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Postdeadline Papers

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CLEO®/Europe 2007

ROOM 13a • 18:00 - 19:30

CP1 Session: CLEO®/Europe Postdeadlines I

Chair: *Markus Pollnau, University of Twente, The Netherlands*

CP1-1-THU 18:00

Few-optical-cycle pulses in the near-IR from a non-collinear optical parametric amplifier

G. Cirmi, C. Manzoni, D. Brida, M. Marangoni, S. De Silvestri, G. Cerullo, Politecnico di Milano, Milano, Italy

We extend the non-collinear optical parametric amplifier (NOPA) concept to the near-IR. In an 800-nm-pumped NOPA using lithium tantalate we amplify spectra spanning the 1.1-1.7 micron range and compress a limited portion to 16 fs.

CP1-2-THU 18:10

Short-pulse optical parametric chirped-pulse amplification for the generation of high-power few-cycle pulses

J. A. Fülöp, Z. Major, A. Henig, S. Kruber, J. Osterhoff, R. Hörlein, F. Krausz, S. Karsch, Max-Planck-Institut für Quantenoptik, Garching, Germany

We propose optical parametric chirped-pulse amplification in the sub-picosecond range for high-power few-cycle pulse generation. Ultrabroadband amplification with 100 fs pulses in the 100 microjoule range has been demonstrated.

CP1-3-THU 18:20

Stronger seed for a multiterawatt few-cycle pulse OPCPA

F. Tavella, T. Wittmann, B. Horvath, A. Cavalieri, L. Veisz, Max Planck Institute of Quantum Optics, Garching, Germany; K. Schmid, F. K. Krausz, Ludwig Maximilian Universität, Munich, Germany; A. M. Marcinkevicius, IMRA inc., Ann Arbor, USA

The output of a high contrast Ti:sapphire amplifier with sequenced hollow-core fiber broadening and cross-polarized wave generation for contrast cleaning is used to seed a multiterawatt sub-10-fs optical parametric chirped pulse amplifier.

CP1-4-THU 18:30

An efficient Ni Ka-line X-ray source driven by a high energy fiber CPA system

K. H. Liao, G. Mordovanakis, B. Hou, G. Chang, G. Mourou, J. Nees, A. Galvanauskas, University of Michigan, Ann Arbor, USA

The first femtosecond fiber laser based hard X-ray source is demonstrated with efficient emission in Ni K-line (7.48keV). This was achieved with pulse energies starting below 100-microjoule and at focused intensities > $1x10^{15}$ W/cm^2.

CP1-5-THU 18:40

Highly efficient mid-infrared OPO GaAs based on low-loss orientation-patterned GaAs samples

D. Faye, A. Grisard, B Gérard, E. Lallier, Thales Research & Technology, Palaiseau, France; C. Kieleck, A. Hirth, Institut Franco-Allemand de Recherches de St-Louis, Saint-Louis, France

We report on what is to our knowledge the highest efficiency (57%) and average power (1.2W) obtained with a GaAs OPO in the mid-infrared region.

CP1-6-THU 18:50

65-mW 3.4-µm tunable difference frequency generation source using damage resistant Zn:$LiNbO_3$ waveguide

M. Asobe, Y. Nishida, O. Tadanaga, T. Yanagawa, T. Umeki, H. Suzuki, NTT Photonics Laboratories Atsugi, Kanagawa, Japan

We describe high-power 3.4-micron difference frequency generation using a quasi-phase matched Zn:$LiNbO_3$ waveguide fabricated with direct bonding. A 65-mW mid-infrared output was obtained by using a continuous wave high-power fiber amplifier as a pump source.

CP1-7-THU 19:00

High power thin disk laser operation of Yb:$Lu2O_3$ with 80% slope efficiency

R. Peters, C. Kränkel, K. Petermann, G. Huber, University of Hamburg, Hamburg, Germany

We report on 80% slope-efficiency high-power thin-disk laser operation of high quality heat-exchanger-method grown Yb:$Lu2O_3$. The laser delivers 32.6W of output-power at 1034nm under 45.3W of incident pump-power at 976nm resulting in 72% optical-to-optical efficiency.

