Trends in Optics and Photonics Series

TOPS
Volume 79

Nonlinear Optics

Postconference Digest

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The organizers of the Nonlinear Optics Topical Meeting gratefully acknowledge the financial support from the following:
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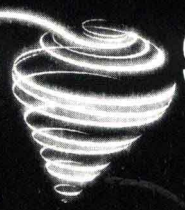
Trends in Optics and Photonics Series



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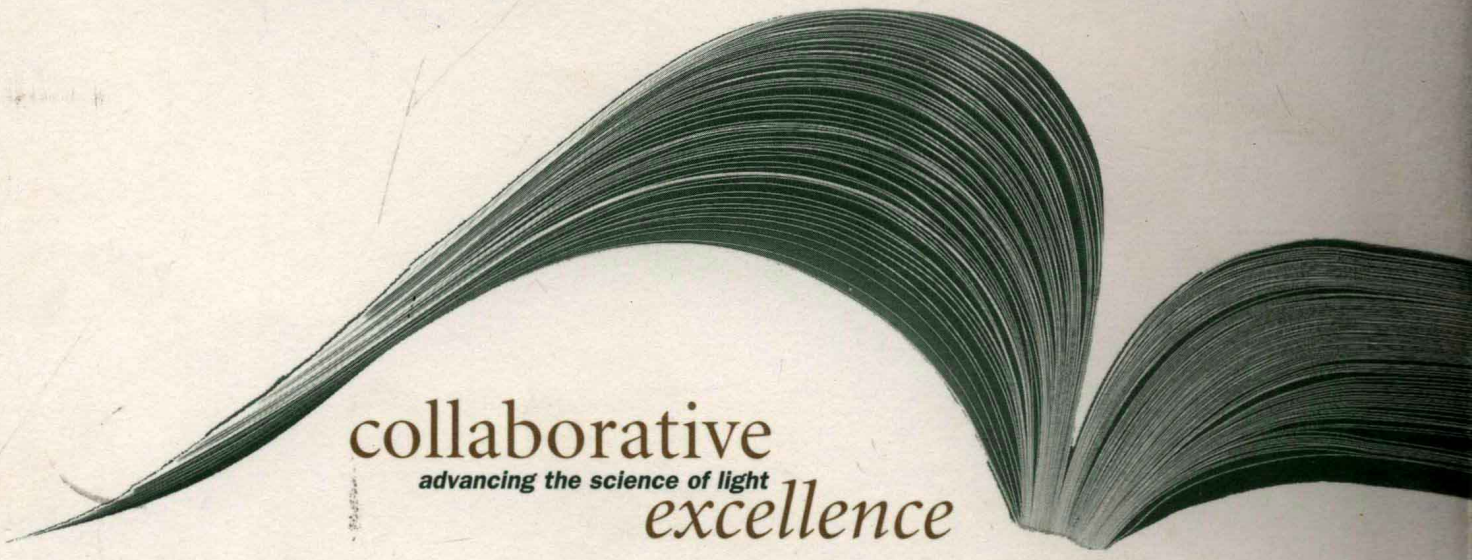

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Agenda of Sessions

Sunday, July 28, 2002	
4:00pm–8:00pm	Registration, *Pavilion Lanai*

Monday, July 29, 2002			
7:30am–12:30pm, 7:30pm–9:30pm	Registration, *Pavilion Lanai*		
Mauna Loa		*Ilima*	
8:30am–10:00am	MA , High Field Nonlinear Optics		
10:00am-10:30am,	Coffee Break		
10:30am–12:30pm	MB, THZ Generation and Material Probing	10:30am–12:30pm	MC, Optical Communications
12:30pm–7:30pm,	Break, On Your Own		
7:30pm–9:30pm	MD, Short Pulses and Weak Fields		

Tuesday, July 30, 2002			
7:30am–12:30pm, 7:30pm–9:30pm	Registration, *Pavilion Lanai*		
Mauna Loa		*Ilima*	
8:00am–10:00am	TuA, Transmission, Generation and Processing		
10:00am–10:30am	Coffee Break		
10:30am–12:30pm	TuB, Wavelength Conversion	10:30am–12:30pm	TuC, Solitons and Pulse Shaping
12:30pm–7:30pm	Break, On Your Own		
7:30pm–9:30pm	TuD, Quasi-Periodic Functions, Control and Atom Optics		

