CLEO/QELS 2007

Postdeadline Papers

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CLEO/QELS 2007 Postdeadline Papers

AGENDA OF SESSIONS

Session	Room	Time
CPDA – CLEO Postdeadline Session I	314	8:00 p.m. – 10:00 p.m.
CPDB – CLEO Postdeadline Session II	315	8:00 p.m. – 10:00 p.m.
QPDA – QELS Postdeadline Session	316	8:00 p.m. – 10:00 p.m.

ABSTRACTS

►CLEO PAPERS

Room: 314
CPDA—CLEO Postdeadline Session I
8:00 p.m. – 10:00 p.m.
Jerry Meyer; NRL, USA, Presider

CPDA1 • 8:00 p.m.
Real-Time Detection of Bacterial Spores, *Arthur Dogariu[1], Yu Huang[1], Dmitry Pestov[2], Robert K. Murawski[2], Alexei V. Sokolov[2], Marlan O. Scully[1,2]; [1]Princeton Univ., USA, [2]Texas A&M Univ., USA.* We demonstrate a real-time method with high sensitivity and high selectivity for detection of Anthrax-surrogate spores using Coherent Anti-Stokes Raman Scattering. We reliably detect spores in less than 50 ms based on their vibrational spectra.

CPDA2 • 8:10 p.m.
Transparent Wavelength Switching of Resonant Filters, *Milos A. Popovic, Tymon Barwicz, Fuwan Gan, Marcus S. Dahlem, Charles W. Holzwarth, Peter T. Rakich, Henry I. Smith, Erich P. Ippen, Franz X. Kärtner; MIT, USA.* We demonstrate the first fully hitless (no out-of-band bit-loss/signal distortion) wavelength switching of microphotonic add-drop filters using silicon microring resonators, based on a new general approach for complete disabling of resonant-system amplitude and phase responses.

CPDA3 • 8:20 p.m.
Ultra-Low Power Frequency Conversion in Silicon Micro-Ring Resonators, *Amy C. Turner, Mark A. Foster, Alexander L. Gaeta, Michal Lipson; Cornell Univ., USA.* We demonstrate ultra-low-power frequency conversion in a micrometer-sized photonic silicon structure via microcavity-enhanced four-wave mixing. Using continuous-wave pump powers of 5mW, we achieve frequency conversion across the C-band in a compact 50-μm radius ring.

CPDA4 • 8:30 p.m.
Observation of Optical Soliton in an SOI Waveguide, *Jidong Zhang, Qiang Lin, Giovanni Piredda, Robert W. Boyd, Govind P. Agrawal, Philippe M. Fauchet; Univ. of Rochester, USA.* We observe, for the first time to our knowledge, the formation of optical solitons inside a short silicon waveguide (only 5 mm long) with sub-picojoule pulses.

CPDA5 • 8:40 p.m.
Merging Spintronics with Plasmonics: Evidence of Electron Spin-Controlled Light Transport, *Kenneth J. Chau[1], Mark Johnson[2], Abdulhakem Y. Elezzabi[1]; [1]Univ. of Alberta, Canada, [2]NRL, USA.* We provide evidence of electron spin-dependent terahertz plasmonic transport through sub-wavelength ferromagnetic/nonmagnetic microparticles. The mechanism is related to dynamic spin accumulation in the nonmagnet. The discovery may lead to plasmonic devices that exploit electron spin.

CPDA6 • 8:50 p.m.
Optical Detection of Terahertz Using Nonlinear Frequency Up-Conversion, *Mohammad Jalal Khan, Jerry Chen, Sumanth Kaushik; MIT Lincoln Lab, USA.* We describe and demonstrate sensitive room-temperature detection of terahertz radiation by nonlinear upconversion to the 1550 nm regime. We rely on telecomm components, achieving a highest reported to date terahertz-to-optical photon conversion efficiency of 0.001%.

CPDA7 • 9:00 p.m.
25% Modulation Depth at 1.54 μm from Large-Area Solution-Processed Colloidal Quantum Dot Electro-Absorption Modulators, *Sjoerd Hoogland, Vlad Sukhovatkin, Harnik Shukla, Jason Clifford, Larissa Levina, Edward H. Sargent; Univ. of Toronto, Canada.* We demonstrate Stark-effect-induced absorption modulation in a large-area spin-cast infrared colloidal quantum dot device. At a wavelength of 1540 nm the modulation depth was >25% for an applied bias of 12 V.