CP1-8-THU 19:10

A new Dysprosium laser: 5.5-µm oscillation in the Dy^{3+}:$RbPb_2Cl_5$ crystal at room temperature

A.G. Okhrimchuk, L.N. Butvina, E.M. Dianov, I.A. Shestakova, Fiber Optics Research Center, Moscow, Russia; N. V. Lichkova, V. Zagorodnev, Institute of Microelectronics Technology RAS, Chernogolovka Moscow Region, Russia; A.V. Shestakov, Elements of Laser Systems Co., Moscow, Russia

Lasing at 5.5 µm wavelength was obtained on a new laser transition in the $RbPb_2Cl_5$: Dy^{3+} crystal. This is to our knowledge the longest oscillation wavelength in a moisture-resistant rare earth doped crystal at room temperature.

CP1-9-THU 19:20

Diode-pumped passively mode-locked Er Yb:$YAl_3(BO_3)_4$ laser at 1.5 - 1.6 µm

A.A. Lagatsky, W. Sibbett, University of St Andrews, St Andrews, United Kingdom; E.U. Rafailov, University of Dundee, Dundee, United Kingdom; N.I. Leonyuk, Moscow State University, Moscow, Russia; A.E. Zhukov, Ioffe Physico-Technical Institute, St Petersburg, Russia; V.E. Kisel, A.E. Troshin, N.A. Tolstik, N.V. Kuleshov, Institute for Optical Materials and Technologies, Minsk, Belarus

Efficient passive mode locking in a diode-pumped Er Yb:$YAl_3(BO_3)_4$ laser in range of 1.5-1.6µm is demonstrated. Pulses of 3.8-ps duration were generated at 1531nm with an average power of 270mW.

ROOM 14b • 18:00 - 19:30

CP2 Session: CLEO®/Europe Postdeadlines II

Chair: *Philip Russell, University of Erlangen-Nürnberg, Germany*

CP2-1-THU 18:00

Efficient Terahertz room-temperature photonic crystal laser

D. Englund, J. Vuckovic, I. Fushman, Stanford University, Stanford, USA; H. Altug, Boston University, Boston, USA

We demonstrate a photonic crystal cavity laser with near-uW threshold at low temperature. The surface-passivated laser operates at room temperature and produces pulses with FWHM shorter than 3 ps (detector response limited).

CP2-2-THU 18:10

Narrow (100 pm) linewidth fibre laser operating in excess of 50 W

N. Jovanovic, A. Fuerbach G. D. Marshall M. J. Withford, Macquarie University, Sydney, Australia; M. Aslund, S. D. Jackson, Sydney University, Sydney, Australia

We present a 50 W ytterbium fibre laser with an intra-active-core Bragg grating. To the best of our knowledge this is the narrowest linewidth (~100 pm) fibre laser operating in this power range.

CP2-3-THU 18:20

415W Single-Mode CW Thulium fiber laser in all-fiber format

D. Gapontsev, N. Platonov, M. Meleshkevich, A. Drozhzhin, IPG Photonics, Oxford, USA; V. Sergeev, IPG Laser GmbH, Burbach, Germany

415W CW output power at 1940nm was demonstrated in all-fiber format Tm fiber laser. This power is the highest reported to date for 2um single mode lasers. Output linewidth was measured to be <1nm at maximum power.

CP2-4-THU 18:30

Inscription of a 300-nm-period nanostructure in a pure fused silica

D. Nikogosyan, V. Mezentsev, M. Duvov, I. Bennion, Aston University, Birmingham, United Kingdom

We report on the first recording of a 150-nm-pitch periodical structure in a permanently moving sample of a pure fused silica using the tightly-focused 82 nJ 267 nm 300 fs 1 kHz laser pulses.

