NLGW

Nonlinear Guided Waves and Their Applications

Topical Meeting

6-9 September 2005
Dreikönigskirche
Dresden, Germany

About NLGW

This topical meeting brings together researchers working in all aspects of nonlinear optics in guided-wave and self-guided geometries. The development of new ideas and novel techniques in the areas of technology, phenomena, applications and theory are particularly emphasized. NLGW aims to:

- Provide a forum for the discussion of nonlinear waveguide and soliton phenomena from theoretical, material, and applications perspectives.
- Identify nonlinear effects in all-optical communications and signal processing and understand the opportunities and challenges that arise from them.
- Improve the interaction between phenomena and applications communities, particularly in the areas of optical communications, all-optical signal processing and frequency conversion.
- Encourage development of novel structures, materials and devices with enhanced nonlinear functionality.
- Address effects such as intrinsic localization in various nonlinear environments, including bulk media, waveguides, arrays, resonators and photonic crystals, and the novel phenomena based on them.
- Identify novel phenomena in configurations involving quadratic, cubic, photorefractive, reorientational and resonant nonlinearities.
- Highlight the similarities and differences between nonlinear effects in conservative and dissipative systems.

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2005 NLGW Agenda of Sessions

Tuesday, 6 September 2005		
8:30 AM – 10:00 AM	TuA, Nanostructured Materials and 2nd Order Effects	Festsaal
10:00 AM – 10:30 AM	Coffee Break	Hallway
10:30 AM – 12:30 PM	TuB, Modulational Instability	Festsaal
12:30 PM – 2:00 PM	Lunch Break	On your own
2:00 PM – 4:00 PM	TuC, Discrete and Gap Solitons	Festsaal
4:00 PM – 4:30 PM	Coffee Break	Hallway
4:30 PM – 6:30 PM	TuD, Continuum Generation and Photonic Crystal Fibers	Festsaal
Wednesday, 7 September 2005		
8:30 AM – 10:00 AM	WA, Cavities and Dissipative Effects	Festsaal
10:00 AM – 10:30 AM	Coffee Break	Hallway
10:30 AM – 12:30 PM	WB, Controlling the Properties of Light	Festsaal
12:30 PM – 2:00 PM	Lunch Break	On your own
2:00 PM – 4:00 PM	WC, Self Similarity and Fiber Nonlinearities	Festsaal
4:00 PM – 6:00 PM	WD, Poster Session I Coffee Break	Kleiner Saal
6:00 PM – 8:00 PM	Conference Reception	Dining Hall
Thursday, 8 September 2005		
8:30 AM – 10:00 AM	ThA, Imaging and Measurements	Festsaal
10:00 AM – 12:00 PM	ThB, Poster Session II Coffee Break	Kleiner Saal
12:00 PM – 2:00 PM	Lunch Break	On your own
2:00 PM – 4:00 PM	ThC, Nonlinear Optics in 2D Periodic Structures	Festsaal
4:00 PM – 4:30 PM	Coffee Break	Hallway
4:30 PM – 6:30 PM	ThD, Nonlinear Spatial Structures	Festsaal
Friday, 9 September 2005		
8:30 AM – 10:00 AM	FA, Fabrication and Uses of Nonlinear Spatial Structures	Festsaal
10:00 AM – 10:30 AM	Coffee Break	Hallway
10:30 AM – 12:30 PM	FB, Solitons and New Nonlinear Structures	Festsaal
12:30 PM – 2:00 PM	Lunch Break	On your own
2:00 PM – 4:00 PM	FC, Nonlinear Effects	Festsaal
4:00 PM – 4:30 PM	Coffee Break	Hallway
4:30 PM – 6:00 PM	Postdeadline Session	Festsaal

2005 NLGW Abstracts

■ **Tuesday, 6 September 2005** ■

TuA ▪ Nanostructured Materials and 2nd Order Effects

Festsaal
8:30 a.m.–10:00 a.m.
TuA ▪ Nanostructured Materials and 2nd Order Effects
Presider, TBA

TuA1 ▪ 8:30 a.m. ►**Invited**◄
Optical Resonance in Nano-Structured Materials, *Ildar R. Gabitov[1], Joshua E. Soneson[1], Andrei I. Maimistov[2]; [1]Univ. of Arizona, USA, [2]Moscow Engineering Physics Inst., Russian Federation.* We examine resonant interactions of optical pulses with nanostructured materials in the case of the electric field interacting with plasmonic oscillations in metallic nanospheres and double resonance including the magnetic field interaction with nano-LC circuits.

TuA2 ▪ 9:00 a.m.
Microcavity Photonic Crystal OPO, *Rumen Iliew, Christoph Etrich, Ulf Peschel, Falk Lederer; IFTO, Friedrich-Schiller-Univ. Jena, Germany.* We study the excitation of a defect mode in a quadratically nonlinear photonic crystal by a second harmonic wave. Both, a mean-field approach and finite-difference time-domain calculations predict spontaneous parametric down-conversion above a certain threshold.

TuA3 ▪ 9:15 a.m.
Brillouin-Zone Spectroscopy of Nonlinear Photonic Lattices, *Guy Bartal[1], Oren Cohen[1], Hrvoje Buljan[1,2], Jason W. Fleischer[1,3], Ofer Manela[1], Mordechai Segev[1]; [1]Technion, Israel Inst. of Technology, Israel, [2]Univ. of Zagreb, Croatia, [3]Princeton Univ., USA.* We present a novel experimental technique for Brillouin-zone spectroscopy of photonic lattices with and without defects. Our technique facilitates mapping the borders of the extended Brillouin zones and the areas of normal and anomalous dispersion.

TuA4 ▪ 9:30 a.m.
Phase-Resolved Nonlinear Propagation: Transition between Coherent Light-Matter Interaction Regimes, *Tilman Höner zu Siederdissen[1], Nils C. Nielsen[1], Jürgen Kuhl[1], Galina Khitrova[2], Hyatt M. Gibbs[2], Stephan W. Koch[3], Harald Giessen[4]; [1]Max-Planck-Inst. für Festkörperforschung, Germany, [2]Optical Sciences Ctr., Univ. of Arizona, USA, [3]Dept. of Physics and Material Sciences Ctr., Philipps-Univ. Marburg, Germany, [4]4th Physics Inst., Univ. of Stuttgart, Germany.* We present phase-resolved pulse propagation measurements of the transition between several light-matter interaction regimes ranging from linear to highly nonlinear effects in a multiple-quantum-well Bragg structure.

TuA5 ▪ 9:45 a.m.
Nondiffracting Beams in Periodic Media, *Ofer Manela[1], Mordechai Segev[1], Demetrios N. Christodoulides[2]; [1]Dept. of Physics and Solid-State Inst.,Technion - Israel Inst. of Technology, Israel, [2]School of Optics/CREOL, Univ. of Central Florida, USA.* We present nondiffracting beams in 2-D periodic systems. We show that these beams may be associated with different bands in the transmission spectrum of the system and with different symmetry points of the Brillouin zone.

10:00 a.m.–10:30 a.m.
Coffee Break

TuB ▪ Modulational Instability

Festsaal
10:30 a.m.–12:30 p.m.
TuB ▪ Modulational Instability
Presider, TBA

TuB1 ▪ 10:30 a.m.
Observation of a Stable Coherent Self-Trapped Vortex Light Beam in a Self-Focusing Medium, *Shiuan-Yeh Chen, Tzu-Chun Lo, Ming-Feng Shih; Natl. Taiwan Univ., Taiwan Republic of China.* We observe a stable coherent self-trapped vortex light beam in a noninstantaneous self-focusing medium. The stabilization, confirmed by numerical simulation, is achieved by adding small time-varying azimuthally-periodic modulation on the vortex light beam.

TuB2 ▪ 10:45 a.m.
Experimental Observation of Modulational Instability in Self-Defocusing Nonlinear Waveguide Arrays, *Christian Wirth, Milutin Stepic, Christian Rueter, Detlef Kip; Inst. of Physics and Physical Technologies, Clausthal Univ. of Technology, Germany.* We observed both experimentally and numerically modulational instability and the consequent energy localization within the first band of a one-dimensional permanent nonlinear waveguide array fabricated in a photorefractive photovoltaic lithium niobate crystal.

TuB3 ▪ 11:00 a.m.
Modulational Instability Due to an Irreversible, Nonlinear Process, *Dirk Michaelis, Ulrich Streppel, Richard Kowarschik, Andreas Bräuer; Fraunhofer Inst. for Applied Optics and Precision Engineering, Germany.* A new type of modulational instability for coherent as well as partially coherent light in systems with integrating nonlinearity caused by an irreversible process is investigated both, experimentally and theoretically.

TuB4 ▪ 11:15 a.m.
High Resolution, High Contrast, High Focal Depth Nonlinear Beams, *Paolo Polesana[1], Daniele Faccio[1], Paolo Di Trapani[1], Audrius Dubietis[2], Ernestas Kucinskas[2], Algis Piskarskas[2]; [1]Univ. degli Studi dell'Insubria, Italy, [2]Vilniaus Univ., Lithuania.* We show nonlinear propagation of a nondiffracting Bessel pulse. In regime of multiphoton absorption, it creates a 4 cm long channel of 3-photon fluorescence, i.e. 80 times the equivalent Rayleigh range.

TuB5 ▪ 11:30 a.m.
Subdiffractive Pulses in Photonic Crystals, *Kestutis Staliunas[1], Carles Serrat[2], Crina Cojocaru[2], Jose Trull[2], Ramon Herrero[2]; [1]ICREA, Spain, [2]UPC, Spain.* We investigate propagation of light pulses in photonic crystals in the vicinity of the zero-diffraction point, and we find the family of nonspreading pulses, propagating without spreading in the vicinity of the zero-diffraction point.

TuB6 ▪ 11:45 a.m.
Soliton Mobility in Nonlocal Nonlinear Media, *Zhiyong Xu, Yaroslav Kartashov, Lluis Torner; Inst. de Ciencies Fotoniques, Spain.* We address the impact of nonlocality in lattice solitons and soliton trains in Kerr-type nonlinear media. We show that the nonlocal nonlinear response can drastically enhance mobility of lattice solitons and stabilize complex multipole-mode solitons.

TuB7 ▪ 12:00 p.m.
"Azimuthons": Spatial Solitons with a Rotating Phase, *Anton S. Desyatnikov, Andrey A. Sukhorukov, Yuri S. Kivshar; Australian Natl. Univ., Australia.* We introduce the concept of "azimuthons" as self-trapped beams generated by azimuthal deformations of vortex solitons. We demonstrate that these modulated beams include the states with negative, positive, or zero rotation velocity.

TuB8 ▪ 12:15 p.m.
Power-Dependent Walk-Off in Modulationally Unstable Nematic Liquid Crystals, *Marco Peccianti, Gaetano Assanto; NooEL-Nonlinear Optics and OptoElectronics Lab, Italian Inst. for the Physics of Matter, Italy.* We experimentally investigate nonlinear walk-off in nematic liquid crystals. In such anisotropic and nonlocal medium, transverse modulational instability results into power-controlled angular steering of a filament pattern.

12:30 p.m.–2:00 p.m.
Lunch Break

TuC ▪ Discrete and Gap Solitons

Festsaal
2:00 p.m.–4:00 p.m.
TuC ▪ Discrete and Gap Solitons
Neil Broderick, Univ. of Southampton, UK, Presider

TuC1 ▪ 2:00 p.m.
Optical Routing by Sequential Incoherent Blocker Soliton-Control Beam Interactions in Kerr Waveguide Arrays, *Joachim Meier[1], George I. Stegeman[1], Demetri Christodoulides[1], Roberto Morandotti[2,3], H. Yang[3], Greg Salamo[3,4], M. Sorel[4]; [1]Univ. of Central Florida, USA, [2]Univ. du Québec, Canada, [3]Univ. of Arkansas, USA, [4]Univ. of Glasgow, UK.* Cascadable, digital all-optical routing by incoherent interactions between a highly confined soliton and two successive control beams of different wavelength was implemented in an AlGaAs waveguide array.

TuC2 ▪ 2:15 p.m.
Modulation Instability and Soliton Fission in Bragg Gratings, *Joe T. Mok, Eduard Tsoy, Ian C. M. Littler, C. Martijn de Sterke, Benjamin J. Eggleton; ARC Ctr. of Excellence for Ultrahigh-Bandwidth Devices for Optical Systems, Australia.* A train of sub-60 ps pulses separated approximately by 200 ps is generated from a 0.6 ns Q-switched pulse in a fibre Bragg grating in transmission through the effects of modulation instability and soliton fission.