CPDA8 • 9:10 p.m.
Advance in Type II InAs/GaSb Superlattice Photodiodes for LWIR Detection and Imaging, *Manijeh Razeghi, Binh-Minh Nguyen, Pierre-Yves Delaunay, Darin Hoffman, Yajun Wei, Andrew Hood; Northwestern Univ., USA.* Recent effort has lifted the Quantum Efficiency of Type-II InAs/GaSb superlattice photodetectors to 54%, comparable to the state-of-the-art MCT technology. High quality Type II Superlattice Focal Plane Array with a 12μm cut-off wavelength was demonstrated.

CPDA9 • 9:20 p.m.
Antimonide-Based Geiger-Mode Avalanche Photodiodes at 2 μm Wavelength, *Erik K. Duerr, Michael J. Manfra, Mohamed A. Diagne, Robert J. Bailey, Joseph P. Donnelly, Michael K. Connors, George W. Turner; Lincoln Lab, MIT, USA.* Geiger-mode avalanche photodiodes (APDs) at 2-μm wavelength have been developed in the antimonide material system. At 77K, the APDs demonstrated a dark count rate of 210kHz and an avalanche probability of 35% at 4.5V overbias.

CPDA10 • 9:30 p.m.
Cascaded Injection-Locked 1.55-μm VCSELs for High-Speed Transmission, *Xiaoxue Zhao, Devang Parekh, Erwin K. Lau, Hyuk-Kee Sung, Ming C. Wu, Connie J. Chang-Hasnain; Dept. of Electrical Engineering and Computer Science, Univ. of California at Berkeley, USA.* We demonstrate high-speed laser transmitters with low-frequency components using a novel cascaded injection-locking scheme. Tailorable RF response with bandwidth about 52 GHz can be obtained by adjusting locking parameters of the two slave lasers independently.

CPDA11 • 9:40 p.m.
High-Speed Electroabsorption Modulation of Single-Mode Composite-Resonator Vertical-Cavity Lasers, *Chen Chen[1], Paul O. Leisher[2], Daniel M. Drasso[3], Christopher Long[1], Kent D. Choquette[1]; [1]Univ. of Illinois at Urbana-Champaign, USA, [2]nLight Corp., USA, [3]Nuvonyx, Inc., USA.* The high-speed characteristics of a single-mode composite-resonator vertical-cavity laser (CRVCL) under electroabsorption modulation are investigated. The CRVCL exhibits the promising potential to extend the modulation bandwidth beyond that of a conventional VCSEL.

CPDA12 • 9:50 p.m.
High Brightness Lasers Using an In-Phase, Coherently Coupled, Output Waveguide Array, *V. C. Elarde, K. E. Tobin, R. K. Price, V. V. Verma, J. J. Coleman; Univ. of Illinois, USA.* We have developed a novel diode laser coupled waveguide array which achieves strong in-phase coupling. Far-field measurements show an interference pattern with a strong, narrow, stable, on-axis central lobe ideal for high-brightness applications.

Room: 315
CPDB—CLEO Postdeadline Session II
8:00 p.m. – 10:00 p.m.
Franz Kaertner; MIT, USA, Presider

CPDB1 • 8:00 p.m.
Diode-Pumped 22-W Average-Power uv Laser with User-Selectable Pulse Width and >50% Conversion Efficiency, *John Honig, John Halpin; LLNL, USA.* A diode-pumped Nd:YAG laser (39 W at 1064 nm) has been frequency tripled with >50% conversion efficiency (22 W at 355 nm). The laser operates at 300 Hz with pulse energies >73 mJ.

CPDB2 • 8:10 p.m.
Laser Diode Array Pumped Cesium Laser with 13 W Output, *Boris Zhdanov, Randall Knize; US Air Force Acad., USA.* We present a Cesium vapor laser pumped with a continuous wave narrowband laser diode array. The laser has output power 13 W, slope efficiency 68% and overall optical efficiency 62%.

CPDB3 • 8:20 p.m.
$4 \cdot 10^{13}$ W/cm^2 at 136 MHz Repetition Rate from a Cavity Enhanced Yb-Similariton Fiber Laser, *Thomas R. Schibli[1], Darren D. Hudson[1], Dylan C. Yost[1], Jun Ye[1], Ingmar Hartl[2], Andrius Marcinkevicius[2], Martin E. Fermann[2]; [1]JILA, Univ. of Colorado at Boulder, USA, [2]IMRA America, Inc., USA.* We achieved record high 1.3 kW average power and $4 \cdot 10^{13}$ W/cm^2 peak intensities at 136 MHz pulse repetition rate via cavity enhancement of a Yb-fiber-frequency-comb laser. We demonstrate a fully saturated laser-induced plasma of Xe.