CP2-5-THU 18:40

Generation of 63-fs 4-MW pulses from a fiber parabolic amplifier

D.N. Papadopoulos, M. Hanna, F. Druon, P. Georges, Institut d'Optique, Palaiseau, France; E. Cormier, Y. Zaouter, CELIA, Bordeaux, France; E. Mottay, Amplitude Systèmes, Bordeaux, France

We report the generation of 63-fs 4-MW peak power 7.5 W average power pulses using a fiber parabolic amplifier. This is the highest peak power reported so far for such amplifiers.

CP2-6-THU 18:50

All-fiber high-speed transparent optical switch via Bragg scattering frequency conversion

D. Méchin, R. Provo, J.D. Harvey, University of Auckland, Auckland, New Zealand; C.J. McKinstrie, Alcatel-Lucent, Holmdel NJ, USA

We present an experimental demonstration of a transparent optical switch using Bragg scattering frequency conversion in a nonlinear optical loop mirror.

CP2-7-THU 19:00

Wide band & high resolution optical coherent processing of RF signals in Er:YSO using a frequency agile laser

V. Crozatier, Fastlite and Laboratoire Aimé Cotton, Orsay Palaiseau, France; G. Gorju, F. Bretenaker, J. L. Le Gouët, I. Lorgeré, Laboratoire Aimé Cotton, Orsay, France

We report on the demonstration of the chirp transform algorithm for the optical processing of RF signals over a 1.5 GHz instantaneous bandwidth together with more than 20 000 independent channels.

CP2-8-THU 19:10

Octave-broad ultrafast all-optical switching of silicon woodpile photonic band gap crystals

T.G. Euser, A.J. Molenaar, A. Polman, W.L. Vos, FOM Institute for Atomic and Molecular Physics (AMOLF), Amsterdam, Netherlands; J.G. Fleming, Sandia National Laboratories, Albuquerque NM, USA; B. Gralak, Institut Fresnel, Marseille, France

We present time-resolved octave-broad reflectivity of optically switched Si woodpile photonic bandgap crystals. The gap shows a large and ultrafast shift in good agreement with theory. We identify a novel application of switched photonic metamaterials.

CP2-9-THU 19:20

Electric field dependence of modulation in multilayer InAs quantum dot waveguides

I.B Akca, A. Aydinli, A. Dana, Bilkent University, Ankara, Turkey; M. Rossetti, Ecole Polytechnique Fédérale de Lausanne, Lausanne, Switzerland; L. Li, A. Fiore, Institute of Quantum Electronics and Photonics, Ecole Polytechnique Federale de Lausanne, Lausanne, Switzerland; N. Dagli, University of California, Santa Barbara, USA

Optical modulation of multilayer InAs quantum dot waveguides has been studied under applied electric field. Absorption spectra of the samples blue shift with the applied voltage. Enhanced electro-optic coefficients compared to bulk GaAs were observed.

Joint Symposium

ROOM 14a • 18:00 - 19:30

JSP1 Session: Joint CLEO®/Europe-IQEC Postdeadlines

Chair: *Nikolay Zheludev, Southampton University, United Kingdom*

JSP1-1-THU 18:00

Colour reveals stacking order in ultra thin self-assembled photonic crystals

A. Blanco, C. López, Instituto de Ciencia de Materiales de Madrid, Madrid, Spain; X. Checoury, Université Paris-Sud, Orsay, France; S. Enoch, Institut Fresnel, Marseille, France

We study the optical properties of ultra thin self-assembled photonic crystals. We found that the visible colour unambiguously reveals the stacking order. FDTD calculations give satisfactory account of the spectra taken without any adjustable parameters.

JSP1-2-THU 18:10

Spectrally resolved optical frequency comb from a self-referenced 5 GHz femtosecond laser

A. Bartels, Gigaoptics GmbH, Konstanz, Germany; R. Gebs, University of Konstanz and Center for Applied Photonics, Konstanz, Germany; M.S. Kirchner, S. A. Diddams, National Institute of Standards and Technology, Boulder, USA

We report a self-referenced 5 GHz Ti:sapphire femtosecond laser and directly observe the individual emitted frequency comb elements using a VIPA (virtually imaged phased array) based spectrometer.