Wednesday, July 31, 2002			
7:30am–12:30pm, 7:30pm–9:30pm	Registration, *Pavilion Lanai*		
Mauna Loa		*Ilima*	
8:00am–10:00am	WA, Semiconductor NLO 1		
10:00am–10:30am	Coffee Break		
10:30am–12:30pm	WB, Optical Pulses: Generation and Diagnostics	10:30am–12:30pm	WC, Nonlinear Optics in Solids
12:30pm–2:00pm	Lunch Break, On Your Own		
2:00pm–3:30pm	WD, Semiconductor Optics 2		
		3:30pm–5:00pm	WE, Poster Session
7:00pm–10:00pm	Luau		

Thursday, August 1, 2002			
7:30am–12:30pm, 7:30pm–9:30pm Registration, Pavilion Lanai			
	Mauna Loa		*Ilima*
8:00am–10:00am	ThA, Bio-Chemical Nonlinear Optics		
10:00am–10:30am Coffee Break			
10:30am–12:30pm	ThB, Semiconductors	10:30am–12:30pm	ThC, NLO in Chemistry and Biology
12:30pm–7:30pm Break, On Your Own			
7:30pm–9:30pm	ThD, Photonic Crystals and Solitons		

Friday, August 2, 2002			
7:30am–12:30pm Registration, Pavilion Lanai			
	Lokelani I		*Lokelani II*
8:00am–10:00am	FA, Quantum Computing and Entanglement		
10:00am–10:30am Coffee Break			
10:30am–12:30pm	FB, Photonic Crystals and Waveguides	10:30am–12:30pm	FC, Raman and Parametric Processes

Abstracts

■ Sunday
■ July 28, 2002

Room: Pavalion Lanai

4:00pm–8:00pm
Registration

■ Monday
■ July 29, 2002

Room: Pavalion Lanai

7:30am–12:30pm
7:30pm–9:30pm
Registration

Room: Mauna Loa

8:30am–10:00am
MA ▪ High Field Nonlinear Optics
Gerard A. Mourou, Univ. of Michigan, USA, Presider

MA1 8:30am (Invited)
High harmonic generation by relativistic Thomson scattering, *D. Umstadter, S. Banerjee, F. He, Y.Y. Lau, R. Shah, T. Strickler, A. Valenzuela, Univ. of Michigan, USA.*
We discuss the first experimental observation of high-order harmonic generation via Compton scattering of a high-intensity laser beam from a laser-driven beam of megavolt-energy electrons. Novel scaling laws governing these processes are also derived theoretically.

MA2 9:00am (Invited)
Few optical cycle pulses in strong-field ionization and non-linear optics, *M. Nisoli, S. Stagira, E. Priori, G. Sansone, S. De Silvestri, INFM, Italy.*
We present applications of high energy few optical cycle pulses to intense-field photoionization, pointing out the role of the absolute phase, and to the generation of high brightness high-order harmonics.

MA3 9:30am (Invited)
Generation and applications of femtosecond X-rays from the Advanced Light Source, *R.W. Schoenlein, A. Cavalleri, C.V. Shank, T.E. Glover, P.A. Heimann, A.A. Zholents, M.S. Zolotorev, Lawrence Berkeley Natl. Lab., USA; H.H.W. Chong, Univ. of California, Berkeley, USA.*
A new frontier in ultrafast science is the investigation of structural dynamics in condensed matter using time-resolved x-ray techniques. We report on the generation of tunable high-brightness femtosecond x-ray pulses from a synchrotron, and recent scientific applications.

10:00am–10:30am
Coffee Break

Room: Mauna Loa

10:30am–12:30pm

MB ▪ THZ Generation and Material Probing

Theodore B. Norris, Univ. of Michigan, USA, Presider

MB1 10:30am

Probing transient conductivity in condensed matter by optical pump/THz time-domain spectroscopy, *J. Shan, F. Wang, T.F. Heinz, Columbia Univ., USA; M. Bonn, Leiden Inst. of Chemistry, The Netherlands; E. Knoesel, Columbia Univ., and Rowan Univ., USA.*

Terahertz time-domain spectroscopy together with femtosecond optical excitation has been applied to probe transient conductivity in normally insulating materials. The conductivity, its temporal evolution, and its temperature dependence yield carrier scattering rate, excitation density, dynamics and scattering mechanisms.

