OSA
Optical Society of America

UP

15th International Conference on Ultrafast Phenomena

Topical Meeting and Tabletop Exhibit

On-Site Proceedings Book Deadline: August 4, 2006
On-Site Postdeadline Submission Deadline: July 31, 2006, 12:00 p.m. noon PDT (19.00 GMT)

July 31-August 4, 2006
Pacific Grove, California, USA

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Connect with the most accomplished international scientists, researchers, engineers and business leaders as they shape the future of optics, photonics and laser science.

Plan to attend UP 2006!

- **Generation and Measurement** – New sources, new wavelength regimes, nonlinear frequency conversion techniques, amplifiers, attosecond pulse generation, pulse shaping, pulse diagnostics and measurement techniques and frequency standards.
- **Physics** – Ultrafast nonlinear optical processes, kinetics of nonequilibrium processes, quantum confinement, coherent transients, nonlinear pulse propagation, novel ultrafast spectroscopic techniques, high intensity physics, X-ray and

plasma physics.

- **Chemistry** – Vibrational and conformational dynamics, energy transfer, kinetics of laser-induced chemistry, proton and electron transfer, solvation dynamics, wavepacket motion and coherent control of reactions.
- **Biology** – Ultrafast processes in photosynthesis, vision, heme proteins, photoisomerization in chromoproteins, wavepacket motion and medical applications.
- **Electronics & Optoelectronics** – Photoconductivity, generation, propagation and detection of ultrafast electrical signals, terahertz radiation, electro-optical sampling and detectors.
- **Applications** – Real world applications of ultrafast technology, including ultrafast near-field, nonlinear, and confocal microscopes, high speed communication, micromachining and more.

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R.J. Dwayne Miller, *Univ. of Toronto, Canada*
Andrew M. Weiner, *Purdue Univ., USA*

Program Chairs:

Paul Corkum, *Steacie Inst. for Molecular Science, Canada*
David M. Jonas, *Univ. of Colorado-Boulder, USA*

> "Great meeting. Ultrafast Phenomena continues to demonstrate that it is the go-to meeting for recent advances in ultrafast laser technology and applications."
>
> – Erich Ippen
> *Massachusetts Institute of Technology*

Mark Your Calendars Now!

Hotel Reservation Deadline: June 15, 2006
Asilomar Conference Grounds, Pacific Grove, California, USA

Pre-Registration Deadline: July 7, 2006

View the Meeting Archives for UP 2004 highlights...

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General Chairs

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About UP

The 2006 Ultrafast Phenomena Conference will be the fifteenth in a series on advances in research on ultrafast science and technology. This meeting is widely recognized as the major international forum for the discussion of new work in this rapidly moving field.

The 2006 conference will bring together a multidisciplinary group sharing a common interest in the generation of ultrashort pulses in the picosecond, femtosecond, and attosecond regimes and their applications to studies of ultrafast phenomena in physics, chemistry, material science, electronics, biology, engineering, and medical applications. In addition, submissions involving real world applications of ultrafast technology are encouraged. A tabletop exhibit featuring leading companies will be held in conjunction with the meeting.

Meeting Topics

Generation and Measurement

New sources, new wavelength regimes, nonlinear frequency conversion techniques, amplifiers, attosecond pulse generation, pulse shaping, pulse diagnostics and measurement techniques, and frequency standards.

Physics

Ultrafast nonlinear optical processes, kinetics of nonequilibrium processes, quantum confinement, coherent transients, nonlinear pulse propagation, novel ultrafast spectroscopic techniques, high intensity physics, X-ray and plasma physics.

Chemistry

Vibrational and conformational dynamics, energy transfer, kinetics of laser-induced chemistry, proton and electron transfer, solvation dynamics, wavepacket motion and coherent control of reactions.

Biology

Ultrafast processes in photosynthesis, vision, heme proteins, photoisomerization in chromoproteins, wavepacket motion and medical applications.

Electronics & Optoelectronics

Photoconductivity, generation, propagation and detection of ultrafast electrical signals, terahertz radiation, electro-optical sampling and detectors.

Applications

Real world applications of ultrafast technology, including ultrafast near-field, nonlinear, and confocal microscopes, high speed communication, micromachining and more.

Invited Speakers

MB1, **Atomic Physics with Attosecond Pulses,** *Anne L'Huillier [1], T. Remetter[1], P. Johnsson[1], J. Mauritsson[1,2], K. Varjú 1, T. Ruchon 1, Y. Ni [3], F. Lépine [3], E. Gustafsson 1, M. Kling[3], J. Khan[3], R. López-Martens[4], K. J. Schafer[2], M. J. J. Vrakking[3]; 1 Univ. of Lund, Sweden, [2]Louisiana State Univ., USA, [3]FOM-Inst. AMOLF, Netherlands, [4] Lab d'Optique Appliquée, Ecole Natl. Supérieure des Techniques Avancées (ENSTA), France.*

MB4, **Sub 100 Attosecond XUV Pulses,** *Eric Mevel[1], Inigo Sola [1], Luc Elouga [1], Eric Constant[1], Vasily Strelkov[2], Luigi Poletto[3], Paolo Villoresi[3], Giuseppe Sansone[4], Enrico Benedetti[4], Jean Pascal Caumes[4], Salvatore Stagira[4], Catarina Vozzi[4], Mauro Nisoli[4]; [1]Celia, France, [2]General Physics Inst. of Russian Acad., Russian Federation, [3]INFM-DEI, Univ. di Padova, Italy, [4]INFM, Dept. de Fisica, Politechnico, Italy.*

MC4, **Ultrafast Chemical Exchange 2-D IR Spectroscopy,** *Junrong Zheng, Kyungwong Kwak, Michael Fayer; Stanford Univ., USA.*

TuA1, **Two-Dimensional Optical Spectroscopy of Multi-Chromophore Protein Complexes,** *Graham R. Fleming[1], Donatas Zigmantas[1], Elizabeth L. Read[1], Thomas Mancal[1], Tobias Brixner[2], Alastair T. Gardiner[3]; [1]Lawrence Berkeley Natl. Lab and Univ. of California at Berkeley, USA, [2]Physikalishes Inst. EP1, Univ. Würzburg, Germany, [3]Div. of Biochemistry and Molecular Biology, Inst. of Biomedical and Life Science, Univ. of Glasgow, UK.*

TuB1, **Generation of Terawatt Sub-10 fs Laser Pulses Using Optical Parametric Chirped Pulse Amplification,** *Stefan Witte, Kjeld S. Eikema, Roel Th. Zinkstok, Wim Hogervorst; Laser Ctr. Vrije Univ., FEW, Netherlands.*

WA1, **Femtosecond Enhancement Cavity: From Real-Time Ultrasensitive Spectroscopy to Coherent Extreme Nonlinear Optics,** *Jun Ye; JILA, Univ. of Colorado and NIST, USA.*

WB1, **Direct Observation of Electron Dynamics at Surfaces Using X-ray Spectroscopy,** *Wilfried Wurth, Alexander Föhlisch; Univ. of Hamburg, Germany.*

ThA1, **Attosecond Physics: Control and Real-Time Observation of Electronic Dynamics,** *Ferenc Krausz; Max-Planck-Inst. für Quantenoptik, Germany.*

ThB1, **Evidence for Ultrafast Superfluorescent Recombination from High-Density Magneto-Plasmas,** *Young-Dahl Jho[1], Xiaoming Wang[1], David H. Reitze[1], Jun Kono[2], Alexey Belyanin[3], Vitaly Kocharovsky[3], Glenn Solomon[4]; [1]Univ. of Florida, USA, [2]Rice Univ., USA, [3]Texas A&M Univ., USA, 4 Stanford Univ., USA.*

ThB3, **Adaptive Control of Nanoscopic Photoelectron Emission,** *Martin Aeschlimann[1], Michael Bauer[1], Daniela Bayer[1], Tobias Brixner[2], F. Javier Garcia de Abajo[3], Walter Pfeiffer[2], Martin Rohmer[1], Christian Spindler[2], Felix Steeb[1]; [1]Technische Univ. Kaiserslautern, Germany, [2]Univ. Würzburg, Germany, [3]Ctr. Mixto CSIC-UPV/EHU, Spain.*

ThC1, **Deep Tissue Nonlinear Imaging through Femtosecond Pulse Shaping,** *Warren S. Warren; Duke Univ., USA.*

ThC4, **Nonlinear Temporal Focusing Microscopy,** *Yaron Silberberg; Weizmann Inst. of Science, Israel.*

FA1, **Single Molecule Pump-Probe Detection on Coupled Quantum Systems,** *Niek F. van Hulst [1,2,3], Erik MHP van Dijk[3], Jacob P. Hoogeboom[3], Jordi Hernando[3,4], Maria F. Garcia-Parajo[2,3,5]; [1]ICFO - Inst. of Photonic Sciences, Spain, [2]ICREA - Inst. Catalana de Recerca i Estudis Avancats, Spain, [3]Applied Optics Group, MESA+ Inst. for NanoTechnology, Netherlands, [4]Dept. de Quimica, Univ. Autonoma de Barcelona, Spain, [5]CREBEC - Lab of NanoBioEngineering, Spain.*

FA4, **Coherent Nuclear Motion in Ultrafast Reactions in Solution,** *Tahei Tahara; RIKEN (The Inst. of Physical and Chemical Res.), Japan.*

FB1, **A Nanometer-Sized Femtosecond Electron Source at 80 MHz Repetition Rate,** *Christoph Lienau, Claus Ropers, Daniel R. Solli, Claus Peter Schulz, Thomas Elsaesser; Max Born Inst., Germany.*

Publications

Conference Program

The printed 2006 UP Conference Program will contain general program information and abstracts of the paper summaries. At the meeting, each registrant will receive a copy of the printed Conference Program. Extra copies can be purchased at the meeting for US$ 100.

Technical Digest

The 2006 UP Technical Digest on CD-ROM will contain PDFs of paper summaries presented during the meeting as they were submitted by the authors. At the meeting, each registrant will receive a copy of the Technical Digest on CD-ROM. Extra copies can be purchased at the meeting for US$ 100.

Conference Proceedings

In addition to the Technical Digest CD, each full technical registration includes one copy of the Conference Proceedings. The Conference Proceedings will be published by Springer-Verlag. Instructions on submitting manuscripts will be mailed to all corresponding authors presenting papers.

Exhibitor/Sponsor List (as of 08/04/2006)

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Agenda of Sessions

Preliminary schedule of events:

Sunday, July 30, 2006

4:00 p.m.–6:00 p.m.	**Registration Open**	Main Lodge
6:00 p.m.	**Dinner**	Crocker Dining Hall
7:00 p.m.–9:00 p.m.	**Welcome Reception**	Heather/Toyon/Acacia

Monday, July 31, 2006

7:00 a.m.–5:30 p.m.	**Registration Open**	Main Lodge
7:30 a.m.	**Breakfast**	Crocker Dining Hall
8:15 a.m.–8:30 a.m.	**Opening Remarks**	Merrill Hall
8:30 a.m.–10:00 a.m.	**MB • Attosecond and High Harmonics I**	Merrill Hall
10:00 a.m.–10:30 a.m.	**Coffee Break**	Merrill Hall
10:30 a.m.–11:45 a.m.	**MC • Two-Dimensional Spectroscopy I**	Merrill Hall
12:00 p.m.	**Lunch**	Crocker Dining Hall
1:15 p.m.–3:30 p.m.	**MD • Generation**	Merrill Hall
1:15 p.m.–3:30 p.m.	**ME • Two-Dimensional Spectroscopy II**	Chapel
3:30 p.m.–4:00 p.m.	**Coffee Break**	Merrill Hall/Chapel
4:00 p.m.–6:00 p.m.	**MF • Chemistry and Biology**	Merrill Hall
4:00 p.m.–6:00 p.m.	**MG • Solid-State Physics**	Chapel
6:00 p.m.	**Dinner**	Crocker Dining Hall
8:00 p.m.–10:00 p.m.	**MH • Poster Session I A** **MI • Poster Session I B**	Heather/Toyon/Acacia

Tuesday, August 1, 2006

7:30 a.m.–5:30 p.m.	**Registration Open**	Main Lodge
7:30 a.m.	**Breakfast**	Crocker Dining Hall
8:30 a.m.–9:45 a.m.	**TuA • Biology I**	Merrill Hall
10:00 a.m.–10:30 a.m.	**Coffee Break**	Kiln
10:30 a.m.–11:45 a.m.	**TuB • High Power Lasers and Propagation**	Merrill Hall
12:00 p.m.	**Lunch**	Crocker Dining Hall
1:15 p.m.–3:30 p.m.	**TuC • Chemistry I**	Chapel
1:15 p.m.–3:30 p.m.	**TuD • Plasmonics, Dots and Wells**	Merrill Hall
3:30 p.m.–4:00 p.m.	**Coffee Break**	Kiln
4:00 p.m.–6:00 p.m.	**TuE • Ultrafast Optics I**	Merrill Hall
4:00 p.m.–6:00 p.m.	**TuF • Hydrogen Bonding**	Chapel
6:00 p.m.	**Dinner**	Crocker Dining Hall
8:00 p.m.–10:00 p.m.	**TuG • Poster Session II A** **TuH • Poster Session II B**	Heather/Toyon/Acacia

Wednesday, August 2, 2006

7:30 a.m.	**Breakfast**	Crocker Dining Hall
8:00 a.m.–5:00 p.m.	**Registration Open**	Main Lodge
8:30 a.m.–10:00 a.m.	**WA • Applications of Combs**	Merrill Hall
10:00 a.m.–10:30 a.m.	**Coffee Break**	Kiln
10:30 a.m.–11:45 a.m.	**WB • Ultrafast X-Ray Diffraction**	Merrill Hall

12:00 p.m.	**Lunch**	Crocker Dining Hall
1:15 p.m.–3:30 p.m.	**WC • Ultrafast Optics II**	Merrill Hall
1:15 p.m.–3:30 p.m.	**WD • Chemistry and X-Rays**	Chapel
3:30 p.m.–4:00 p.m.	**Coffee Break**	Kiln
4:00 p.m.–6:00 p.m.	**WE • Biology II**	Chapel
4:00 p.m.–6:00 p.m.	**WF • AMO Physics**	Merrill Hall
6:30 p.m.–10:00 p.m.	**Conference Reception**	Bonfire Pit

Thursday, August 3, 2006

7:30 a.m.	**Breakfast**	Crocker Dining Hall
8:00 a.m.–5:00 p.m.	**Registration Open**	Main Lodge
8:30 a.m.– 10:00 a.m.	**ThA • Attoseconds and High Harmonics II**	Merrill Hall
10:00 a.m.–10:30 a.m.	**Coffee Break**	Kiln
10:30 a.m.–11:45 p.m.	**ThB • Plasmas and Plasmons**	Merrill Hall
12:00 p.m.	**Lunch Break (On Your Own)**	Crocker Dining Hall
1:15 p.m.–3:30 p.m.	**ThC • Imaging and Microscopy**	Merrill Hall
3:30 p.m.–4:00 p.m.	**Coffee Break**	Kiln
4:00 p.m.–6:00 p.m.	**ThD • Poster Session III A** **ThE • Poster Session III B**	Heather/Toyon/Acacia
6:00 p.m.	**Dinner**	Crocker Dining Hall
7:30 p.m.–9:30 p.m.	**ThF • Postdeadline Session**	Merrill Hall

Friday, August 4, 2006

7:30 a.m.	**Breakfast**	Crocker Dining Hall
8:00 a.m.–12:00 p.m.	**Registration Open**	Main Lodge
8:30 a.m.–10:00 a.m.	**FA • Chemistry II**	Merrill Hall
10:00 a.m.–10:30 a.m.	**Coffee Break**	Merrill Hall
10:30 a.m.–12:00 p.m.	**FB • Ultrafast Electron Studies**	Merrill Hall
12:00 p.m.–12:15 p.m.	**Closing Remarks**	Merrill Hall
12:15 p.m.	**Lunch**	Crocker Dining Hall

Abstracts

•Sunday, July 30, 2006•

Main Lodge
Registration Open
4:00 p.m.–6:00 p.m.

Heather/Toyon/Acacia
7:00 p.m.–9:00 p.m.
Welcome Reception

•Monday, July 31, 2006•

Main Lodge
Registration Open
7:00 a.m.–5:30 p.m.

MA • Opening Remarks

Merrill Hall
8:15 a.m.–8:30 a.m.
MA • Opening Remarks

MB • Attosecond and High Harmonics I

Merrill Hall
8:30 a.m.–10:00 a.m.
MB • Attosecond and High Harmonics I
Sandro De Silvestri; INFM - Unita di Ricerca di Milano - Politecnico, Italy, Presider

MB1 • 8:30 a.m. **•Invited•**
Atomic Physics with Attosecond Pulses, *Anne L'Huillier[1], T. Remetter[1], P. Johnsson[1], J. Mauritsson[1,2], K. Varjú[1], T. Ruchon[1], Y. Ni[3], F. Lépine[3], E. Gustafsson[1], M. Kling[3], J. Khan[3], R. López-Martens[4], K. J. Schafer[2], M. J. J. Vrakking[3]; [1]Univ. of Lund, Sweden, [2]Louisiana State Univ., USA, [3]FOM-Inst. AMOLF, Netherlands, [4]Lab d'Optique Appliquée, Ecole Natl. Supérieure des Techniques Avancées (ENSTA), France.* We present experimental results where attosecond pulses are generated, characterized, transported, refocused, synchronized with an IR pulse, and used in a novel application, electron wave packet interferometry.

MB2 • 9:00 a.m.
Observation of Intra-Molecular Vibrational Dynamics Using High-Harmonic Generation as a Probe, *Nicholas L. Wagner, Margaret Murnane, Andrea Wüest, Henry Kapteyn; JILA, USA.* Intra-molecular vibrational dynamics in SF6 are observed, using electrons rescattered during the process of high-order harmonic generation. All of the Raman-active modes of SF6 are observed, as well as vibrational relaxation.

MB3 • 9:15 a.m.
Ultrafast Soft X-ray Absorption Spectroscopy in Silicon with 20fs Resolution Using HH Radiation, *Christian Spielmann[1], Enikoe Seres[1,2]; [1]Physikalisches Inst. EP1, Germany , [2]Photonics Inst., Vienna Univ. of Technology, Austria.* We followed the modification of the X-ray absorption spectrum above the L-edge of Silicon after excitation with intense laser pulses and gathered information about the carrier and structural dynamics with sub-20 fs resolution.

MB4 • 9:30 a.m. **•Invited•**
Sub 100 Attosecond XUV Pulses, *Eric Mevel[1], Inigo Sola[1], Luc Elouga[1], Eric Constant[1], Vasily Strelkov[2], Luigi Poletto[3], Paolo Villoresi[3], Giuseppe Sansone[4], Enrico Benedetti[4], Jean Pascal Caumes[4], Salvatore Stagira[4], Catarina Vozzi[4], Mauro Nisoli[4]; [1]Celia, France , [2]General Physics Inst. of Russian Acad., Russian Federation, [3]INFM-DEI, Univ. di Padova, Italy , [4]INFM, Dept. de Fisica, Politechnico, Italy.* For the first time, we observe unambiguous signature of broadband (50 eV) XUV harmonic radiation temporally confined down to an isolated attosecond pulse by applying polarization gating to phase-stabilized-few-cycle laser pulses.

Merrill Hall
10:00 a.m.–10:30 a.m.
Coffee Break

MC • Two-Dimensional Spectroscopy I

Merrill Hall
10:30 a.m.–11:45 a.m.
MC • Two-Dimensional Spectroscopy I
Maxim Pshenichnikov; Univ. of Groningen, Netherlands, Presider

MC1 • 10:30 a.m.
Observation of Kinetic Networks of Hydrogen-Bond Exchange Using 2D IR Echo Spectroscopy, *Robin M. Hochstrasser, YungSam Kim; Univ. of Pennsylvania, USA.* The ultrafast H-bond motions in methanol of acetonitrile and a dicarbonyl having a cis amide dominates the mechanism of vibrational coherence transfer in linear and 2D IR echo spectra. Multiple state coherence transfer is seen**.**

MC2 • 10:45 a.m.
2D-IR Photon Echo Spectroscopy of Pure Liquid Water—Combination of Novel Nanofluidics and Diffractive Optics Deciphers Ultrafast Structural Dynamics, *Alexander Paarmann[1], Darren Kraemer[1], Michael L. Cowan[1], Barry D. Bruner[1], R. J. Dwayne Miller[1], Nils Huse[2], Jason R. Dwyer[2], Erik T. J. Nibbering[2], Thomas Elsaesser[2]; [1]Inst. for Optical Sciences and Depts. of Chemistry and Physics, Univ. of Toronto, Canada , [2]Max-Born-Inst. für Nichtlineare Optik und Kurzzeitspektroskopie, Germany.* 2D-IR photon echo studies of the OH stretching vibration in pure liquid water are presented. At room temperature, a 50-fs decay of structural correlations is found. The temperature dependence of the vibrational dynamics is investigated.