TuC3 ▪ 2:30 p.m.
Interaction of Novel 2D Gap Solitons with Defects, *Alejandro B. Aceves, Tomas Dohnal; Univ. of New Mexico, USA.* Existence of novel gap solitons in 2-D waveguides with Bragg grating in the propagation direction is shown and their trapping at localized defects modelled and explained via the principle of resonant energy transfer.

TuC4 ▪ 2:45 p.m.
Identification of Gap Soliton through Phase Measurement, *Simon-Pierre Gorza[1], Cyril Cambournac[1], Philippe Emplit[1], Marc Haelterman[1], Dirk Taillaert[2], Bjorn Maes[2], Roel Baets[2]; [1]Optique et Acoustique, Univ. Libre de Bruxelles, Belgium, [2]Dept. of Information Technology, Ghent Uni.-IMEC, Belgium.* We fully characterize the stationary spatial gap soliton in periodic planar waveguide through the measurement of the transverse phase evolution across the soliton beam.

TuC5 ▪ 3:00 p.m.
Observation of the Discrete Talbot Effect, *Robert Iwanow[1], Daniel A. May-Arrioja[1], Demetrios N. Christodoulides[1], George I. Stegeman[1], Yoohong Min[2], Wolfgang Sohler[2]; [1]College of Optics and Photonics/CREOL&FPCE, Univ. of Central Florida, USA, [2]Univ. of Paderborn, Germany.* We report the first observation of the discrete Talbot effect in waveguide arrays. Recurrence for different input patterns was observed in good agreement with theory. The effect of nonlinearity on the Talbot dynamics was investigated.

TuC6 ▪ 3:15 p.m.
Waveguide Arrays for Passive Temporal Mode-Locking, *J. Nathan Kutz, Joshua Proctor; Dept. of Applied Mathematics, Univ. of Washington, USA.* A novel mode-locking technique is presented in which the intensity dependent spatial coupling dynamics of a waveguide array is used to achieve temporal (soliton) mode-locking in a passive optical fiber laser.

TuC7 ▪ 3:30 p.m.
Two-Dimensional Complex Optically–Induced Nonlinear Photonic Lattices, *Nina Sagemerten[1], Jörg Imbrock[1], Denis Träger[1], Cornelia Denz[1], Anton S. Desyatnikov[2], Dragomir N. Neshev[2], Alexander Dreischuh[2], Wieslaw Krolikowski[2], Yuri S. Kivshar[2], Robert Fischer[2]; [1]Inst. für Angewandte Physik, WWU Muenster, Germany, [2]Australian Natl. Univ., Australia.* We generate different types of two-dimensional nonlinear photonic lattices in a photorefractive crystal by engineered periodic phase patterns, including novel triangular and vortex-like lattices, and study their linear guiding properties.

TuC8 ▪ 3:45 p.m.
Observation of Light Confinement by Defects in Optically-Induced Photonic Lattices, *Igor Makasyuk[1], Zhigang Chen[1], Jianke Yang[2]; [1]San Francisco State Univ., USA, [2]Univ. of Vermont, USA.* Both one- and two-dimensional optically-induced photonic lattices with single-site negative defects are realized experimentally, in which light confinement as defect modes is clearly demonstrated. Our experimental results are in good agreement with theoretical predictions.

4:00 p.m.–4:30 p.m.
Coffee Break

TuD ▪ Continuum Generation and Photonic Crystal Fibers

Festsaal
4:30 p.m.–6:30 p.m.
TuD ▪ Continuum Generation and Photonic Crystal Fibers
Keith Blow, Aston Univ., UK, Presider

TuD1 ▪ 4:30 p.m. ►Invited◄
Supercontinuum Generation and Superfocusing in Microstructure Fibers, Hollow Waveguides and Photonic Crystals, *Joachim Herrmann, Anton Husakou; Max Born Inst., Germany.* We present the theory of spectral broadening and short pulse generation due to nonlinear processes in microstructure fibers and hollow waveguides, and focusing of light below the diffraction limit by photonic crystals with negative refraction.

TuD2 ▪ 5:00 p.m.
Experimental Observation of Polarization Modulation Instability in a Photonic Crystal Fiber, *Kwan Leung G. Wong[1], Robert J. Kruhlak[1], Rainer Leonhardt[1], John D. Harvey[1], Nicolas Y. Joly[2], Jonathan C. Knight[2], William J. Wadsworth[2], Philip St. J. Russell[2]; [1]Univ. of Auckland, New Zealand, [2]Univ. of Bath, UK.* Polarization modulation instability in a birefringence photonic crystal fiber has been observed in the normal dispersion regime with a frequency shift of 64 THz between the generated frequencies and the pump frequency.

TuD3 ▪ 5:15 p.m.
Single Mode Holey Fiber in GeGaSbS Chalcogenide Glass, *Laurent Brilland[1], Frederic Smektala[2], Thierry Chartier[3], Nicholas Traynor[1], Achille Monteville[1], Johan Troles[2], Thanh Nam Nguyen[3]; [1]PERFOS, France, [2]Lab Verres et Céramiques, France, [3]ENSSAT, France.* We present recent results on the fabrication of a single mode Holey Fiber in GeGaSbS chalcogenide glass using the "Stack&Draw" technique. We measure a MFD of 8.3 μm and we estimate γ at 200 $W^{-1}km^{-1}$.

TuD4 ▪ 5:30 p.m.
Dispersion-Management for Enhancing Supercontinuum Generation in Optical Fiber, *J. Nathan Kutz[1], Claire Lynga[2], Ben Eggleton[2]; [1]Dept. of Applied Mathematics, Univ. of Washington, USA, [2]Ctr. for Ultrahigh Bandwidth Devices for Optical Systems, Australia.* Supercontinuum generation from a continuous wave field in a highly nonlinear fiber operating near the zero-dispersion point can be significantly enhanced with the aid of dispersion management.

TuD5 ▪ 5:45 p.m.
All-Optical Switching in a Dual Core Photonic Crystal Fiber, *A. Betlej[1], S. Suntsov[1], R. El-Ganainy[1], D. N. Christodoulides[1], George Stegeman[1], J. Fini[2], R. T. Bise[2], D. J. DiGiovanni[2]; [1]Univ. of Central Florida, USA, [2]OFS Labs, USA.* We demonstrate all-optical switching at 1550nm in a photonic crystal fiber consisting of two weakly coupled cores. At high powers, the output was dominated by continuum generation primarily towards shorter wavelengths.

TuD6 ▪ 6:00 p.m.
Numerical Modeling of Continuous-Wave Supercontinuum Generation, *Frédérique Vanholsbeeck[1], Stéphane Coen[1], Sonia Martin-Lopez[2], Miguel González-Herráez[2,3]; [1]Univ. of Auckland, New Zealand, [2]Consejo Superior de Investigaciones Científicas (CSIC), Spain, [3]Univ. of Alcalá, Spain.* Continuous-wave supercontinuum generation is studied numerically. We show that the random fluctuations of the partially coherent pump beam play a dominant role in the spectral broadening process and explain the smoothness of experimental spectra.

TuD7 ▪ 6:15 p.m.
Interaction of a Soliton with a Continuous Wave in Photonic Crystal Fibers: Theory and Experiment, *Dmitry Skryabin[1], A. Yulin[1], N. Joly[1], J. Knight[1], P. Russell[1], A. Efimov[2], F. Omenetto[2], A. Taylor[2]; [1]Univ. of Bath, UK, [2]Los Alamos Natl. Lab, USA.* We study interaction of a weak cw pump with an optical soliton in highly nonlinear photonic crystal fiber. We predict theoretically and confirm experimentally using XFROG measurements generation of new frequencies resulting from this interaction.

WA ▪ Cavities and Dissipative Effects

Festsaal
8:30 a.m.–10:00 a.m.
WA ▪ Cavities and Dissipative Effects
Robert Kuszelewicz; Lab de Photonique et Nanostructures, France, Presider

WA1 ▪ 8:30 a.m. ►**Invited**◄
Dissipative Spatial Soliton Phenomena in Active Semiconductor Optical Amplifiers, *George Stegeman[1], Erdem Ultanir[1], Demetri Christoulides[1,2], Falk Lederer[2], Christoph H. Lange[2]; [1]Univ. of Central Florida, USA, [2]Friedrich-Schiller-Univ. Jena, Germany.* We review our observations of multiple solitonic phenomena in electrically pumped semiconductor optical amplifiers (SOAs) including the generation of scalar solitons, their interactions, the possibility of incoherent vector solitons and modulational instability.

WA2 ▪ 9:00 a.m.
Cavity Solitons in Driven VCSELs above Threshold: Theory and Experiment, *Giovanna Tissoni[1], Franco Prati[1], Lorenzo Columbo[1], Reza Kheradmand[1,2], Luigi A. Lugiato[1], Xavier Hachair[3], Francesco Pedaci[3], Emilie Caboche[3], Stephane Barland[3], Massimo Giudici[3], Jorge Tredicce[3], Igor Protsenko[4], Massimo Brambilla[5]; [1]INFM, Dipt. di Fisica e Matematica, Univ. dell'Insubria, Italy, [2]Ctr. for Applied Physics and Astronomical Res., Univ. of Tabriz, Iran (Islamic Republic of), [3]Inst. Non-Linéaire de Nice, France, [4]Lebedev Physics Inst., Russian Federation, [5]INFM, Dipt. di Fisica Interateneo, Politecnico di Bari, Italy.* We experimentally demonstrate the existence and the control of cavity solitons in externally driven vertical-cavity semiconductor lasers above threshold. A model including material polarization dynamics is used to predict and confirm the experimental findings.

WA3 ▪ 9:15 a.m.
Towards a Cavity Soliton Laser: Localized Emission States in Vertical-Cavity Surface-Emitting Lasers with Frequency-Selective Feedback, *Thorsten Ackemann[1,2], Malte Schulz-Ruhtenberg[2], Markus Sondermann[2], Karl F. Jentsch[2], Xavier Hachair[3], Massimo Guidici[3], Jorge R. Tredicce[3], Aleksandr V. Naumenko[4], Natalia A. Loiko[4], Roland Jaeger[5]; [1]Dept. of Physics, Univ. of Strathclyde, UK, [2]Inst. of Applied Physics, Univ. of Muenster, Germany, [3]Inst. Non-Linéaire de Nice, France, [4]Inst. of Physics, Acad. of Sciences of Belarus, Belarus, [5]ULM Photonics, Germany.* We report on experimental investigations of self-sustained bistable localized emission states in vertical-cavity surface-emitting lasers with frequency-selective feedback without purely electrical pumping. Some insight is obtained already by a plane-wave theoretical model.

WA4 ▪ 9:30 a.m.
Beam Propagation in a Cold Rb Atomic Sample, *Guillaume Labeyrie[1], Thorsten Ackemann[2], Bruce Klappauf[3], Gian Luca Lippi[1], Robin Kaiser[1]; [1]Inst. Non-Linéaire de Nice, France, [2]Dept. of Physics, Univ. of Strathclyde, UK, [3]Univ. of British Columbia, Canada.* Reshaping of a probe laser beam crossing a cold Rb sample is measured as a function of power, detuning and beam waist position. Three different, independent, and controllable sources of nonlinear interaction are identified.

WA5 ▪ 9:45 a.m.
Composite Solitons Generated by Solid State Passively Mode-Locked Laser, *Jose-Maria Soto-Crespo[1], Nail Akhmediev[2], Irina T. Sorokina[3], Evgeni Sorokin[3]; [1]Inst. de Optica, Spain, [2]Optical Sciences Group, Australia, [3]Technical Univ., Austria.* We present the first experimental observation of composite solitons generated by the Cr:LiSGaF Kerr-lens passively mode-locked laser. These solitons are characterized by the multi-peaked autocorrelation traces and double-peaked spectrum.

10:00 a.m.–10:30 a.m.
Coffee Break

WB ▪ Controlling the Properties of Light

Festsaal
10:30 a.m.–12:30 p.m.
WB ▪ Controlling the Properties of Light
Michael Cada, Technical Univ. of Nova Scotia, Canada, Presider

WB1 ▪ 10:30 a.m. ►**Invited**◄
Optically Tunable "Slow" Light in Waveguides, *Alexander Gaeta[1], Yoshitomo Okawachi[1], Saikat Ghosh[1], Jay E. Sharping[1], Matthew S. Bigelow[2], Aaron Schweinsberg[2], Robert W. Boyd[2], Zhaoming Zhu[3], Daniel J. Gauthier[3]; [1]Cornell Univ., USA, [2]Inst. of Optics, Univ. of Rochester, USA, [3]Duke Univ., USA.* We demonstrate a technique for generating tunable all-optical delays as long as 20 ns in single-mode fibers at telecommunication wavelengths using stimulated Brillouin scattering. This process represents a step towards implementing slow-light in telecommunication systems.