MB2 10:45am

Optimal condition for T-ray generation with a focused beam in nonlinear optical crystals, *J.Z. Xu, T. Yuan, X.–C. Zhang, Rensselaer Polytechnic Inst., USA.*

The rectified terahertz (THz) wave power reaches its maximum once the radius of the optical excitation area in an electro-optical crystal is comparable to the center wavelength of the rectified THz radiation

MB3 11:00am

Improved temporal and spatial resolution in junction-mixing ultrafast scanning tunneling microscopy, *Dzmitry A. Yarotski, Antoinette J. Taylor, Los Alamos Natl. Lab., USA.*

We present results of junction-mixing ultrafast scanning tunneling microscopy that demonstrate a combined spatial/temporal resolution of 1 nm/13 ps, yielding nearly a factor 3 improvement in the temporal resolution over previous results.

MB4 11:15am

Novel femtosecond setup for high sensitive absorption coefficient and optical nonlinearities measurements, *S. Abbas Hosseini, A. Sharan, D. Goswami, Tata Inst. of Fundamental Res., India.*

We introduce a new method to measure both absorption coefficient and third order optical nonlinearity of materials with high sensitivity in a single experimental setup. A dual-beam pump-probe experiment achieves this goal but shows a counterintuitive coupling.

Room: Ilima

10:30am–12:30pm

MC ▪ Optical Communications

Herwig Kogelnik, Bell Labs., USA, Presider

MC1 10:30am

Fiber-optic sources for quantum communication, *Prem Kumar, Marco Fiorentino, Jay E. Sharping, Paul L. Voss, Northwestern Univ., USA.*

We present recent experimental progress towards demonstrating fiber-based sources of quadrature as well as polarization entanglement for quantum communication applications in the 1.5μm band of standard telecommunication fiber.

MC2 10:45am

Amplified spontaneous noise suppression using non-linear vertical-cavity semiconductor gate, *Antti Isomäki, Anne Vainionpää, Jari Lyytikäinen, Oleg G. Okhotnikov, Markus Pessa, Tampere Univ. of Tech., Finland.*

We report on a monolithic semiconductor non-linear reflector for suppressing low-intensity noise in a high-power fiber amplifier. Efficient multistage fiber amplifier systems can be built using these high-contrast non-linear gates.

MC3 11:00am

Phase jitter in single-channel soliton systems, *C.J. McKinstrie, C. Xie, T.I. Lakoba, Lucent Tech., USA.*

Formulas are derived for the noise-induced phase variance of an ensemble of solitons. These formuls, which cover the entire range of practical transmission distances, are validated by numerical solutions of the nonlinear Schroedinger equation.

MC4 11:15am

Towards a better nonlinear phase shifting element, *Yan Chen, Steve Blair, Univ. of Utah, USA.*

Large nonlinear phase shifts can be achieved using cascaded microring resonators even if the constituent material has large linear and two-photon absorption. Constant intensity transmittance can also be maintained.

Room: Mauna Loa

MB5 11:30am
Tunable THz-wave difference frequency generation from slant-stripe-type PPLN based on surface-emitting geometry, *Yuzo Sasaki, Yuri Avetisyan, Tohoku Univ., Japan; Kodo Kawase, RIKEN, Japan; Hiromasa Ito, Tohoku Univ. and RIKEN, Japan.*
We report demonstration of surface-emitted THz-wave difference frequency generation (DFG) using slant-stripe-type PPLN. The maximum output was at around 202 μm (= 1.49 THz), which is close to the expected wavelength of 200μm.

MB6 11:45am
Mixed-phase dynamics in colossal magnetoresistive manganites, *R.D. Averitt, V.K. Thorsmolle, Q.X. Jia, A.J. Taylor, Los Alamos Natl. Lab., USA.*
Our temperature-dependent optical-pump terahertz-probe experiments on mixed-valence manganites reveal that the high temperature dynamics, characteristic of paramagnetic polarons, persist well into the nominally ferromagnetic metal state in these technologically relevant materials.

12:30pm–7:30pm
Break, On Your Own

Room: Ilima

MC5 11:30am
Demonstration of high-speed XOR operation using a Mach Zehnder interferometer with integrated semiconductor optical amplifiers, *H. Chen, G. Zhu, Q. Wang, N. Dutta, Univ. of Connecticut, USA; J. Jaques, A. Piccirilli, J. Leuthold, Lucent Tech., USA.*
All optical XOR functionality is demonstrated experimentally using an integrated SOA-based Mach-Zehnder interferometer at 40 Gb/s. Further, a differential scheme for XOR operation is experimentally investigated in order to reach higher speeds.