MC3 • 11:00 a.m.
Absorptive Propagation Effects in Femtosecond Four-Wave-Mixing, *Michael K. Yetzbacher, David M. Jonas; Univ. of Colorado, USA.* Propagation distortions are examined for frequency resolved pump-probe (FRPP) signals in the perturbative limit. Propagation distortions exhibit qualitative differences that depend on the system dynamics.

MC4 • 11:15 a.m. **•Invited•**
Ultrafast Chemical Exchange 2D IR Spectroscopy, *Junrong Zheng, Kyungwong Kwak, Michael Fayer; Stanford Univ., USA.* The 2D IR vibrational echo spectroscopy is applied to study the ultrafast dynamics of organic solute-solvent complexes and carbon-carbon single bond rotation of ethane derivatives in liquids at room temperature.

Crocker Dining Hall
12:00 p.m.
Lunch

MD • Generation

Merrill Hall
1:15 p.m.–3:30 p.m.
MD • Generation
Franz X. Kaertner; MIT, USA, Presider

MD1 • 1:15 p.m.
Holographic Snapshots of Laser Wakefields, *Nicholas H. Matlis[1], Stephen Reed[2], Stephan S. Bulanov[2], Vladimir Chvykov[2], Galina Kalintchenko[2], Takeshi Matsuoka[2], Pascal Rousseau[2], Victor Yanovsky[2], Anatoly Maksimchuk[2], Serguei Kalmykov[1], Gennady Shvets[1], Michael C. Downer[1]; [1]Univ. of Texas at Austin, USA, [2]Univ. of Michigan, USA.* We report the first single-shot measurements of transverse and longitudinal structure of laser-generated wakefields. Real-time, non-averaged measurements of resonant wakes reveal detailed temporal and spatial features that depend on pulse energy and electron density.

MD2 • 1:30 p.m.
Phase-Mask Control and Stabilization of Optical Filamentation, *Thomas Pfeifer, Lukas Gallmann, Mark J. Abel, Daniel M. Neumark, Stephen R. Leone; Univ. of California at Berkeley and Lawrence Berkeley Natl. Lab, USA.* Applying a circular phase mask before focusing improves the pointing stability of optical filamentation and helps to enhance the coherent supercontinuum bandwidth. The experiment is supported by simulations showing stabilized guiding without a waveguide structure.

MD3 • 1:45 p.m.
Development of a Multi-Terawatt Ultrabroadband Optical Parametric Chirped Pulse Amplifier, *Andrius Marcinkevicius, Franz Tavella, Ferenc Krausz; Max-Planck-Inst. of Quantum Optics, Germany.* We report broadband fs 70 mJ non-collinear optical parametric chirped pulse amplification. The picosecond Nd:YAG laser was optically synchronized with a Ti:Sapphire oscillator. This system is projected to deliver a 10 TW pulses.

MD4 • 2:00 p.m.
High Energy Self-Phase-Stabilized Pulses by Difference Frequency Generation and Optical Parametric Amplification, *Caterina Vozzi, Cristian Manzoni, Enrico Benedetti, Giovanni Cirmi, Giuseppe Sansone, Salvatore Stagira, Orazio Svelto, Sandro De Silvestri, Mauro Nisoli, Giulio Cerullo; Politecnico di Milano, Italy.* We generate ultrabroadband self-phase-stabilized near-IR pulses by difference-frequency generation of a hollow-fiber broadened supercontinuum followed by two-stage optical parametric amplification. Energies up to 40 microJoules are demonstrated and a route for energy scaling is indicated.

MD5 • 2:15 p.m.
Enhanced High Harmonic Generation from Ions Using a Capillary Discharge, *Tenio Popmintchev[1], Brendan Reagan[2], David M. Gaudiosi[1], Michael Grisham[2], Mark Berrill[2], Oren Cohen[1], Barry C. Walker[3], Margaret M. Murnane[1], Henry C. Kapteyn[1], Jorge J. Rocca[2]; [1]JILA/Univ. of Colorado, USA, [2]Colorado State Univ., USA, [3]Univ. of Delaware, USA.* We demonstrate a significant increase of the high harmonic cutoff in xenon, from 70 eV to 150 eV, using a pre-ionized plasma created with a capillary discharge.

MD6 • 2:30 p.m.
Shaped UV Pulses with 20 fs Substructures, *Christian Schriever, Stefan Lochbrunner, Eberhard Riedle; Lehrstuhl für BioMolekulare Optik, Ludwig-Maximilians-Univ., Germany.* Shaped UV pulses tunable between 295 and 370 nm are generated with 20 fs substructures. Visible NOPA pulses are shaped in a 4-f-setup with a LCD mask and sum frequency mixed with stretched NIR pulses.

MD7 • 2:45 p.m.
Direct UV-AOPDF Ultrafast Laser Pulse Shaping, *Sebastien Coudreau, Daniel Kaplan, Pierre Tournois; Fastlite, France.* An AOPDF pulse shaper for direct UV operation has been designed in KDP. A resolution of 0.15nm has been measured with a 72mm interaction length. Diffraction efficiencies up to 50% are expected in practical conditions.

ME • Two-Dimensional Spectroscopy II

Chapel
1:15 p.m.–3:30 p.m.
ME • Two-Dimensional Spectroscopy II
Igor V. Rubtsov; Univ. of Pennsylvania, USA, Presider

ME1 • 1:15 p.m.
2D IR Spectroscopy of Hydrogen Bond Switching in Liquid Water, *Joseph J. Loparo, Sean T. Roberts, Andrei Tokmakoff; MIT, USA.* We use multidimensional infrared spectroscopy to observe the interconversion of hydrogen bonding environments in water. Our experiments show that hydrogen bond switching is concerted with broken hydrogen bonds disappearing on the timescale of intermolecular motions.

ME2 • 1:30 p.m.
Weak IR Modes as Structural Reporters via Dual-Frequency 2D IR Spectroscopy, *Igor V. Rubtsov, Dmitry V. Kurochkin, Sri Ram Gopal Naraharisetty; Tulane Univ., USA.* Interactions of CN mode with CO and CC stretching modes in 2-cyanocoumarin were measured via dual-frequency 2D spectroscopy. Long-lived vibrational states were detected allowing a new 2D IR strategy which takes advantage of vibrational relaxation.

ME3 • 1:45 p.m.
Different Two-Dimensional Infrared Spectral Signatures for 3_{10}- and α-Helix Octapeptides, *Hiroaki Maekawa[1], Nien-Hui Ge[1], Claudio Toniolo[2], Alessandro Moretto[2], Quirinus Broxterman[3]; [1]Univ. of California at Irvine, USA, [2]Univ. of Padova, Italy, [3]DSM Res., Life Sciences, Advanced Synthesis and Catalysis, Netherlands.* Femtosecond two-dimensional infrared spectroscopy is applied to the amide I modes of homo-octapeptides Z-[L-(αMe)Val]$_8$-O*t*Bu and Z-(Aib)$_8$-O*t*Bu in several organic solvents. Distinct cross-peak patterns that discriminate between 3_{10}- and α-helix structures are obtained.

ME4 • 2:00 p.m.
Multidimensional IR Spectroscopy of Site-Specific Hairpin Folding, *Adam W. Smith, Hoi Sung Chung, Ziad Ganim, Andrei Tokmakoff; MIT, USA.* 2D IR spectroscopy is used to probe the thermal unfolding of trpzip2 and PG-12, two β-hairpin peptides. The transient thermal unfolding of PG-12 is investigated with dispersed vibrational echo spectroscopy following a nanosecond temperature jump.

ME5 • 2:15 p.m.
Single-Shot, Two Dimensional, Time-Resolved Femtosecond CARS, *Yuri Paskover, Yehiam Prior; Weizmann Inst. of Science, Israel* Experimental demonstration of single shot femtosecond three-dimensional phase matched CARS is reported, where two-dimensional temporal information (intensity vs. pump-Stokes and pump-probe delays) is derived by geometrical imaging of the CARS signal beam.

ME6 • 2:30 p.m.
Two-Dimensional Optical Correlation Spectroscopy Applied to Liquid/Glass Dynamics, *Kees Lazonder, Maxim S. Pshenichnikov, Douwe A. Wiersma; Ultrafast Laser and Spectroscopy Lab, Materials Science Ctr., Univ. of Groningen, Netherlands.* Correlation spectroscopy was used to study the effects of temperature and phase changes on liquid and glass solvent dynamics. This method yielded both intuitive clues and a quantitative measure of the dynamics of the system.

ME7 • 2:45 p.m.
2D Optical Spectroscopy of a Conjugated Polymer with Tunable Visible 15 fs-Pulses from a 200 kHz NOPA, *Franz Milota[1], Peter Baum[1], Jaroslaw Sperling[1], Eberhard Riedle[2], Katarina Matuszna[1], Harald F. Kauffmann[1]; [1]Inst. für Physikalische Chemie der Univ. Wien, Austria, [2]LS für BioMolekulare Optik, LMU München, Germany.* We investigate inter-site electronic coupling and ultrafast dynamics of delocalized molecular excitons in a conjugated polymer by two-dimensional heterodyned three-pulse photon echoes. This gives unbiased insight into exciton scattering and the time-evolution of electron-phonon coupling.

MD • Generation—Continued

MD8 • 3:00 p.m.
High Resolution Atomic Coherent Control via Spectral Phase Manipulation of an Optical Frequency Comb, *Matthew C. Stowe, Avi Pe'er, Jun Ye; JILA, Univ. of Colorado, USA.* We demonstrate high resolution coherent-control of cold atomic Rubidium utilizing spectral phase manipulation of a femtosecond frequency comb. Transient coherent accumulation versus pulse number is manifested in the enhancement of the signal amplitude and resolution.

MD9 • 3:15 p.m.
5.1 fs Pulses by Filamentation—Prospective of Self-Compression to One Optical Cycle, *Annalisa Guandalini[1], Petrissa R. Eckle[1], Florian Schapper[1], Arnaud Couairon[2], Michel Franco[3], Andre Mysyrowicz[3], Jens Biegert[1], Ursula Keller[1]; [1]Swiss Federal Inst. of Technology (ETH), Switzerland, [2]Ctr. de Physique Théorique, École Polytechnique, France, [3]Lab d'Optique Appliquée, École Polytechnique, France.* Intense 5.1-fs pulses, more than 600 THZ spectral range, were generated through filamentation in argon. Simulations show that filamentation in a suitable pressure gradient leads to self-compression down to one optical cycle without chirped mirrors.

Merrill Hall
3:30 p.m.–4:00 p.m.
Coffee Break

ME • Two-Dimensional Spectroscopy II—Continued

ME8 • 3:00 p.m.
Direct Probing of the Local Solvent Response During Intermolecular Electron Transfer, *David F. Underwood, David Blank; Univ. of Minnesota, USA.* Following resonant photo-excitation of coumarin 152 in aniline and dimethylaniline, dramatic changes the local intermolecular solvent response are monitored directly as a function of time during intermolecular electron transfer using third-order non-resonant Raman spectroscopy.

ME9 • 3:15 p.m.
Ultrafast Superheating of Ice, *Hristo Iglev, Marcus Schmeisser, Andy Thaller, Alfred Laubereau; Physics Dept. E11, Technical Univ. Munich, Germany.* Ultrafast temperature jump technique for ice is demonstrated using infrared double resonant spectroscopy. Measurements performed close to the melting point show substantial superheating of the ice sample to 301 K that persists more than 1.3 ns.

Merrill Hall
3:30 p.m.–4:00 p.m.
Coffee Break

MF • Chemistry and Biology

Merrill Hall
4:00 p.m.–6:00 p.m.
MF • Chemistry and Biology
Peter Vöhringer; Univ. of Bonn, Germany, Presider

MF1 • 4:00 p.m.
Femtosecond Multidimensional Imaging—Watching Chemistry from the Molecule's Point of View, *Oliver Gessner[1], Anthony M. D. Lee[1,2], Albert Stolow[1,2], Engelene T-H Chrysostom[3], Carl C. Hayden[3]; [1]Steacie Inst. for Molecular Sciences, Canada, [2]Dept. of Chemistry, Queen's Univ., Canada , [3]Combustion Res. Facility, Sandia Natl. Labs, USA.* Using Femtosecond Multidimensional Imaging we disentangle the complex neutral dissociation mechanism of the NO dimer. We characterize all electronic configurations from start to finish and directly observe the evolution of intramolecular vibrational energy redistribution (IVR).

MF2 • 4:15 p.m.
Vibrational Spectroscopy of Nonlinear Excitations via Excited-State Resonant Impulsive Raman Spectroscopy, *F. X. Morrissey, S. L. Dexheimer; Washington State Univ., USA.* We probe the vibrational modes associated with the equilibrated self-trapped exciton state in a quasi-one-dimensional system using resonant impulsive Raman excitation of the excited state in a pump-pump-probe measurement.

MF3 • 4:30 p.m.
Two-Color Electric Field Resolved Transient Grating Spectroscopy of an Oligophenylenevinylene Dimer, *Andrew M. Moran[1], Rene A. Nome[1], Janice W. Hong[2], Guillermo C. Bazan[2], Norbert F. Scherer[1]; [1]Univ. of Chicago, USA, [2]Univ. of California at Santa Barbara, USA.* Two-color transient grating signals for an oligophenylenevinylene dimer and monomer are measured using spectral interferometry. It is shown that the spectral phases of the signals are particularly sensitive to nuclear dynamics and relaxation.

MF4 • 4:45 p.m.
Ultrafast Polarization-Sensitive Infrared Spectroscopy of Photoactive Yellow Protein and Model Compounds, *Omar F. Mohammed[1], Karsten Heyne[1], Anwar Usman[1], Jens Dreyer[1], Erik T. J. Nibbering[1], Michael A. Cusanovich[2]; [1]Max Born Inst. fuer Nichtlineare Optik und Kurzzeitspektroskopie, Germany, [2]Dept. of Biochemistry and Molecular Biophysics, Univ. of Arizona, USA.* We use polarization-sensitive ultrafast infrared spectroscopy to derive excited state lifetimes, quantum yields and structural information on the chromophore of photoactive yellow protein and model compounds in the primary events of photoinduced isomerization.

MG • Solid-State Physics

Chapel
4:00 p.m.–6:00 p.m.
MG • Solid-State Physics
Steven Cundiff; JILA, USA, Presider

MG1 • 4:00 p.m.
Sub-Picosecond Carrier Dynamics in ZnO Nanowires and Films Measured by Time-Resolved THz Spectroscopy (TRTS), *Jason B. Baxter, Charles A. Schmuttenmaer; Yale Univ., USA.* The transient photoconductivity of ZnO nanowires and polycrystalline and nanoparticle films displays non-Drude behavior. Electron injection occurs on sub-picosecond time scales and decay kinetics indicate that surfaces and interfaces are the dominant sources of recombination.

MG2 • 4:15 p.m.
Coherent Dynamics of the Quantum Hall System, *K. M. Dani[1], D. S. Chemla[1], J. Tignon[2], E. G. Kavousanaki[3], I. E. Perakis[3]; [1]Lawrence Berkeley Natl. Lab, USA, [2]Lab Pierre Aigrain, Ecole Normale Supérieure, France, [3]Inst. of Electronic Structure & Laser, Foundation of Res. & Technology-Hellas and Dept. of Physics, Univ. of Crete, Greece.* Using 3-pulse four-wave mixing spectroscopy we excite an intra-band coherence of the photoexcited Quantum Hall system and probe its early dynamics. Many-body theory elucidates the non-instantaneous interactions between photoexcited carriers and magnetoplasmon excitations.

MG3 • 4:30 p.m.
Dynamics of Photoexcited Carriers in Heavy-Electron Systems, *Jure Demsar[1], Verner K. Thorsmolle[2], John F. Sarrao[3], Antoinette J. Taylor[3]; [1]Jozef Stefan Inst., Slovenia, [2]EPFL, Switzerland, [3]Los Alamos Natl. Lab, USA.* We have studied the photoexcited carrier dynamics in Kondo insulator and heavy fermion metal. The data suggest that carrier relaxation in both classes is governed by the presence of a hybridization gap in the DOS.

MG4 • 4:45 p.m.
Intraband Spectroscopy of GaSe Nanoparticles and InSe/GaSe Nanoparticle Heterojunctions, *David F. Kelley, Haohua Tu; Univ. of California at Merced, USA.* Femtosecond polarized transient absorption results are obtained for solution-phase GaSe nanoparticles. These results are used to interpret analogous results obtained for GaSe-InSe nanoparticle heterojunctions, indicating that electron transfer occurs upon photoexcitation.

MF • Chemistry and Biology—Continued

MF5 • 5:00 p.m.
What Determines the Success of Isomerization of the Photoactive Yellow Protein Chromophore? A Picosecond Pump-Probe Study in the midIR, *Marloes Groot[1], Luuk J. G. Van Wilderen[1], Ivo H. M. Van Stokkum[1], Rienk Van Grondelle[1], Michel Van der Horst[2], Klaas J. Hellingwerf[2]; [1]Vrije Univ. Amsterdam, Netherlands, [2]Univ. of Amsterdam, Netherlands.* We have measured the mid-infrared absorption-difference spectra of PYP photocycle intermediates representing successful and unsuccessful attempts to enter the signaling state. It appears that breaking of the chromophores hydrogen bond with Cys69 is decisive.

MF6 • 5:15 p.m.
Femtosecond Pump-Shaped Dump-Probe Control of Retinal in Bacteriorhodopsin, *Patrick Nuernberger, Gerhard Vogt, Tobias Brixner, Gustav Gerber; Physikalisches Inst., Germany.* We experimentally demonstrate a novel quantum-control scheme involving pump and optimally-shaped dump laser pulses. This allows selective control of molecular dynamics all the way to the product state and provides information on potential energy surfaces.

MF7 • 5:30 p.m.
Experimental Coherent Control of Retinal Isomerization in Bacteriorhodopsin, *Valentyn I. Prokhorenko[1], Andrea M. Nagy[1], R.J. Dwayne Miller[1], Leonid S. Brown[2]; [1]Univ. of Toronto, Canada, [2]Univ. of Guelph, Canada.* Coherent control of retinal photoisomerization in bacteriorhodopsin was experimentally accomplished under weak excitation. Using tailored excitation pulses found from optimization experiments we are able to manipulate the absolute isomerization yield within a 50% range.

MF8 • 5:45 p.m.
THz Radiation from Light-Induced Electron and Proton Motion in Bacteriorhodopsin, *Géza I. Groma[1], György Váró[1], János Hebling[2], Jürgen Kuhl[3], Ida Z. Kozma[4], Eberhard Riedle[4]; [1]Inst. of Biophysics, Biological Res. Ctr. of the Hungarian Acad. of Sciences, Hungary, [2]Dept. of Experimental Physics, Univ. of Pécs, Hungary, [3]Max Planck Inst. for Solid State Res., Germany, [4]Chair for BioMolecular Optics, Ludwig-Maximilians Univ., Germany.* Terahertz radiation from oriented bacteriorhodopsin samples was generated by fs light pulses and detected by electro-optic sampling. Simulations indicated that both excited state electron redistribution and early step of proton motion contribute to the phenomenon.

MG • Solid-State Physics—Continued

MG5 • 5:00 p.m.
Energy Relaxation and Anomalies in the Thermo-Acoustic Response of Femtosecond Laser-Excited Germanium, *Klaus Sokolowski-Tinten[1], Uladzimir Shymanovich[1], Matthieu Nicoul[1], Juris Blums[1,2], Alexander Tarasevitch[1], Michael Horn von Hoegen[1], Dietrich von der Linde[1], Andreas Morak[3], Tobias Wietler[4]; [1]Univ. Duisburg-Essen, Inst. für Experimentelle Physik, Germany, [2]Riga Technical Univ., Faculty of Material Science and Applied Chemistry, Latvia, [3]Friedrich-Schiller-Univ. Jena, Inst. für Optik- und Quantenelektronik, Germany, [4]Univ. Hannover, Inst. für Halbleiterbauelemente und Werkstoffe, Germany.* Multiple-order, ultrafast time-resolved X-ray diffraction has been used to study the electron-lattice energy exchange and the thermo-acoustic relaxation in femtosecond laser-excited Germanium.

MG6 • 5:15 p.m.
Enhanced Photosusceptibility in the Insulator-to-Metal Phase Transition in Vanadium Dioxide, *David J. Hilton[1], Rohit P. Prasankumar[1], Sylvain Fourmaux[2], Andrea Cavalleri[3], Daniel Brassard[2], My Ali El Khakani[2], Jean-Claude Keiffer[2], Antoinette J. Taylor[1], Richard D. Averitt[1]; [1]Los Alamos Natl. Lab, USA, [2]Univ. du Quebec, Canada, [3]Oxford Univ., UK.* We use optical-pump terahertz-probe spectroscopy to measure the photoinduced phase transition in vanadium dioxide thin films. Our measurements reveal a fluence threshold needed to drive this transition that decreases with increasing temperature.

MG7 • 5:30 p.m.
Stimulated Terahertz Emission from Excitons in Cu_2O, *Robert A. Kaindl, Rupert Huber, Ben A. Schmid, Y. Ron Shen, Daniel S. Chemla; Lawrence Berkeley Natl. Lab, USA.* Using ultrashort THz pulses we observe stimulated emission between internal energy levels of excitons. Emission occurs in Cu_2O due to the 3*p* to 2*s* transition at 6.6 meV, with a cross section of 10^{-14} cm^2.

