by Maxwell's equations in a uniform media, and instead possess much richer properties.

QWH6 • 6:00 p.m.
Three Wave Interaction in Negative Refractive Index Materials with Quadratic Nonlinearity, *Andrei Maimistov[1], Ildar Gabitov[2], Elena Kazantseva[2]; [1]Moscow Engineering Physics Inst., Russian Federation, [2]Univ. of Arizona, USA.* We examine waves propagation in negative refractive index materials with quadratic nonlinearity. We analyze the modulational instability of the wave with constant background. The solitary wave solutions binding pump and second harmonic waves are found.

CWM • Free-Space and Multi-Mode Fiber Transmission—Continued

CWM4 • 5:45 p.m.
Simple SBS-Mitigating Waveforms for High-Power PPM Transmitters for Space Laser Communications, *Neal W. Spellmeyer, Don M. Boroson, David O. Caplan, Bryan S. Robinson, Mark L. Stevens; MIT Lincoln Lab, USA.* Simple waveforms with sub-pulse structure for mitigating stimulated Brillouin scattering in high-power fiber amplifiers using pulse-position-modulated data formats are presented. Experimental measurements show good agreement with theory. The impact on lasercom transmitter design is discussed.

CWM5 • 6:00 p.m.
Mode Coupling: Why POF Supports 40Gbps, *Arup Polley, Kasyapa Balemarthy, Stephen E. Ralph; Georgia Tech, USA.* We demonstrate experimentally and numerically that mode-coupling in graded index plastic optical fiber enables 40Gbps over 200m in the presence of dramatic refractive index errors.

CWN • III-IV Nanophotonics—Continued

CWN5 • 5:45 p.m.
Local On-Chip Temperature Tuning of InGaAs Quantum Dots, *Andrei Faraon[1], Dirk Englund[1], Ilya Fushman[1], Jelena Vuckovic[1], Nick Stoltz[2], Pierre Petroff[2]; [1]Stanford Univ., USA, [2]Univ. of California at Santa Barbara, USA.* Quantum network based on InGaAs quantum dots (QDs) rely on QDs being in resonance with each other. We developed a new technique based on temperature tuning to spectrally align QDs located on the same chip.

CWN6 • 6:00 p.m.
Littrow Lasing in Photonic Crystal Waveguides, *Omer Khayam[1], Melanie Ayre[1], Cyril Cambournac[1], Henri Benisty[1], Wolfram Pernice[2], Dominic Gallagher[3]; [1]Lab Charles Fabry de l'Inst. d'Optique, CNRS, Univ Paris Sud, France, [2]Dept. of Engineering Science, Univ. of Oxford, UK, [3]Photon Design, UK.* We propose Littrow based lasing of band edge modes in an open resonator formed by broad photonic crystal waveguide. The concept is developed by plane wave and FDTD simulations of bulk crystal and waveguide.

CWO • Microstructured Fibers and Applications—Continued

CWO4 • 5:45 p.m.
Practical Design of Microstructured Optical Fibers for Surface Plasmon Resonance Excitation, *Alireza Hassani, Maksim Skorobogatiy; École Polytechnique de Montréal, Canada.* Plasmons on the surface of large metallized holes containing analyte are excited by the fundamental mode of a microstructured fiber. Phase matching between plasmon and core modes is facilitated by the perforation of fiber core.

CWO5 • 6:00 p.m.
Index-Guiding, Single-Mode, Liquid-Core, Liquid-Cladding Photonic Crystal Fibers, *Christiano J.S. de Matos[1], Cristiano M.B. Cordeiro[2], Alexandre Bozolan[1], Jackson S.K. Ong[1], Eliane M. dos Santos[2], Carlos H. de Brito Cruz[2]; [1]Univ. Presbiteriana Mackenzie, Brazil, [2]UNICAMP, Brazil.* Index-guiding, hollow-core photonic crystal fibers whose core and cladding have been filled with different liquids are theoretically and experimentally demonstrated. These waveguides present a single-mode operation and applicability in sensing and nonlinear optics of liquids.

CWP • Joint Symposium on THz QCLs II—Continued

CWP5 • 5:45 p.m.
Electrical and Optical Characterization of Microdisk Quantum Cascade Lasers Emitting at Terahertz Frequencies, *L. Andrea Dunbar[1], Giacomo Scalari[2], Lorenzo Sirigu[2], Marcella Giovannini[2], Romuald Houdré[1], Jérôme Faist[2]; [1]Inst. de Photonique et d'Electronique Quantique, Ecole Polytechnique Federale de Lausanne, Switzerland, [2]Dept. of Physics, Univ. of Neuchâtel, Switzerland.* Quantum cascade laser samples microdisks with double plasmon waveguiding were fabricated (λ@80µm). High impedance mismatch between the confined optical mode and surrounding free-space allows the existence of whispering gallery modes 'unobtainable' in standard dielectric microdisks.