MC6 11:45am
Three-wave mixing with whispering-gallery modes for electro-optic modulation and photonic reception, *Vladimir Ilchenko, A.A. Savchenkov, A.B. Matsko, L. Maleki, California Inst. of Tech., USA.*
We demonstrate an electro-optic microwave modulator with milliWatt control power and a sub-microWatt photonic receiver based on triply-resonant three-wave mixing in high-Q toroidal lithium niobate cavities with whispering-gallery (WG) modes.

MC7 12:00pm
Hybridly modelocked multiwavelength semiconductor diode laser, *Michael Mielke, Peter J. Delfyett, School of Optics/CREOL, USA; Gerard A. Alphonse, Sarnoff Corp., USA.*
We demonstrate a hybridly modelocked multiwavelength semiconductor laser using an intracavity saturable absorber. Intensity autocorrelations show improved interchannel phase coherence versus active modelocking. Eye diagrams illustrate the suppression of mode partition noise and the production of error-free optical pulse trains in each of the multiwavelength channels.

MC8 12:15pm
Efficient instantaneous optical switching and frequency conversion on a femtosecond time scale, *R.P. Schmid, J. Reif, Brandenburgische Tech. Univ. Cottbus and JointLab BTU/IHP, Germany.*
Interference between 100-fs laser pulses generates an instantaneous transient index grating in Barium Fluoride. This traveling thin grating supports strong third harmonic generation and leads to efficient self diffraction and diffraction of further beams.

12:30pm–7:30pm
Break, On Your Own

Room: Mauna Loa

7:30pm–9:30pm

MD ▪ Short Pulses and Weak Fields

Stephen E. Harris, Stanford Univ., USA, Presider

MD1 7:30pm (Invited)

Breaking the 1-femtosecond barrier –the advent of attosecond metrology, *Reinhard Kienberger, Michael Hentschel, Markus Drescher, Georg Reider, Christian Spielmann, Ferenc Krausz, Tech. Univ., Austria.*

High-order harmonics have been discussed for years as a means of generating sub-femtosecond x-ray pulses. We report the break of this barrier by few-cicle laser-driven, single, isolated sub-femtosecond pulses and the onset of attosecond metrology.

MD2 8:00pm (Invited)

The quest for single-cycle optical pulses, *F.X. Kärtner, MIT, USA.*

Few-cycle laser pulses from Ti:sapphire and Cr:Forsterite lasers in the wavelength range from 650 nm to 1600 nm have been demonstrated recently. The possible generation of single-cycle optical pulses based on the coherent superposition of these pulses is discussed.

MD3 8:30pm (Invited)

Measuring short pulses using nonlinear optics and nonlinear materials using short pulses, *Ian A. Walmsley, Univ. of Oxford, UK.*

We discuss recent developments in the characterization of ultrashort optical pulses including extensions to the space-time domain and the attosecond regime These methods may be applied to the study of the dynamics of the field in nonlinear interactions.

MD4 9:00pm (Invited)

Nonlinear optics with two photons (or less), *K.J. Resch, J.S. Lundeen, A.M. Steinberg, Univ. of Toronto, Canada.*

Nonlinear optical effects are generally limited to the high-intensity regime due to the small value of typical nonlinear coefficients. We demonstrate novel effects where a strong spectator field mediates a large nonlinear interaction between two photons. Such effects open the door to a new field of {\it quantum} nonlinear optics, potentially useful for two-photon all-optical switches (e.g., optical quantum logic gates) as well as other nonlinear effects such as the formation of quantum solitons. I will talk about enhanced upconversion, quantum state preparation, two-photon cross-phase modulation, and potential quantum-information applications to tasks such as Bell state determination.

■ Tuesday
■ July 30, 2002

Room: Pavalion Lanai

7:30am–12:30pm
7:30pm–9:30pm
Registration

Room: Mauna Loa

8:00am–10:00am
TuA ▪ Transmission, Generation and Processing
Hermann A. Haus, MIT., USA, Presider

TuA1 8:00am (Invited)
The temporal lens as jitter-killer, *Linn F. Mollenauer, Chris Xu, Chongjin Xie, Inuk Kang, Lucent Tech., USA.*
We describe a device, based on a clock-driven modulator followed by a linear dispersive element, which accurately removes jitter in pulse arrival times. This "temporal lens", used just prior to the receiver, greatly improves the BER performance of an ultra-long-haul, dense WDM transmission system.