MG8 • 5:45 p.m.
Terahertz Nonlinear Response in Lithium Niobate, *Thomas Hornung, Ka-Lo Yeh, Keith A. Nelson; MIT, USA.* THz SHG is observed in a patterned $MgO:LiNbO_3$ crystal using crossed THz polariton waves generated by spatiotemporally shaped optical pulses. The experiment foreshadows versatile nonlinear THz spectroscopy with integrated THz field shaping, guidance, and visualization.

MH • Poster Session IA

Heather/Toyon/Acacia
8:00 p.m.–10:00 p.m.
MH • Poster Session IA

MH1
Ultrafast Dynamics of the Itinerant Antiferromagnet $UNiGa_5$, *Ee Min Elbert Chia, Hae Ja Lee, Namjung Hur, Eric D. Bauer, Tomasz Durakiewicz, Richard D. Averitt, John L. Sarrao, Antoinette J. Taylor; Los Alamos Natl. Lab, USA.* Time-resolved photoinduced reflectivity data for the itinerant antiferromagnet $UNiGa_5$ showed a divergence of the relaxation time near TN due to the opening of a spin gap, and at the lowest temperatures indicative of spin-fluctuation scattering.

MH2
Spatiotemporal Femtosecond Pulse Shaping Using a MEMS-Based Micromirror SLM, *Katherine W. Stone, Maaike T. W. Milder, Joshua C. Vaughan, Keith A. Nelson; MIT, USA.* 2D pulse shaping with a MEMS micromirror SLM allows IR-UV operation at kHz repetition rates. Diffraction-mode phase and amplitude shaping are possible at wavelengths longer than the maximum optical delay of the device.

MH3
Nonlinear Optical Approach to Multiexciton Relaxation Dynamics in Quantum Dots, *Vanessa Huxter, Mayrose Salvador, Gregory Scholes; Univ. of Toronto, Canada.* We use an nth-order nonlinear transient spectroscopy to directly observe multiparticle dynamics on an ultrafast timescale in semiconductor nanocrystals. Time constants associated with multiexciton recombination and depopulation dynamics are reported.

MI • Poster Session IB

Heather/Toyon/Acacia
8:00 p.m.–10:00 p.m.
MI • Poster Session IB

MI1
Transient 2D-IR Spectroscopy of Thiopeptides: Resolution Enhancement and Observation of Transient Cross-Peaks, *Jan Helbing, Valentina Cervetto, Rolf Pfister; Univ. of Zurich, Switzerland* We resolve the dynamics of individual C=O oscillators and observe transient cross peaks in the transient two-dimensional infrared spectra recorded during thiopeptide isomerization.

MI2
Ultrafast Relaxation Dynamics of O-H Bending and Librational Excitations in Liquid H_2O, *Satoshi Ashihara[1,2], Nils Huse[1], Erik T. J. Nibbering[1], Thomas Elsaesser[1]; [1]Max Born Inst. fuer Nichtlineare Optik und Kurzzeitspektroskopie, Germany, [2]Inst. of Industrial Science, Univ. of Tokyo, Japan.* We determine the vibrational population relaxation dynamics of the intramolecular O-H bending mode of neat liquid water and elucidate the accompanying nonlinear absorption changes of librational bands.

MI3
Nonequilibrium 2D-IR Exchange Spectroscopy: Ligand Migration in Proteins, *Jens Bredenbeck[1], Jan Helbing[1], Karin Nienhaus[2], G. Ulrich Nienhaus[2,3], Peter Hamm[1]; [1]Physikalisch-Chemisches Inst., Switzerland, [2]Dept. of Biophysics, Germany, [3]Univ. of Illinois at Urbana-Champaign, USA.* Two-dimensional exchange spectroscopy maps networks of interconverting chemical species in dynamic equilibrium. We present the extension of ultrafast 2D-IR exchange spectroscopy to the nonequilibrium regime and its application to ligand migration in proteins.

MH • Poster Session IA—Continued

MH4
Memory and Nanostructure Formation in the Intense Field Ionization of Fused Silica, *Rajeev Pattathil[1], Eli Simova[1], Cyril Hnatovsky[1], Marina Gertsvolf[1], Rod Taylor[1], Paul Corkum[1], David Rayner[1], Ravi Bhardwaj[2]; [1]Natl. Res. Council, Canada , [2]Univ. of Ottawa, Canada.* We propose that memory in ionization and local field effects form self-organized nanostructures when ultrashort laser pulses are focused inside glass. Reduction in ionization threshold constitutes such a memory and is evidenced through transmission measurements.

MH5
Secure Communications over a Public Network Using Ultrafast Optical Technology, *Bernard Wu, Evgenii Narimanov; Princeton Univ., USA.* We develop a spread-spectrum based approach using ultrafast technology for secure communications over existing fiber-optical networks. Secure channel is encrypted and submerged below the noise floor of the network, allowing cryptographic and steganographic security capabilities.

MH6
Ultrabright 4.5 keV Xe(L) X-ray Source from Optimized Stable Relativistic Channels, *Alex B. Borisov, Xiangyang Song, Ping Zhang, Keith Boyer, Charles K. Rhodes; Univ. of Illinois at Chicago, USA.* A new technique has been established to produce stable ultra-powerful relativistic channels in high-density plasmas optimized to significantly increase the brightness of the developed 4.5 keV Xe(L) X-ray source.

MH7
Phonon-Polariton Excitation in Ferroelectric Slab Waveguides and Photonic Crystals, *Eric R. Statz, David W. Ward, Keith A. Nelson; MIT, USA.* Unique THz phonon-polariton properties in $LiNbO_3$ planar waveguides and photonic crystals are examined experimentally and compared to theoretical expectations.

MH8
Ultrafast X-ray Diffraction and Optical Reflection Measurements of Coherent Optical Phonons of CdTe, *Kazutaka G. Nakamura[1], Yoichiro Hironaka[1], Jun Irisawa[1], Ken-ichi Kondo[1], Kunie Ishioka[2], Masahiro Kitajima[2]; [1]Tokyo Inst. of Technology, Japan, [2]Natl. Inst. of Materials Science, Japan.* Coherent optical phonon of CdTe with a frequency of 5-THz is excited by femtosecond laser pulses and detected successfully with femtosecond time-resolved X-ray diffraction as well as with optical reflection measurements.

MH9
Amplitude and Phase Correction of Ultra-Broadband Femtosecond Laser Pulses, *Bingwei Xu, D. Ahmasi Harris, Yves P. Coello, Vadim V. Lozovoy, Marcos Dantus; Michigan State Univ., USA.* We report on the effects of amplitude and phase correction of an ultra-broadband (400 nm) femtosecond laser. This bandwidth generates 4.6-fs pulses with minimized satellite pulses in time profile.

MH10
Laser-Induced Breakdown Spectroscopy Analysis of Bacteria: What Femtosecond Lasers Make Possible, *Laurent Guyon[1], Matthieu Baudelet[1], Jin Yu[1], Jean-Pierre Wolf[1], Tanguy Amodeo[2], Emerick Frejafon[2], Patrick Laloi[3]; [1]LASIM, France, [2]INERIS, France, [3]Lab de Microbiologie et Genetique, France.* Laser Induced Breakdown Spectroscopy spectra of bacteria, with nanosecond and femtosecond ablation, are compared. High sensitivity for mineral trace detections, larger intensity from molecular bands and precise kinetic study are among benefits using short pulses.

MH11
Molecular Basis of Non-Photochemical Quenching (NPQ); The Role of the Major Light-Harvesting Complex LHC II, *Sergiu Amarie[1], Tiago Barros[2], Jörg Standfuss[2], Andreas Dreuu[1], Werner Kühlbrandt[2], Josef Wachtveitl[1]; [1]Inst. for Physical and Theoretical Chemistry, Frankfurt Univ., Germany, [2]Max Plank Inst. of Biophysics, Germany.* Although NPQ has been documented for years, its mechanism and exact location is still under debate. Femtosecond spectroscopy on LHCII and thylakoid membranes reveal that zeaxanthin in LHCII is not sufficient for efficient quenching.

MH12
Nature and Dynamics of the Excited States in Single-Walled Carbon Nanotubes, *Feng Wang, Gordana Dukovic, Louis Brus, Tony Heinz; Columbia Univ., USA.* Using two-photon spectroscopy, we show that the optically excited states of semiconducting single-walled carbon nanotubes are excitons. Their dynamics are examined by time-resolved fluorescence measurements.

MI • Poster Session IB—Continued

MI4
Lineshapes and Correlations in Two Dimensional Vibrational Signals of NMA, *Tomoyuki Hayashi[1], Zhuang Wei[1], Darius Abramavicious[2], Shaul Mukamel[1]; [1]Univ. of California at Irvine, USA, [2]Vilniaus Univ., Lithuania.* Third-order optical response of the coupled amide I and III modes of NMA is calculated varying degrees of correlation between mode frequency fluctuations. The $k_i=-k_1+k_2+k_3$ lineshaps show signatures of anti-correlation, suggesting correlated hydrogen bonding dynamics.

MI5
Chirped Molecular Vibration During Photo-Isomerization in Stilbene Derivative in Solution, *Takayoshi Kobayashi[1,2], Anne Colonna[3], Atsushi Yabushita[1], Izumi Iwakura[1], Eiji Tokunaga[4]; [1]Univ. of Tokyo, Japan, [2]Osaka Univ., Japan, [3]Ecole Polytechnique, France,[4]Science Univ. of Tokyo, Japan.* The photoisomerisation reaction of 4-methoxy-4'-nitrostilbene in condensed phase was studied by femtosecond pump probe spectroscopy. Transient changes in absorption intensity exhibit oscillations which reflect chirped vibrational motions on the potential surface.

MI6
Coherent Control of Molecular Fragmentation Using Binary Phase Shaped Femtosecond Laser Pulses, *Vadim V. Lozovoy, Michael J. Kangas, Tissa C. Gunaratne, Janelle C. Shane, Marcos Dantus; Michigan State Univ., USA.* We report on order-of-magnitude control of the relative yield of photofragment ions achieved with binary phase shaped femtosecond laser pulses. We discuss trends observed related to selective enhancement or suppression of fragment ions.

MI7
Two-Photon Electronic Pump Vibrational Probe of ß-apo-8'-carotenal in Solution, *Aaron J. Van Tassle, Matthew A. Prantil, Graham R. Fleming; Univ. of California at Berkeley, USA.* Results of infrared transient absorption measurements following two-photon excitation to the forbidden S_1 state of the carotenoid β-apo-8'-carotenal are presented. This technique enables the study of subsequent structural dynamics without interference from higher states.

MI8
Accumulative Quantum Control of Photochemical Reactions, *Florian Langhojer[1], Frank Dimler[1], Gregor Jung[2], Tobias Brixner[1]; [1]Univ. Würzburg, Germany, [2]Univ. des Saarlandes, Germany.* We demonstrate quantum control over photoreactions in liquid phase involving chemical bond breaking. Stable photoproducts from indocyanine green and green fluorescent protein are generated in a novel accumulative scheme with high product detection sensitivity.

MI9
Slow Fluorescence and Fast Intersystem Crossing—The Xanthone Anomaly, *Bjoern J. Heinz[1], Peter Gilch[1], Wolfgang Zinth[1], Christopher Root[1], Bernhard Schmidt[1], Helmut Satzger[1], Franz Milota[2], Beat Fierz[3], Thomas Kiefhaber[3]; [1]Ludwig-Maximilians-Universität München, Germany, [2]Inst. fuer Physikalische Chemie der Univ. Wien, Austria, [3]Div. of Biophysical Chemistry, Univ. of Basel, Switzerland.* Intersystem crossing of xanthone in protic solvents proceeds within 1 ps, whereas its fluorescence decays within 60-600 ps. This is due to a delayed fluorescence from a 3npi* state energetically close to the 1pipi* state.

MI10
Ultrafast Relaxation of the S_2 Excited State in β-Carotene and Its Homologs: A Role of Intermediate States, *Masayuki Yoshizawa[1], Daisuke Kosumi[1], Makito Komukai[1], Kazuhiro Yanagi[2], Hideki Hashimoto[2]; [1]Dept. of Physics, Graduate School of Science, Tohoku Univ., Japan, [2]"Light and Control", PRESTO/JST, Dept. of Physics, Graduate School of Science, Osaka City Univ., Japan.* Carotenoids with several conjugation lengths have been investigated. Time-resolved absorbance change and fluorescence are explained by relaxation of excited states and nonlinear optical effects. A role of intermediate states between S_2 and S_1 is discussed.

MI11
Manipulating Multidimensional Nonlinear Electronic Spectra of Excitons by Coherent Control with Polarization Pulse Shaping, *Dmitri V. Voronine[1], Darius Abramavicius[2], Shaul Mukamel[1]; [1]Univ. of California at Irvine, USA, [2]Vilniaus Univ., Lithuania.* Femtosecond two-pulse photon echo signals of excitons from a chiral porphyrin dimer are simulated using the cumulant expansion method. Cross peaks are manipulated by coherent control with adaptive polarization pulse shaping combined with genetic algorithm.

MH • Poster Session IA—Continued

MH13
A Simple Linear Technique for Measuring the Spectral Phase of Complicated Pulses with High Resolution, *Pamela Bowlan, Pablo Gabolde, Aparna Shreenath, Selcuk Akturk, Rick Trebino; School of Physics, Georgia Tech, USA.* We present a simplified, alignment-free spectral interferometer using optical fibers. Using spatial fringes the spectral resolution is improved and time-domain filtering is unnecessary. To demonstrate this technique, we measure temporal chirp and a 14-ps double-pulse.

MH14
Impurity-Localized Electronic Changes in Eu:$SrGa_2S_4$ Studied by Ultrafast X-ray Absorption Spectroscopy, *Steven L. Johnson[1], Paul Beaud[1], Gerhard Ingold[1], Daniel Grolimund[1], Maik Kaiser[1], Rafael Abela[1], Yuri Zaushitsyn[2], Van Thai Pham[2], Alexander N. Tarnovsky[3]; [1]Paul Scherrer Inst., Switzerland, [2]Ecole Polytechnique Federale de Lausanne, Switzerland, [3]Bowling Green State Univ., USA.* The time-dependent electronic structure of Eu:$SrGa_2S_4$ after excitation by a femtosecond laser pulse is investigated by time-resolved X-ray absorption spectroscopy. We observe a transient shift in the Eu L_3 edge consistent with Eu ionization.

MH15
Strong Field, Ultrafast Ionization of Atoms and Molecules in the Mid-Infrared, *Robert J. Levis, Dmitri A. Romanov, Katherine W. Moore, Ryan Compton; Temple Univ., USA.* The ionization yields for atomic and molecular targets in the strong field, mid-IR regime reveal an exponentially increasing ionization probability as the excitation wavelength increases. The counter-intuitive trend is attributed to transient Rydberg ionization.

MH16
Spectral Dependence of Phase Noise of Stabilized Optical Frequency Combs, *Qudsia Quraishi[1,2], Scott A. Diddams[1], Leo Hollberg[1]; [1]NIST, USA, [2]Dept. of Physics, Univ. of Colorado, USA.* We present the spectral dependence of the phase noise between two optical frequency combs which are frequency shifted from each other by their offset frequencies and both stabilized to the same optical reference.

MH17
Probing Exciton Dynamics of Semiconducting Single-Walled Carbon Nanotubes Using Photon Echo Spectroscopy, *Ying-Zhong Ma[1], Matthew W. Graham[1], Graham R. Fleming[1], Leonas Valkunas[2], Sergei M. Bachilo[3]; [1]Dept. of Chemistry, Univ. of California at Berkeley and Physical Biosciences Div., Lawrence Berkeley Natl. Lab, USA, [2]Inst. of Physics and Theoretical Physics Dept., Faculty of Physics of Vilnius Univ., Lithuania, [3]Dept. of Chemistry, Ctr. for Nanoscale Science and Technology, and Ctr. for Biological and Environmental Nanotechnology, Rice Univ., USA.* Three-pulse photon echo peak shifts of single-walled carbon nanotubes were recorded at 975 nm, showing an initial value of 26 fs, a dominant decay time of 59 fs and an oscillatory frequency of 282 cm^{-1}.

MH18
Direct Comparison of the Hollow-Core Fiber and Filamentation Techniques for Few-Cycle Pulse Generation, *Lukas Gallmann[1,2], Thomas Pfeifer[1,2], Mark J. Abel[1,2], Phillip M. Nagel[1,2], Daniel M. Neumark[1,2], Stephen R. Leone[1,2]; [1]Chemical Sciences Div., Lawrence Berkeley Natl. Lab, USA, [2]Depts. of Chemistry and Physics, Univ. of California at Berkeley, USA.* Important experimental parameters of the gas-filled hollow-core fiber and filamentation techniques such as beam pointing stability, beam profile, spatial chirp, spectral phase and their gas pressure dependence were investigated in view of few-cycle pulse generation.

MH19
Using of 2D PPLN Crystal for Surface-Emitted THz-Wave Generation by Optical Rectification of the Laser Pulses, *Yuri H. Avetisyan[1], Karo Khachatryan[1], Hiromasa Ito[2,3]; [1]Yerevan State Univ., Armenia, [2]Res. Inst. of Electrical Communication, Tohoku Univ., Japan, [3]RIKEN, Japan.* The two dimensional periodically poled lithium niobate crystal is proposed for narrow-band THz-wave generation by optical rectification of ultrashort pulses delivered by kHz amplified system. The THz field strength a few tens kV/cm is estimated.

MI • Poster Session IB—Continued

MI12
Adiabatic Passage in the Presence of Excited-State Absorption and Two-Exciton Processes, *Boris D. Fainberg[1,2], Vladimir A. Gorbunov[1]; [1]Holon Inst. of Technology, Israel, [2]Tel-Aviv Univ., Israel.* We show that excited-state absorption has a profound effect on coherent population transfer in complex molecules that necessitates a more accurate interpretation of experimental data. A method for quantum control of two-exciton states is proposed.

MI13
Investigation of Coriolis Perturbations on the Ro-Vibrational v1 Band of H_2CO with fs-CARS, *Gregor Knopp, Andreas Walser, Peter Radi, Paul Beaud, Marek Tulej, Thomas Gerber; Paul Scherrer Inst., Switzerland.* Experiment and simulation of fs-CARS signals from the ν_1 band of formaldehyde including a model for 'Coriolis' interactions are presented. 'Coriolis' coupling coefficients and energy shifts are derived from the experiments by a least-square fit.

MI14
Ultrafast Photochromism: Structural and Electronic Dynamics of Indolyl Fulgimides, *Markus Braun[1], Stephan Malkmus[1], Florian O. Koller[1], Björn Heinz[1], Wolfgang Zinth[1], Christine Schulz[2], Steffen Dietrich[2], Karola Rück-Braun[2]; [1]Sektion Physik, Ludwig-Maximilians-Univ. München, Germany, [2]Inst. für Chemie, Technische Univ. Berlin, Germany.* We report on detailed investigations of the complete ultrafast reaction cycle of photochromic indolyl fulgimides observed by the combination of time-resolved transient absorption and fluorescence studies in the UV, VIS, and mid-IR spectral range.

MI15
Resonance Hyper-Raman Spectroscopy of Organic Nonlinear Optical Chromophores, *Anne M. Kelley, Lian C. T. Shoute; Univ. of California at Merced, USA.* Many conjugated organic chromophores with large first hyperpolarizabilities also exhibit strong two-photon-resonant hyper-Raman scattering. The hyper-Raman spectra, excitation profiles, and depolarization ratios provide structural and energetic information about overlapping electronic transitions in these molecules.

MI16
Photo-Excitation Dynamics of Malachite Green in Ionic Liquids Studied by the Transient Grating Method, *Masanori Fukuda[1], Yoshifumi Kimura[2], Okitsugu Kajimoto[1], Masahide Terazima[1]; [1]Kyoto Univ., Japan, [2]Kyoto Univ. Intl. Innovation Ctr., Japan.* Photo-excitation dynamics of malachite green in ionic liquids has been studied by the transient grating method. Anomalies of the S_1 lifetime and vibrational energy relaxation are found together with the structural relaxation of ionic liquid.

MI17
Fifth-Order Raman Spectroscopy: Liquid Benzene, *Chris J. Milne[1], Yun-Liang Li[1], Thomas l. C. Jansen[2], Lei Huang[1], R. J. Dwayne Miller[1,3]; [1]Univ. of Toronto, Canada, [2]Univ. of Groningen, Netherlands, [3]Inst. of Optical Sciences, Canada.* This paper presents the first measurement of the fifth-order Raman response of liquid benzene for the all-parallel and 'Dutch Cross' tensor elements as well as preliminary results for the finite-field molecular dynamics simulation.

MH • Poster Session IA—Continued

MH20
Adaptive Spatial Control of High-Harmonic Generation, *Jan Lohbreier, Thomas Pfeifer, Robert Spitzenpfeil, Dominik Walter, Carsten Winterfeldt, Gustav Gerber, Christian Spielmann; Univ. of Wuerzburg, Germany.* By adaptively controlling the mode structure in a gas-filled capillary with spatially shaped laser pulses we can manipulate the spatial and spectral properties of high-harmonic generation. This complements the control achieved by temporal pulse shaping.