CWP6 • 6:00 p.m.
Terahertz Quantum Cascade Lasers: Novel Resonators and Linewidth Properties, *Lukas Mahler[1], Richard Green[1], Ji-Hua Xu[1], Alessandro Tredicucci[1], Guido Giuliani[2], Harvey E. Beere[3], David A. Ritchie[3]; [1]Scuola Normale Superiore, Italy, [2]Univ. di Pavia, Italy, [3]Cavendish Lab, Univ. of Cambridge, UK.* We report simulations and experimental results of THz QCLs with quasiperiodic resonators based on a Fibonacci sequence. We have also measured the linewidth enhancement factor of a THz QCL.

NOTES

ROOM 318-320 — CLEO

CWH • Organic Optoelectronics—Continued

CWH4 • 6:15 p.m.
Photoconductive Properties of Regioregular Poly(3-hexylthiophene), *Jonathan P. Laib, Hui Zhan, Jason A. Deibel, Daniel M. Mittleman, Jeff Worne, Douglas Natelson; Rice Univ., USA.* We investigate the photoconductivity of regioregular Poly(3-hexylthiophene) using 400 and 800 nm light. We observe a linear dependence of the photocurrent on optical power at both wavelengths.

ROOM 321-323 — CLEO

CWI • Mode-Locked Semiconductor Lasers II—Continued

CWI6 • 6:15 p.m.
Bistable Lasing Wavelength in a Mode-Locked Two-Section Quantum-Dot Diode Laser, *Mingming Feng[1], Steven T. Cundiff[1], Richard P. Mirin[2], Kevin L. Silverman[2]; [1]Dept. of Physics, Univ. of Colorado, and JILA, NIST and Univ. of Colorado, USA, [2]NIST, USA.* We report a two-section mode-locked quantum dot laser with an emission wavelength that is bistable with respect to applied reverse bias on the saturable absorber region.

ROOM 324-326 — JOINT

JWE • High-Power Few-Cycle Sources—Continued

JWE6 • 6:15 p.m.
Few-Cycle Terawatt Optical Parametric Chirped-Pulse Amplification System Using an Yb:YLF Chirped-Pulse Amplification Pump Laser, *Makoto Aoyama[1], Yutaka Akahane[1], Kanade Ogawa[1], Koichi Tsuji[1], Akira Sugiyama[1], Koichi Yamakawa[1], Tetsuo Harimoto[2], Junji Kawanaka[3], Hajime Nishioka[4], Masayuki Fujita[5]; [1]Japan Atomic Energy Agency, Japan, [2]Faculty of Engineering, Univ. of Yamanashi, Japan, [3]Inst. of Laser Engineering, Osaka Univ., Japan, [4]Inst. for Laser Science, Univ. of Electro-Communications, Japan, [5]Inst. for Laser Technology, Japan.* We present an ultra-broadband optical parametric chirped-pulse amplification system with a 400 nm bandwidth pumped by two broadband pulses delivered from a liquid nitrogen cooled Yb:YLF chirped-pulse amplification laser.

ROOM 314 — CLEO

CWJ • Ultrafast Dynamics and Optical Switching—Continued

CWJ7 • 6:15 p.m.
Optical Spatially Quantized High Performance Analog-to-Digital Conversion, *Mona Jarrahi, David A. B. Miller, Fabian W. Pease, Thomas H. Lee; Stanford Univ., USA.* We present an optical spatial quantized analog-to-digital converter (ADC) and experimentally demonstrate 8-level quantization consuming only 7.2pJ per quantization operation. Measured 8ps full-width half-maximum photodetector outputs, promises the potential of realizing a 3bit 125GS/s ADC.

ROOM 315 — CLEO

CWK • Biosensors—Continued

CWK7 • 6:15 p.m.
Single Molecule Pulsed Interleaved Excitation Fluorescence Resonance Energy Transfer (PIE-FRET) inside Nanometer-Scale Apertures at Biologically Relevant Concentration, *Samantha Fore[1], Thomas Huser[1], Yin Yuen[2], Lambertus Hesselink[2]; [1]Univ. of California at Davis, USA, [2]Stanford Univ., USA.* PIE-FRET offers significant advantages over conventional single molecule FRET techniques, but it still requires the dilution of samples to biologically low concentrations. Here, we present FRET measurements inside nm-sized apertures at ~1000 times higher concentrations.

ROOM 316 — CLEO

CWL • Panel on Solid-State Laser Power Scaling through Beam Combination—Continued

ROOM 317 — QELS

QWF • Entanglement—Continued

QWF4 • 6:15 p.m.
Photon Pair Generation in Reverse-Proton-Exchange Lithium Niobate Waveguides with Mode Demultiplexing at a Pump Repetition Rate of 10 GHz, *Xiuping Xie[1], Qiang Zhang[1], Carsten Langrock[1], Yoshihisa Yamamoto[1], Martin M. Fejer[1], Hiroki Takesue[2], Sae Woo Nam[3]; [1]Stanford Univ., USA, [2]NTT Basic Res. Labs, NTT Corp., Japan, [3]NIST, USA.* We report correlated photon pair generation in periodically-poled reverse-proton-exchange lithium niobate waveguides with mode demultiplexing using 10-ps-long laser pulses at a repetition rate of 10 GHz. We observed a visibility as high as 167.