WB2 ▪ 11:00 a.m.
Group Velocity Control by Cascaded $\chi^{(2)}$ Interactions, *Cristian Manzoni[1], Marco Marangoni[1], Giulio Cerullo[1], Roberta Ramponi[1], Fabio Baronio[2], Costantino De Angelis[2], Kenji Kitamura[3]; [1]Politecnico di Milano, Italy, [2]Univ. degli Studi di Brescia, Italy, [3]Natl. Inst. for Res. in Inorganic Materials, Japan.* We experimentally demonstrate that the group velocity of ultrashort pulses can be controlled through $\chi^{(2)}$-cascaded interactions. This is achieved by propagating 35fs pulses around 1400nm in a 25-mm-long periodically poled stoichiometric lithium tantalate crystal.

WB3 ▪ 11:15 a.m.
Cavity Solitons in Frequency Divide-by-Three Optical Parametric Oscillators, *Kestutis Staliunas[1], Stefano Longhi[2]; [1]ICREA, Spain, [2]Politecnico di Milano, Italy.* We predict cavity solitons in frequency divide-by-three optical parametric oscillators in the presence of an additional degenerate parametric process between the signal and idler waves, and we investigate their stability properties.

WB4 ▪ 11:30 a.m.
Pulse Train Generation by Counterpropagating Second Order Nonlinear Interactions, *Matteo Conforti[1], Andrea Locatelli[1], Costantino De Angelis[1], Alberto Parini[2], Gaetano Bellanca[2], Stefano Trillo[2]; [1]Univ. di Brescia, Italy, [2]Univ. di Ferrara, Italy.* We investigate temporal stability of stationary solutions for backward degenerate parametric mixing. We show that self-oscillating solutions can be obtained from suitable fundamental and second-harmonic continuous wave inputs under general phase-mismatched conditions.

WB5 ▪ 11:45 a.m.
FDTD Modeling of Conversion and Separatrix Crossing in Second Harmonic Generation, *Michele Lauritano, Gaetano Bellanca, Stefano Trillo; Univ. of Ferrara, Italy.* We investigate forward and backward second-harmonic-generation by means of FDTD method. We show that numerical dispersion of the method can strongly affect the generation process. Nevertheless FDTD captures complex dynamical phenomena such as separatrix crossing.

WB6 ▪ 12:00 p.m.
Nonlinear Pulse Propagation and All-Optical Regeneration in Chalcogenide Waveguides Integrated with Bragg Grating Filters, *Vahid Ta'eed[1], David J. Moss[1], Merdahd Shokooh-Saremi[1], Ian Littler[1], Martin Rochette[1], Libin Fu[1], Neil Baker[1], Barry Luther-Davies[2], Yinlan Ruan[2], Benjamin J. Eggleton[1]; [1]Univ. of Sydney, Australia, [2]CUDOS, Australian Natl. Univ., Australia.* We report all-optical regeneration in chalcogenide glass waveguides integrated with Bragg gratings, demonstrating nonlinear power transfer functions with 1ps to 2ps optical pulses.

WB7 ▪ 12:15 p.m.
10Gbit/s Transmission over Long Distance after All-Optical NRZ and RZ to CSRZ Format Conversion Using SLALOM, *Mousaab M. Nahas, Mohamad H. A. Wahid, Robin A. Ibbotson, Keith J. Blow; Aston Univ., UK.* We present a 10Gbit/s transmission performance over long distance after all-optical format conversion between NRZ and RZ to CSRZ format, using a semiconductor laser amplifier in a loop mirror (SLALOM).

12:30 p.m.–2:00 p.m.
Lunch Break

WC ▪ Self Similarity and Fiber Nonlinearities

Festsaal
2:00 p.m.–4:00 p.m.
WC ▪ Self Similarity and Fiber Nonlinearities
Jeroen Nijhof, Marconi, UK, Presider

WC1 ▪ 2:00 p.m.
High-Energy, Few-Cycle Pulses by Chirped-Pulse Cascaded Quadratic Compression, *Jeffrey A. Moses[1], John Nees[2], Bixue Hou[2], Kyung-Han Hong[2], Gerard Mourou[2], Frank W. Wise[1]; [1]Cornell Univ., USA, [2]Univ. of Michigan, USA.* A new type of soliton-effect compression is proposed and demonstrated. Requiring only a quadratic crystal and high-energy 100-fs source, near-single-cycle durations are predicted, despite significant group-velocity-mismatch. Initial experiments generate 4.5-cycle pulses and bandwidths >500 nm.

WC2 ▪ 2:15 p.m.
Entrainment of Pulse Modulation Frequency in Fiber Lasers, *Nail Akhmediev[1], Jose-Maria Soto-Crespo[2], Adrian Ankiewicz[1]; [1]Australian Natl. Univ., Australia, [2]Inst. de Optica, Spain.* We demonstrate that the period of soliton pulsations in a fiber laser can be entrained to the round-trip period. This entrainment contains elements of chaotic dynamics which is quantified by estimating the Lyapunov exponent.

WC3 ▪ 2:30 p.m.
Wide Control of the Group Velocity of Light in Optical Fibers, *Miguel Gonzalez-Herraez[1,2], Kwang-Yong Song[2], Luc Thévenaz[2]; [1]Dept. of Electronics, Univ. of Alcala, Spain, [2]Nanophotonics and Metrology Lab, Ecole Polytechnique Fédérale de Lausanne, Switzerland.* We demonstrate experimentally that a wide control of the group velocity of light can be achieved in conventional optical fibers by use of the stimulated Brillouin scattering effect.

WC4 ▪ 2:45 p.m.
A Semi-Analytic Theory of the Self-Similar Laser Oscillator, *Christian Jirauschek, F. Oemer Ilday, Franz X. Kaertner; MIT, USA.* A semi-analytic theory for the similariton laser is developed using the variational approach. A new trial pulse shape, continuously adjustable inbetween pure Gaussian and pure parabolic, is introduced. Excellent agreement with numerical solutions is obtained.

WC5 ▪ 3:00 p.m.
Experimental Observation of Bound Dispersion-Managed Solitons, *Martin Stratmann, Fedor M. Mitschke; Univ. of Rostock, Germany.* We show numerically and experimentally the existence of bound states of bright and dark temporal solitons. These 'soliton molecules' exist only in dispersion-managed fiber.

WC6 ▪ 3:15 p.m.
Experimental Demonstration of Self-Similar Pulse Compression and Amplification, *David Mechin, Sung-Hoon Im, Vladimir Kruglov, John Harvey; Dept. of Physics, Univ. of Auckland, New Zealand.* Self-similar propagation of linearly chirped hyperbolic secant pulses in a decreasing dispersion fiber amplifier has been observed experimentally. The scheme takes advantage of an exact solution of the generalized nonlinear Schrödinger equation with distributed coefficients.

WC7 ▪ 3:30 p.m.
Testing and Extrapolating the Nonlinear Robustness of Modulation Formats, *Alessandro Tonello[1], Stefan Wabnitz[1], Erwan Pincemin[2], J. Y. Guilloux[2], A. Bezard[2], T. Vargas[2], Juan Diego Ania Castanon[3], Sergei K. Turitsyn[3]; [1]Lab de Physique de l'Univ. de Bourgogne, France, [2]France Telecom R&D, France, [3]Aston Univ., UK.* The comparison of the robustness of modulation formats in fiber transmission systems facing nonlinear impairments and noise is carried out experimentally using a

test link. Special techniques may be necessary when extrapolating by numerical simulations.

WC8 ▪ 3:45 p.m.
Experimental Observation of Incoherent Modulation Instability in Standard Optical Fibers, *Alexandre Sauter[1], S. Pitois[1], G. Millot[1], A. Picozzi[2]; [1]Lab de Physique de l'Univ. de Bourgogne, France, [2]Lab de Physique de la Matière Condensée, Univ. de Nice Sophia-Antipolis, France.* In this work, we demonstrate theoretically and experimentally that a partially temporally incoherent light can exhibit modulational instability when propagating in an optical fiber with instantaneous nonlinear Kerr response.

WD ▪ Poster Session I

Kleiner Saal
4:00 p.m.–6:00 p.m.
WD ▪ Poster Session I
Coffee Break

WD1
Transverse Dynamics of Anisotropic Nematicons, *Marco Peccianti[1], Andrea Fratalocchi[1], Gaetano Assanto[1], Antonio De Luca[2], Cesare Umeton[2]; [1]NooEL-Nonlinear Optics and OptoElectronics Lab, Italian Inst. for the Physics of Matter, Italy, [2]INFM, LICRYL– Liquid CRYstal Lab, Univ. of Calabria, Italy.* We investigate the role of anisotropy in the transverse dynamics of spatial solitons in nematic liquid crystals, owing to the interplay between walk-off, bias-induced index profile and self-confinement.

WD2
Ring Vortex Solitons in Nonlocal Nonlinear Media, *Dahliyani Briedis[1], Dan E. Petersen[2], Darran Edmundson[1], Wieslaw Krolikowski[1], Ole Bang[3]; [1]Australian Natl. Univ., Australia, [2]Univ. of Copenhagen, Denmark, [3]Technical Univ. of Denmark, Denmark.* Stable two-dimensional vortex solitons are formed using a nonlocal nonlinear model. Nonlocality stabilizes otherwise unstable vortex beams in the case of single or higher charge fundamental vortices as well as higher order vortex solitons.

WD3
From Maxwell's Equations to Helmholtz Solitons, *Pedro Chamorro-Posada[1], Graham S. McDonald[2]; [1]Dept. de Teoría de la Señal y Comunicaciones e Ingeniería Telemática, Univ. de Valladolid, Spain, [2]Univ. of Salford, UK.* We analyse the propagation properties of Helmholtz solitons numerically solving Maxwell's equations. The results support previous Helmholtz work and permit to extend the analysis to new problems. We report the stability of sub-wavelength TE solitons.

WD4
Spatio-Temporal Reallocation and Evolution Patterns of Interacting Beams in Nonlinear Bi-Dispersive Media, *Yannis Kominis[1], Panagiotis Papagiannis[1], Nikolaos Moshonas[1], Sotiris Droulias[1], Ilias Tsopelas[1], Nikolaos Efremidis[1], Kyriakos Hizanidis[1,2], Demetrios Christodoulides[2]; [1]Natl. Technical Univ. of Athens, Greece, [2]School of Optics/CREOL, Univ. of Central Florida, USA.* Beam interactions in nonlinear bi-dispersive media are studied and the spatio-temporal reallocation of beams is investigated, in order to transform an initial space separation of beams to a certain time separation.

WD5
The Dynamics of the Optical Parametric Oscillator Near Resonance Detuning, *Braxton Osting, Sarah Hewitt, J. Nathan Kutz; Dept. of Applied Mathematics, Univ. of Washington, USA.* A quintic, fourth-order evolution equation of the Swift-Hohenberg type is derived for an optical parametric oscillator near the resonance detuning limit which supports the formation of cavity solitons, plane waves, and periodic structures.

WD6
Steering Properties of the Bright Discrete Staggered Solitons in Photovoltaic Photorefractive Media, *Aleksandra Maluckov[1], Ljupco Hadzievski[2], Milutin Stepic[3], Detlef Kip[3]; [1]Faculty of Sciences and Mathematics, Serbia and Montenegro, [2]Vinca Inst. of Nuclear Sciences, Serbia and Montenegro, [3]Inst. of Physics and Physical Technologies, Clausthal Univ. of Technology, Germany.* The steering properties of on-site and inter-site stationary discrete bright staggered photovoltaic solitons are interpreted by the Peierls-Nabbaro formalism. The free steering of twisted inter-site and on-site modes is absent.

WD7
Screening Solitons in Photorefractive Multiple Quantum Well Planar Waveguide, *Andrzej Ziolkowski, Ewa Weinert-Raczka; Szczecin Univ. of Technology, Poland.* The possibility of screening solitons generation in semi-insulating multiple quantum well planar waveguide is analysed. An approximate analytical solution is presented and confirmed by a numerical time-dependent solution to complete band transport model.

WD8
Transverse Response of Cavity Systems, *Andrew J. Scroggie, Gian-Luca Oppo, John Jeffers, Graeme McCartney; Dept. of Physics, Univ. of Strathclyde, UK.* We show that plane-mirror optical cavities (linear and nonlinear) can convert spatially-phase (amplitude) modulated input beams into amplitude (phase) modulated outputs. The effect occurs for only one sign of the effective cavity detuning.