JSP1-3-THU 18:20

11-as relative timing jitter between the output pulse trains of a free-running two-branch femtosecond fiber system

F. Adler, A. Sell, R. Huber, A. Leitenstorfer, University of Konstanz, Konstanz, Germany

The relative phase noise of a free-running two-branch mode-locked Er:fiber laser is measured in the time-domain. The experiment employs an interferometric optical cross-correlator and reveals 11 attoseconds of total jitter over the entire Nyquist bandwidth.

JSP1-4-THU 18:30

Proposal for absolute CEP measurement using 0-to-f self-referencing

P. Kinsler, S.B.P. Radnor, G.H.C. New, Imperial College London, London, United Kingdom

Analysis of 0-to-f self-referencing techniques for carrier-envelope phase (CEP) stabilisation suggests that absolute CEP measurement might be possible. We describe the procedure needed to achieve this and explain the constraints that must be satisfied.

JSP1-5-THU 18:40

A tunable whispering-gallery-mode bottle resonator

M. Pöllinger, A. Rauschenbeutel, University of Mainz, Mainz, Germany; F. Warken, W. Alt, D. Meschede, University of Bonn, Bonn, Germany

We present results on the fabrication and characterization of a novel type of whispering-gallery-mode microresonator combining high Q factor small mode volume and tunability. Tuning over more than one free-spectral-range was demonstrated.

JSP1-6-THU 18:50

Narrowband polarization-entangled photon pairs distributed over a WDM link for qubit networks

S. Sauge, M. Swillo, S. Albert-Seifried, J. Waldebäck, D. Ljunggren, M. Tengner, A. Karlsson, KTH - Royal Institute of Technology, Stockholm, Sweden; G.B. Xavier, Pontifical Catholic University, Rio de Janeiro, Brazil

We used long crystals to narrow the bandwidth of entangled photon pairs allowing chromatic dispersion free transmission of qubits in a WDM environment with 100 GHz spacing between quantum and classical channels in same fiber.

JSP1-7-THU 19:00

Ultrafast switching of Si inverse opal photonic band gap crystals

T.G. Euser, J. Kalkman, A. Polman, W. L. Vos, FOM Institute for Atomic and Molecular Physics (AMOLF), Amsterdam, Netherlands; H. Wei, Y. Jun, D. J. Norris, University of Minnesota, Minneapolis, USA

We demonstrate the first ultrafast switching of photonic bandgaps using silicon inverse opals. We observe large shifts of all peaks in the range of the bandgap. The results are relevant to ultrafast QED.

JSP1-8-THU 19:10

Ultra-fast evolution of photonic eigenstates tracked in k-space

R.J.P Engelen, L. Kuipers, FOM Institute AMOLF, Amsterdam, Netherlands; Y. Sugimoto, N. Ikeda, AIST, Tsukuba, Japan; K. Asakawa, University of Tsukuba, Tsukuba, Japan; H. Gersen, University of Bristol, Bristol, United Kingdom

We experimentally tracked both the phase and the amplitude of an optical pulse in a photonic crystal device. In k-space the photonic eigenstates were separated and their mutual coupling was studied on a femtosecond timescale.

JSP1-9-THU 19:20

Turning optically Achiral materials Chiral

J. Wang, C. Guo, University of Rochester, Rochester, USA

We report on an unusual permanent recording of light helicity on optically achiral metals.

IQEC 2007

ROOM 13b • 18:00 - 19:30

IP1 Session: IQEC Postdeadlines I

Chair: *Fedor Mitschke, University of Rostock, Germany*

IP1-1-THU 18:00

Experiments with a 39K Bose-Einstein condensate with tunable interactions

G. Roati, G. Modugno, J. Catani, C. D'errico, M. Fattori, M. Zaccanti, M. Modugno, M. Inguscio, LENS University of Florence, Sesto Fiorentino, Italy; A. Simoni, Laboratoire de Physique des Atomes, Rennes, France

We produce a nove Bose-Einstein condensate composed of 39K atoms where the interactions are precisely tunable around zero. We employ it for atom-interefrometry experiments.