MH21
Measurement of Pressure Dependent Dispersion of Femtosecond Pulses in Air down to 0.01 mbar, *Adam Börzsönyi[1], Karoly Osvay[1,2], Attila P. Kovács[1], Mihály Görbe[1], Renata Balogh[1], Mikhail Kalashnikov[2]; [1]Dept. Optics, Univ. Szeged, Hungary, [2]Max Born Inst., Germany.* Group-delay dispersion of femtosecond pulses was measured in ambient and low pressure air by spectral interferometry. The validity of Edlén's dispersion formulae is experimentally verified to five orders of magnitude below the atmospheric level.

MH22
Direct Observation of the 'Lubricant of Life' Using Ultrafast Spectroscopies, *Klaas Wynne, Neil T. Hunt, David A. Turton, Lisa Kattner, Richard P. Shanks; Univ. of Strathclyde, UK.* For the first time we have observed the changes occurring in the terahertz Raman spectrum of a peptide in a secondary-structure transition. Comparison with a phenol model system suggests an origin in hydrogen bonding.

MH23
Ultrafast Fano Dynamics of Quasiparticles in a Semiconductor, *JaeDong Lee[1], Junichi Inoue[1,2], Muneaki Hase[3,4]; [1]ICYS, NIMS, Japan, [2]NML, NIMS, Japan, [3]MEL, NIMS, Japan, [4]PRESTO, JST, Japan.* Transient Fano resonance of optical phonon and continuum quasiparticles in a semiconductor is theoretically studied. We find the destructive Fano interference at birth of them, originating from the potential scattering by the q=0 coherent phonon.

MH24
Mechanism of Radical Transfer during Photoactivation of the Flavoprotein DNA Photolyase, *Andras Lukacs[1], Marten H. Vos[1], André P. M. Eker[2], Martin Byrdin[3], Klaus Brettel[3]; [1]LOB, Ecole Polytechnique, France , [2]Dept. of Cell Biology and Genetics, Medical Genetics Ctr., Erasmus Univ. Medical Ctr., Netherlands, [3]Service de Bioénergétique, CEA Saclay, France.* Ultrafast transient absorption experiments on mutant DNA photolyase imply that radical transfer along a chain of tryptophan residues is substantially faster than the ~30-ps photo-induced electron-transfer event initiated by excitation of the radical flavin FADH.

MH25
Slowing Down Molecular Dissociation in Strong Laser Fields, *Chunlei Guo; Inst. of Optics, Univ. of Rochester, USA.* Doubly ionized carbon monoxide, CO^{2+}, always appeared to dissociate in previous strong-field experiments and the metastble channel was scantly seen. In this paper, we demonstrate experimental conditions to obtain an abundance of metastable CO^{2+}.

MH26
Grism Based Stretcher/Compressor System for Amplified, Femtosecond Kilohertz Lasers, *David M. Gaudiosi[1], Emily A. Gibson[1], Steve Kane[2], Rachel Huff[3], Henry C. Kapteyn[1], Charles Durfee[3], Jeff Squier[3], Ralph Jimenez[1]; [1]JILA/ Univ. of Colorado and NIST, USA, [2]Horiba Jobin-Yvon, USA, [3]Colorado School of Mines, USA.* We demonstrate a simple and efficient grism based stretcher/ compression system. 40 fs, 300 μJ pulses are generated at 5 kHz using this unique amplifier design.

NOTES

•Tuesday, August 1, 2006•

Main Lodge
Registration Open
7:30 a.m.–5:30 p.m.

TuA • Biology I

Merrill Hall
8:30 a.m.–9:45 a.m.
TuA • Biology I
Jennifer P. Ogilvie; Univ. of Michigan, USA, Presider

TuA1 • 8:30 a.m. **•Invited•**
Two-Dimensional Optical Spectroscopy of Multi-Chromophore Protein Complexes, *Graham R. Fleming[1], Donatas Zigmantas[1], Elizabeth L. Read[1], Thomas Mancal[1], Tobias Brixner[2], Alastair T. Gardiner[3]; [1]Lawrence Berkeley Natl. Lab and Univ. of California at Berkeley, USA, [2]Physikalisbes Inst. EP1, Univ. Wurzburg, Germany, [3]Div. of Biochemistry and Molecular Biology, Inst. of Biomedical and Life Science, Univ. of Glasgow, UK.* Two-dimensional optical spectroscopy is used to probe electronic couplings and ultrafast dynamics in photosynthetic light-harvesting complexes. Data and analysis reveal contributions to line-broadening, signatures of weakly- and strongly-coupled chromophores, and pathways of energy transfer.

TuA2 • 9:00 a.m.
Ultrafast Photoreactions in the Green Fluorescent Protein Studied through Time Resolved Vibrational Spectroscopy, *Stephen R. Meech[1], Jerome Nappa[1], Michael Towrie[2], Pavel Matousek[2], Deborah Stoner-Ma[3], Peter J. Tonge[3]; [1]Univ. of East Anglia, UK, [2]Rutherford Appleton Lab, CLF, UK, [3]Dept. of Chemistry, Stony Brook Univ., USA.* A time and polarisation resolved study of excited state reactions in the green Fluorescent Protein and its mutants is described. The rate and mechanism of the proton relay reaction are determined.

TuA3 • 9:15 a.m.
Ultrafast Energy and Electron Transfer in Photosystem I Direct Evidence for Two-Branched Electron Transfer, *Alfred R. Holzwarth[1,2], Marc G. Müller[1], Chavdar Slavov[1], Rajiv Luthra[2], Kevin Redding[2]; [1]Max-Planck-Inst. für Bioanorganische Chemie, Germany, [2]Univ. of Alabama, USA.* The ultrafast energy and electron transfer processes in photosystem I particles carrying mutations around the primary electron acceptors have been studied. Evidence is provided for electron transfer to occur efficiently in both cofactor branches.

TuA4 • 9:30 a.m.
Decomposing the Excited State Dynamics of Carotenoids in Light Harvesting Complexes and Dissecting Pulse Structures from Optimal Control Experiments, *Delmar S. Larsen[1,2,3,4], Emmanouil Papagiannakis[2], Ivo H. M. van Stokkum[2], Rienk van Grondelle[2], Mikas Vengris[3], Leonas Valkunas[3], Richard J. Cogdell[4]; [1]Univ. of California at Davis, USA, [2]Vrije Univ., Netherlands, [3]Vilnius Univ., Lithuania, [4]Univ. of Glasgow, UK.* Dispersed transient absorption and multi-pump spectroscopies were used to illustrate how the interplay between excited-state dynamics, saturation, and annihilation phenomena in the LH2 protein from Rhodopseudomonas acidophila generates structured pulses in optimal control experiments.

Kiln
Coffee Break
10:00 a.m.–10:30 a.m.

TuB • High Power Lasers and Propagation

Merrill Hall
10:30 a.m.–11:45 a.m.
TuB • High Power Lasers and Propagation
Jens Biegert; ICFO, Spain, Presider

TuB1 • 10:30 a.m. **•Invited•**
Generation of Terawatt Sub-10 fs Laser Pulses Using Optical Parametric Chirped Pulse Amplification, *Stefan Witte, Kjeld S. Eikema, Roel Th. Zinkstok, Wim Hogervorst; Laser Ctr. Vrije Univ., FEW, Netherlands.* Based on noncollinear optical parametric chirped pulse amplification, generation of near-Fourier-limited 9.8(0.3) fs laser pulses at 30 Hz repetition rate is demonstrated with an intensity exceeding a terawatt and an integrated fluorescence energy below 1%.

TuB2 • 11:00 a.m.
Spatio-Temporal Properties of Single-Cycle THz Pulses Generated by Relativistic Electron Beams in a Laser-Plasma Accelerator, *Csaba Toth, Jeroen van Tilborg, Carl B. Schroeder, Cameron G. R. Geddes, Eric Esarey, Wim Leemans; Lawrence Berkeley Natl. Lab, USA.* Spatial and temporal properties of single-cycle THz pulses from a laser-plasma accelerator have been measured. Spatio-temporal coupling is observed that can impact pump-probe experiments: aberrations in the THz focusing system cause an apparent double-pulse structure.

TuB3 • 11:15 a.m.
Interfering Lasing Filaments in Dense Absorbing Media, *Laurent Guyon[1], François Courvoisier[4], Véronique Boutou[1], Rachel Nuter[2], Antoine Vinçotte[2], Stéphanie Champeaux[2], Luc Bergé[2], Pierre Glorieux[3], Jean-Pierre Wolf[3]; [1]LASIM, France, [2]CEA-DAM/Ile de France, France, [3]Lab de Physique des Lasers, France, [4]Group of Applied Physics, Switzerland.* The filamentation of powerful, ultrashort laser pulses in liquids is investigated, both experimentally and numerically, varying two-photon absorption dye concentration. Pump-dump pulse experiments furthermore locks in phase each filament fluorescence leading to bright interference patterns.

TuB4 • 11:30 a.m.
Non-Relativistic Magnetic Continuum Generation, *Samuel L. Oliveira, Stephen C. Rand; Div. of Applied Physics, Univ. of Michigan, USA.* We report white light generation from magnetic dipoles established by the magnetic component of incident electromagnetic fields in the non-relativistic limit. Radiated power is one quarter of the electric dipole contribution even in dielectric media.

Crocker Dining Hall
Lunch
12:00 p.m.

TuC • Chemistry I

Chapel
1:15 p.m.–3:30 p.m.
TuC • Chemistry I
Takayoshi Kobayashi; Dept. of Physics, Univ. of Tokyo, Japan, Presider

TuC1 • 1:15 p.m.
Dissociative Wave Packets in Large Molecules: Control and Measurement, *Brett J. Pearson[1], David Cardoza[1], Thomas C. Weinacht[1], Mark Baertschy[2]; [1]Stony Brook Univ., USA, [2]Univ. of Colorado at Denver, USA.* Ultrafast control experiments in halogenated acetone ($CHBr_2COCF_3$) uncover a resonant charge transfer mechanism during molecular dissociation. Mechanisms such as this provide a technique for measuring dynamic molecular wave functions.

TuC2 • 1:30 p.m.
Coherent Control of 1,3-Cyclohexadiene Ring Opening, *Elizabeth Carroll, Andrei Florean, James L. White, Philip H. Bucksbaum, Roseanne J. Sension; Univ. of Michigan, USA.* Control over the cyclohexadiene ring-opening is achieved via multiphoton excitation. A learning algorithm searched for excitation pulses while pulse effectiveness was evaluated using transient absorption. Control parameters are identified through analysis of the search set.

TuC3 • 1:45 p.m.
Coherent Infrared Pulse Sequences for Probing Molecular Chirality, *Wei Zhuang, Darius Abramavicius, Shaul Mukamel; Dept. of Chemistry, Univ. of California at Irvine, USA.* Novel Polarization configurations in infrared four wave mixing are proposed and simulated using the nonlinear exciton equations (NEE). Application to helical peptides demonstrates higher sensitivity than CD to molecular chirality.

TuC4 • 2:00 p.m.
Robust Basis Functions for Control from Dimension Reduction of Adaptive Pulse-Shaping Experiments, *Niels H. Damrauer[1], Matthew A. Montgomery[1], Robert R. Meglen[2]; [1]Univ. of Colorado at Boulder, USA, [2]Latent Structures LLC, USA.* A new statistical analysis of our adaptive control experiment reveals that only seven simple basis functions are needed to account for ~ 90% of the fitness variance in 11700 laser pulses explored during an optimization.

TuC5 • 2:15 p.m.
Control Strategies for Molecular Switches in Donor-Bridge-Acceptor Systems, *Regina de Vivie-Riedle, Dorothee Geppert; Dept. Chemie, LMU, Germany.* We investigate donor-bridge-acceptor systems for energy transfer. As bridge a molecular switch is selected, allowing to control the transfer. Optimal control theory is used to find the optimal laserfield that steers the switching process efficiently.

TuC6 • 2:30 p.m.
Ultrafast Chelation Dynamics of Model Photoswitches: Cyclopentadienyl Manganese and Arene Chromium Tricarbonyl Derivatives with Pendant Sulfides, *Tung T. To[1], Edwin J. Heilweil[1], Charles B. Duke[2], Theodore J. Burkey[2]; [1]NIST, USA, [2]Univ. of Memphis, USA.* The chelation dynamics of $[Mn\{\eta^5\text{-}C_5H_4C(O)R\}(CO)_3]$ and $[Cr\{\eta^6\text{-}C_6H_5C(O)R\}(CO)_3]$ (R=$CH_2(SCH_3)$, $CH(SCH_3)_2$, $C(SCH_3)_3$) in solution were investigated on the picosecond timescale. Tailoring the side chain structure and solvent environment influences the reaction rates and chelation pathways.

TuC7 • 2:45 p.m.
A Femtosecond IR and Raman Look on a Nucleophilic Addition in the Electronic Ground State, *Peter Gilch, Stefan Laimgruber, Hilmar Schachenmayr, Wolfgang Schreier; Dept. fuer Physik, LMU Muenchen, Germany.* A highly reactive ketene intermediate is formed in its electronic ground state via photo-induced hydrogen transfer in 400 fs. The mechanistic details of a nucleophilic addition to this ketene are revealed by femtosecond vibrational spectroscopy.

TuD • Plasmonics, Dots and Wells

Merrill Hall
1:15 p.m.–3:30 p.m.
TuD • Plasmonics, Dots and Wells
Theodore Norris; Univ. of Michigan, USA, Presider

TuD1 • 1:15 p.m.
Femtosecond Microscopy of Surface Plasmon Propagation in a Silver Film, *Atsushi Kubo[1], Niko Pontius[2], Hrvoje Petek[1]; [1]Univ. of Pittsburgh, USA, [2]BESSY GmbH, Germany.* Propagation of surface plasmon polariton (SPP) in a silver film launched by 10-fs, 400-nm pulsed light is imaged at 0.33-fs delay/frame rate. The dynamics of SPP are simulated based on SPP complex wave vector.

TuD2 • 1:30 p.m.
Terahertz Emission from Nano-Structured Metal Surfaces , *Gregor H. Welsh, Neil T. Hunt, Klaas Wynne; Univ. of Strathclyde, UK.* Emission of ultrafast terahertz radiation from roughened and nano-patterned surfaces is reported for the first time. It is thought to be caused by a novel process involving multiphoton ionisation and acceleration in the surface-plasmon field.

TuD3 • 1:45 p.m.
Coherent Control of Light in Metal Nanostructures, *Peter van der Walle, L. (Kobus) Kuipers, Jennifer L. Herek; FOM Inst. AMOLF, Netherlands.* Coherent control of light localization at 'hotspots' in metal nanostructures is investigated theoretically and experimentally. Simulations of the optical response of these structures show a large effect of the pulse shape on the energy distribution.

TuD4 • 2:00 p.m.
Ultrafast Optical Nonlinearities of Metal Nanoparticles: Single-Particle Measurements and Correlation to Structure, *Norbert F. Scherer, Matthew Pelton, Rongchao Jin, Justin E. Jureller, Mingzhao Liu, Hee Y. Kim, Sungnam Park, Guyot-Sionnest Philippe; Univ. of Chicago, USA.* We have measured nonlinear scattering from plasmons in individual Au nanorods and have correlated second-harmonic activity of Ag nanoparticles and clusters to morphology. The measurements reveal novel ultrafast nonlinear phenomena related to electron confinement.

TuD5 • 2:15 p.m.
Dynamical Electric Metamaterial Response at Terahertz Frequencies, *Willie J. Padilla[1], Antoinette J. Taylor[1], Clarke Highstrete[2], Mark Lee[2], Richard D. Averitt[1]; [1]Los Alamos Natl. Lab, USA, [2]Sandia Natl. Lab, USA.* Utilizing terahertz time domain spectroscopy, we characterized the electromagnetic response of planar Split Ring Resonators fabricated on GaAs. Optical excitation is sufficient to turn off the electric resonance demonstrating the potential of SRR terahertz switches.

TuD6 • 2:30 p.m.
Time Resolved Magneto-Optical Microscopy of Individual Ferromagnetic Dots, *Jean-Yves Bigot, Abdelghani Laraoui, Mircea Vomir, Michele Albrecht, Eric Beaurepaire; Univ. Louis Pasteur, CNRS, France.* We have studied the ultrafast magnetization dynamics of individual ferromagnetic $CoPt_3$ dots. The time resolved magneto-optical Kerr measurements are performed with a confocal microscope with an accuracy of 300 nm and 150 fs.

TuD7 • 2:45 p.m.
Nonlinear Optical Microscopy of a Single Self-Assembled InGaAs Quantum Dot, *Markus Betz[1], Markus Wesseli[1], Claudia Ruppert[1], Stephan Trumm[1], Hubert J. Krenner[2], Jonathan J. Finley[2]; [1]Physik-Dept. E11, Germany, [2]Walter Schottky-Inst. and Physik-Dept. E24, Germany.* A single InGaAs/GaAs quantum dot is addressed in a two-color femtosecond transmission experiment. We find bleaching signals arising from individual excitonic interband transitions thus providing a scheme for ultrafast optical read-out of one artificial atom.

TuC • Chemistry I—Continued

TuC8 • 3:00 p.m.
Electron Transfer and Triplet State Formation in Merocyanine/TiO_2 Systems, *Martin O. Lenz, Josef Wachtveitl; Univ. Frankfurt, IPTC, Germany.* The photoinduced dynamics of merocyanine dyes in solution and coupled to semiconductor nanoparticles have been investigated by transient absorption spectroscopy. Ultrafast triplet state formation observed for the uncoupled system is quenched for the merocyanine/TiO_2 system.

TuC9 • 3:15 p.m.
Dynamics of Electron Injection from the Excited State of Anchored Molecules into Semiconductors, *Frank Willig, Lars Gundlach, Ralph Ernstorfer, Rainer Eichberger, Winfried Storck, Silke Felber; Hahn-Meitner-Inst., Germany.* A complete picture of different interfacial electron transfer dynamics has been obtained from transient absorption and two-photon photoemission data when inserting different anchor/bridge groups between the excited organic donor and the electrode surface.

Kiln
Coffee Break
3:30 p.m.–4:00 p.m.

TuD • Plasmonics, Dots and Wells—Continued

TuD8 • 3:00 p.m.
Microscopic Many-Body Analysis of Ultrafast Photocurrents in Semiconductor Nanostructures, *Torsten Meier[4], Quang Tuyen Vu[1], Bernhard Pasenow[1], Stephan W. Koch[1], Huynh Thanh Duc[2], Hartmut Haug[3]; [1]Dept. of Physics, Philipps Univ., Germany, [2]Inst. of Physics, Viet Nam, [3]Inst. fuer Theoretische Physik, Goethe Univ., Germany.* The dynamics of charge and spin currents generated by two-color femtosecond laser pulses is investigated. Non-Markovian memory effects lead to oscillations in the coherent transients.Consequences arising from the heavy-hole light-hole coupling are predicted.

TuD9 • 3:15 p.m.
Polarized Optical Two-Dimensional Fourier Transform Spectroscopy of Semiconductors, *Tianhao Zhang[1], Xiaoqin Li[2], S. T. Cundiff[2], I. Kuznetsova[3]; [1]JILA, NIST and Univ. of Colorado, USA, [2]JILA, USA, [3]Philipps-Univ. Marburg, Germany.* The polarization dependence of optical two-dimensional Fourier transform spectra of excitons and continuum in a GaAs quantum well probes the interplay between many-body interactions and disorder and the fundamental nature of the continuum states.

Kiln
Coffee Break
3:30 p.m.–4:00 p.m.

TuE • Ultrafast Optics I

Merrill Hall
4:00 p.m.–6:00 p.m.
TuE • Ultrafast Optics I
Antoinette J. Taylor; Los Alamos Natl. Lab, USA, Presider

TuE1 • 4:00 p.m.
High Power Compact THz System Based on Ultrafast Yb-Doped Parabolic Fiber Amplifier, *Guoqing Chang[1], Charles J. Divin[1], Chi-Hung Liu[1], Almantas Galvanauskas[1], Theodore B. Norris[1], Steven L. Williamson[2]; [1]Univ. of Michigan, USA, [2]Picometrix LLC, USA.* A power-scalable approach for high power THz generation is demonstrated using optical rectification in GaP pumped by an ultrafast Yb-doped parabolic fiber amplifier. 35 μW THz radiation is obtained from 8.5 W optical power.

TuE2 • 4:15 p.m.
Mode-Locked Ytterbium Fiber Laser with Dispersion Compensation by a Fiber Taper, *Robert Herda, Matei Rusu, Samuli Kivistö, Oleg G. Okhotnikov; Optoelectronics Res. Ctr., Finland.* We exploit the large anomalous dispersion in the waist of a fiber taper to offset the normal chromatic dispersion of an Yb-doped mode-locked fiber laser. The taper provides sufficient anomalous dispersion to ensure soliton operation.