WD9
Chaotic Bound State of Localized Structures in the Complex Ginzburg-Landau Equation, *Turaev Dmitry[1], Sergey Zelik[2], Andrei G. Vladimirov[3]; [1]Ben Gurion Univ., Israel, [2]Inst. of Information Transmission Problems, Russian Acad. of Sciences, Russian Federation, [3]Weierstrass Inst. for Applied Analysis and Stochastics, Germany.* A new type of dynamic stable bound state of dissipative localized structures is found. It is characterized

by chaotic oscillations of distance between the localized structures, their phase difference, and the center of mass velocity.

WD10

Mode Splitting in a Fiber Coupled-Resonator System, *Nick Lepeshkin[1], Aaron Schweinsberg[1], George Gehring[1], Robert W. Boyd[1], David D. Smith[2], Q-Han Park[3], Deborah J. Jackson[4]; [1]Inst. of Optics, USA, [2]Science Directorate, NASA Marshal Space Flight Ctr., USA, [3]Dept. of Physics, Korea Univ., Republic of Korea, [4]Quantum Computing Technologies Group, Jet Propulsion Lab, USA.* We study mode splitting in a coupled fiber-ring resonator system. Cancellation of absorption on resonance is observed and explained in terms of destructive interference of the symmetric and anti-symmetric modes of the system.

WD11

High Density InAlAs/GaAlAs Quantum Dots as an Efficient Enhanced Kerr Material for Transverse Non-linear Optics in Microcavities, *Jean-Michel Benoit, Aristide Lemaître, Gilles Patriarche, Karine Meunier, Sylvain Barbay, Robert Kuszelewicz; Lab de Photonique et Nanostructures, France.* InAlAs/GaAlAs quantum dots are studied using transmission electron microscopy, photoluminescence. These systems appear as promising materials for laser and non-linear optics in the visible/near infrared range, particularly as a focusing Kerr-like medium for pattern formation.

WD12

Circulating Spatial Solitons, *Eyal Feigenbaum[1], Meir Orenstein[1], Jacob Scheuer[2]; [1]Technion, Israel, [2]Caltech, USA.* To drive a spatial soliton into a circular motion, we employed interactions between the soliton and a curved nonlinear interface. The radial forces yielded an orbital soliton, when the interface nonlinearity exceeded a threshold value.

WD13

Hyperbolic Patterns in Nonlinear Resonators, *Kestutis Staliunas[1], Mustapha Tlidi[2]; [1]ICREA, Spain, [2]Univ. Libre de Bruxelles, Belgium.* Nonlinear resonators with diffraction coefficients of opposite signs along two transverse directions support hyperbolic transverse patterns. These novel types of structures are described analytically by normal form analysis, and investigated numerically.

WD14

Optical Pattern and Cavity Solitons in a Microcavity Based on Semiconductor Quantum Dots: Microscopic Model, *Sylvain Barbay[1], Robert Kuszelewicz[1], Ida Perrini[2], Tommaso Maggipinto[2], Massimo Brambilla[2]; [1]Lab de Photonique et Nanostructures, France, [2]Inst. Nazionale di Fisica della Matera, Italy.* We develop an optical spatio-temporal model for quantum dots. Auger interactions are included as well as the inhomogeneous distribution of quantum dot sizes. Both focusing and defocusing nonlinear regimes are highlighted for cavity soliton applications.

WD15

Spatio-Temporal Vortices and Vortex-Solitons, *Anatoly P. Sukhorukov, V. V. Yangirova, IV; Faculty of Physics, Lomonosov Moscow State Univ., Russian Federation.* We first investigate spatio-temporal vortices propagating in linear and nonlinear media. Their features are described, and the methods of registration and generation are proposed. We present spatio-temporal vortex-soliton dynamics.

WD16

Modulational Instability in Quadratic Media in a Quasi Self-Imaging Resonator, *Mark Saffman, Oo-Kaw Lim, Brian Boland; Univ. of Wisconsin at Madison, USA.* We discuss the threshold for transverse modulational instability in a quasi self-imaging resonator with a quadratic nonlinearity. We show that a large reduction in the threshold can be obtained using a short diffraction length.

WD17

Theoretical and Experimental Temporal Self-Focusing Studies in Photorefractive InP:Fe at Telecommunication Wavelengths, *Naima Khelfaoui[1], Delphine Wolfersberger[1], Godefroy Kugel[1], Nicolas Fressengeas[1], Mathieu Chauvet[2]; [1]LMOPS (Supelec), France, [2]FEMTO-ST, France.* We propose a theoretical and experimental analysis of the temporal self focusing phenomena in InP:Fe semiconductor for low irradiations of continuous laser beams at infrared wavelengths for optical telecommunication applications.

WD18

Escape Angles for Out-of-Phase Nematicons, *Per Dalgaard Rasmussen[1], Ole Bang[1], Wieslaw Krolikowski[2]; [1]Res. Ctr. COM, Technical Univ. of Denmark, Denmark, [2]Laser Physics Ctr., Australian Natl. Univ., Australia.* We study interaction between out-of-phase nematicons and predict analytically the critical degree of nonlocality that provides enough attraction for them to attract and collide. The results are verified by numerical simulations.

WD19

Circular-Flow Modes in Nonlinear Multicore Couplers Eqipped with Long-Period Gratings, *Noriaki Tsukada, Kensuke Fukushima; Hiroshima Inst. of Technology, Japan.* We have numerically investigated spatiotemporal behaviors of circular flow modes induced in nonlinear fiber couplers that consist of phase-shifted N identical long-period fiber gratings by use of the discrete nonlinear Schrodinger equation.

WD20

Discrete Solitary Waves in Nonlinear Nonlocal Media, *Andrea Fratalocchi, Gaetano Assanto; NooEL-Nonlinear Optics and OptoElectronics Lab, Italian Inst. for the Physics of Matter, Italy.* We develop a theory of discrete spatial solitons in media with an arbitrary degree of nonlinear nonlocality and discuss the existence of a novel family of discrete localized waves.

WD21

Discrete Light Propagation and Nonlinear Interactions in Self-Defocusing Liquid Crystalline Waveguides, *Andrea Fratalocchi[1], Gaetano Assanto[1], Kasia Brzdąkiewicz[2], Miroslaw Karpierz[2]; [1]NooEL-Nonlinear Optics and OptoElectronics Lab, Italian Inst. for the Physics of Matter, Italy, [2]Faculty of Physics, Warsaw Univ. of Technology, Poland.* We investigate discrete light propagation and nonlinear interactions in a voltage-controlled array of channel waveguides in undoped nematic liquid crystals, exploiting their self-defocusing response.

WD22

Stabilization of Light Bullets in a Kerr Medium with Dispersion Management, *Marek Trippenbach[1], Michal Matuszewski[1], Eryk Infeld[2], Boris A. Malomed[3]; [1]Warsaw Univ., Poland, [2]Soltan Inst. for Nuclear Studies, Poland, [3]Tel Aviv Univ., Poland.* We demonstrate a possibility to stabilize spatiotemporal solitons in self focusing Kerr media by means of dispersion management in the longitudinal direction with the group velocity dispersion alternating between positive and negative values.

WD23

Pulse Compression Using Nonlinear Waveguide Arrays, *Sotirios Droulias[1], Ilias Tsopelas[1], Nikolaos Moshonas[1], Panagiotis Papagiannis[1], Yannis Kominis[1], Nikolaos Efremidis[1], Kyriakos Hizanidis[1], Joachim Meier[2], Demetrios N. Christodoulides[2]; [1]School of Electrical and Computer Engineering, Natl. Technical Univ. of Athens, Greece, [2]College of Optics and Photonics, CREOL & FPCE, Univ. of Central FLorida, USA.* We demonstrate that high fidelity compression is possible when normally dispersive waveguide arrays are used together with gratings or other programmable phase filters. The performance of this scheme is assessed in AlGaAs array systems.

WD24

Defect Modes in One-Dimensional Optically-Induced Photonic Lattices, *Francesco Fedele[1], Jianke Yang[1], Igor Makasyuk[2], Zhigang Chen[2]; [1]Univ. of Vermont, USA, [2]San Francisco State Univ., USA.* Defect modes in one-dimensional optically-induced photonic lattices are theoretically predicted and experimentally observed. Such defect modes are analogous to guided light in an air-hole in photonic crystal fibers.

WD25

Polychromatic Multigap Solitons in Nonlinear Photonic Lattices, *Kristian Motzek[1,2], Andrey A. Sukhorukov[1], Yuri S. Kivshar[1], Friedemann Kaiser[2]; [1]Australian Natl. Univ., Australia, [2]Technische Univ. Darmstadt, Germany.* We predict simultaneous self-trapping of multiple frequency beams in spectral gaps of periodic lattices, and demonstrate strong sensitivity of localization and mobility of such polychromatic multigap solitons on their spectra due to lattice-enhanced dispersion.

WD26

Dissipative Solitons in Multi-Domain Semiconductor Laser Waveguides with Local Gain and Fast-Relaxing Absorption, *Alexandre S. Shcherbakov, Mauro Sanchez Sanchez; Natl. Inst. for Astrophysics, Optics & Electronics, Mexico.* We recognize steady states for dissipative solitons in multi-domain semiconductor laser waveguides shaped via resculpturing external optical pulses. Both dark and bright solitons are supported by waveguides with quasi-linear local gain and fast-relaxing saturable absorption.

WD27

Optically Induced Sculpturing of Three-Wave Coupled States in a Two-Mode Waveguide with a Square-Law Nonlinearity, *Alexandre S. Shcherbakov[1], Arturo Aguirre Lopez[2]; [1]Natl. Inst. for Astrophysics, Optics & Electronics, Mexico, [2]Mixteca Univ. of Technology, Mexico.* Multi-pulse three-wave weakly-coupled states are shaped under action of a pulsed optical pump in a two-mode nonlinear waveguide. Analysis of the intensity and frequency distributions in their optical components and the experimental studies are presented.

WD28

Revealing Multi-Pulse Four-Wave Bragg Spatial Solitons Inperiodic Square-Law Nonlinear Crystal with Direct Transitions, *Alexandre S. Shcherbakov[1], Arturo Aguirre Lopez[2]; [1]Natl. Inst. for Astrophysics, Optics & Electronics, Mexico, [2]Mixteca Univ. of Technology, Mexico.* Multi-pulse four-wave Bragg spatial solitons, originating with a two-phonon non-collinear light scattering, are uncovered in periodic crystals providing direct transitions between all light modes. Spatio-frequency distributions of their optical components are estimated and observed experimentally.

WD29

Subdiffractive Solitons in Bose-Einstein Condensates, *Kestutis Staliunas[1], Ramon Herrero[2], German De Valcarcel[3]; [1]ICREA, Spain, [2]UPC, Spain, [3]Univ. of Valencia, Spain.* We predict the disappearance of diffraction (the increase of the mass) of Bose-Einstein condensates in counter-moving periodic potentials. We demonstrate subdiffractive solitons (stable droplets of the condensate) in the vicinity of this zero diffraction point.

WD30

Discrete Interband Mutual Focusing in Nonlinear Photonic Lattices, *Christian R. Rosberg, Brendan Hanna, Dragomir N. Neshev, Andrey A. Sukhorukov, Wieslaw Krolikowski, Yuri S. Kivshar; Australian Natl. Univ., Australia.* We study nonlinear coupling of mutually incoherent waves in a one-dimensional photonic lattice. We demonstrate experimentally mutual focusing and defocusing of beams associated with different Floquet-Bloch waves of the transmission spectrum.

WD31

Gap Random-Phase Lattice Solitons, *Robert Pezer[1], Hrvoje Buljan[1], Jason Wolf Fleischer[2], Guy Bartal[3], Oren Cohen[3], Mordechai Segev[3]; [1]Dept. of Physics, Univ. of Zagreb, Croatia, [2]Electrical Engeneering Dept., USA, [3]Physics Dept. and Solid State Inst., Israel.* We theoretically study the intensity structure, coherence properties, Floquet-Bloch and Fourier power spectra of gap random-phase lattice solitons in nonlinear photonic lattices with self-defocusing nonlinearity.

WD32
Steering Properties of Bright Discrete Staggered Solitons in Photovoltaic Photorefractive Media, *Aleksandra Maluckov[1], Ljupčo Hadžievski[2], Milutin Stepic[3], Detlef Kip[3]; [1]Faculty of Sciences and Mathematics, Serbia and Montenegro, [2]Vinča Inst. of Nuclear Sciences, Serbia and Montenegro, [3]Clausthal Univ. of Technology, Germany.* The steering properties of different types of discrete staggered solitons in self-defocusing photovoltaic photorefractive media are investigated and the exchange between trapping and steering of these modes is interpreted by the Peierls-Nabarro formalism.