CPDB4 • 8:30 p.m.
Temporal Characterization of Energy-Tunable EUV Pulses in the Sub-Optical-Cycle Regime Using FROG-CRAB, *Isabell Thomann, Emily Gregonis, Margaret Murnane, Henry Kapteyn; JILA, Univ. of Colorado at Boulder, USA.* We temporally characterize 1.5 fs FWHM intensity extreme-ultraviolet pulses by two-color cross-correlation. Careful application of the interferometric FROG CRAB technique allows for determination of EUV pulse width without deconvolution from the driving laser.

CPDB5 • 8:40 p.m.
Complete Characterization of Photoelectron Wave Packets by Spectral Shearing Interferometry, *Taro Sekikawa, Eisuke Haraguchi, Takashi Tanigawa, Mikio Yamashita; Hokkaido Univ., Japan.* We propose a simple and robust method to characterize attosecond pulses fully by photoelectron spectral shearing interferometry. As the first step, complete characterization of photoelectron wave packets produced by above-threshold ionization is demonstrated.

CPDB6 • 8:50 p.m.
High Energy, Long Pulse Filaments in Air, *Olivier J. Chalus[1], Alexey Sukhinin[2], Alejandro Aceves[2], Jean-Claude Diels[3]; [1]Ctr. for High Technology Materials, Univ. of New Mexico, USA, [2]Dept. of Mathematics, Univ. of New Mexico, USA, [3]Dept. of Physics and Astronomy, Univ. of New Mexico, USA.* We have produced, for the first time, a single long pulse UV filament in air with an energy in excess of 100 mJ.

CPDB7 • 9:00 p.m.
Direct Writing of High Strength Bragg Grating Waveguides in Fused Silica by an Externally Modulated Ultrafast Fiber Laser, *Haibin Zhang, Shane M. Eaton, Peter R. Herman; Univ. of Toronto, Canada.* Strong >35-dB first-order Bragg-grating-waveguides with sharp 0.2-nm resonances were inscribed in a single scanning step inside bulk fused silica glass with an externally modulated ultrafast fiber laser. The grating devices were thermally stable to 500°C.

CPDB8 • 9:10 p.m.
Low-Loss Waveguides Fabricated in $KGd(WO_4)_2$ by High Repetition Rate Femtosecond Laser, *Clark A. Merchant[1], Shane M. Eaton[1], Rajiv Iyer[1], Amr S. Helmy[1], Peter R. Herman[1], J. Stewart Aitchison[1], Cyril Hnatovsky[2], Rod S. Taylor[2]; [1]Univ. of Toronto, Canada, [2]Inst. for Microstructural Sciences, Natl. Res. Council (NRC), Canada.* We report formation of low-loss waveguides in $KGd(WO_4)_2$ with a focused high repetition-rate femtosecond laser. The guiding structures support both TE and TM polarized modes and show preservation of the crystal Raman activity.

CPDB9 • 9:20 p.m.
Amplitude and Phase Shaping of Ultrafast Laser Pulses with a Single High-Resolution Linear Liquid Crystal Array, *Philip Schlup, Jesse Wilson, Randy A. Bartels; Colorado State Univ., USA.* A single liquid-crystal array, whose pixel pitch over-samples the spatial resolution of a pulse shaper, is used to simultaneously shape the spectral amplitude and phase of ultrashort laser pulses. A sinusoidal grating controls spectral amplitude.

CPDB10 • 9:30 p.m.
CSS-AMPSK for Rayleigh Noise Mitigation in PONs, *C. W. Chow, G. Talli, A. D. Ellis, P. D. Townsend; Photonic Systems Group, Tyndall Natl. Inst., Ireland.* We demonstrate a novel Rayleigh-noise-mitigation scheme for 10-Gb/s-DWDM-PONs using CSS-AMPSK modulation, generated by a single Mach-Zehnder-modulator (MZM). The required optical-signal-to-Rayleigh-noise-ratio (OSRNR) is reduced by 12dB, while achieving excellent tolerance to dispersion, subcarrier-frequency and drive-amplitude variations.

CPDB11 • 9:40 p.m.
An Ultrastable Cs Optical Atomic Clock with a Regeneratively Mode-Locked Fiber Laser and an Optically Pumped Cs Gas Cell, *Toru Hirayama[1], Masato Yoshida[1], Masataka Nakazawa[1], Ken Hagimoto[2], Takeshi Ikegami[2]; [1]Res. Inst. of Electrical Communication, Tohoku Univ., Japan, [2]Inst. of Advanced Industrial Science and Technology, Japan.* We demonstrate an ultra-stable rack-mount type Cs optical atomic clock with a regeneratively mode-locked fiber laser and a Cs gas cell. The frequency stability reached as high as 5.0×10^{-14} for τ=1000 s.