TuE3 • 4:30 p.m.
A Novel Fast-Mixing Microfluidic Device for Studying Nonequilibrium Systems Using Femtosecond Spectroscopies, *Emily A. Gibson[1], Dawn Schafer[2], Wafa Amir[2], David W. M. Marr[2], Jeff Squier[2], Ralph Jimenez[1]; [1]JILA, USA, [2]Colorado School of Mines, USA.* We demonstrate the first femtosecond spectroscopy measurements in a microfluidic device. The microfluidic device is characterized using two-photon fluorescence and computer simulations, and pulse propagation through the high N.A. objective is characterized with spectral interferometry.

TuE4 • 4:45 p.m.
20-fps Motion Capture of Phase-Controlled Wave-Packets for Adaptive Quantum Control, *Kazuhiko Misawa, Kengo Horikoshi, Roy Lang; Tokyo Univ. of A&T, Japan.* We developed a sensitive femtosecond wave-packet spectrometer for rapid capture of wave-packet motion at 20 fps. This new method enables us to trace detailed dynamics of coherently controlled wave-packets in condensed matters.

TuE5 • 5:00 p.m.
Detection of Ultrafast Infrared Electric Fields by Chirped-Pulse Upconversion, *Kevin J. Kubarych[1], Manuel Joffre[2]; [1]Univ. of Michigan, USA, [2]Lab d'Optique et Biosciences/Ecole Polytechnique, France.* Sum-frequency mixing between a chirped 800-nm pulse and a 100-fs infrared pulse allows determination of the IR spectral phase and amplitude using spectral interferometry. A dispersed vibrational echo signal is also measured by upconversion.

TuF • Hydrogen Bonding

Chapel
4:00 p.m.–6:00 p.m.
TuF • Hydrogen Bonding
Andrei Tokmakoff; MIT, USA, Presider

TuF1 • 4:00 p.m.
Femtosecond Infrared Spectroscopy of HOD in Liquid to Supercritical Heavy Water, *Jörg Lindner[1], Peter Vöhringer[1], Dirk Schwarzer[2]; [1]Rheinische Friedrich-Wilhelms Univ., Germany, [2]Max-Planck-Inst. für Biophysikalische Chemie, Germany.* Investigation of vibrational energy relaxation of the OH-stretching vibration of HOD in liquid-to-supercritical heavy water as a function of temperature and solvent density by femtosecond mid-infrared spectroscopy.

TuF2 • 4:15 p.m.
Ultrafast Aqueous Bimolecular Acid-Base Proton Transfer: From Direct Exchange to Sequential Hopping, *Omar F. Mohammed[1], Jens Dreyer[1], Erik T. J. Nibbering[1], Dina Pines[2], Ehud Pines[2]; [1]Max Born Inst. fuer Nichtlineare Optik und Kurzzeitspektroskopie, Germany, [2]Ben Gurion Univ. of the Negev, Israel.* We explore the aqueous neutralization reaction between a photoacid ROH and carboxylate bases -OOCR' and show that proton transfer in loose complexes (ROH..H2O..-OOCR') occurs through intermediate water molecules in a sequential von Grotthuss type fashion.

TuF3 • 4:30 p.m.
The Role of Water in Intermolecular Proton Transfer Reactions, *Bradley J. Siwick[1], Huib J. Bakker[2]; [1]McGill Univ., Canada , [2]FOM—Inst. for Atomic and Molecular Physics (AMOLF), Netherlands.* We investigate intermolecular proton transfer in aqueous solution and show the process occurs via a Grotthuss-like mechanism involving the conduction of the protonic charge across several water molecules linking the donor-acceptor pair by hydrogen bonds.

TuF4 • 4:45 p.m.
Picosecond Thermometry and Manometry of Hydrogen-Bonded Systems, *Marcus Schmeisser, Hristo Iglev, Andy Thaller, Alfred Laubereau; Technische Univ. München, Germany.* A method for ultrafast temperature and pressure measurements in H-bonded systems is presented. Using mid-infrared subpicosecond pulses for excitation and probing, we studied temperature jumps in ice where a thermalization within 25 ps was observed.

TuF5 • 5:00 p.m.
Multicolor IR Spectroscopy on Pure Liquid Water, *Dan Cringus[1], Maxim S. Pshenichnikov[1], Douwe A. Wiersma[1], Maxim Mostovoy[1], Jörg Lindner[2], Peter Vöhringer[2]; [1]Univ. of Groningen, Netherlands , [2]Rheinische Friedrich-Wilhelms-Univ., Germany.* Multicolor infrared ultrafast spectroscopy is applied to investigate the vibrational relaxation dynamics in liquid water at room temperature with both the stretching and the bending mode being photoexcited and probed.

TuE • Ultrafast Optics I—Continued

TuE6 • 5:15 p.m.
Nonlinear Optical Detection of Photonic Jets, *Hirlimann Charles[1], Olivier Crégut[1], Stefan Haacke[1], Nhan Le Cong[1], Jean-Luc Rehspringer[1], Sylvain Lecler[2]; [1]IPCMS, France, [2]LSP, France.* The amplitude of light diffracted in the near field by micrometric spherical silica beads shows caustics named photonic jets. To demonstrate their presence, we performed a femtosecond two-photon excited photoluminescence experiment with 4-Methylumbelliferone.

TuE7 • 5:30 p.m.
Ultrashort Light Pulse Propagation through Resonantly Absorbing Bragg Reflector: Stationary Soliton Excitation, Frequency Conversion, Negative Refraction and Super-Focusing, *Jian Ying Zhou, Jun Tao Li, Qiang Lan, Jian Zhu, Jie Zhang, Ji Zhao; State Key Lab of Optoelectronic Materials and Technologies, Sun Yat-sen Univ., China.* Spatially localized ultrashort light pulse is applied to enhance nonlinear frequency conversion in a resonantly absorbing Bragg reflector. This externally excited gap soliton is shown to experience negative refraction and super-focusing, resulting in spatial-temporal soliton.

TuE8 • 5:45 p.m.
Two-Photon Bio-Imaging with a Mode-Locked Semiconductor Laser, *Hengchang Guo, Ki-ichi Sato, Keijiro Takashima, Hiroyuki Yokoyama; New Industry Creation Hatchery Ctr. (NICHe), Tohoku Univ., Japan.* We demonstrated two-photon imaging of biological tissues by employing a mode-locked semiconductor laser. Kilowatt-peak-power second-harmonic pulses were obtained from amplified 1.55-μm optical pulses, and were used for two-photon excitation.

TuF • Hydrogen Bonding—Continued

TuF6 • 5:15 p.m.
Towards a Molecular Movie: Real Time Observation of Hydrogen Bond Breaking by Transient 2D-IR Spectroscopy in a Cyclic Peptide, *Christoph Kolano[1], Jan Helbing[1], Peter Hamm[1], Wolfram Sander[2]; [1]Physikalisch-Chemisches Inst., Switzerland, [2]Lehrstuhl für Organische Chemie II, Germany.* Transient two-dimensional infrared spectroscopy (T2D-IR) has been used to observe in real time the non-equilibrium structural dynamics of intramolecular hydrogen bond breaking in a small cyclic disulfide-bridged peptide.

TuF7 • 5:30 p.m.
A Complete Experimental and Numerical Study of the Terahertz Dynamics of Methanol, *David A. Turton, Neil T. Hunt, Andrew R. Turner, Gregor H. Welsh, Klaas Wynne; Dept. of Physics, Univ. of Strathclyde, UK.* Advanced spectroscopies including terahertz absorption and third-order Raman scattering have been combined with molecular-dynamics simulations and instantaneous normal-mode analysis. This yields, for the first time, a deep understanding of the ultrafast dynamics of biologically-important liquids.

TuF8 • 5:45 p.m.
Structure and Dynamics of Rotaxanes Studied by Femtosecond Infrared Spectroscopy, *Sergey Yeremenko[1], Olaf F. A. Larsen[1], Sander Woutersen[1], Pavol Bodis[2], Wybren Jan Buma[2], Jeffrey S. Hannam[3], David A. Leigh[3]; [1]AMOLF, Netherlands, [2]Van 't Hoff Inst. for Molecular Sciences, Univ. of Amsterdam, Netherlands, [3]School of Chemistry, Univ. of Edinburgh, UK.* 2D IR spectroscopy allows revealing the structure of a rotaxane, while its dynamics is investigated with photon echo spectroscopy. The results demonstrate possibility of a real-time study of structure and dynamics of molecular devices.

TuG • Poster Session II A

Heather/Toyon/Acacia
8:00 p.m.–10:00 p.m.
TuG • Poster Session II A

TuG1
High Power Femtosecond IR Laser Source Based on Noncollinear Optical Parametric Chirped Pulse Amplification, *Darren Kraemer[1], Renzhong Hua[2], Michael L. Cowan[2], Kresimir Franjic[2], R. J. Dwayne Miller[1,2,3]; [1]Dept. of Chemistry, Univ. of Toronto, Canada, [2]Dept. of Physics, Univ. of Toronto, Canada, [3]Inst. for Optical Sciences, Canada.* The Optical Parametric Chirped Pulse Amplication (OPCPA) concept has been extended to the IR range to provide high power operation with large bandwidths using KTA in a noncollinear phase matching geometry with pumping at 1053nm.

TuG2
Gradient- and Vortex-Shaped fs Pulses in Air, *Antoine Vinçotte, Luc Bergé; CEA/DAM, France.* Femtosecond pulses exhibiting special distributions in space (sharp gradients, vortex shapes) are examined to monitor multiple filamentation in air. Ultrashort optical vortices are shown to propagate over hundreds of meters before breaking up into filaments.

TuG3
Ultrafast Intramolecular Energy Transfer in Water, *Dan Cringus, Maxim S. Pshenichnikov, Douwe A. Wiersma; Univ. of Groningen, Netherlands.* An unexpectedly fast (0.2 ps) intramolecular energy conversion occurring in H_2O molecule has been revealed using frequency-resolved mid-infrared pump-probe spectroscopy in the spectral region of the OH-stretching vibration.

TuG4
Understanding the Building Blocks of Life—Evidence of Hydrogen-Bonded Aggregation of N-Methylacetamide, *Neil T. Hunt, David A. Turton, Klaas Wynne; Univ. of Strathclyde, UK.* The ultrafast dynamics of N-methylacetamide, peptide-linkage model compound, are reported for the first time as a function of temperature and aqueous concentration. These provide evidence of a phase transition attributable to disruption of Hydrogen-bonded aggregates.

TuH • Poster Session II B

Heather/Toyon/Acacia
8:00 p.m.–10:00 p.m.
TuH • Poster Session II B

TuH1
Thymine Dimer Formation Probed by Time-Resolved Vibrational Spectroscopy, *Wolfgang J. Schreier[1], Tobias E. Schrader[1], Florian O. Koller[1], Peter Gilch[1], Wolfgang Zinth[1], Bern Kohler[2]; [1]Chair for BioMolecular Optics, Ludwig-Maximilians-Univ., Germany, [2]Dept. of Chemistry, Obio State Univ., USA.* Cyclobutane pyrimidine dimers are the major photoproducts formed when DNA is exposed to UV light. Femtosecond time-resolved vibrational spectroscopy shows that thymine dimers are formed in thymidine oligonucleotides < 20 ps after photoexcitation.

TuH2
Primary Reaction of Sensory Rhodopsin II Mutant D75N, *Mirka-Kristin Verhoefen[1], Sergiu Amarie[1], Martin O. Lenz[1], Josef Wachtveitl[1], Johann P. Klare[2], Martin Engelhard[2]; [1]Johann-Wolfgang-Goethe Univ., Germany, [2]Max-Planck-Inst. für Molekulare Physiologie, Germany.* The primary reaction of the sensory rhodopsin II mutant D75N has been investigated using femtosecond transient absorption spectroscopy. A reaction mechanism taking into account all observations including the slower photoresponse has been worked out.

TuH3
Modeling of the Extreme Nonlinear Optical Response of Semiconductor Nanostructures, *Daniel Golde, Torsten Meier, Stephan W. Koch; Dept. of Physics, Philipps Univ., Germany.* In extreme nonlinear optics the Rabi and transition frequencies are on the same order of magnitude. In this highly nonperturbative regime, the band dispersion characteristically modifies the response of semiconductor quantum wells and wires.

TuH4
Phase-Sensitive Resonance in Scattering of Continuous Waves on Femtosecond Solitons in Photonic Crystal Fibers, *Anatoly Efimov[1], Antoinette J. Taylor[1], Alex V. Yulin[2], Dmitry V. Skryabin[2], Jonathan C. Knight[2]; [1]Los Alamos Natl. Lab, USA, [2]Univ. of Bath, UK.* Using cross-correlation frequency-resolved optical gating we observe the phase-sensitive resonance in the interaction of a soliton with a continuous wave in a birefringent photonic crystal fiber, which leads to generation of new spectral components.

TuG • Poster Session II A—Continued

TuG5
Time- and Frequency-Resolved Two-Dimensional Transient Absorption Imaging of Beta-Carotene in Solids, *Jun Takeda, Yoshinori Makishima, Akihiro Ishida; Yokohama Natl. Univ., Japan*. Ultrafast transient absorption imaging implemented on a single shot basis is demonstrated. Using this method, we can successfully obtain time-frequency two-dimensional mapping of the absorbance change of beta-carotene in solids with very short accumulation.

TuG6
Rotational Wave Packet Dynamics Correlated to Ultrafast Non-Time-Stationary Linear and Nonlinear Optical Susceptibilities, *Omid Masihzadeh[1], Mark Baertschy[2], Randy Bartels[1]; [1]Colorado State Univ., USA, [2]Univ. of Colorado, USA*. Rotational wavepacket dynamics produced by a ultrafast pulses are related to linear and nonlinear optical susceptibilities. Limitations of wavepacket dynamic probing through optical susceptibilities are revealed. Correlations between nonlinear order and fractional revivals are discussed.

TuG7
A Proposed Tabletop Attosecond Pulse Coherent Soft X-ray Source, *Tomas Plettner, Robert L. Byer; E.L. Ginzton Labs, USA*. We propose a micro-undulator free-electron laser based system powered by an attosecond bunched electron beam generated from a laser-driven particle accelerator as a tabletop source of coherent attosecond deep-UV to soft X-ray pulses.

TuG8
Well Resolved Coherent Raman Spectra from Femtosecond Pulses, *Sukendu Nath, Diana C. Urbanek, Sean J. Kern, Mark A. Berg; Univ. of South Carolina, USA*. Coherent anti-Stokes Raman spectra with resolution better than the inherent linewidths of organic liquids are measured with 50 fs pulses. Data is collected in both time and frequency and analyzed in a 2D frequency-frequency format.

TuG9
Spatio-Temporal Couplings of Gaussian Pulses and Beams, *Selcuk Akturk, Xun Gu, Pablo Gabolde, Rick Trebino; Georgia Tech, USA*. We show that there are four previously undiscovered first order spatio-temporal couplings in ultrashort laser pulses. Our model not only identifies all possible couplings, but also yields explicit relations between the different couplings.

TuG10
Photochemistry of a Retinal Protonated Schiff-Base Analogue Mimicking the Opsin Shift of Bacteriorhodopsin, *Osbrat Bismuth[1], Noga Friedman[2], Mudi Sheves[2], Sanford Ruhman[1]; [1]Dept. of Physical Chemistry, The Hebrew Univ., Israel, [2]Dept. of Organic Chemistry, Weizmann Inst., Israel*. Photochemistry of retinal protonated Schiff-base analogue mimicking opsin shift of bacteriorhodopsin is studied. Results rule out correlations between BR's absorption red shifting and internal conversion catalysis. Indications for the involvement of multiple excited states uncovered.

TuG11
High-Energy Down-Chirped Few-Cycle Pulse Generation in Filaments, *Christoph P. Hauri, Michele Merano, Alexandre Trisorio, Rodrigo B. Lopez-Martens; Lab d'Optique Appliquée, France*. We report the generation of clean 1.8 mJ, sub-10-fs pulses generated by self-guided beam propagation of intense 40-fs pulses in argon and demonstrate the low energy fluctuations of such a system running at 1 kHz.

TuG12
Attosecond Pulse Production and Orbital Tomography with Orthogonally Polarized Two-Color Few-Cycle Pulses, *Markus Kitzler[1], Jeremie Caillat[2], Armin Scrinzi[1], Andrius Baltuska[1]; [1]Photonics Inst., Vienna Univ. of Technology, Austria, [2]Lab de Chimie Physique – Matière et Rayonnement, Univ. Pierre et Marie Curie, France*. We theoretically investigate the potential of orthogonally polarized two-color few-cycle pulses for important applications in attosecond physics, such as attosecond pulse production and orbital tomography.

TuG13
Coherent Control of Fluorescent Proteins with a Compact High-Resolution Spectral Phase Shaper, *S. Postma[1], H. L. Offerhaus[1], V. Subramaniam[1], N. F. van Hulst[2]; [1]Univ. of Twente, Netherlands, [2]ICFO Inst. de Ciències Fotòniques, Spain*. We present coherent control measurements on two photon fluorescence of a fluorescent protein, by spectral phase shaping of a femtosecond pulse. Properties of a compact high resolution spectral phase shaper will also be discussed.

TuH • Poster Session II B—Continued

TuH5
Dynamical Properties of Terahertz Radiation from Coherent Longitudinal Optical Phonons Confined in a GaAs/AlAs Multiple Quantum Well, *Kohji Mizoguchi[1], Masaaki Nakayama[1], Shingo Saito[2], Atsushi Syoujt[2], Kiyomi Sakai[2]; [1]Dept. of Applied Physics, Osaka City Univ., Japan, [2]KARC, Natl. Inst. of Information and Communications Technology, Japan*. We have investigated the dynamical properties of intense terahertz waves from coherent longitudinal optical phonons in a GaAs/AlAs multiple quantum well, which is radiated in accordance with the group velocity of the phonon-polariton branch.

TuH6
Shear Picosecond Ultrasonics in Crystals with Broken Symmetry, *Thomas Pezeril, Nikolay Chigarev, Pascal Ruello, Samuel Gougeon, Denis Mounier, Jean-Marc Breteau, Pascal Picart, Vitaly Gusev; LPEC, France*. Shear hypersound generation and detection by femtosecond laser pulses in opaque single crystals is investigated. Experiments reveal a non-local volumetric mechanism of plane shear sound excitation and the role of anisotropy in acousto-optic detection.

TuH7
Carotenoid Excited State Kinetics in Purple Bacterial Reaction Centers with the Primary Electron Donor Oxidized, *Su Lin, Evaldas Katilius, Neal W. Woodbury; Dept. of Chemistry and Biochemistry and the Ctr. for the Study of Early Events in Photosynthesis, Biodesign Inst. of ASU, Arizona State Univ., USA*. Carotenoid singlet excited state kinetics in wild type reaction centers from *Rhodobacter sphaeroides* was investigated using ultrafast laser spectroscopy under conditions where the primary electron donor is either neutral or oxidized.

TuH8
Characterization of Magnetization Dynamics Using Terahertz Emission Spectroscopy, *James M. Schleicher[1], Shayne M. Harrel[1], Charles A. Schmuttenmaer[1], Eric Beaurepaire[2], Jean-Yves Bigot[2]; [1]Yale Univ., Dept. of Chemistry, USA, [2]IPCMS at the CNRS, France*. THz pulse emission is used to study demagnetization dynamics in polycrystalline iron and nickel films of thickness from 5 to 60 nm. Bulk and surface contributions each play a role, and their origins are discussed.

TuH9
Transient Holographic Detection of Surface Deformation Using Extreme Ultraviolet Radiation, *Ra'anan I. Tobey[1], Mark E. Siemens[1], Oren Cohen[1], Henry C. Kapteyn[1], Margaret M. Murnane[1], Keith A. Nelson[2]; [1]JILA, Univ. of Colorado, USA, [2]MIT, USA*. We extend the use of Gabor Holography with Extreme Ultraviolet Radiation to study surface deformations on ultrafast timescales. The use of EUV light allows surface sensitive probing with sub-Angstrom displacement resolution and sub-100fs time resolution.

TuH10
Single-Shot, High-Resolution, THz Field Reconstruction Using Phase-Retrieval, *Balakishore Yellampalle, KiYong Kim, Richard D. Averitt, George Rodriguez, James H. Glownia, Antoinette J. Taylor; Los Alamos Natl. Lab, USA*. Single-shot, high-resolution reconstruction of ultrafast THz fields is possible by using a characterized chirped probe pulse in an electro-optic mixing measurement. We identify the reconstruction as a phase-retrieval problem and present an iterative reconstruction technique.

TuH11
Ultrafast Dynamics of Polarization Induced at Surface Plasmon Resonances in One Dimensional Metallic Plasmonic Crystal, *Arvind S. Vengurlekar[1], Achanta Venu Gopal[1], Teruya Ishibara[2]; [1]Tata Inst. of Fundamental Res., India, [2]Frontier Res. System, RIKEN, Japan*. Femtosecond pump-probe measurements reveal that lifetime of surface plasmons at the upper energy edge of the band gap in a plasmonic crystal is about 2ps but is much smaller at the other edge.