WD33
Femtosecond Laser Writing of Surface Microstructures in Lithium Niobate, *Daniela Grando, J. Yu, D. Ballarini, P. Galinetto; Univ. di Pavia, Italy.* Femtosecond pulses from an amplified Ti:Sapphire laser were found to be a surgically precise manufacturing tool for the formation of microstructures in Lithium Niobate crystals. Surface gratings were formed with 10% first order diffraction efficiency.

WD34
Gap Soliton Internal Modes Beating and Optical Zoomeron, *Boris Mantsyzov; Dept. of Physics, M. V. Lomonosov Moscow State Univ., Russian Federation.* It is shown that a beating of internal modes of perturbed gap soliton of self-induced transparency causes energy exchange between linear modes and soliton. As a result, slow gap soliton demonstrates zoomeron-like oscillating dynamics.

WD35
Analytical Solution for Gap Soliton of Self-Induced Transparency in Structure with Cosine-Modulated Density of Resonant Atoms, *Boris I. Mantsyzov, Evgeny V. Petrov; Physics Dept., M. V. Lomonosov Moscow State Univ., Russian Federation.* We show analytically that a gap soliton of self-induced transparency can arise in cosine-modulated resonant structures, which are formed using holographic polymerization technique. The features of the solitons and their interactions are discussed.

WD36
Diffraction Management and Formation of Gap Solitons in Lithium Niobate Waveguide Arrays, *Milutin Stepic[1], Feng Chen[1], Christian Rueter[1], Daniel Runde[1], Detlef Kip[1], Vladimir Shandarov[2], Ofer Manela[3], Mordechai Segev[3]; [1]Inst. of Physics and Physical Technologies, Clausthal Univ. of Technology, Germany, [2]State Univ. of Control Systems and Radioelectronics, Russian Federation, [3]Dept. of Physics, Solid State Inst., Technion, Israel.* We report on light propagation in one-dimensional photorefractive waveguide arrays in $LiNbO_3$ exhibiting a saturable defocusing nonlinearity. Low-intensity discrete diffraction and high-intensity formation of gap solitons arising from the first band are demonstrated.

WD37
Gap Solitons in Photonic Crystal with Quadratic Nonlinearity and Diffraction, *Maria V. Komissarova, Irina Yu. Polyakova, Anatoly P. Sukhorukov, Irina G. Zakharova; Faculty of Physics, Moscow State Univ., Russian Federation.* Gap solitons excited by spatially limited wave beams in photonic crystals are studied numerically. In the cascade limit destructive diffraction influence is shown for zero-velocity solitons. Solitons with nonzero velocity are quasi-stable provided certain conditions.

WD38
Gap Soliton Gating, Dissociation, and Retrieval via Defect Mode Excitation in a Resonant Photonic Crystal, *Igor V. Mel'nikov[1,2], J. S. Aitchison[3]; [1]Comtex Consulting Inc., Canada, [2]A. M. Prokhorov General Physics Inst. RAS, Russian Federation, [3]Dept. Electrical and Computer Engineering, Univ. of Toronto, Canada.* The long-range interaction of gap solitons in a resonant photonic crystal is mediated by a defect that is shown to provide a selective reversible tool for optical storage/processing.

WD39
Experimental Observation of Discrete Modulation Instability in 1-D Nonlinear Waveguide Arrays, *Mathieu Chavet[1], Guoyuan Fu[1], Gregory J. Salamo[1], Jason W. Fleischer[2], Mordechai Segev[3]; [1]Univ. of Arkansas, USA, [2]Princeton Univ., USA, [3]Physics Dept. and Solid State Inst., Technion, Israel.* We report on the study of discrete modulation instability in a 1-D photonic lattice waveguide. Experimental results obtained both at the base and at the edge of the first Brillouin zone compare favorably with theory.

6:00 p.m.–8:00 p.m.
Conference Reception

■ Thursday, 8 September 2005 ■

ThA ▪ Imaging and Measurements

Festsaal
8:30 a.m.–10:00 a.m.
ThA ▪ Imaging and Measurements
Akihiro Maruta; Osaka Univ., Japan, *Presider*

ThA1 ▪ 8:30 a.m.
All-Optical Analog-to-Digital Conversion Based on 2nd-Order Soliton Splitting in Fiber, *Shoichiro Oda, Akihiro Maruta; Graduate School of Engineering, Osaka Univ., Japan.* In this paper, we propose a novel polarization-independent all-optical analog-to-digital conversion scheme, which is realized by filtering the spectrum of the 2nd-order soliton. We experimentally demonstrate the proposed 2-bit all-optical ADC.

ThA2 ▪ 8:45 a.m.
Near-Field Imaging of Short Pulse Dynamics in Nonlinear Planar Silica Waveguides, *Yoav Linzon[1], I. Ilsar[1], D. Cheskis[1], S. Bar-Ad[1], R. Morandotti[2], J. S. Aitchison[3]; [1]School of Physics and Astronomy, Tel Aviv Univ., Israel, [2]Univ. du Québec, Israel, [3]Univ. of Toronto, Israel.* Imaging by a simplified near-field scanning optical microscope and numerical simulations reveal the complex spatiotemporal and spectral dynamics during propagation of 60-fs pulses in nonlinear planar silica waveguides, in the anomalous dispersion regime.

ThA3 ▪ 9:00 a.m.
Measurements of Large and Broadband Raman Gain Coefficients for a Number of Glass Families, *Robert Stegeman[1], Clara Rivero[1], Kathleen Richardson[1], Peter Delfyett[1], George Stegeman[1], Thierry Cardinal[2], Michel Couzi[3], Philippe Thomas[4], Jean-Claude Champarnaud-Mesjard[4]; [1]Univ. of Central Florida, USA, [2]Inst. de Chimie de la Matière Condensée de Bordeaux, France, [3]Lab de Physico-Chimie Moleculaire, Univ. of Bordeaux 1, France, [4]Science des Procedés Céramiques et Traitements de Surfaces, Faculté des Sciences et Techniques, France.* Raman Gain coefficients have been measured for several different compositions of a variety of glass families in bulk samples. Coefficients up to 80 times and bandwidths three times that of fused silica will be reported.

ThA4 ▪ 9:15 a.m.
Cutoff and Leakage Properties of Bi-Soliton and Its Existent Parameter Range, *Yoshifumi Asao, Akihiro Maruta; Graduate School of Engineering, Japan.* We study the cutoff and leakage properties of bi-soliton, which is a periodically stationary pair of adjacent pulses, and show then these properties limit its existent parameter range.

ThA5 ▪ 9:30 a.m.
Bloch-Oscillations in Frequency Space, *Ulf Peschel, Thomas Pertsch, Falk Lederer; Friedrich-Schiller-Univ. Jena, Germany.* We show that based on the concept of Bloch-oscillations distortion free signal transfer between different frequency channels and spectral demultiplexing can be realized in a single mode fiber.

ThA6 ▪ 9:45 a.m.
Instabilities of Four-Wave Mixing, *S. Valentini[1], G. Bellanca[1], Stefano Trillo[1], G. Millot[2]; [1]Fondazione Ugo Bordoni, Italy, [2]Univ. de Bourgogne, France.* We predict that four-wave mixing driven by a dual frequency input undergoes different instability scenarios encompassing modulational instability or multiple shock formation in the anomalous and normal dispersion regime, respectively.

ThB ▪ Poster Session II

Kleiner Saal
10:00 a.m.–12:00 p.m.
ThB ▪ Poster Session II
Coffee Break

ThB1
Theoretical Description of a Self-Phase Modulation Based All-Optical Pulse Regenerator, *Pontus Johannisson[1], Magnus Karlsson[2]; [1]Dept. of Radio and Space Science, Chalmers Univ. of Technology, Sweden, [2]Dept. of Microtechnology and Nanoscience, Photonics Lab, Chalmers Univ. of Technology, Sweden.* A self-phase modulation based all-optical pulse regeneration system of the Mamyshev type is investigated. Design guidelines are given and system trade-offs are described.

ThB2
Polarization-Mode Dispersion in Dispersion-Managed Soliton Transmission - Impact of Sectional Power Management, *Satoshi Kawashima[1], Kentarou Ishii[1], Yutaka Fukuchi[2], Joji Maeda[1]; [1]Dept. of Electrical Engineering, Faculty of Science and Technology, Tokyo Univ. of Science, Japan, [2]Dept. of Electrical Engineering, Faculty of Engineering, Tokyo Univ. of Science, Japan.* We numerically show that transmission power management in optical fiber links will effectively reduce PMD-induced pulse broadening in dispersion-managed soliton transmission.

ThB3
Theory of Multi-Frequency Mode-Locked Lasers, *Edward Farnum, J. Nathan Kutz; Dept. of Applied Mathematics, Univ. of Washington, USA.* A theoretical model based upon the master mode-locking equation is constructed to describe multi-frequency, pulsed mode-locking. The model results in mode-locking dynamics qualitatively observed in experimental multi-frequency laser operation.

ThB4
Semi-Analytical Q Parameter Estimate in Linear and Nonlinear Transmission Systems, *Marc A. Eberhard, Keith J. Blow; Aston Univ., UK.* We compare the Q parameter obtained from the semi-analytical model with scalar and vector models for two realistic transmission systems. First a linear system with a compensated dispersion map and second a soliton transmission system.

ThB5
Stimulated Emission of Linear Waves from Optical Solitons: Analytical Approach, *Dmitry Skryabin, Alex Yulin; Univ. of Bath, UK.* We present theory of emission of new spectral components by optical solitons probed by a dispersive wave. Our theory includes scalar and vector cases and allows explicit calculation of the amplitudes of the generated waves.

ThB6
Resonant π and 2π Solitons in Gas-Filled Hollow-Core PCFs, *Fabio Biancalana[1], Dmitry V. Skryabin[2]; [1]Tyndall Natl. Inst., Ireland, [2]Univ. of Bath, UK.* A feasibility study of excitation of Raman Pi and 2Pi solitons in gas-filled hollow-core PCFs is given. We give realistic estimates for soliton durations and powers and investigate the role played by GVD and dephasing.

ThB7

Modeling and Analysis of High Performance L-Band Erbium-Doped Fiber Amplifier (EDFA) , *Siham N. Muhyaldin, Marc A. Eberhard, Keith J. Blow; Photonic Res. Group, School of Engineering and Applied Science, Aston Univ., UK.* The performances of L-band EDFA are modeled and analyzed, based on C-band EDFA, through variation of pump power, ion concentration and fiber length. The fiber length promises higher performance than others.

ThB8

Application of the Manakov-PMD Equation to a Computational Investigation of Low-PMD Fibres, *Christos Braimiotis, Marc Eberhard; Photonics Res. Group, UK.* The phenomenon of low-PMD fibres is examined through numerical simulations with an algorithm developed by the integration of the Manakov-PMD equation.

ThB9

Reduction of the Impact of Group Delay Ripples in 10 Gb/s NRZ Grating-Compensated Dispersion-Managed Fiber System Using Nonlinear Optical Loop-Mirrors, *A. Labruyere[1], K. Nakkeeran[2], Y.H.C. Kwan[1], P.K.A. Wai[1]; [1]Hong Kong Polytechnic Univ., China, [2]Univ. of Aberdeen, UK.* We investigate the re-amplification and reshaping using nonlinear optical loop-mirrors in a 10-Gb/s non-return-to-zero grating-compensated dispersion-managed transmission line with standard fibers. A large improvement of the system performance is achieved.

ThB10

Continuum Generation in a Dispersion-Shifted Fiber Using One or Two Continuous-Wave Raman Fiber Lasers, *Thibaut Sylvestre, Armand Vedadi, Arnaud Mussot, Eric Lantz, Hervé Maillotte; Lab d'Optique P. M. Duffieux, France.* We report the experimental generation of a 2W broadband (1450-1650nm) supercontinuum using two continuous-wave Raman fiber lasers and demonstrate theoretically that it originally relies on modulation instability and blue-shifted dispersive waves and subsequently Raman amplification.

ThB11

Nonlinear Stabilization of Modes with an Orbital Momentum in Optical Fibers, *Bryan Burgoyne, Nicolas Godbout, Suzanne Lacroix; Ecole Polytechnique de Montréal, Canada.* "Vortex modes" carrying orbital momenta may be created in optical fibers by superpositions of fiber modes. Slight fiber core asymmetries destabilize the linear vortex modes during their propagation but the nonlinear effects can stabilize them.