CPDB12 • 9:50 p.m.
Counter-Propagating QPM Parametric Interacions: A Mirrorless OPO in sub-μm Periodically Poled $KTiOPO_4$, *Carlota Canalias, Valdas Pasiskevicius; Laser Physics, Royal Inst. of Technology, Sweden.* We report on the first experimental demonstration of mirrorless optical parametric oscillation. The counter-propagating idler and signal oscillate without an external cavity in a sub-μm periodically poled $KTiOPO_4$ crystal, reaching an efficiency of 16.5%.

►QELS PAPERS

Room: 316

QPDA—QELS Postdeadline Session

8:00 p.m. – 10:00 p.m.

Paul Lett; NIST, USA; Mordechai Segev; Technion – Israel Inst. of Technology, Israel, Presiders

QPDA1 • 8:00 p.m.

A Simple Spin-Exchange-Relaxation-Free Atomic Magnetometer Using Microfabricated Vapor Cell, *Vishal Shah, Peter Schwindt, Svenja Knappe, John Kitching; NIST, USA.* We demonstrate an atomic magnetometer with a sensitivity below 100 fT/√Hz, using a millimeter-scale microfabricated alkali vapor cell and a single low-power diode laser. This work suggests that compact, low-power, highly sensitive magnetometers are feasible.

QPDA2 • 8:15 p.m.

Fiber-Based Telecom-Band CNOT Gate, *Jun Chen[1], Joseph B. Altepeter[1], Milja Medic[1], Kim Fook Lee[1], Burc Gokden[1], Prem Kumar[1], Robert H. Hadfield[2], Sae Woo Nam[2]; [1]Northwestern Univ., USA, [2]NIST, USA.* We present the first controlled-NOT gate realized using a fiber-based indistinguishable photon-pair source in the 1.55 μm telecom band. Such operation makes this gate particularly attractive for distributed quantum information processing.

QPDA3 • 8:30 p.m.

A Robust Phase-Stable Broadband High Spectral Brightness Polarization-Entangled Fiber-Based Two-Photon Source, *Jingyun Fan; NIST, USA.* We report making a broadband high spectral brightness polarization-entangled fiber-based two-photon source, with registered photon coincidence rate of 7 kHz, visibility greater than 97% and violation of classical limit by 37 σ at room temperature.

QPDA4 • 8:45 p.m.

Nanophotonic Devices Based on Two-Dimensional Negative Refractive Index Materials, *Igor I. Smolyaninov, Yu-Ju Hung, Christopher C. Davis; Univ. of Maryland, USA.* Fabrication of 3-D negative refractive index materials in the visible range faces numerous technological challenges. We demonstrate that negative refractive index metamaterial devices may be realized much easier in two spatial dimensions using surface plasmons.

QPDA5 • 9:00 p.m.

Soft X-Ray Driven Femtosecond Molecular Dynamics, *Arvinder S. Sandhu[1], Etienne Gagnon[1], Predrag Ranitovic[2], Ariel Paul[1], C. Lewis Cocke[2], Margaret M. Murnane[1], Henry C. Kapteyn[1]; [1]JILA, Univ. of Colorado and NIST, USA, [2]Kansas State Univ., USA.* We present the first direct measurements of ultrafast EUV ionization-induced dynamics in molecules. Using a few femtosecond EUV pump and strong-field probe, we time resolve the evolution of molecular ion Rydberg states.

QPDA6 • 9:15 p.m.

Slow-to-Fast Light Switching in Quantum-Well Semiconductor Optical Amplifier, *Piotr K. Kondratko, Shun Lien Chuang; Univ. of Illinois at Urbana-Champaign, USA.* We demonstrate and model a large delay-bandwidth product of 0.56 at 1 GHz by switching from absorption (slow-light) to gain (fast-light) in a quantum-well semiconductor optical amplifier.

QPDA7 • 9:30 p.m.
High Sensitive Detection of THz-Wave at Room Temperature Using of Stimulated Polariton Scattering in MgO:$LiNbO_3$, *Ruixiang Guo, Tomofumi Ikari, Hiroaki Minamide, Hiromasa Ito; Photodynamics Res. Ctr., RIKEN, Japan.* We demonstrate THz-wave detection running at room temperature utilizing stimulated scattering in MgO:$LiNbO_3$, which is two of magnitude more sensitive and three of magnitude faster than a typical Si bolometer for detecting quasi-cw THz-wave beam.

QPDA8 • 9:45 p.m.
Direct Measurement of Sub-100 Nanometer Light Confinement in Dielectric Photonic Structures, *Jacob T. Robinson, Michal Lipson; Cornell Univ., USA.* We directly measure the field confined in an 85 nm gap in a silicon slotted waveguide using a nanoscale probe to locally perturb the phase velocity of the light. We detect this perturbation interferometrically on-chip.