TuA2 8:30am (Invited)
Ultrafast optical TDM transmission with the use of femtosecond pulses, *Masataka Nakazawa, Res.Inst. of Elec. Comm., Tohoku Univ., Japan.*
We have recently succeeded in transmitting a 1.28 Tbit/s OTDM signal over 70 km with the adoption of third- and fourth-order simultaneous dispersion compensation. In this talk, key technologies for ultrahigh-speed OTDM transmission with the use of femtosecond pulses are described.

TuA3 9:00am (Invited)
All-optical signal processing using nonlinear fibers, *Shigeki Watanabe, Fujitsu Labs. Ltd., Japan.*
The possible applications of highly-nonlinear fibers to all-optical signal processing are described. Ultrabroad band/ ultra-fast optical signal processings using four-wave mixer, cross-phase modulation-based nonlinear optical loop mirror and supercontinuum generation are successfully demonstrated.

TuA4 9:30am (Invited)
Tunable compact THz sources and their application, *Hiromasa Ito, Kodo Kawase, Tohoku Univ., Japan.*
Tunable compact terahertz-wave sources by optical parametric generation / oscillation are reviewed. Wide tunability over the 0.7 to 3THz range, narrow linewidth (<100MHz), and room-temperature operation, promises new coherent THz-wave sources suited to a variety of applications

10:00am–10:30am
Coffee Break

Room: Mauna Loa

10:30am–12:30pm

TuB ▪ Wavelength Conversion

Andrew Kung, Academica Sinica, Taiwan, Presider

TuB1 10:30am

Wavelength conversion of a stored photon, *D.P. Caetano, C. McCormick, R.Y. Chiao, J.M. Hickmann, Univ. Federal de Alagoas, and Cidade Univ., Brazil.*

Using the coherent dynamics of a four-level system, we show that it is possible to store a photon at one wavelength and retrieve it at another wavelength.

TuB2 10:45am

Near-field second-harmonic generation by local field enhancement, *Lukas Novotny, Alexandre Bouhelier, Univ. of Rochester, USA.*

The enhanced field near a laser irradiated metal tip leads to local second-harmonic generation thereby creating a highly confined photon source. This effect is applied to image the field distribution of strongly focused laser modes.

TuB3 11:00am

Three novel nonlinear wavelength converters with built-in amplitude modulators, *Y.C. Huang, K.W. Chang, Y.H. Chen, A.C. Chiang Natl. Tsinghua Univ., Taiwan.*

To achieve simultaneous wavelength conversion and amplitude modulation, we electro-optically modulated a dispersion lithium niobate section in two PPLN sections for a linear-cascaded configuration and a folding-crystal configuration. The performance is compared with an electrode-coated asymmetric-duty-cycle PPLN amplitude modulator.

TuB4 11:15am

Second harmonic generation tuning curves for focused input beams and spatial soliton generation in periodically poled bulk KTP crystal, *Hongki Kim, Ladislav Jankovic, George Stegeman, Univ. of Central Florida, USA; David Eger, Mordechai Katz, Soreq NRC, Israel; Silvia Carrasco, Lluis Torner, Univ. Politecnica de Catalunya, Spain.*

Second harmonic with quadratic soliton generation was measured with 16μm beam waists versus input intensity for periodically poled KTP. Complex highly asymmetric SHG tuning curves were obtained for angle and temperature tuning due to competing effects.

Room: Ilima

10:30am–12:30pm

TuC ▪ Solitons and Pulse Shaping

John Harvey, Univ. of Auckland, New Zealand, Presider

TuC1 10:30am

Observation of the Townes soliton, *K.D. Moll, Alexander L. Gaeta, Cornell Univ., USA.*

We demonstrate that when a laser beam undergoes self-focusing collapse the spatial profile always evolves into the same cylindrically symmetric shape, known as the Townes soliton, regardless of the shape (e.g. elliptical, noisy) of the input beam profile.

TuC2 10:45am

Pulse contrast enhancement of high energy pulses using a gas-filled hollow waveguide, *D. Homoelle, Alexander L. Gaeta, Cornell Univ., USA; V. Yanovsky, G. Mourou, Univ. of Michigan, USA.*

We demonstrate that the technique of nonlinear ellipse rotation in a gas-filled hollow waveguide satisfies all the requirements for greatly improving the pulse contrast of microjoule-to-millijoule femtosecond laser pulses. We believe that this technique will facilitate the development of the next generation of ultra-high-peak power laser systems.