ThB12

Effect of Distributed Loss of Waveguide on Amplitude Squeezing in the Second-Harmonic Generation, *Joji Maeda, Yutaka Fukuchi; Tokyo Univ. of Science, Japan.* Squeezing in the second-harmonic generation in dissipative waveguides is numerically studied. The effect of distributed loss on squeezing degradation is shown much smaller than that of the same amount of lumped loss at the output.

ThB13

Characteristics of All-Optical Gate Switches Using Cascaded Second-Order Nonlinear Effect in Periodically-Poled Lithium Niobate Devices: Effect of Fabrication Errors, *Yutaka Fukuchi, Keita Kojima, Masami Akaike; Tokyo Univ. of Science, Japan.* We numerically analyze the performance of all-optical gate switches employing the cascaded second-order nonlinear effect in periodically-poled lithium niobate devices. We find that the domain length error of the device decreases the switching efficiency significantly.

ThB14

Efficient Phase Matched Second Harmonic Generation through Rotated Periodic Poling in $LiNbO_3$ Waveguides, *Filippo M. Pigozzo, Elena Autizi, Antonio D. Capobianco, Cinzia Sada, Marco Bazzan, Nicola Argiolas, Paolo Mazzoldi; Univ. of Padova, Italy.* We present a new technique for continuously phase matched second harmonic generation in $LiNbO_3$ optical waveguides. We show that a periodic variation of the nonlinear coefficient along the transverse coordinate permits for efficient energetic exchanges.

ThB15

Efficient and Rigorous Modeling of Second-Harmonic Generation Including Moderate Pump-Depletion, *Bjorn Maes, Peter Bienstman, Roel Baets; Ghent Univ. - IMEC, Belgium.* We present an efficient modeling method to simulate second-harmonic generation in arbitrary two-dimensional devices. By employing eigenmode expansion the algorithm is fully vectorial and especially suited for periodic structures. We include moderate pump-depletion using iteration.

ThB16

Dispersion-Managed Light Bullets and Their Interactions, *Lu Gao, Kelvin H. Wagner, Robert McLeod; Univ. of Colorado at Boulder, USA.* Dispersion management of nonlinear bulk materials sandwiched in between a pair of chirped mirrors is proposed for the generation of (3+1)-D optical solitons. Numerical simulations are performed to study their interactions.

ThB17

All-Optical Switching via Vector Parametric Interactions, *Anatoly P. Sukhorukov, V. E. Lobanov, A. K. Sukhorukova; Faculty of Physics, Moscow State Univ., Russian Federation.* We present our recent results of investigations into three-frequency interactions between noncollinear optical beams. We discuss new effects such as phase-matched and mismatched refraction of signal waves, parametric waveguiding, and multiplexing.

ThB18

All-Optical Generation and Steering of Spatial Solitions in Discrete Waveguide Array, *Igor V. Mel'nikov[1,2], Clark A. Merchant[1], J. Stewart Aitchison[1]; [1]Univ. of Toronto, Canada, [2]Comtex Consulting Inc., Canada.* We numerically study Stokes beam generation in an array of discrete waveguides. The feasibility of generation and steering of spatial solitons due to nonlinear Raman response is demonstrated for the first time.

ThB19

Nonlinear Gyrotropic Guided Waves at Negatively Refracting Interfaces, *Allan D. Boardman[1], Neil King[1], Yuriy Rapoport[2], Larry Velasco[1]; [1]Univ. of Salford, UK, [2]Natl. Taras Shevchenko Univ., Ukraine.* Guided wave propagation in nonlinear layered gyrotropic media with embedded negatively refracting metamaterials is investigated. A general approach is taken that embraces gyroelectric and gyromagnetic materials nonreciprocal dispersion and an FDTD study of mode launching.

ThB20

Joined Resonances of Matter-Wave Solitons in Harmonic Traps, *Bakhtiyor Baizakov; Dept. of Physics, Univ. of Salerno, Italy.* Simultaneous resonances in oscillations of the center-of-mass position and width of matter-wave solitons, induced by periodic modulation of the strength of the harmonic trap are studied. Corresponding domains in the system's parameter space are identified.

ThB21

Dynamical Stabilization of Matter-Wave Solitons in Bose-Einstein Condensates with Two and Three-Body Interactions, *Fatkhulla Abdullaev; Physical-Technical Inst. of the Uzbek Acad. of Sciences, Uzbekistan.* The existence of localized states in the Bose-Einstein condensate with two and three-body interactions in presence of nonlinearity management is shown. This result also obtained from Gross-Pitaevskii equation averaged over rapid modulations.

ThB22

Optical Image and Data Processing with Cavity Type-II Second Harmonic Generation, *Adrian Jacobo, Pere Colet; Inst. Mediterraneo de Estudios Avanzados (IMEDEA) (CSIC-UIB), Spain.* We study the possibilities of all-optical image and data processing using intracavity type II second-harmonic generation. We show AND and XOR operations when using two images. The use of cavities with spherical mirrors is discussed.

ThB23

Modeling Q-Switching in Actively Mode-Locked Lasers, *Joshua Proctor, J. Nathan Kutz; Dept. of Applied Mathematics, Univ. of Washington, USA.* We characterize the Q-switching behavior in an active mode-locked cavity as the nonlinear beating interaction of two unstable modes. The nonlinear beating generates a modulated pulse-train which is verified with numerical simulations.

ThB24

Spatial Solitons in an Optically Pumped Semiconductor Resonator, *Yevgeniya Larionova, Carl Otto Weiss; Physikalisch-Technische Bundesanstalt, Germany.* Spatial solitons and structures in quantum well semiconductor microcavities are investigated with optical pumping. Dramatic reduction of light intensities supporting dark and bright solitons are found. Change of the nonlinearity sign at transparency is apparent.

ThB25

Dark Spatial Solitons in Semiconductor Microcavities, *Yevgeniya Larionova[1], Oleg Egorov[2], Carl Otto Weiss[1]; [1]Physikalisch-Technische Bundesanstalt, Germany, [2]Inst. für Festkörpertheorie und Theoretische Optik, Friedrich-Schiller Univ., Germany.* Properties of dark spatial solitons observed in reflection in a passive quantum well semiconductor resonator and comparison of theoretical calculations with experimental observations are discussed.

ThB26

Cavity Solitons in a VCSEL with Saturable Absorber, *Giovanna Tissoni[1], Morten Bache[1], Franco Prati[1], Reza Kheradmand[1,2], Luigi A. Lugiato[1], Igor Protsenko[3], Massimo Brambilla[4]; [1]INFM, Dipt. di Fisica e Matematica, Univ. dell'Insubria, Italy, [2]Ctr. for Applied Physics and Astronomical Res., Univ. of Tabriz, Iran (Islamic Republic of), [3]Lebedev Physics Inst., Russian Scientific Ctr. of Applied Res., Russian Federation, [4]INFM, Dipt. di Fisica Interateneo, Univ. e Politecnico di Bari, Italy.* We predict the existence and control of cavity solitons in a VCSEL with saturable absorber. The absence of a holding beam implies that the background is the zero intensity field, originating a Cavity Soliton Laser.

ThB27

Cavity Solitons and Patterns in an Optically Pumped Semiconductor Amplifier with Coherent Injection, *Sylvain Barbay, Yves Ménesguen, Isabelle Sagnes, Robert Kuszelewicz; Lab de Photonique et de Nanostructures, France.* We show the spontaneous formation of cavity solitons in a 120 microns diameter, specially designed and very uniform optically pumped semiconductor microcavity as well as patterns with local hexagonal symmetry.

ThB28

Transverse Solitons on a Dynamical Spiral Background, *Florian Huneus, Elmar Schoebel, Thorsten Ackemann, Wulfhard Lange; Univ. of Münster, Germany.* We investigate the properties and the region of existence of high-amplitude dissipative solitons on a low-amplitude dynamical spiral background. The experimental system is a single-mirror scheme with sodium vapor as the nonlinear medium.

ThB29

Absolute Instability and Pattern Formation in Cold Atomic Vapors, *Gevorg A. Muradyan[1,2], Yingxue Wang[2], William Williams[2], Mark Saffman[2]; [1]Yerevan State Univ., Armenia, [2]Univ. of Wisconsin, USA.* We calculate the threshold for transverse instability of counterpropagating beams in a cold atomic vapor. Redistribution of the atomic density lowers the threshold for instability for self-focusing, and raises it for self-defocusing.

ThB30

Polarization Properties and Length Scales of Patterns in Vertical-Cavity Surface-Emitting Lasers, *Malte Schulz-Ruhtenberg[1], Thorsten Ackemann[2,1], Igor V. Babushkin[3], Natalia A. Loiko[3], Kai-Feng Huang[4]; [1]Inst. of Applied Physics, Univ. of Münster, Germany, [2]Dept. of Physics, Univ. of Strathclyde, UK, [3]Inst. of Physics, Acad. of Sciences of Belarus, Belarus, [4]Dept. of Electrophysics, Natl. Chiao Tung Univ., Taiwan Republic of China.*

We report on experimental investigations of the emission of vertical-cavity surface-emitting lasers with a large square aperture. Spatial-resolved polarization and length scales of transverse patterns are examined.

ThB31
Quantum Fluctuations in Cavity Solitons, *Isabel Perez-Arjona[1], German J. de Valcarcel[2], Eugenio Roldan[2]; [1]Univ. Politecnica de Valencia, Spain, [2]Univ. de Valencia, Spain.* Quantum fluctuations of degenerate optical parametric oscillators' cavity solitons (CS) are studied. We show that CSs are sources of perfectly squeezed light that exhibit photon fluctuations below the shot-noise level as well.

12:00 p.m.–2:00 p.m.
Lunch Break

ThC ▪ Nonlinear Optics in 2D Periodic Structures

Festsaal
2:00 p.m.–4:00 p.m.
ThC ▪ Nonlinear Optics in 2D Periodic Structures
Demetri Christodoulides, CREOL, USA, Presider

ThC1 ▪ 2:00 p.m. **►Invited◄**
Photonic Crystal Fibers for Nonlinear Fiber Optics, *Jonathan Knight, Feng Luan, Cristiano Cordeiro, Nicolas Joly, Philip St. John Russell; Univ. of Bath, UK.* Photonic crystal fibers are formed from two-dimensionally patterned glass, which can trap light in a single guided mode in a specially-designed core. Their unusual properties make them a rich source of nonlinear optical effects.

ThC2 ▪ 2:30 p.m.
Enhanced Nonlinear Beam Steering Near Band-Edges of Waveguide Arrays, *Yoav Lahini, Daniel Mandelik, Asaf Avidan, Yaron Silberberg; Weizmann Inst. of Science, Israel.* We investigate experimentally nonlinear dynamics of light beams coupled near band edges of waveguide arrays. In this regime nonlinearity results in strong beam shifts, due to the high curvature of the diffraction curves.

ThC3 ▪ 2:45 p.m.
Spectral Signatures of Soliton Collisions in Photonic Crystal Fibers, *Dmitry Skryabin, F. Luan, J. Knight, A. Yulin; Univ. of Bath, UK.* Collisions of femtosecond solitons in photonic crystal fibers are investigated experimentally and numerically. Clear spectral signatures of the power exchange between the interacting pulses and of the resonant radiation resulting from the collision are reported.

ThC4 ▪ 3:00 p.m.
Nonlinear Tamm States in Waveguide Lattices, *Sergiy Suntsov[1], Konstantinos Makris[1], Demetri Christodoulides[1], George Stegeman[1], Alain Hache[2], Roberto Morandotti[3], H. Yang[4], Greg Salamo[4], M. Sorel[5]; [1]Univ. of Central Florida, USA, [2]Univ. of Moncton, Canada, [3]Univ. du Québec, Canada, [4]Univ. of Arkansas, USA, [5]Univ. of Glasgow, UK.* We report the first experimental observation of nonlinear Tamm states in waveguide arrays. These self-trapped waves are located at the edge of an array and can only exist above a certain power threshold.

ThC5 ▪ 3:15 p.m.
Tunable Refraction in Nonlinear Optically-Induced Photonic Lattices, *Christian R. Rosberg, Dragomir N. Neshev, Andrey A. Sukhorukov, Wieslaw Krolikowski, Yuri S. Kivshar; Australian Natl. Univ., Australia.* We demonstrate tunable positive and negative refraction of Bloch waves in optically-induced photonic lattices. At high laser intensities, the beam broadening due to diffraction can be suppressed through nonlinear self-focusing while preserving the steering properties.