TuH12
Ligand Interconversion Dynamics in the Primary Docking Site of Heme Proteins in Various Solvents, *Seongheun Kim, Manho Lim; Pusan Natl. Univ., Republic of Korea*. Interconversion dynamics of ligand in the primary docking site of myoglobin and hemoglobin in various solvents at 283K was investigated by probing time-resolved vibrational spectra of CO photodissociated from these proteins.

TuG • Poster Session II A—Continued

TuG14
MHz-Rate White Light Generation Using a Novel Positive-Dispersion Cavity-Dumped Ti:Sapphire Laser, *Xibin Zhou, Henry Kapteyn, Margaret Murnane; JILA and Dept. of Physics, Univ. of Colorado and NIST, USA.* We obtain 0.45 μJ from a cavity-dumped Ti:sapphire oscillator stably operating in the positive-dispersion regime. The pulse can be compressed to 60-fs using a prism pair, and can generate white light continuum through self-filamentation.

TuG15
Ac Stark-Mediated Quantum Control with Two-Color Pulses in Two- and Three-Level Systems, *Carles Serrat, Yurii Loiko; Univ. Politecnica de Catalunya, Spain.* The optical Stark shift of two-color pulses propagating in two- and three-level media is critical for the phase-sensitivity of four-wave mixing. We present a coherent control scheme for potential ultrafast nonlinear optical spectroscopy techniques.

TuG16
Isolated EUV Pulses via CEP-Insensitive Nonlinear Stabilization in a Waveguide, *Arvinder S. Sandhu[1], Etienne Gagnon[1], Ariel Paul[1], Isabell Thomann[1], Amy Lytle[1], Tracey Keep[1], Margaret Murnane[1], Henry Kapteyn[1], Ivan Christov[2]; [1]JILA, USA, [2]Sofia Univ., Bulgaria.* We discuss a new regime of harmonic generation, where isolated femtosecond EUV pulses are generated via a mechanism relatively insensitive to carrier-envelope phase. This approach allows for selective control of the EUV energy and bandwidth.

TuG17
Unique Behavior of Lattice Modulation Phase Induced by Ligand Motion of a Mixed-Valence Metal-Halogen Complex, *Fumito Araoka; Univ. of Tokyo, Japan.* A highly time-resolved pump-probe measurement for a halogen-bridged mixed-valence metal complex, $[Pt(en)_2][Pt(en)_2Br_2](ClO_4)_4$, shows sinusoidal modulations accompanying with a unique behavior of probe-wavelength-dependent phase, suggesting an existence of a ligand motion coupled with the lattice vibration.

TuG18
High Spectral Irradiance White Light Continuum Z-Scan, *Mihaela Balu, David J. Hagan, Eric W. Van Stryland; College of Optics and Photonics/CREOL and FPCE, USA.* We generate high-energy, high-quality supercontinua in Krypton gas for Z-scan measurements of nonlinear absorption and refraction spectra in optical materials throughout the visible. This eliminates the need for tunable sources (OPA's) for nonlinear measurements.

TuG19
Dynamics of One-Dimensional Exciton in Porphyrin J Aggregates by Sub-5fs Transient Absorption Experiment, *Takayoshi Kobayashi, Akira Ozawa; Univ. of Tokyo, Japan.* Time-resolved pump-probe experiment was applied to porphyrin J aggregates. The new relaxation model with two kinds of Auger processes is proposed and investigated to explain the spectral and decay features of experimental results.

TuG20
Control of Third Order Dispersion of Ultrashort Laser Pulses, *Miklós Erdélyi, Attila P. Kovács, Katalin Mecseki, Gábor Szabó; Dept. of Optics and Quantum Electronics, Hungary* We propose a system with a birefringent crystal, which is able to control the third order dispersion in a wide range independently of the second order one. Numerical simulations and experimental results are presented.

TuG21
Ultrasimple Extremely Broadband Transient-Grating Frequency-Resolved-Optical-Gating Device, *Dongjoo Lee, Selcuk Akturk, Pablo Gabolde, Rick Trebino; Georgia Tech, USA.* We demonstrate an ultrasimple, compact, extremely broad band, alignment-free, and single-shot Transient-Grating Frequency-Resolved-Optical-Gating device that can measure (amplified) UV, visible, and IR pulses without change of optics.

TuG22
Generation of 460nm Femtosecond Laser Pulse by Sum Frequency Synchronized Femtosecond Ti:Sapphire Laser and Picosecond Nd:YVO_4 Laser, *Huan Zhao, Peng Wang, Jiangfeng Zhu, Hainian Han, Zhiyi Wei; Lab of Optical Physics, Inst. of Physics, Beijing Natl. Lab for Condensed Matter Physics, China.* Broad-band femtosecond laser of 460nm is generated by sum frequency the synchronized Ti:Sapphire femtosecond laser and picosecond Nd:YVO_4 laser. It presents a new way to generate ultrafast laser at new wavelength through nonlinear frequency mixing.

TuH • Poster Session II B—Continued

TuH13
Time-Resolved THz Spectroscopy: Ultrafast Charge Carrier Dynamics in Low-Dimensional Solids, *Christian Frischkorn, Luca Perfetti, Tobias Kampfrath, Martin Wolf; Freie Univ. Berlin, Germany.* Ultrashort broadband THz pulses are applied to probe the femtosecond charge carrier dynamics in graphite and carbon nanotubes revealing information on the temporal evolution of the electronic temperature and scattering rate and the plasma frequency.

TuH14
Ultrafast Optoelectronic Probing of Charge Carrier Mobility in Organic Devices, *Juan Cabanillas-Gonzalez[1], Tersilla Virgili[1], Alessio Gambetta[1], Guglielmo Lanzani[1], Thomas D. Anthopoulos[2], Dago M. De Leeuw[2]; [1]Dept. di Fisica, Italy, [2]Philips Res. Labs, Netherlands.* We report sub-picosecond charge mobility measurements in an organic semiconductor obtained by probing with ultrashort pulses the temporal evolution of the electroabsorption signal following ultrafast charge generation.

TuH15
Damaging DNA with Ultrafast Hard X-rays, *Ting Guo, Fang Shan, Joshua D. Carter; Univ. of California at Davis, USA.* Preliminary results on damaging DNA with ultrafast X-rays seem to suggest that ultrafast X-rays generated with an ultrafast laser are more effective to cause strand breaks in DNA than conventional continuous-wave X-rays.

TuH16
Time-Resolved Photoluminescence of GaAs/AlGaAs Asymmetric Quantum Wells, *Jennette N. Mateo[1,2], Arnel Salvador[2]; [1]CV-CNO Product Engineering, Philippines, [2]CMPL, Natl. Inst. of Physics, Univ. of the Philippines, Philippines.* Time-resolved photoluminescence was performed on a coupled GaAs/AlGaAs asymmetric quantum well at room temperature. Streak camera images at differnt biases show indirect transition between narrow well and wide well non-resonant tunneling via acoustic phonons.

TuG • Poster Session II A—Continued

TuG23
Anharmonic Bend-Stretch Coupling in Water, *Jörg Lindner[1], Peter Vöhringer[1], Maxim S. Pshenichnikov[2], Dan Cringus[2], Douwe A. Wiersma[2]; [1]Rheinische Friedrich-Wilhelms Univ., Inst. für Physikalische und Theoretische Chemie, Germany , [2]Univ. of Groningen, Dept. of Physical Chemistry, Netherlands.* A change of the transient absorption of the stretch which decays with the bend lifetime is observed by exciting the bending and probing the stretching mode, and interpreted as anharmonic mode coupling.

TuG24
Photoionization Mechanisms of Atmospheric Gases Probed by Terahertz Pulses, *Zoltan Mics[1], Filip Kadlec[1], Petr Kuzel[1], Pavel Jungwirth[2], Stephen E. Bradforth[3], V. Ara Apkarian[4]; [1]Inst. of Physics, Czech Republic, [2]Inst. of Organic Chemistry and Biochemistry, Czech Republic, [3]Univ. of Southern California, USA, [4]Univ. of California at Irvine, USA.* We use optical pump-terahertz probe spectroscopy for exploring photoinduced ionization and plasma formation in atmospheric gases. Multiphoton versus strong-field photoionization processes are investigated using variable intensity, polarization and wavelength of the femtosecond optical pump pulses.

TuG25
Multidimensional Anisostropic Spectroscopy for the Study of Intramolecular Charge Transfer, *Dao Lap Van, McDonald David, Hannaford Peter; CAOUS, FISE, Swinburne Univ. of Technology, Australia.* The multidimensional anisostropic spectroscopy is applied to the study of intramolecular charge transfer of the DCM molecule in different solutions. The experimental results demonstrate the potential of such multidimensional spectroscopy for investigating molecular dynamics.

TuG26
Supermode Noise Correlation of Harmonically Modelocked Lasers, *Sangyoun Gee, Franklyn Quinlan, Sarper Ozharar, Peter Delfyett; CREOL/College of Optics, USA.* Two types of supermode noise, uncorrelated and correlated, are demonstrated for two different types of harmonically modelocked lasers. The correlated supermode noise is originated from the excitation of multiple correlated optical supermodes.

TuG27
Molecular Orientation via Molecular Anti-Alignment, *Erez Gershnabel[1], Ilya Sh Averbukh[1], Robert J. Gordon[2]; [1]Weizmann Inst. of Science, Israel, [2]Univ. of Illinois at Chicago, USA.* We show that field-free molecular orientation induced by a half-cycle pulse may be considerably enhanced by an additional laser pulse inducing molecular anti-alignment. Two qualitatively different enhancement mechanisms are identified depending on the pulse order.

NOTES

•Wednesday, August 2, 2006•

Main Lodge
Registration Open
8:00 a.m.–5:00 p.m.

WA • Applications of Combs

Merrill Hall
8:30 a.m.–10:00 a.m.
WA • Applications of Combs
Erich Ippen; MIT, USA, Presider

WA1 • 8:30 a.m. **•Invited•**
Femtosecond Enhancement Cavity: From Real-Time Ultrasensitive Spectroscopy to Coherent Extreme Nonlinear Optics, *Jun Ye; JILA, Univ. of Colorado & NIST, USA*. No abstract available.

WA2 • 9:00 a.m.
Spectral Line-by-Line Pulse Shaping of a Mode-Locked Laser and a Phase Modulated CW Laser, *Zhi Jiang, Daniel E. Leaird, Andrew M. Weiner; Purdue Univ., USA*. We demonstrate line-by-line pulse shaping control on both a mode-locked laser and a phase modulated CW laser. Independent manipulation of individual spectral lines leads to synthesis of user-specified ultrafast optical waveforms with unprecedented frequency resolution.

WA3 • 9:15 a.m.
High-Resolution Spectral Fingerprinting with a Stabilized Femtosecond Laser Frequency Comb, *Scott A. Diddams, Leo Hollberg, Vela Mbele; NIST, USA*. We demonstrate a novel optical spectroscopy technique combining a stabilized femtosecond frequency comb with a spectrometer that resolves individual comb elements. Rapid parallel data acquisition over many terahertz with hertz-level resolution can be achieved.

WA4 • 9:30 a.m.
Mapping of the Optical Frequency Comb to the Atom Velocity Comb, *Ticijana Ban, Damir Aumiler, Hrvoje Skenderović, Goran Pichler; Inst. of Physics, Croatia*. A mode-locked fs laser is used to map the laser frequency comb into the velocity comb of the Rb atoms at room temperature. Modified DFCS is developed and density matrix treatment is used.

WA5 • 9:45 a.m.
Demonstration of Frequency Comb Laser Spectroscopy in the Vacuum-Ultraviolet, *Roel Th Zinkstok, Stefan Witte, Wim Ubachs, Wim Hogervorst, Kjeld S. E. Eikema; Laser Ctr. Vrije Univ., FEW, Netherlands*. High-resolution spectoscopy at 125 nm is performed on xenon, using amplified frequency comb pulse trains that are frequency upconverted in a gas cell, thereby demonstrating the potential for sub-MHz accuracy in the vacuum-ultraviolet.

Kiln
10:00 a.m.–10:30 a.m.
Coffee Break

WB • Ultrafast X-ray Diffraction

Merrill Hall
WB • Ultrafast X-ray Diffraction
10:30 a.m.–11:45 a.m.
Christoph Rose-Petruck; Brown Univ., USA, Presider

WB1 • 10:30 a.m. **•Invited•**
Direct Observation of Electron Dynamics at Surfaces Using X-ray Spectroscopy, *Wilfried Wurth, Alexander Föhlisch; Univ. of Hamburg, Germany*. With an X-ray spectroscopic technique based on the use of the lifetime of a core excited state as an "internal clock" we investigate electron transfer between adsorbed atoms and metallic substrates on (sub)-femtosecond time scales.

WB2 • 11:00 a.m.
Carrier Dependent Stability of a Semiconductor Lattice Measured with Femtosecond X-ray Diffraction, *Kelly J. Gaffney, Pat B. Hillyard, Aaron M. Lindenberg, Simon Engemann, Anniruddha Deb, Drew A. Meyer; SSRL/SLAC, USA*. The melting dynamics of laser excited InSb have been studied with femtosecond X-ray diffraction. These measurements have allowed us to characterize the atomic motion occurring during the initial stages of a photo-induced phase transition.

WB3 • 11:15 a.m.
Probing Strain Propagation in Nanolayered Perovskites by Ultrafast X-ray Diffraction, *Matias Bargheer[1], Clemens v. Korff Schmising[1], Mareike Kiel[1], Nikolay Zhavoronkov[1], Michael Woerner[1], Thomas Elsaesser[1], Ionela Vrejoiu[2], Marin Alexe[2], Dietrich Hesse[2]; [1]Max-Born-Inst., Germany, [2]Max-Planck-Inst. für Mikrostrukturphysik, Germany*. Propagating strain waves in $SrTiO_3$ launched from $PbZr_{0.2}Ti_{0.8}O_3$ films are measured by time-resolved X-ray diffraction. X-ray interference among contributions from differently strained regions allow to determine absolute transient strain amplitudes down to $\Delta a(t)/a_0 \approx 2 \cdot 10^{-5}$.

WB4 • 11:30 a.m.
Lattice Motions from THz Phonon-Polaritons Measured with Femtosecond X-ray Diffraction, *Andrea Cavalleri[1], Simon Wall[1], Nicky Dean[1], Chris Simpson[1], Matteo Rini[2], Robert Schoenlein[2], Munira Khalil[3], David W. Ward[4], Eric Statz[4], Keith A. Nelson[4]; [1]Dept. of Physics, Univ. of Oxford, UK, [2]Lawrence Berkeley Natl. Lab, USA, [3]Dept. of Chemistry, Univ. of California at Berkeley, USA, [4]Dept. of Chemistry, MIT, USA*. We use femtosecond X-ray diffraction to measure coherent lattice motion associated with the excitation and propagation of THz phonon polaritons in $LiTaO_3$.

Crocker Dining Hall
Lunch
12:00 p.m.

WC • Ultrafast Optics II

Merrill Hall
1:15 p.m.–3:30 p.m.
WC • Ultrafast Optics II
Mauro Nisoli; Politecnico di Milano, Italy, Presider

WC1 • 1:15 p.m.
Measurement of the Complete Electric Field of an Ultrashort Laser Pulse from a Single-Exposure Digital Hologram, *Pablo Gabolde, Rick Trebino; Georgia Tech, USA*. Using a very simple apparatus, we generate multiple digital holograms in a single-exposure interferogram from which we experimentally reconstruct the complete electric field, E(x,y,z,t), of a potentially complex ultrashort laser pulse in a single shot.

WC2 • 1:30 p.m.
Ultrasensitive Second-Harmonic Generation Frequency-Resolved Optical Gating Using a Fiber-Pigtailed Aperiodically Poled Lithium Niobate Waveguide at 1.55μm, *Houxun Miao[1], Andrew M. Weiner[1], Shang-Da Yang[2], Carsten Langrock[3], Rostislav V. Roussev[3], Martin M. Fejer[3]; [1]Purdue Univ., USA, [2]Natl. Tsing-Hua Univ., Taiwan, [3]Stanford Univ., USA*. We retrieve intensity and phase profiles of few hundred femtosecond optical pulses at 6 nW average power via second-harmonic generation FROG using a new fiber-pigtailed aperiodically poled lithium niobate waveguide with apodized design.

WC3 • 1:45 p.m.
Two-Dimensional Spectral Shearing Interferometry (2DSI) for Few-Cycle Pulse Characterization and Optimization, *Jonathan R. Birge, Richard Ell, Franz X. Kärtner; MIT, USA*. We demonstrate a new pulse measurement technique, two-dimensional spectral shearing interferometry, which is particularly amenable to the online optimization of few-cycle lasers. We show initial results of measurements from a 5 fs Ti:sa oscillator.

WC4 • 2:00 p.m.
Chirped Mirrors without Dispersion Oscillations by Brewster's Angle Incidence, *Peter Baum[1], Markus Breuer[1], Eberhard Riedle[1], Günter Steinmeyer[2]; [1]LMU München, Germany, [2]Max-Born-Inst. (MBI), Germany*. We experimentally demonstrate a new generation of chirped mirrors designed for Brewster's angle incidence. Dispersion oscillations are virtually eliminated and extremely clean 5.6-fs-pulses are generated. We show the general applicability for various spectroscopic pulse requirements.

WC5 • 2:15 p.m.
Pulse Self-Compression of Supercontinuum in Photonic Nanowires, *Mark A. Foster[1], Qiang Cao[2], Rick Trebino[2], Alexander L. Gaeta[1]; [1]Cornell Univ., USA, [2]Georgia Tech, USA*. Photonic nanowires exhibit broad regions of anomalous group-velocity dispersion and large effective nonlinearities allowing for efficient pulse self-compression. Experimentally, we demonstrate self-compression of 70-fs pulses to 6.8-fs. Simulations predict potential compression to near single-cycle durations.

WC6 • 2:30 p.m.
Pulse Polarization Splitting with Propagation through an Ultrafast Transient Waveplate, *Klaus Hartinger, Randy A. Bartels; Colorado State Univ., USA*. The decomposition of a linearly polarized laser pulse into two distinct, orthogonally polarized laser pulses after propagation through an ultrafast time- varying waveplate is demonstrated with transiently aligned, linear molecules.

WD • Chemistry and X-Rays

Chapel
1:15 p.m.–3:30 p.m.
WD • Chemistry and X-Rays
Henry Kapteyn; Univ. of Colorado Boulder, USA, Presider

WD1 • 1:15 p.m.
Optical Stark Effect in Semiconducting Single-Walled Carbon Nanotubes, *Daohua Song[1], Feng Wang[1], Gordana Dukovic[1], M. Zheng[2], E.D. Semke[2], Louis E. Brus[1], Tony Heinz[1]; [1]Columbia Univ., USA, [2]DuPont Central Res. and Development, USA*. A strong optical Stark effect has been observed in the 1D system of semiconducting single-walled carbon nanotubes for non-resonant excitation.

WD2 • 1:30 p.m.
Real Time Observation of Nonlinear Coherent Phonon Dynamics in Semiconducting Single Wall Carbon Nanotubes, *Cristian Manzoni[1], Alessio Gambetta[1], Giulio Cerullo[1], Guglielmo Lanzani[1], Enzo Menna[2], Moreno Meneghetti[2]; [1]Physics Dept., Politecnico di Milano, Italy, [2]Dept. of Chemical Sciences, Univ. of Padova, Italy*. Sub-10-fs visible pulses allow real time detection of coherent phonons in single-walled carbon nanotubes. Nonlinear coupling between radial breathing (250 cm^{-1}) and the carbon-stretching (1600 cm^{-1}) modes is experimentally observed and theoretically modeled.

WD3 • 1:45 p.m.
Ultrafast Dynamics of Fe(II) Polypyridyl Chromophores: Design Implications for Dye-Sensitized Photovoltaics, *James K. McCusker, Amanda L. Smeigh; Michigan State Univ., USA*. Femtosecond time-resolved spectroscopy has been used to probe charge transfer-state deactivation in Fe(II) complexes. A sub-100 fs process is implicated as a reason why TiO_2-based photovoltaic devices utilizing these chromophores as sensitizers exhibit low photocurrents.

WD4 • 2:00 p.m.
Ultrafast XAFS of Transition Metal Complexes, *Taewoo Lee, Frank Benesch, Christian Reich, Chris Laperle, Xiaodi Li, Margaret Grant, Christoph Rose-Petruck; Brown Univ., USA*. Ultrafast laser pump-XAFS probe spectra of ironhexacyanide solvated in water have been measured using a laser-driven plasma x-ray source. A new x-ray source driven by a 15-W, 5-kHz laser system has been developed.

WD5 • 2:15 p.m.
Picosecond X-ray Absorption Spectroscopy of Photochemical Transient Species in Solution, *Munira Khalil[1], Matthew A. Marcus[2], Amanda L. Smeigh[3], James K. McCusker[3], Henry H. W. Chong[4], Robert W. Schoenlein[4]; [1]Univ. of California at Berkeley, USA, [2]Advanced Light Source, Lawrence Berkeley Natl. Lab, USA, [3]Michigan State Univ., USA, [4]Materials Sciences Div., Lawrence Berkeley Natl. Lab, USA*. A photoinduced Fe^{II} spin crossover reaction in solution is studied with ultrafast X-ray absorption spectroscopy. The iron-nitrogen bond lengthens by 0.21±0.03 Å in the high-spin transient excited state relative to the ground state.