TuC3 11:00am

Spatial soliton families in lithium niobate slab waveguides with engineered QPM gratings, *Roland Schiek, Reinhard Neumeier, Univ. Appl. Sciences Regensburg, Germany; Robert Iwanow, George I. Stegeman, CREOL, USA; Gerhard Schreiber, Wolfgang Sohler, Univ. Paderborn, Germany.*

The relation between power and width of 1D quadratic spatial solitons in SHG was experimentally investigated. In a specially engineered non-uniform QPM section at the waveguide beginning the SH part of the soliton was generated.

TuC4 11:15am

Quadratic solitons in anisotropic media, *Sergey V. Polyakov, George I. Stegeman, Univ. Central Florida, USA.*

Because they have proven inadequate for describing recent experiments, we introduce anisotropic diffraction into the cylindrically symmetric equations used successfully for >25 years to describe quadratic solitons. We show this leads to stationary stable elliptically shaped solitons.

Room: Mauna Loa

TuB5 11:30am
Second harmonic generation in glass doped with I-VII semiconductor nanocrystals, *Napoleon Thantu, Robert S. Schley, Idaho Natl. Engineering and Environmental Lab., USA; Brian L. Justus, NRL, USA.*
Second harmonic generation at 379–426 nm in borosilicate glass doped with I-VII (CuCl) semiconductor nanocrystals, or quantum dots, was observed. The second harmonics were generated without injection of external second harmonic seed pulses.

TuB6 11:45am
Observation of wavelength tuning curves during pump-depleted second harmonic generation, *Krishnan R. Parameswaran, Jonathan R.. Kurz, Rostislav V. Roussev, M.M. Fejer, Stanford Univ., USA.*
We present measurement of SHG tuning curves with strong pump depletion. Quasi-CW pulses were frequency doubled in an annealed and reverse proton exchanged waveguide in PPLN, where the predicted Jacobi elliptic functions were observed.

12:30pm–7:30pm
Break, On Your Own

Room: Ilima

TuC5 11:30am
Dependence of Raman forward scattering and relativistic self-guiding on duration and chirp of an intense laser pulse propagating in a plasma, *Yu-hsin Chen, Chia-Jen Hsu, Hsu-hsin Chu, Natl. Taiwan Univ., Taiwan; Tai-Wei Yau, Chau-Hwang Lee, Inst. Applied Science and Engineering Res., Taiwan; Jyhpyng Wang, Natl. Taiwan Univ. and Inst. of Atomic and Molecular Sciences, Taiwan; Szu-yuan Chen Inst. of Atomic and Molecular Sciences, Taiwan.*
Raman forward scattering and relativistic self-guiding of an intense ultrashort laser pulse propagating in a plasma were studied. Especially, the dependence of these two nonlinear effects on duration and chirp of the laser pulse was characterized.

TuC6 11:45am
Propagation of UV filaments, *Jens Schwarz, Jean-Claude Diels, Univ. of New Mexico, USA.*
Our analytical studies on long pulse (ns) UV filaments show that they can propagate up to 2.5 km. Experimental results are presented that show their feasability for remote sensing applications.

TuC7 12:00pm
Measurement of nonlinear refraction in rubidium vapor, *C. McCormick, D. Solli, J.M. Hickmann, R.Y. Chiao, Univ. of California, Berkeley, USA.*
Using the z-scan technique in the saturated regime, we have quantitatively characterized the nonlinearity of rubidium vapor in a thick cell with a low power diode laser operating around the D2 line.

TuC8 12:15pm
Extending pulse shaping capabilities from UV to mid-IR, *Warren S. Warren, Howe-Siang Tan, Elmar Schreiber, Wolfgang Wagner, Princeton Univ., USA.*
Optical parametric amplification of shaped signal pulses produces shaped idler pulses with expanded wavelength flexibility. Mid-infrared and ultraviolet shaping will be presented along with molecular applications.

12:30pm–7:30pm
Break, On Your Own

Room: Mauna Loa

7:30pm–9:30pm

TuD ▪ Quasi-Periodic Functions, Control and Atom Optics

Arnold Migus, Ecole Polytechnique, France, Presider

TuD1 7:30pm (Invited)

Nonlinear atom optics of bosons and fermions, *Pierre Meystre, Univ. of Arizona, USA.*

We review the general principles underlying the nonlinear atom optics of bosons and fermions. Examples such as matter-wave four-wave mixing and coherent matter-wave amplification are presented, and potential applications are discussed.