ThC6 ▪ 3:30 p.m.
Observation of 2nd Band Vortex-Ring Soliton in 2-D Photonic Lattices, *Guy Bartal[1], Ofer Manela[1], Oren Cohen[1], Jason W. Fleischer[2], Mordechai Segev[1]; [1]Technion, Israel Inst. of Technology, Israel, [2]Princeton Univ., USA.* We present the first observation of second-band vortex-ring solitons in 2-D photonic lattices, along with a theoretical study of their stability. This constitutes the first observation of a 2-D higher-band lattice soliton.

ThC7 ▪ 3:45 p.m.
Reduced-Symmetry Two-Dimensional Solitons in Square Photonic Lattices, *Denis Traeger[1], Robert Fischer[2], Dragomir N. Neshev[2], Andrey A. Sukhorukov[2], Cornelia Denz[1], Yuri S. Kivshar[2], Wieslaw Krolikowski[3]; [1]Westfaelische Wilhelms-Univ., Germany, [2]Australian Natl. Univ., Australia, [3]Laser Physics Ctr., CUDOS, Australia Natl. Univ., Australia.* We describe soliton localization through combined effects of total internal and Bragg reflection along the principal directions of a square lattice, and study generation of these reduced-symmetry states experimentally through quasi-collapse of phase-engineered elliptic beams.

4:00 p.m.–4:30 p.m.
Coffee Break

ThD ▪ Nonlinear Spatial Structures

Festsaal
4:30 p.m.–6:30 p.m.
ThD ▪ Nonlinear Spatial Structures
Stefan Wabnitz, Xtera Communications, Inc. USA, Presider

ThD1 ▪ 4:30 p.m.
Optical Bloch Oscillations and Zener Tunneling in Two-Dimensional Photonic Lattices, *Henrike Trompeter[1,2], Wieslaw Krolikowski[2], Dragomir N. Neshev[3], Anton S. Desyatnikov[3], Andrey A. Sukhorukov[3], Yuri S. Kivshar[3], Thomas Pertsch[1], Ulf Peschel[1], Falk Lederer[1]; [1]Inst. of Condensed Matter Theory and Solid State Optics, Friedrich-Schiller Univ. Jena, Germany, [2]Laser Physics Ctr. and CUDOS, Res. School of Physical Sciences and Engineering, Australian Natl. Univ., Australia, [3]Nonlinear Physics Ctr. and CUDOS, Res. School of Physical Sciences and Engineering, Australian Natl. Univ., Australia.* We study Bloch oscillations and Zener tunnelling in a two-dimensional optically-induced

lattice with superimposed gradient of the refractive index. We observe simultaneous tunneling into three different points of the lattice bandgap spectrum.

ThD2 ▪ 4:45 p.m.
Modulational Instability in an Optical Ring Cavity Filled with Right-Handed and Left-Handed Materials, *Pascal Kockaert[1], Philippe Tassin[2], Guy Van der Sande[2], Irina Veretennicoff[2], Mustapha Tlidi[1]; [1]Univ. Libre de Bruxelles, Belgium, [2]Vrije Univ. Brussel, Belgium.* From the Maxwell equations, we derive the equations of propagation in a Kerr nonlinear left-handed metamaterial and show that a cavity filled with right-handed and left-handed materials exhibits bistable behavior and spatial modulational instability.

ThD3 ▪ 5:00 p.m.
Long-Range Interactions between Solitons in Nonlocal Nonlinear Media, *Barak Alfassi[1], Carmel Rotschild[1], Oren Cohen[1], Mordechai Segev[1], Demetrios N. Christodoulides[2]; [1]Technion Israel, Israel, [2]School of Optics/CREOL, USA.* We present the first observation of long-range interactions between solitons. Two beams launched in parallel, initially separated by 330µm, self-trap and attract one another, reducing their separation to 190µm over a propagation distance of 50mm.

ThD4 ▪ 5:15 p.m.
Optical Quasi Crystals — Properties and Dynamics, *Barak Freedman[1], Guy Bartal[1], Mordechai Segev[1], Demetrios N. Christodoulides[2], Jason W. Fleischer[3]; [1]Technion, Israel, [2]CREOL, Univ. of Central Florida, USA, [3]Princeton Univ., USA.* We present the first observation of wave dynamics in 2-D Penrose-Tile quasi-periodic optical lattices, including experiments on linear "discrete" diffraction from various lattice sites, nonlinear (self-focusing) localization, and experiments on nonlinearly interacting quasi-periodic lattices.

ThD5 ▪ 5:30 p.m.
Soliton Control in Modulated Optically-Induced Photonic Lattices, *Ivan L. Garanovich, Andrey A. Sukhorukov, Yuri S. Kivshar; Nonlinear Physics Ctr. and CUDOS, Res. School of Physical Sciences and Engineering, Australian Natl. Univ., Australia.* We demonstrate that modulated lattices created by three interfering beams may allow for effective all-optical steering of spatial optical solitons, and also discuss novel effects such as soliton explosions due to resonant inter-band wave mixing.

ThD6 ▪ 5:45 p.m.
Reversible Motion of Cavity Solitons on Modulated Backgrounds, *Andrew J. Scroggie, Gian-Luca Oppo, John Jeffers, Graeme J. McCartney; Dept. of Physics, Univ. of Strathclyde, UK.* Cavity solitons can move up or down phase gradients, or even remain motionless regardless of background modulations. Abrupt changes in their direction of motion and final destination occur on increasing the background modulation wavenumber.

ThD7 ▪ 6:00 p.m.
Information Transfer through Photorefractive Spatial Solitons in the Telecommunication Wavelength Range, *Markus Tiemann, R. Sisodia, V. Petrov, J. Petter, T. Tschudi; TU Darmstadt, Germany.* Photorefractive spatial solitons are attractive elements as interconnectors for all-optical devices. According to our knowledge, we demonstrated for the first time the ability to transmit information through a soliton with the speed of 88.44 Tbits/s.

ThD8 ▪ 6:15 p.m.
Soliton Transport in Quasi-Periodic Lattices, *Andrey A. Sukhorukov; Australian Natl. Univ., Australia.* We demonstrate that nonlinear wave transport in quasi-periodic super-lattices, which profiles are described by multiple spatial frequencies, can be dramatically enhanced if mixed-frequency resonances are suppressed through aperiodic modulations defined by a simple analytical expression.

■ Friday, 9 September 2005 ■

FA ▪ Fabrication and Uses of Nonlinear Spatial Structures

Festsaal
8:30 a.m.–10:00 a.m.
FA ▪ Fabrication and Uses of Nonlinear Spatial Structures
Ulf Peschel, Friedrich-Schiller-Univ. Jena, Germany, Presider

FA1 ▪ 8:30 a.m.
Walking Anisotropic Spatial Solitons and Their Steering in Nematic Liquid Crystals, *Marco Peccianti[1], Alessandro Alberucci[1], Gaetano Assanto[1], Antonio De Luca[2], Gianluca Coschignano[2], Cesare Umeton[2]; [1]NooEL-Nonlinear Optics and OptoElectronics Lab, Italian Inst. for the Physics of Matter, Italy, [2]LICRYL-Natl. Inst. for the Physics of Matter, Univ. of Calabria, Italy.* A novel nematic liquid crystal cell allows the excitation of anisotropic spatial solitons and their angular steering, acting on walk-off thru the applied bias. The input interface enables polarization-healing soliton generation and spatial routing.

FA2 ▪ 8:45 a.m.
Complex Waveguide Trajectories Induced by Photorefractive Solitons in $LiNbO_3$: A Step toward 3-D Optical Circuitry, *Virginie Coda[1], Hervé Maillotte[1], Mathieu Chauvet[1], Simon-Pierre Gorza[2], Cyril Cambournac[2], Marc Haelterman[2], Eugenio Fazio[3], Gregory J. Salamo[4]; [1]Dépt. d'Optique, Inst. FEMTO-ST, France, [2]Univ. Libre de Bruxelles, Belgium, [3]Univ. La Sapienza and INFM, Italy, [4]Univ. of Arkansas, USA.* We report on the realization of optical integrated circuits in 3-D using circular bright photorefractive spatial solitons in photonic-grade lithium niobate. Fabrication of curved waveguides, zero-radius-bend waveguides and 1-by-4 crossconnect circuit is described.

FA3 ▪ 9:00 a.m.
Observation of a Discrete Family of Dissipative Solitons in the Presence of a Symmetry-Breaking Bifurcation, *Matthias Pesch, Jens-Uwe Schurek, Thorsten Ackemann, Wulfhard Lange; Inst. für Angewandte Physik, Germany*. The experimental observation of a discrete family of vector dissipative solitons in a single-mirror scheme based on sodium vapor is reported. Simulations provide further insight into the mechanisms leading to soliton formation.

FA4 ▪ 9:15 a.m.
Experimental Observation of the Elliptically Polarized Fundamental Vector Soliton of Isotropic Kerr Media, *Michaël Delqué[1], Hervé Maillotte[1], Thibaut Sylvestre[1], Cyril Cambournac[2], Pascal Kockaert[2], Marc Haelterman[2]; [1]Dépt. d'Optique P. M. Duffieux, Inst. FEMTO-ST, France, [2]Service d'Optique et d'Acoustique, Univ. Libre de Bruxelles, Belgium.* We report the experimental observation of the elliptically polarized fundamental vector soliton of isotropic Kerr media and its unique polarization evolution. This was achieved in the spatial domain in a non birefringent CS2 planar waveguide.

FA5 ▪ 9:30 a.m.
Nonlinear Waveguide Arrays by Femtosecond Laser Writing in Fused Silica, *Alexander Szameit[1], Dominik Blomer[1], Jonas Burghoff[1], Thomas Pertsch[1], Stefan Nolte[1], Andreas Tunnermann[1], Ulf Peschel[2], Falk Lederer[2]; [1]Inst. of Applied Physics, Germany, [2]Friedrich-Schiller-Univ., Germany.* We report on the progress of optical waveguide arrays in fused silica produced by femtosecond laser writing with increased efficiency. We demonstrate discrete soliton formation in one-dimensional arrays and discrete diffraction in two-dimensional hexagonal lattices.

FA6 ▪ 9:45 a.m.
Spatio-Temporal Dynamics of Ultrashort Laser Pulses in Materials with Anomalous Dispersion, *Stefan Skupin[1], Falk Lederer[1], Luc Bergé[2]; [1]IFTO, Germany, [2]Dépt. de Physique Théorique et Appliquée, CEA/DAM Ile de France, France.* The nonlinear dynamics of femtosecond optical pulses propagating in solid media with anomalous group-velocity dispersion (GVD) is investigated. 3-D collapsing pulses are shown to propagate by emitting quasi-periodically bursts of temporally-compressed light bullets.

10:00 a.m.–10:30 a.m.
Coffee Break

FB ▪ Solitons and New Nonlinear Structures

Festsaal
10:30 a.m.–12:30 p.m.
FB ▪ Solitons and New Nonlinear Structures
Pere Colet, IMEDEA, Spain, Presider

FB1 ▪ 10:30 a.m.
Mutual Self-Focusing and Modulational Instability in Cold Atomic Vapors, *Mark Saffman, Yingxue Wang; Univ. of Wisconsin at Madison, USA.* We discuss mutual self-focusing of light and cold atoms. Stable stationary solutions corresponding to atom-optical solitons are found as well as modulational instability under conditions of optical self-defocusing.

FB2 ▪ 10:45 a.m.
Weak, Strong and Mixed Coupling of Laser Solitons, *Nikolay N. Rosanov, Sergey V. Fedorov, Anatoly N. Shatsev; Res. Inst. for Laser Physics, Russian Federation.* Complexes of two-dimensional topological solitons in wide-aperture lasers with saturable absorption are characterized not only by weak, but also by strong and mixed coupling of individual solitons. Center of inertia of asymmetric complexes moves curvilinearly.

FB3 ▪ 11:00 a.m.
Dissipative Quadratic Lattice Solitons, *Oleg A. Egorov, Ulf Peschel, Falk Lederer; Inst. of Condensed Matter Theory and Solid State Optics, Friedrich-Schiller-Univ. Jena, Germany.* We report for the first time on the existence of dissipative lattice solitons in a quadratically nonlinear cavity with a periodic modulation of the refractive index. We observe various localized structures, in particular multiband solitons.

FB4 ▪ 11:15 a.m.
Positioning and Addressing of Solitary Structures in a Nonlinear Optical Single Feedback Experiment, *Björn Gütlich, Holger Zimmermann, Cornelia Denz; Inst. für Angewandte Physik, Westfälische Wilhelms Univ., Münster, Germany.* Interactions challenge the implementation of solitary structures in context of optical information processing. We investigate control of solitary structures with white light input and demonstrate compensation of inhomogeneity, dynamic and static positioning of solitary structures.