WD6 • 2:30 p.m.
Femtosecond X-ray Diffraction on DIABN Single Crystals, *Markus Braun[1], Christopher Root[1], Tobias E. Schrader[1], Peter Gilch[1], Wolfgang Zinth[1], Matias Bargheer[2], Clemens v. Korff Schmising[2], Mareike Kiel[2], Nikolai Zhavoronkov[2], Michael Woerner[2], Thomas Elsaesser[2]; [1]Sektion Physik, Ludwig-Maximilians-Univ. München, Germany, [2]Max-Born Inst., Germany*. Structure sensitive methods like time-resolved X-ray diffraction and transient absorption in the mid-IR are combined with UV/VIS transient absorption spectroscopy to probe the charge transfer photo-reaction in single crystals of an aminobenzonitrile derivative.

WC • Ultrafast Optics II—Continued

WC7 • 2:45 p.m.
Design and Fabrication of Efficient Reflection Grisms for Pulse Compression and Dispersion Compensation, *Steve Kane[1], Herb Dinger[1], Fred Tortajada[1], Bruno Touzet[1], Rachel Huff[2], Jeff Squier[2], Charles Durfee[2], Emily Gibson[3], Ralph Jimenez[3]; [1]Horiba Jobin Yvon, USA, [2]Colorado School of Mines, USA, [3]JILA/NIST/Univ. of Colorado, USA*. Efficient reflection grisms for pulse compression and material-dispersion compensation have been designed and demonstrated in a CPA system. Designs for 800-nm and 1030-nm ultrafast applications are characterized using off-the-shelf diffraction gratings.

WC8 • 3:00 p.m.
eXtreme Chirped Pulse Amplification Using Semiconductor Optical Amplifiers, *Kyungbum Kim, Shinwook Lee, Peter J. Delfyett; College of Optics and Photonics/CREOL/FPCE, USA*. Implementing a method called "eXtreme Chirped Pulse Amplification", we demonstrate an all-semiconductor high power mode-locked semiconductor laser system generating ~1.4kW record peak power.

WC9 • 3:15 p.m.
High Performance Passively Mode-Locked 1.3mμm Quantum-Dot Lasers, *Jean-Philippe Tourrenc, Maria Teresa Todaro, Stephen P. Hegarty, Carmel Kelleher, Brian Corbett, Guillaume Huyet, John G. McInerney; Tyndall Natl. Inst., Ireland*. We measured pulsewidth, time-bandwidth product and timing jitter in passively mode-locked two-section InAs quantum-dot lasers emitting at 1310 nm. Two distinct stable mode-locked regions were identified, each with robust short pulses and low timing jitter.

Kiln
3:30 p.m. –4:00 p.m.
Coffee Break

WE • Biology II

Chapel
4:00 p.m.–6:00 p.m.
WE • Biology II
Eberhard Riedle; LS fuer BioMolekulare Optik, Germany, Presider

WE1 • 4:00 p.m.
Energy Transport in a Peptide Helix, *Virgiliu V. Botan[1], Ellen Backus[1], Peter Hamm[1], Alessandro Moretto[2], Claudio Toniolo[2]; [1]Zurich Univ., Switzerland, [2]Padova Univ., Italy*. We investigate energy transport through a 3_{10}-helix by locally heating with a chromophore that rapidly dissipates energy and measuring temperature at various distances from the chromophore with the help of vibrational labels.

WE2 • 4:15 p.m.
Ultrafast Energy Transfer in the Soret Band of Linear Porphyrin Arrays, *Hanju Rhee[1], Taiba Joo[1], Naoki Aratani[2], Atsubiro Osuka[2]; [1]Pohang Univ. of Sci. and Tech., Republic of Korea, [2]Dept. of Chemistry, Kyoto Univ., Japan*. Energy transfer in the S_2 state of a donor-acceptor porphyrin array system has been probed by 60 fs time-resolved fluorescence spectra. Detailed energy transfer channels and mechanism are revealed for this multi-level system.

WD • Chemistry and X-Rays—Continued

WD7 • 2:45 p.m.
Ultrafast Optical and X-Ray Measurements of Femtosecond Lattice Dynamics in Photoexcited Bismuth , *David M. Fritz[1], Bernhard Adams[2], Christian Blome[3], Phillip H. Bucksbaum[4], Adrian L. Cavalieri[5], Simon Engemann[6], Stephen Fahy[7], Paul H. Fuoss[2], Kelley J. Gaffney[6], Patrick Hillyard[4], Michael Horn-von Hoegen[8], Mathias Kammler[9], Jen Kaspar[4], Aaron M. Lindenberg[6], Soo-Heyong Lee[1], Brian McFarland[4], Drew Meyer[4], Eamonn Murray[7], Matthieu Nicoul[8], Juana Rudati[2], David P. Siddons[10], Klaus Sokolowski-Tinten[8], Dietrich von der Linde[8], Jerome B. Hastings[6], David A. Reis[1]; [1]Univ. of Michigan, USA, [2]Argonne Natl. Lab, USA, [3]Duestches Elektronen-Synchrotron, Germany, [4]Stanford Univ., USA, [5]Max-Planck-Inst. of Quantum Optics, Germany, [6]Stanford Synchrotron Radiation Lab, USA, [7]Univ. College, Ireland, [8]Univ. Duisburg-Essen, Germany, [9]Univ. Hannover, Germany, [10]Brookhaven Natl. Lab, USA*. We present the first detailed measurements of the interatomic potential of photoexcited bismuth using ultrafast optical and x-ray scattering. Our results show that electronic softening is responsible for the strong chirp in phonon frequency.

WD8 • 3:00 p.m.
Investigation of Plume Dynamics with Ultrafast Hard X-Ray Absorption Spectroscopy, *Ting Guo, Fang Shan, Rhiannon Porter; Univ. of California at Davis, USA*. Results on plume dynamics of pulsed laser ablation of metal thin films in helium at ambient pressure studied with ultrafast hard x-ray absorption spectroscopy/imaging are presented. The x-ray absorbing plume propagated at $4x10^2$ m/sec.

WD9 • 3:15 p.m.
Ultrafast Electron Dynamics in C_6F_6/Cu(111) after a Localized or Delocalized Excitation, *Patrick S. Kirchmann[1], Panagiotis A. Loukakos[1], Uwe Bovensiepen[1], Martin Wolf[1], Sethuraman Vijayalakshmi[2], Franz Hennies[2], Annette Pietzsch[2], Mitsuru Nagasono[2], Alexander Föhlisch[2], Wilfried Wurth[2]; [1]Freie Univ. Berlin, Germany, [2]Univ. Hamburg, Inst. für Experimentalphysik, Germany*. Comparing optical and core-hole excitation, we study relaxation dynamics of excited electrons at C_6F_6/Cu(111) interfaces. The pronounced tenfold difference in relaxation times is attributed to electron transfer across the interface and intra-molecular electron delocalization, respectively.

Kiln
3:30 p.m. –4:00 p.m.
Coffee Break

WF • AMO Physics

Merrill Hall
4:00 p.m.–6:00 p.m.
WF • AMO Physics
Randy Bartels, Colorado State Univ., USA, Presider

WF1 • 4:00 p.m.
Three-Pulse Photon Echo in a Dense Potassium Vapor, *Virginia O. Lorenz[1], Steven T. Cundiff[2], Wei Zhuang[3], Shaul Mukamel[3]; [1]JILA / Univ. of Colorado and NIST, and Dept. of Physics, Univ. of Colorado, USA, [2]JILA / Univ. of Colorado and NIST, USA, [3]Dept. of Chemistry, Univ. of California at Irvine, USA*. Time-integrated three-pulse photon echo (3PE) and time-resolved 3PE measurements in dense potassium vapor reveal clear signatures of non-Markovian dynamics. We pursue a molecular dynamics simulation to study the many-body effects contributing to the response.

WF2 • 4:15 p.m.
Determination of the CEO Phase-Ionization of He with Circularly Polarized 5.5-fs Pulses, *Jens Biegert[1], Petrissa R. Eckle[1], Philip Schlup[1], Mathias P. Smolarski[2], André Staudte[2], Markus Schöffler[2], Ottmar Jagutzki[2], Reinhard Dörner[2], Ursula Keller[1]; [1]Swiss Federal Inst. of Technology (ETH), Switzerland, [2]Inst. für Kernphysik, Germany*. The intensity distribution in momentum space of He, ionized with circularly polarized ultrashort laser pulses, shows a clear dependence on the pulses carrier-envelope phase. A numerical simulation reproduces the characteristics found in the experiment.

WE • Biology II—Continued

WE3 • 4:30 p.m.
Multiphoton Quantum Control Spectroscopy of Beta-Carotene, *Tiago Buckup, Timo Lebold, Alexander Weigel, Wendel Wohlleben, Marcus Motzkus; Philipps Univ. Marburg, Germany.* Quantum control is used to disentangle the congestion of spectral features of beta-carotene after multiphoton excitation with tunable tailored sub-30fs pulses in the near-IR. We coherently controlled the triplet over the singlet population.

WE4 • 4:45 p.m.
Direct Observation of Ultrafast Dynamics in DNA Bases, *Helmut Satzger[1], Dave Townsend[1], Marek Z. Zgierski[1], Albert Stolow[1,2]; [1]Natl. Res. Council of Canada, Canada, [2]Dept. of Chemistry, Queen's Univ., Canada.* Time-resolved photoelectron spectra of adenine and 9-methyl adenine are presented. Differences in the spectra together with calculated Franck-Condon structures proof unambiguously the involvement of the pi-sigma-star deactivation channel in the reaction dynamics of adenine.

WE5 • 5:00 p.m.
Following Photoinduced Dynamics in Bacteriorhodopsin with 7 fsec Impulsive Vibrational Spectroscopy, *Anat Kahan[1], Mudi Sheves[2], Sanford Ruhman[3]; [1]Dept. of Physical Chemistry, Hebrew Univ., Israel, [2]Dept. of Organic Chemistry, Weizmann Inst. of Science, Israel, [3]Dept. of Physical Chemistry, Hebrew Univ., Israel.* Spectral modulations induced by 6fsec photoexcitation of bacteriorhodopsin are Fourier analyzed. Long lived undulations are assigned to ground state vibrational coherences, while possible excited state contributions are very short lived consisting mainly of HOOP motions.

WE6 • 5:15 p.m.
Real-Time Observation of Carbon Double Bond Transformation during Photo-Isomerization of Bacteriorhodopsin, *Atsushi Yabushita[1], Takayoshi Kobayashi[1,2]; [1]Univ. of Tokyo, Japan, [2]Osaka Univ., Japan.* The modulation in the frequency of the C=C stretching mode was observed by pump-probe measurement. The period of the modulation, corresponding to the modulation of the mean C=C bond length, was found to be ~200fs.

WE7 • 5:30 p.m.
Ultrafast Conformational Changes in Carboxy-Myoglobin Studied by Time-Resolved Circular Dichroism, *Thibault Dartigalongue, François Hache; LOB, France.* Conformational changes following photodissociation of carboxy-myoglobin are studied by time-resolved circular dichroism. We observe a distortion of the proximal histidine which builds up in 10 ps and relaxes in 100 ps.

WE8 • 5:45 p.m.
Ultrafast Unzipping of a Beta-Hairpin Peptide, *Wolfgang Zinth[1], Tobias E. Schrader[1], Wolfgang J. Schreier[1], Florian O. Koller[1], Thorben Cordes[1], Galina Babizki[1], Robert Denschlag[1], Paul Tavan[1], Markus Löweneck[2], Shou-Liang Dong[2], Louis Moroder[2], Christian Renner[2]; [1]BioMolecular Optics, Physics Dept., Univ. of Munich, Germany, [2]Max-Planck-Inst. für Biochemie, Germany.* Light induced switching of a beta-hairpin structure is investigated by femtosecond IR-spectroscopy. While the unzipping process comprises ultrafast kinetics and is finished within 1ns, the folding into the hairpin structure is a much slower process.

Bonfire Pit
6:30 p.m.–10:00 p.m.
Conference Reception

WF • AMO Physics—Continued

WF3 • 4:30 p.m.
Direct Distinction between Phase Shift and Time Delay with Carrier-Envelope Phase-Controlled Pulses, *Shunsuke Adachi, Akira Ozawa, Takayoshi Kobayashi; Dept. of Physics, Faculty of Science, Univ. of Tokyo, Japan.* Phase-locked pump-probe measurement is implemented with carrier-envelope phase-controlled pulses, and direct distinction between phase-shift and time-delay is demonstrated. The carrier-envelope phase is a new controllable parameter in phase-coherent experiments, which enables, *e.g.*, optical *phase cycling*.

WF4 • 4:45 p.m.
Coherent Population Control of Rydberg Atom by Adiabatic Rapid Passage, *H. Maeda, J.H. Gurian, D.V.L. Norum, Tom F. Gallagher; Dept. of Physics, Univ. of Virginia, USA.* We have demonstrated that the binding energy of a Rydberg atom is controlled as a function of a chirp of a microwave field through sequences of one-photon or a single multi-photon adiabatic rapid passage.

WF5 • 5:00 p.m.
Femtosecond Dynamics of Fano-Resonance in Zn, *Muneaki Hase[1,2], Masahiro Kitajima[1], Jure Demsar[3]; [1]Natl. Inst. for Materials Science, Japan, [2]PRESTO, JST, Japan, [3]J. Stefan Inst., Slovenia.* We have studied transient reflectivity dynamics in Zn by femtosecond spectroscopy. At high excitation densities coherent phonon spectra exhibits strongly asymmetric lineshape, attributed to Fano interference due to coupling of phonon to electronic continuum.

WF6 • 5:15 p.m.
Ultrafast Dynamics of Autoionization in O_2 Probed by Laser-Field-Assisted XUV Photoionization, *Changjun Zhu[1], Kyung Sik Kang[1], Kyung Taec Kim[1], Mi Na Park[1], Tayyab Imran[1], Chang Hee Nam[1], E. Krishnakumar[2]; [1]Coherent X-Ray Res. Ctr., Dept of Phys., KAIST, Republic of Korea, [2]Tata Inst. of Fundamental Res., India.* Autoionization in O_2 is investigated using laser-field-assisted extreme ultraviolet photoionization under static and dynamic conditions. The static photoelectron spectrum is reconstituted and the dynamic behaviors for three categories of photoelectron peaks are studied.

WF7 • 5:30 p.m.
Control of Dissociative Ionization of Ethanol Molecule by Cascaded Double Ultrashort Laser Pulse Excitation, *Hiroki Yazawa[1], Tadamasa Shioyama[1], Yoshitaka Suda[1], Fumihiko Kannari[1], Ryuji Itakura[2], Kaoru Yamanouchi[2]; [1]Keio Univ., Japan, [2]Univ. of Tokyo, Japan.* Dissociative ionization of ethanol at C-O bond cleavage, which is induced by the movement of nuclear wave packet on the potential energy surface, is studied under irradiation of various types of double ultrashort laser pulses.

WF8 • 5:45 p.m.
Time-Resolved Imaging of H_2^+ (D_2^+) Nuclear Wave Packets, *Artem Rudenko, Thorsten Ergler, Bernold Feuerstein, Karl Zrost, Claus Dieter Schröter, Robert Moshammer, Joachim Ullrich; Max Planck Inst. für Kernphysik, Germany.* The spatio-temporal evolution of H_2^+ (D_2^+) nuclear wave packets is visualized using time-resolved Coulomb explosion imaging. We study the motion of the dissociating and bound parts of the wave packet, its dephasing and fractional revivals.

Bonfire Pit
6:30 p.m.–10:00 p.m.
Conference Reception

•Thursday, August 3, 2006•

Main Lodge
Registration Open
8:00 a.m.–5:00 p.m.

ThA • Attoseconds and High Harmonics II

Merrill Hall
8:30 a.m.–10:00 a.m.
ThA • Attoseconds and High Harmonics II
Margaret Murnane; JILA, USA, Presider

ThA1 • 8:30 a.m. Invited•
Attosecond Physics: Control and Real-Time Observation of Electronic Dynamics, *Ferenc Krausz; Max-Planck-Inst. für Quantenoptik, Germany.* No abstract available.

ThA2 • 9:00 a.m.
Tunable Isolated Attosecond Pulses, *Mauro Nisoli, Giuseppe Sansone, Enrico Benedetti, Francesca Calegari, Caterina Vozzi, Salvatore Stagira, Sandro De Silvestri; Politecnico di Milano, Italy.* Using the polarization gating technique with few-cycle phase-stabilized pulses, we have achieved the generation of isolated attosecond pulses tunable in a broad spectral region, corresponding to more than 26 eV.

ThA3 • 9:15 a.m.
Measurement and Control of Attosecond Pulse Formation, *Nirit Dudovich, Olga Smirnova, Jerome Lavesque, Yann Mairesse, Misha Yu Ivanov, David Villeneuve, Paul Corkum; Natl. Res. Council of Canada, Canada.* We show that attosecond pulses can be measured as they are produced and the production process can be controlled. We manipulate the harmonic spectrum and also create transient diffractive elements in the nonlinear medium itself.

ThA4 • 9:30 a.m.
Continuum Harmonic Radiation in the Extreme Ultraviolet Region Using Synthesized Sub-10-fs Two-Color Field, *Masanori Kaku[1], Yu Oishi[1], Akira Suda[1], Fumihiko Kannari[2], Katsumi Midorikawa[1]; [1]RIKEN, Japan, [2]Keio Univ, Japan.* When the synthesized sub-10-fs two-color field was used for high harmonic generation, a continuum centered at 30 nm with a spectral bandwidth of 8 nm was obtained with an energy of 10 nJ.

ThA5 • 9:45 a.m.
Basis for Ultrafast Imaging of Molecular Orbitals with High-Order Harmonic Generation, *Tsuneto Kanai, Shinichirou Minemoto, Hirofumi Sakai; Dept. of Physics, Graduate School of Science, Univ. of Tokyo, Japan.* We investigate ellipticity dependence of high-order harmonic generation in aligned molecules both experimentally and theoretically. Our model reproduces experimental results including geometrical and quantum interference effect and provides a basis for imaging of molecular orbitals.

Kiln
10:00 a.m.–10:30 a.m.
Coffee Break

ThB • Plasmas and Plasmons

Merrill Hall
10:30 a.m.–11:45 p.m.
ThB • Plasmas and Plasmons
Robert Schoenlein; Lawrence Berkeley Natl. Lab, USA, Presider

ThB1 • 10:30 a.m. •Invited•
Evidence for Ultrafast Superfluorescent Recombination from High-Density Magneto-Plasmas, *Young-Dahl Jho[1], Xiaoming Wang[1], David H. Reitze[1], Jun Kono[2], Alexey Belyanin[3], VItaly. Kocharovsky[3], Glenn Solomon[4]; [1]Univ. of Florida, USA, [2]Rice Univ., USA, [3]Texas A&M Univ., USA, [4]Stanford Univ., USA.* Ultrafast cooperative recombination from dense electron-hole plasmas is observed in quantum wells pumped by femtosecond pulse in strong magnetic fields. At a critical fluence and field strength, superfluorescent bursts with randomly fluctuating direction are observed.

ThB2 • 11:00 a.m.
Nanolocalized Nonlinear Photoprocesses under Coherent Control, *Mark I. Stockman; Georgia State Univ., USA.* We theoretically show that coherent control yields nonlinear photoprocesses in metal nanostructures nanolocalized in areas whose positions are controllable on nanoscale, in agreement with recent experiments. We explore various nanoantenna media for controlled nanolocalized photoprocesses.

ThB3 • 11:15 a.m. •Invited•
Adaptive Control of Nanoscopic Photoelectron Emission, *Matin Aeschlimann[1], Michael Bauer[1], Daniela Bayer[1], Tobias Brixner[2], F. Javier Garcia de Abajo[3], Walter Pfeiffer[2], Martin Rohmer[1], Christian Spindler[2], Felix Steeb[1]; [1]Technische Univ. Kaiserslautern, Germany, [2]Univ. Würzburg, Germany, [3]Ctr. Mixto CSIC-UPV/EHU, Spain.* We show experimentally that optimally polarization-shaped femtosecond laser pulses provide spatial control over electron photoemission from nanostructures. Emission patterns are manipulated with subdiffraction resolution, illustrating the potential of electric near-field control in nanophotonics.

Crocker Dining Hall
12:00 p.m.
Lunch

ThC • Imaging and Microscopy

Merrill Hall
1:15 p.m.–3:30 p.m.
ThC • Imaging and Microscopy
Niek van Hulst; Univ. of Twente, Netherlands, Presider

ThC1 • 1:15 p.m. •Invited•
Deep Tissue Nonlinear Imaging through Femtosecond Pulse Shaping, *Warren S. Warren; Duke Univ., USA.* Two-photon absorption and self phase modulation can be detected deep in tissue with modest laser powers, using shaped femtosecond pulses. This permit microscopic-resolution images of biologically important targets.