ROOM 336 — QELS

QWG • Laser Cooling and Other Effects in Semiconductors—Continued

QWG6 • 6:15 p.m.
Resonant Energy Transfer Due to Exciton-Exciton Interaction in the Strong Coupling Regime in Hybrid InGaN Quantum Wells, *Jianyou Li[1], Arup Neogi[1], Teruya Ishihara[2], Atsushi Tackeuchi[3]; [1]Univ. of North Texas, USA, [2]RIKEN, Japan, [3]Waseda Univ., Japan.* Resonant coupling of excitons in strongly confined hybrid perovskite conjugated to InGaN quantum wells is observed. Temperature and time-resolved-photoluminescence (PL) reveal 10 times enhancement of recombination lifetime in strong-coupling regime due to resonant energy transfer.

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

QWH • Photonic Metamaterials—Continued

QWH7 • 6:15 p.m.
Light Transfer, Parallel Focusing and Demultiplexing Using Negative Refraction in Photonic Crystal, *Takashi Matsumoto, Tomohiko Asatsuma, Toshihiko Baba; Yokoham Natl. Univ., Japan.* We experimentally demonstrate three important functions utilizing the negative refraction of light in the photonic crystal slab, for the first time. They will be applicable to a sophisticated in-plane free space optical network.

CWM • Free-Space and Multi-Mode Fiber Transmission—Continued

CWM6 • 6:15 p.m.
Twin-Spot Launch for Enhancement of Multimode-Fiber Communication Links, *Qing Sun[1], Jonathan D. Ingham[1], Richard V. Penty[1], Ian H. White[1], David G. Cunningham[2]; [1]Univ. of Cambridge, UK, [2]Avago Technologies, UK.* A novel twin-spot launch is proposed for multimode-fiber (MMF) links. Experimental and theoretical investigation of the launch indicates a penalty reduction of ≈50% of the 10 Gigabit Ethernet allocation for EDC-enabled links over worst-case MMF.

CWN • III-IV Nanophotonics—Continued

CWN7 • 6:15 p.m.
Topology Optimization for Photonic Crystal Waveguide Bends with Wide and Flat Bandwidths in Air-Bride Type Photonic Crystal Slabs, *Yoshinori Watanabe[1], Naoki Ikeda[1,2], Yoshimasa Sugimoto[1,2], Yoshiaki Takata[1], Yoshinori Kitagawa[1], Akio Mizutani[1], Nobuhiko Ozaki[1], Kiyoshi Asakawa[1]; [1]Univ. of Tsukuba, Japan, [2]AIST, Japan.* Topology optimization method has been applied to design the waveguide bends in the air-bridge type two-dimensional photonic crystal slab. We demonstrated that the optimized bends show good performance, comparable to the straight waveguide.

CWO • Microstructured Fibers and Applications—Continued

CWO6 • 6:15 p.m.
IR Supercontinuum in Compact Tellurite PCFs, *Peter Domachuk[1], Natalie A. Wolchover[1], Mark Cronin-Golomb[1], Fiorenzo Omenetto[1], K. K. Jang[2], Jaewook Ahn[2], Aimin Wang[3], Alan C. George[3], Jonathan Knight[3]; [1]Tufts Univ., USA, [2]Korea Advanced Inst. of Science and Technology, Republic of Korea, [3]Univ. of Bath, UK.* We demonstrate two-octave supercontinuum generation in an 8 cm length of tellurite glass photonic crystal fiber. The high modal confinement and nonlinearity of the tellurite PCF enables the short length of fiber used.

CWP • Joint Symposium on THz QCLs II—Continued

CWP7 • 6:15 p.m.
Ultra-Low Threshold THz Microcavity Lasers with Sub-Wavelength Mode Volumes, *Yannick Chassagneux[1], Jose Palomo[1], Raffaele Colombelli[1], Sukhi Dhillon[2], Stefano Barbieri[2], Carlo Sirtori[2], Harvey Beere[3], Jessie Alton[3], David Ritchie[3]; [1]Inst. d'Electronique Fondamentale, France, [2]MPQ, France, [3]Cavendish Lab, Univ. of Cambridge, UK.* We demonstrate terahertz microcavity-lasers at λ=112μm with ultra-low current-thresholds of 4mA and mode-volumes of less than one-cubic-wavelength. Confinement in the longitudinal direction is obtained using almost-circular micro-disk-resonators. Devices lase up to 70K/60K in pulsed mode/cw.

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