FB5 ▪ 11:30 a.m.
Ground-State Selection and Modal Cooling in a Nonlinear Waveguide, *Yoav Lahini, Daniel Mandelik, Asaf Avidan, Yaron Silberberg; Weizmann Inst. of Science, Israel.* We demonstrate a nonlinear process in which an excitation containing a substantial component of high modes transfers irreversibly a large fraction of the power to the ground state, while shedding some energy into radiation modes.

FB6 ▪ 11:45 a.m.
Boundaries of Existence for Pulsating Solitons in Dissipative Systems, *Nail Akhmediev[1], Eduard Tsoy[1,2]; [1]Optical Sciences Group, Australian Natl. Univ., Australia, [2]Physical-Technical Inst., Uzbekistan.* Stationary to pulsating soliton bifurcation analysis of the complex Ginzburg-Landau equation based on a reduction to finite dimensional system is presented. It allows to find, approximately, the boundaries of existence for pulsating solitons.

FB7 ▪ 12:00 p.m.
Bifurcation Structure and Asymmetric Sequences of Cavity Solitons, *Damia Gomila, Andrew J. Scroggie, William J. Firth; Univ. of Strathclyde, UK.* We study the bifurcation structure of soliton clusters in models of nonlinear optical cavities. We

demonstrate a much higher level of complexity than previously reported, and discuss the properties of asymmetric clusters of solitons.

FB8 ▪ 12:15 p.m.
Excitability Mediated by Localized Structures, *Gomila Damia[1], Manuel A. Matias[2], Pere Colet[2]; [1]Dept. of Physics, Univ. of Strathclyde, UK, [2]IMEDEA (CSIC-UIB), Spain.* We characterize a scenario where localized structures in nonlinear optical cavities display an oscilatory behavior which becomes unstable leading to an excitable regime. Excitability emerges from spatial dependence since the system locally is not excitable.

12:30 p.m.–2:00 p.m.
Lunch Break

FC ▪ Nonlinear Effects

Festsaal
2:00 p.m.–4:00 p.m.
FC ▪ Nonlinear Effects
Presider, TBA

FC1 ▪ 2:00 p.m. **►Invited◄**
Nonlinear Light Propagation in Air, *Arnaud Couairon; Ctr. Natl. de Recherche Scientifique, France.* Numerical simulations predict that femtosecond filamentation in low pressure gases efficiently generates single cycle pulses with 100 μJ energy. The coalescence of multiple filaments in suitable pressure gradients provides a scheme to increase this energy.

FC2 ▪ 2:30 p.m.
Solitons in Nonlinear Media with Infinite Range of Nonlocality: First Observation of Coherent Elliptic Solitons and Bright Vortex-Ring Solitons, *Carmel Rotschild[1], Oren Cohen[1], Ofer Manela[1], Mordechai Segev[1], Tal Carmon[2]; [1]Technion ISRAEL, Israel, [2]Caltech, USA.* We study solitons in highly-nonlocal nonlinear media for which far-away boundary conditions remotely control the evolution of the localized beam, and present the first experimental observation of coherent elliptic solitons and of vortex-ring solitons.

FC3 ▪ 2:45 p.m.
Observation of Attraction Forces between Dark Solitons, *Alexander Dreischuh[1,2], Dragomir N. Neshev[2], Dan E. Petersen[2], Ole Bang[3], Wieslaw Krolikowski[2]; [1]Dept. of Quantum Electronics, Bulgaria, [2]Australian Natl. Univ., Australia, [3]Technical Univ. of Denmark, Denmark.* We demonstrate a dramatic change in the interaction forces between dark solitons in nonlocal nonlinear media. We show the first experimental evidence of attraction between dark solitons.

FC4 ▪ 3:00 p.m.
Observation of New Singular Solutions of the Nonlinear Schrödinger Equation, *Taylor D. Grow[1], Alexander L. Gaeta[1], Gadi Fibich[2]; [1]Cornell Univ., USA, [2]Tel Aviv Univ., Israel.* We investigate theoretically and experimentally the collapse dynamics of non-Gaussian beams. Surprisingly, we find that the spatial profile evolves to a ring rather than to the Townes profile as the beam collapses.

FC5 ▪ 3:15 p.m.
UV-Supercontinuum Generation and Femtosecond Filamentation in Air, *Stefan Skupin[1], Falk Lederer[1], Luc Bergé[2], Guillaume Méjean[3], Jérôme Kasparian[3], Jin Yu[3], Steffen Frey[3], Estelle Salmon[3], Roland Ackermann[3], Jean-Pierre Wolf[3]; [1]IFTO, Germany, [2]Département de Physique Théorique et Appliquée, CEA/DAM Ile de France, France, [3]Lab de Spectrométrie Ionique et Moléculaire, Univ. Claude Bernard, France.* We report experimental and numerical results on supercontinuum generation at ultraviolet/visible wavelengths produced by the long-range propagation of infrared femtosecond laser pulses in air.

FC6 ▪ 3:30 p.m.
Observation of Random Phase Gap Solitons in 2-D Photonic Lattices, *Guy Bartal[1], Hrvoje Buljan[2], Oren Cohen[1], Jason Fleischer[3], Mordechai Segev[1]; [1]Technion, Israel Inst. of Technology, Israel, [2]Univ. of Zagreb, Croatia, [3]Princeton Univ., USA.* We report the first experimental observation of gap random-phase lattice solitons. We observe their self-trapping conformed to the lattice periodicity in real space, as well as their multi-humped power spectrum in k-space.

FC7 ▪ 3:45 p.m.
New Topologies for Solitons in Optical Lattices, *Yaroslav V. Kartashov, Lluis Torner; ICFO-Inst. de Ciencies Fotoniques, Spain.* We address properties and enriched set of manipulations with solitons accessible in optical lattices that belong to different topological classes than periodic lattices. The particular examples of Bessel lattices and lattices with dislocations are considered.

4:00 p.m.–4:30 p.m.
Coffee Break

Postdeadline Session

Festsaal
4:30 p.m.–6:00 p.m.
Postdeadline Session
Presider, TBA

2005 NLGW Key to Authors and Presiders

-R-

-S-

-T-

-U-

Nonlinear Guided Waves and Their Application
Topical Meeting
6-9 September 2005

Program Update Sheet

Welcome to Dresden and the Nonlinear Guided Waves and Their Applications Topical Meeting. This promises to be a most informative and exciting meeting. We are pleased that you are here!

PROGRAM UPDATES

Updated Author Block
WD20
Discrete Solitary Waves in Nonlinear Nonlocal Media, *Andrea Fratalocchi, Gaetano Assanto; NooEL-Nonlinear Optics and OptoElectronics Lab, Italian Inst. for the Physics of Matter, Italy*

Program Updates
ThB19 – Withdrawn.

Presider Updates
TuA - Nanostructured Materials and 2nd Order Effects, *Demetrios Christodoulides, Univ. of Central Florida, USA*
TuB - Modulational Instability, Moti Segav, *Technion Israel Inst. of Technology, Israel*
ThC – Nonlinear Optics in 2D Periodic Structures, *George Stegeman; Univ. of Central Florida, USA*
FC - Nonlinear Effects, Roberto Morandotti, *INRS-EMT, Canada*

Title & Author Block Change
ThC3 - **Families of Raman-Kerr Solitons in Hollow-Core Photonic Crystal Fibers**, *D. Skryabin, F. Biancalana, A. Yulin, Univ. Of Bath, UK*

Remember to fill out a conference survey and return it to the registration desk.

The Organizers of NLGW 2005 gratefully acknowledge the support of:
Defense Advanced Research Projects Agency (DARPA)
U.S. Air Force Office of Scientific Research (AFOSR)

▪ Friday, 9 September 2005 ▪

Postdeadline Paper Session
4:30 p.m. – 6:15 p.m.
Festsaal

PDP1 ▪ 4:30 p.m.
Direct Observation of Fast Intensity Fluctuations of a Cascaded Raman Fiber Laser, *Jochen Schroeder[1], Frederique Vanholsbeeck[1], Miguel Gonzalez-Herraez[2], Stephane Coen[1]; [1]Univ. of Auckland, New Zealand, [2]Inst. de Fisica Aplicada, Spain.* We show experimentally that Raman fiber lasers exhibit fast intensity fluctuations on a time scale of a few tens of picoseconds. Observations are performed with a forward-pump Raman amplifier with zero walk-off.

PDP2 ▪ 4:45 p.m.
Coherent and Incoherent Inscription/Erasure of Cavity Solitons in an Optically-Pumped Vertical-Cavity Semiconductor Amplifier, *Robert Kuszelewicz, Sylvain Barbay, Yves Ménesguen, Isabelle Sagnes; Lab de Photonique et Nanostructures, France.* We show pattern formation and demonstrate both coherent and incoherent inscriptions of cavity solitons in a broad-area, highly uniform optically pumped GaAlAs vertical-cavity semiconductor amplifier. Erasure is also demonstrated in the coherent case.

PDP3 ▪ 5:00 p.m.
Bound Chains of Dark Dispersion-Managed Solitons, *Martin Stratmann, Fedor M. Mitschke; Univ. of Rostock, Germany.* Attractive interaction of dark dispersion-managed temporal solitons is observed numerically. We find chains of up to six bound dark DM solitons. Their binding mechanism is related to the undulating wings of dark DM solitons.

PDP4 ▪ 5:15 p.m.
An Optical Ring Oscillator Using an Active Mach-Zehnder Interferometer, *Ronnie Van Dommelen, Michael Cada; Dalhousie Univ., Canada.* An all-optical self-starting oscillator was proposed, analyzed, built and tested, that uses an integrated interferometer with semiconductor optical amplifiers and a feedback loop. The nonlinearity of both the amplifiers and the interferometer are exploited.

PDP5 ▪ 5:30 p.m.
Soliton-Like Differential Phase-Shift Keying Transmission Guided by In-Line Semiconductor Optical Amplifiers in 40 Gb/s Systems, *Sonia Boscolo[1], Sergei K. Turitsyn[1], Ranjeet Bhamber[1], Vladimir K. Mezentsev[1], Vladimir S. Grigoryan[2]; [1]Photonics Res. Group, School of Engineering and Applied Science, Aston Univ., UK, [2]Ctr. for Photonic Communication and Computing, Northwestern Univ., USA.* We propose a novel, soliton-like optical signal transmission scheme using differential phase-shift keying modulation format and cascaded in-line semiconductor optical amplifiers. The operational regime at 40 Gb/s data rate is numerically demonstrated.

PDP6 ▪ 5:45 p.m.
Stability of Nonlinear Bound States in the Presence of a Continuous Spectrum, *Asaf Avidan, Y. Lahini, D. Mandelik, Y. Silberberg; Weizmann Inst. of Science, Israel.* We study nonlinear relaxation of the excited state in a system with two bound states and a continuum. We simulate the process in a one dimensional waveguide array, and suggest a four wave mixing explanation.

PDP7 ▪ 6:00 p.m.
Enhanced Third Order Nonlinear Effects in AlGaAs Nano-Wire Waveguides, *Roberto Morandotti[1], Robert Iwanow[2], George I. Stegeman[2], Demetri N. Christodoulides[2], Daniel Modotto[3], Andrea Locatelli[3], Costantinos De Angelis[3], C. R. Stanely[4], Marc Sorel[4], Stewart Aitchison[5]; [1]Inst. natl. de la recherché scientifique, Univ. du Québec, Canada, [2]College of Optics and Photonics, Univ. of Central Florida, USA, [3]Inst. Nazionale per la Fisica della Materia, Dipartimento di Elettronica per l'Automazione, Univ. di Brescia, Italy, [4]Dept. of Electrical and Electronic Engineering, Univ. of Glasgow, UK, [5]Dept. of Electrical and Computer Eng, Univ. of Toronto, Canada.* We report the first observation of self-phase-modulation enhancement in 500 nm wide, AlGaAs Kerr nonlinear nano-waveguides.

2005 NLGW Postdeadline Key to Authors

Aitchison, Stewart – PDP7
Avidan, Asaf – PDP6
Barbay, Sylvain – PDP2
Bhamber, Ranjeet – PDP5
Boscolo, Sonia – PDP5
Cada, Michael – PDP4
Christodoulides, Demetri N. – PDP7
Coen, Stephane – PDP1
De Angelis, Costantinos – PDP7
Gonzalez-Herraez, Miguel – PDP1
Grigoryan, Vladimir S. – PDP5
Iwanow, Robert – PDP7
Kuszelewicz, Robert – PDP2
Lahini, Y. – PDP6
Locatelli, Andrea – PDP7
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Van Dommelen, Ronnie – PDP4
Vanholsbeeck, Frederique – PDP1