TuD2 8:00pm (Invited)

Coherent control of atoms and molecules, for applications in nonlinear optics, *R.A. Bartels, T.C. Weinacht, S. Backus, E. Zeek, L. Misoguti, N. Wagner, M. Baertschy, C.H. Greene, M.M. Murnane, H.C. Kapteyn, JILA,NIST and Univ. of Colorado, Boulder, USA; I.P. Christov, Sofia Univ., Bulgaria.*

We have demonstrated the use of shaped light pulses to generate EUV light with enhanced temporal coherence. In other experiments, we use coherently spinning molecules to phase modulate and compress an ultrashort pulse.

TuD3 8:30pm (Invited)

Quasi-periodic functions and femtosecond pulses, *S.E. Harris, D.R. Walker, D.D. Yavuz, M. Shverdin, Stanford Univ., USA.*

Two Raman generators which have different Raman transition frequencies and are used in series produce a number of sidebands equal to the product of either generator, if alone. Experiments using this source are described.

TuD4 9:00pm (Invited)

Steering molecules by light: From NLO as a goal to NLO as a tool, *Sophie Brasselet, Sébastien Bidault, Rozenn Piron, J. Zyss, LPQM - ENS Cachan, France.*

We demonstrate the first application of optical coherent control techniques to build up a multifunctional molecular material endowed with both quadratic non-linear and two-photon luminescence properties. Tensorial polarization control and monitoring are demonstrated and analyzed.

■ Wednesday
■ July 31, 2002

Room: Pavalion Lanai

7:30am–12:30pm
7:30pm–9:30pm
Registration

Room: Mauna Loa

8:00am–10:00am
WA ▪ Semiconductor Nonlinear Optics 1
Antoinette Taylor, Los Alamos Natl. Lab., USA, Presider

WA1 8:00am (Invited)
Higher order correlations and semiconductor optical nonlinearities, *H.M. Gibbs, G. Khitrova, C. Ell, R. Binder, Univ. of Arizona, USA; W. Hoyer, M. Kira, S.W. Koch, T. Meier, C. Sieh, Philipps Univ., Germany.*
A microscopic theory for optical semiconductor nonlinearities systematically including Coulomb correlation effects is able to explain AC Stark shifts measured with all possible pump/probe circular polarizations and gives evidence for a 3-level-atom-like intervalence band coherence.

WA2 8:30am (Invited)
Dynamics of spectral hole burning in self organized quantum dot amplifiers, *T.B. Norris, K. Kim, J. Urayama, J. Singh, J. Phillips, P.K. Bhattacharya, Univ. of Michigan, USA.*
Femtosecond differential transmission spectroscopy on quantum dots in the gain regime enables direct observation of the spectral hole dynamics; we can independently determine the gain recovery due to intradot carrier relaxation and capture from the barrier region.

WA3 9:00am (Invited)
Fabrication and optical properties of GaN-based quantum dots, *Yasuhiko Arakawa, Univ. of Tokyo, Japan.*
We discuss our recent progress in fabrication and optical of GaN-based quantum dots of high quality. Strong polarization effect induced by GaN/AlN heterointerface leads to various unique features such as long radiative recombination lifetime. A new type of quantum dot lasers operated without population-inversion is proposed utilizing the polarization effect.

WA4 9:30am (Invited)
Carrier-wave nonlinear optics in semiconductors, *Martin Wegener, Univ. of Karlsruhe, Germany.*
We review resonant (off-resonant) experiments on semiconductors with intense 5fs pulses in the regime where the Rabi (Bloch) period becomes as short as the light period and discuss the influence of the carrier-envelope phase.

10:00am–10:30am
Coffee Break

Room: Mauna Loa

10:30am–12:30pm

WB ■ Optical Pulses: Generation and Diagnostics

Hiroyuki Yokoyama, NEC, Japan, Presider

WB1 10:30am

Fully spatially coherent EUV light generated using a small-scale laser, *R.A. Bartels, A. Paul, S. Backus, H.C. Kapteyn, M.M. Murnane, NIST and Univ. of Colorado, USA; I.P. Christov, Sofia Univ., Bulgaria; Y. Liu, D.T. Attwood, Lawrence Berkeley Natl. Lab. and Univ. of California, USA; Chris Jacobson, SUNY at Stony Brook, USA.*

We demonstrate that extreme-ultraviolet light generated using the process of high-harmonic upconversion of a femtosecond laser in a hollow fiber is fully spatially coherent. EUV holography is also demonstrated using this source.