IP1-2-THU 18:10

A high flux continuous source of ultracold guided chromium atoms

A. Griesmaier, A. Greiner, J. Sebastian, A. Aghajani-Talesh, M. Falkenau, P. Rehme, T. Pfau, Universität Stuttgart, Stuttgart, Germany

We report on the recent demonstration of a continuous flux of 6x10^9 laser cooled chromium atoms/s in a magnetic guide. The flux is achieved by continuous operation of a MOT within the magnetic guide.

IP1-3-THU 18:20

Dynamical control of tunneling in periodic potentials

O. Morsch, E. Arimondo, Y. Singh, A. Zenesini, C. Sias, D. Ciampini, H. Lignier, CNR-INFM, Pisa, Italy

We report on the experimental observation of the dynamical suppression of tunneling of a Bose condensate in an optical lattice by sinusoidally shaking the lattice. Our results are in perfect agreement with theoretical calculations.

IP1-4-THU 18:30

Individual addressing with trapped Yb+ Ions

M. Johanning, A. Braun, V. Elman, C. Wunderlich, Universität Siegen, Siegen, Germany; W. Neuhauser, Universität Hamburg, Hamburg, Germany

Addressing individual ions using an inhomogeneous magnetic field that creates spatially varying Zeeman-shifts is demonstrated for the first time. We report results of rf-optical double-resonance-spectroscopy applied to laser-cooled 172 Yb^+ -ions in a linear Paul-trap.

IP1-5-THU 18:40

Quantum engineering of photon states with atomic ensembles

D. Porras, J.I. Cirac, Max-Planck-Institut für Quantenoptik, Garching, Germany

We propose to map atomic entangled states into photonic channels to generate entangled states of photons for Quantum Information. This can be accomplished with current quantum engineering techniques in trapped ions/atoms and atomic ensembles.

IP1-6-THU 18:50

A Single-photon server with just one atom

M. Hijlkema, B. Weber, H.P. Specht, G. Rempe, Max-Planck-Institute for Quantum Optics, München, Germany; S. C. Webster, A. Kuhn, University of Oxford, Oxford, United Kingdom

We trap a single atom in a cavity and use it to produce a stream of up to 300000 single photons. Such a single-photon server is useful for quantum information science.

IP1-7-THU 19:00

Novel type of one-dimensional discrete vector solitons

R. A. Vicencio, Universidad de Chile, Santiago, Chile; M. Stepic, National Metrology Institute, Braunschweig, Germany; E. Smirnov, V. Shandarov, C. E. Rüter, D. Kip, Clausthal University of Technology, Clausthal-Zellerfeld, Germany

Localized vectorial modes with mutually orthogonal polarizations are investigated experimentally and analytically in a one-dimensional photonic lattices. Dominating TE mode spreads in cascades in saturation while weaker TM mode exhibits splitting into a two-hump structure.

IP1-8-THU 19:10

High-visibility multi-photon interference for classical light

T. S. Iskhakov, M. V. Chekhova, I. N. Agafonov, Lomonosov Moscow State University, Moscow, Russia

The classical limit of two-photon interference visibility is 50% but we demonstrate that it is much higher for multi-photon case. In particular coherent radiation provides third-order and fourth-order interference with 81 8% and 94% visibility respectively.

IP1-9-THU 19:20

Entanglement swapping with independent CW-sources

M. Halder, V. Scarani, C. Simon, H. Zbinden, C. Jorel, A. Beveratos, N. Gisin, University of Geneva, Geneva, Switzerland

An entanglement swapping experiment realized for the first time with independent sources in continuous wave mode is presented. Timing is achieved by the temporal resolution of the detectors much shorter than the photons coherence length.

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