WB2 10:45am

Control over absolute carrier-envelope phase of ultrafast pulses: Complete waveform synthesis, *Tara M. Fortier, David J. Jones, Jun Ye, Steven T. Cundiff, JILA, Univ. of Colorado and NIST.,USA; Robert S. Windeler, OFS Fitel Labs., USA.*

We have established carrier-envelope phase coherence of an ultrafast pulse train extending over 5 minutes. We also discuss results of measuring and controlling the absolute phase of a pulse train emitted directly from an oscillator.

WB3 11:00am

All-optical carrier-envelope-phase stabilization of ultrashort laser pulses by a parametric process, *Takayoshi Kobayashi, Andrius Baltuska, Nobuhisa Ishii, Univ. of Tokyo, Japan.*

White-light-seeded optical parametric amplifiers permit generation of ultrashort pulses with precisely controlled oscillations of the electric field. Generation of ultrashort pulses with passively locked carrier-envelope phase is demonstrated and expected to be useful in the study of extremely nonlinear optical processes.

WB4 11:15am

FROG studies of SSBR: Effects of anomalous dispersion near the exciton resonance, *Ci-Ling Pan, Chao-Kuei Lee, Tze-An Liu, Kai-Fung Huang, Natl. Chiao Tung Univ., Taiwan.*

The reflected pulses from the Strained Saturable Bragg Reflector (SSBR) at several wavelengths were studied using the Frequency Resolved Optical Gating (FROG) technique and incident pulses with zero, positive, or negative chirp. On the long wavelength side of the exciton resonance, weak wavelength-dependent chirp due to material dispersion of the SSBR results in pulse broadening. Strong pulse shortening near the excitonic resonance was observed and attributed to anomalous dispersion due to the resonance absorption.

Room: Ilima

10:30am–12:30pm

WC ■ NLO in Solids

Lawrence S. Goldberg, National Science Foundation, USA, Presider

WC1 10:30am

Measurement of the nonlinear surface susceptibilities of isotrpic thin films: Al and $Ni_{81}Fe_{19}$, *Charles W. Teplin, Charles T. Rogers, Univ. of Colorado at Boulder, USA.*

We present measurements of the second order nonlinear susceptibility tensor $\chi^{(2)}$ for isotropic air-exposed Al films and for structurally isotropic, but magnetic $Ni_{81}Fe_{19}$ films. These measurements provide new insight into the large second harmonic Kerr effect observed for magnetic materials.

WC2 10:45am

Surface magnetization of Si(111)-7x7 probed by SHG, *Takanori Suzuki, RIKEN, Japan; Kazutaka Noguchi, RIKEN and Univ. of Tokyo, Japan; Motowo Tsukakoshi, Univ. of Tokyo, Japan; Masakazu Aono, RIKEN and Osaka Univ., Japan.*

Magnetic field of 10 T increased the surface second-harmonic generation from Si(111)-7x7 by 100% at room temperature and 500% at 120K. Electron spins at the dangling bonds are suggested to be responsible for the magnetization.

WC3 11:00am

Enhanced half-gap nonlinearity in one-dimensional cuprate, *M. Ashida, Japan Science and Tech. Corp., Japan; S. Uchida, Y. Tokura, M. Kuwata-Gonokami, Univ. of Tokyo, Japan.*

We discovered strong interband two-photon absorption in one-dimensional cuprate using sub-picosecond pump-probe measurements in near- and mid-infrared region. The enhanced half-gap nonlinearity comes from the strong dipole coupling between exited states of different parity.

WC4 11:15am

Crystalline dot and line patterning with SHG in samarium bismuth borate glasses by YAG laser irradiation, *Tsuyoshi Honma, Yasuhiko Benino, Takumi Fujiwara, Takayuki Komatsu, Nagaoka Univ. of Tech., Japan; Ryuji Sato, Tsuruoka Natl. Coll. of Tech., Japan.*

Transparent surface crystallized glasses in the samarium doped bismuth borate system have been successfully fabricated. The irradiation of fundamental wave for CW-YAG laser induces sharp refractive-index changes or crystalline dot formation.