ThC2 • 1:45 p.m.
Selective Two-Photon Imaging of a Biological Sample, *Jess M. Gunn, Stephanie Bonner, Rebekah Martin, Laura Schelhas, Janelle Shane, Marcos Dantus; Michigan State Univ., USA.* The use of phase shaping to selectively enhance the excitation of dyes in biological samples is shown. Resulting images show high contrast without the use of filters or tuning the laser.

ThC3 • 2:00 p.m.
Optically Active Sum Frequency Generation Microscopy for Cell Imaging, *Kai Zhang, Na Ji, Haw Yang, Yuen-Ron Shen; Univ. of California at Berkeley, USA.* Optically active sum-frequency generation microscopy was applied to imaging cells, utilizing the intrinsic chirality of DNA and RNA molecules as the contrast mechanism.

ThC4 • 2:15 p.m. •Invited•
Nonlinear Temporal Focusing Microscopy, *Yaron Silberberg; Weizmann Inst. of Science, Israel.* Optical sectioning nonlinear microscopy, which is usually obtained by spatial focusing of a laser beam, is expanded by using temporal focusing of short laser pulses. We discuss various forms and applications of this new method.

ThC5 • 2:45 p.m.
Time-Resolved Single-Beam CARS with Shaped Supercontinuum from a Photonic Crystal Fiber, *Bernhard von Vacano, Wendel Wohlleben, Marcus Motzkus; Philipps Univ. Marburg, Germany.* Photonic crystal fibre supercontinuum generated from a standard 100 fs Ti:Sapphire-oscillator is successfully compressed and phase-tailored in a fs-pulse shaper. Using this supercontinuum, we present a novel scheme for time-resolved single-beam CARS microscopy.

ThC6 • 3:00 p.m.
Novel Applications of Broadband Excitation to Multiphoton Microscopy, *Jennifer P. Ogilvie[1,2], Delphine Débarre[2], Xavier Solinas[2], Jean-Louis Martin[2], Antigoni Alexandrou[2], Emmanuel Beaurepaire[2], Manuel Joffre[2]; [1]Univ. of Michigan, USA, [2]Lab d'Optique et Biosciences, France.* We report a single-laser time-resolved Fourier transform implementation of coherent anti-Stokes Raman scattering microscopy that provides high resolution spectrally-resolved images. We also demonstrate coherent-control-based two-photon fluorescence microscopy for selective fluorescence excitation in live organisms.

ThC7 • 3:15 p.m.
***In-vivo* Multi-Nonlinear Optical Imaging of a Living Cell Using a Single Femtosecond Ti:Sapphire Oscillator,** *Hideaki Kano, Hiro-o Hamaguchi; Univ. of Tokyo, Japan.* A supercontinuum light source generated from a photonic crystal fiber has been used to obtain both multiplex coherent anti-Stokes Raman scattering (CARS) and two-photon excitation fluorescence images of a living cell simultaneously with high speed.

Kiln
3:30 p.m.–4:00 p.m.
Coffee Break

ThD • Poster Session III A

Heather/Toyon/Acacia
4:00 p.m.–6:00 p.m.
ThD • Poster Session III A

ThD1
Probing and Controlling the Nonlinear Optical Properties of Nanometer Silver Antenna Clusters, *Jess M. Gunn, Melinda Ewald, Marcos Dantus; Michigan State Univ., USA.* The emissive properties of dendritic silver thin films due to two-photon excitation are explored. Emission is observed to occur at points more than 10 μm from the focal spot, and is polarization dependent.

ThD2
Electronic Structure in Real Time: Femtosecond Photoelectron Spectroscopy Using VUV Photons Produced by High Harmonic Generation, *Philippe Wernet, Kai Godehusen, Olaf Schwarzkopf, Jerome Gaudin, Wolfgang Eberhardt; BESSY, Germany.* We explore the potential of time resolved photoelectron spectroscopy with fs VUV and soft x-ray pulses to study, in real time, changes of the valence bands of molecules during chemical reactions in the gas phase.

ThD3
Determination of Electronic Mixing in Purple Photosynthetic Bacteria by Two-Color Three Pulse Photon Echo Peak Shift, *Dilworth Y. Parkinson[1,2], Hohjai Lee[1,2], Graham R. Fleming[1,2]; [1]Univ. of California at Berkeley, USA, [2]Physical Biosciences Div., Lawrence Berkeley Natl. Lab, USA.* One- and two-color three pulse photon echo peak shift spectroscopy was used to determine that the electronic coupling between H and B in *Rb. sphaeroides* reaction centers is ~300 cm^{-1}.

ThD4
High Intensity VUV-FEL Interaction with Solids: First Experimental Results, *Klaus Sokolowski-Tinten[1], Nikola Stojanovic[1], Dietrich von der Linde[1], Ulf Zastrau[2], Frank Perner[2], Eckart Förster[2], Ryszard Sobierajski[3], Robert Nietubyc[3], Marek Jurek[3], Jacek Krzywinski[3], Libor Juha[4], J. Cihelka[4], A. Velyhan[4], Jaroslav Kuba[5], J. Chalupsky[5], Thomas Tschentscher[6], Sven Toleikis[6], Stefan Düsterer[6], Harald Redlin[6]; [1]Univ. Duisburg-Essen, Inst. fuer Experimentelle Physik, Germany , [2]Friedrich-Schiller-Univ. Jena, Inst. für Optik- und Quantenelektronik, Germany , [3]Inst. of Physics PAS, Poland, [4]Acad. of Sciences of the Czech Rep. Inst. of Physics, Czech Republic, [5]Czech Technical Univ., Czech Republic, [6]HASYLAB at DESY, Germany.* Results from first experiments at the VUV free electron laser facility at DESY (Hamburg) addressing the interaction of ultrashort high intensity VUV-pulses with solids will be discussed.

ThD5
Nonlinear THz Spectroscopy on n-Type GaAs, *Peter Gaal[1], Klaus Reimann[1], Michael Woerner[1], Thomas Elsaesser[1], Rudolf Hey[2], Klaus H. Ploog[2]; [1]Max-Born-Inst., Germany, [2]Paul-Drude-Inst., Germany.* Nonlinear propagation experiments with intense THz pulses on n-type GaAs show even at room temperature coherent polarizations with lifetimes of more than 1 ps contrary to the predictions of Drude theory.

ThD6
Ultrafast Charge Transfer Dynamics of a Modified Double Helical DNA, *P. Manoj[1,2], Chang-Ki Min[1], Taiha Joo[1], C. T. Aravindakumar[2]; [1]Pohang Univ. of Sci. and Tech., Republic of Korea, [2]Mahatma Gandhi Univ., India.* We studied ultrafast dynamics of electron transfer in a double helical DNA modified by 2-aminopurine by time-resolved fluorescence. Charge transfer dynamics varies with the nature and position of the bridge between the donor and acceptor.

ThD7
Characterization of Ultrashort Electron Pulses, *Christoph T. Hebeisen, Ralph Ernstorfer, Maher Harb, Thibault Dartigalongue, Lili Zhu, Robert E. Jordan, R. J. Dwayne Miller; Univ. of Toronto, Canada.* Two methods for measuring the duration of femtosecond electron pulses using time-dependent scatterers—the laser ponderomotive potential and electrons emitted by a metal surface during the early stages of plasma formation—are discussed.

ThE • Poster Session III B

Heather/Toyon/Acacia
4:00 p.m.–6:00 p.m.
ThE • Poster Session III B

ThE1
Enhancement of Raman Modes in Complex Molecules by Coherent Control, *Jürgen Hauer[1], Tiago Buckup[1], Hrvoje Skenderovic[2], Karl-Ludwig Kompa[3], Marcus Motzkus[1]; [1]Philipps Univ. Marburg, Germany, [2]Inst. of Physics, Croatia, [3]MPI für Quantenoptik, Germany.* Using coherent control the vibrational modes in complex solvated molecules are enhanced by femtosecond pulse shaping compared to Fourier-limited excitation. The crucial role of electronic resonant transitions for the enhancement of selective states is explored.

ThE2
Quantum Control of Two-Photon Fluorescence in Solution, *Valeria D. Kleiman, Daniel G. Kuroda; Dept. of Chemistry, Univ. of Florida, USA.* A novel, compact, and high-resolution phase modulator in reflective mode is presented and used to coherently control two-photon fluorescence of Rhodamine 6G in solution. Two pulses sets that minimize or maximize the fluorescence are found.

ThE3
A New Class of Ultrafast Photoswitchable Chromopeptides, *Thorben Cordes[1], Kerstin Riesselmann[2], Stefan Herre[2], Karola Rück-Braun[2], Wolfgang Zinth[1]; [1]Lehrstuhl fuer BioMolekulare Optik, Germany, [2]Technische Univ. Berlin, Germany.* Photochemical properties of a new ultrafast photoswitch (hemithioindigo-based) are investigated by transient absorption spectroscopy. The applicability as a trigger molecule for fast structural changes in small peptides is tested on a biologically relevant structure.

ThE4
Intermolecular Communication and a Vibrationally Adiabatic Basis Treatment of Small-Molecule Dynamics in Low Temperature Solids, *Craig T. Chapman[1], Mary A. Rohrdanz[2], Jeffrey A. Cina[1]; [1]Univ. of Oregon, USA, [2]Walsh Univ., USA.* We investigate intermolecular communication between a Ca atom and an I_2 molecule in a cryogenic Ar matrix. An adiabatic-basis approach to simulating ultrafast spectroscopic signals from small, matrix-isolated molecules is also presented.

ThE5
Multidimensional Infrared Spectroscopy of a Peptide NH•••O Intramolecular Hydrogen Bond, *Jaehun Park[1], Robin M. Hochstrasser[2]; [1]Pohang Accelerator Lab, Republic of Korea, [2]Univ. of Pennsylvania, USA.* Stimulated three pulse photon echoes and heterodyned 2D-IR echoes of acetylproline-NHMe in $CHCl_3$ are reported. Multidimensional-IR spectroscopy clearly shows the potential to disentangle congested spectra by spreading them into two dimensions and expose multiple structures.

ThE6
Multi-Cycle Driven Isolated Attosecond Pulse Generation, *Thomas Pfeifer, Lukas Gallmann, Mark J. Abel, Phillip M. Nagel, Daniel M. Neumark, Stephen R. Leone; Univ. of California at Berkeley and Lawrence Berkeley Natl. Lab, USA.* Conversion of 1% fundamental to a separate wavelength before high-harmonic generation can be used to quadruple the attosecond-pulse period to two optical cycles. In simulations, a 24-fs pulse can produce an isolated attosecond pulse.

ThE7
Ultrafast Interfacial Carrier Dynamics in UV-Blue Photoluminescing ZnSe Nanoparticles, *Victor V. Matylitsky[1], Josef Wachtveitl[1], Alexey Shavel[2], Nikolai Gaponik[2], Alexander Eychmüller[2]; [1]Johann Wolfgang Goethe-Univ. Frankfurt, IPTC, Germany, [2]Technical Univ. Dresden, IPCE, Germany.* Relaxation dynamics of photogenerated charge carriers in ZnSe-nanoparticles were examined via transient absorbance spectroscopy. Using an electron quencher we were able to assign observed dynamics to the relaxation of the electron in the conduction band.

ThE8
Energy Transport Mechanisms in Doped Organic Films, *Stefan Lochbrunner, Martin Schlosser; Lehrstuhl für BioMolekulare Optik, Ludwig-Maximilians-Univ., Germany.* Energy transfer pathways are characterized by ultrafast absorption spectroscopy in thin PMMA films highly doped with perylene bisimide dyes. We find a high exciton mobility and a multistep mechanism for the transfer to acceptor units.

ThD • Poster Session III A—Continued

ThD8
Raman Coherence Beats of Interacting Quantum Well Magnetoexcitons, *Jigang Wang[1], K. M. Dani[1], D. S. Chemla[1], J. Tignon[2], E. G. Kavousanaki[3], I. E. Perakis[3]; [1]Lawrence Berkeley Natl. Lab, USA, [2]Lab Pierre Aigrain, Ecole Normale Supérieure, France, [3]Inst. of Electronic Structure and Laser, Foundation of Res. and Technology-Hellas and Dept. of Physics, Univ. of Crete, Greece.* Three-pulse four-wave-mixing spectroscopy reveals a long-lived, optically induced inter-Landau-level Raman coherence arising from interacting magnetoexcitons, in contrast to uncorrelated exciton dephasing processes. By comparing to theory, we identify the resulting contributions to the coherent response.

ThD9
Ultrafast Dynamics of the Green Fluorescent Protein: Probing the Solubility of Antibodies Fragments, *Pascal Didier[4], Luca Guidoni[1], Jean-Yves Bigot[1], Etienne Weiss[2]; [1]IPCMS, Univ. Louis Pasteur, CNRS, France, [2]ESBS, Univ. Louis Pasteur, France.* We report a strong correlation between the excited-state dynamics of a Green Fluorescent Protein mutant (GFPuv) fused with a Single Chain antibody fragment (scFv) and the intrinsic solubility of the antibody fragment.

ThD10
Landau Damping of Coherent Plasmons, *Michael P. Hasselbeck[1], Denis Seletskiy[1], Mansoor Sheik-Bahae[1], L. Ralph Dawson[2]; [1]Dept. of Physics, Univ. of New Mexico, USA, [2]Ctr. for High Technology Materials, Univ. of New Mexico, USA.* We use ultrafast THz spectroscopy to study damping of coherent plasmon oscillations in InSb. Spatial confinement restricts the plasmon wave vector resulting in collisionless or Landau damping of the collective electronic motion.

ThD11
Coherent Phonons in the Zone-Boundary Region of Solid Ar Doped with Cl_2, *Mizuho Fushitani[1], Nikolaus Schwentner[1], Maike Schröder[2], Oliver Kühn[2]; [1]Inst. für Experimentralphysik, Germany, [2]Inst. für Chemie und Biochemie, Physikalische und Theoretische Chemie, Germany.* We observed coherent zone-boundary phonons of solid Ar doped with Cl_2 in pump-probe spectra. Comparison with diatomics-in-molecules simulation shows that specific motions of Ar atoms in the (100) plane are responsible for the observed oscillations.

ThD12
Ultrafast Gigantic Photo-Response in $(EDO\text{-}TTF)_2PF_6$ Initiated by 10-fs Laser Pulses, *Jiro Itatani[1,2], Matteo Rini[1], Andrea Cavalleri[3], Ken Onda[2,4], Tadahiko Ishikawa[4], Shin-ya Koshihara[2,4,5], Xiangfeng Shao[2,6], Hideki Yamochi[2,6], Gunzi Saito[6], Robert W. Schoenlein[1]; [1]Lawrence Berkeley Natl. Lab, USA, [2]Japan Science and Technology Agency, Japan, [3]Univ. of Oxford, UK, [4]Tokyo Inst. of Technology, Japan, [5]High Energy Accelerator Res. Organization (KEK), Japan, [6]Kyoto Univ., Japan.* We photoexited a charge-ordered organic salt $(EDO\text{-}TTF)_2PF_6$ with sub-10-fs optical pulses. The photo-induced metallic phase appeared within 50-fs after pumping, characterized by large changes in reflectivity ($\Delta R/R \sim 0.8$) followed by strong coherent phonon modulation.

ThD13
Femtosecond Dynamics of Coherent Optical Phonons in Graphite, *Kunie Ishioka[1], Muneaki Hase[1], Masahiro Kitajima[1], Hrvoje Petek[2]; [1]Natl. Inst. of Materials Science, Japan, [2]Univ. of Pittsburgh, USA.* Femtosecond dynamics of the coherent C-C stretching of graphite is reported. After the initial upshift and recovery, the phonon frequency adiabatically follows the oscillation of the interlayer mode, providing a time-domain manifestation of anharmonic coupling.

ThD14
2D Fourier Transform Electronic Spectroscopy of Photosynthetic Reaction Centers: Mapping Coupling in the B Band, *Gregory S. Engel, Tessa R. Calhoun, Donatas Zigmantas, Tomáš Mancal, Hohjai Lee, Graham R. Fleming; Univ. of California at Berkeley, USA.* The B800 band of the reaction center complex of *Rhodobacter sphaeroides* has been probed with two-dimensional Fourier transform electronic spectroscopy using 40 fs pulses and evidence for coupling within the band will be presented.

ThD15
Dispersion Relations in Two-Dimensional Spectroscopy, *Katherine A. Kitney, Allison A. Ferro, David M. Jonas; Univ. of Colorado at Boulder, USA.* Kramers-Kronig relations are applied to two-dimensional Fourier transform spectra of a silicon naphthalocyanine. Transformed spectra agree qualitatively with experiment, but the real and imaginary parts of two-dimensional spectra contain independent information.

ThE • Poster Session III B—Continued

ThE9
Electron Transfer in Triarylmethane Lactones: From the sub-100 fs Regime to Solvent Control, *Uli Schmidhammer[4], Stefan Lochbrunner[4], Eberhard Riedle[1], Jerzy Karpiuk[2]; [1]Lehrstuhl für BioMolekulare Optik, Ludwig-Maximilians-Univ., Germany, [2]Inst. of Physical Chemistry, Polish Acad. of Sciences, Poland.* The electron transfer in triarylmethane lactones can be as fast as 50 fs exceeding the inertial solvation. Changing the character of the excited state switches to complete solvent control.

ThE10
Signature of Chemical Exchange in 2D Vibrational Spectroscopy; Simulations Based on the Stochastic Liouville Equations, *Wei Zhuang, Frantisek Sanda, Tomoyuki Hayashi, Thomas Jansen, Shaul Mukamel; Dept. of Chemistry, Univ. of California at Irvine, USA.* The stochastic Liouville equations are employed to investigate the combined signatures in coherent vibrational spectroscopy of chemical exchange and spectral diffusion in molecular complexes and of hydrogen bonding fluctuations in water.

ThE11
Pulse Shape Control of Population Transfer in LDS750, *Omer Nahmias, Oshrat Bismuth, Ofir Shoshana, Sanford Ruhman; Dept. of Physical Chemistry, Hebrew Univ., Israel* Quantum control experiments are conducted to investigate population transfer in LDS750 in solutions. The optimal pulse found by a shaper has nonlinear chirp, and it follows the dynamic Stokes shifting of the excited state emission.

ThE12
Selective Measurement of Ultrafast Exciton Spin Relaxation in Quantum Dots, *Jeongho Kim, Cathy Y. Wong, Gregory D. Scholes; Univ. of Toronto, Canada.* An ultrafast transient polarization grating method is proposed as a means of measuring the dynamics of exciton spin relaxation in colloidal quantum dots. Measurement for CdSe quantum dots shows that spin relaxation is selectively probed.

ThE13
Mode-Selective O-H Stretching Relaxation in a Hydrogen Bond Studied by Ultrafast Vibrational Spectroscopy, *Wolfgang Werncke, Valeri Kozich, Jens Dreyer, Satoshi Ashihara, Thomas Elsaesser; Max-Born-Inst., Germany.* The 200 fs decay of O-H stretching population in an intramolecular hydrogen bond is governed by mode-selective excitation of fingerprint modes with a significant O-H bending character, followed by energy randomization within 10 ps.

ThE14
Femtosecond 3D IR Spectroscopy, *Feng Ding, Eric C. Fulmer, Martin Zanni; Univ. of Wisconsin, USA.* By using a novel fifth order pulse sequence and Fourier transforming the three coherence times of the response signal, three-dimensional spectra were obtained for a series of model systems.

ThD • Poster Session III A—Continued

ThD16
Distortion of Ultrashort Pulses Caused by Aberrations, *Zoltan L. Horvath, Attila P. Kovács, Zsolt Bor; Dept. of Optics and Quantum Electronics, Univ. of Szeged, Hungary.* The effect of the primary wave aberrations (spherical aberration, astigmatism and coma) on ultrashort pulses is studied by the Nijboer-Zernike theory. The results of the geometrical and the wave optical treatments are compared.

ThD17
Subpicosecond Time-Resolved Photoluminescence of Carrier Transfer in AlGaN Using Difference-Frequency Generation, *Gregory A. Garrett, Anand V. Sampath, Hongen Shen, Michael Wraback; US ARL, USA.* Ultraviolet photoluminescence from $Al_xGa_{1-x}N$ epilayers exhibiting strong carrier localization is time-resolved with system response down to 300 fs using optical gating by frequency downconversion in a nonlinear crystal.

ThD18
Laser-Assisted Photoelectric Effect on Pt(111), *Luis Miaja[1], Guido Saathoff[1], Chifong Lei[1], Margaret M. Murnane[1], Henry C. Kapteyn[1], Martin Aeschlimann[2], John L. Gland[3]; [1]Jila, USA, [2]Dept. of Physics, Univ. of Kaiserslautern, Germany, [3]Dept. of Chemistry, Univ. of Michigan, USA.* We observe the laser-assisted photoelectric effect on a surface for the first time. Simultaneously illuminating Pt(111) with the fundamental and 27th harmonic of a Ti:sapphire femtosecond laser results in energy modulation of the photoelectron spectrum.

ThD19
Is High Harmonic Generation a Single-Active-Electron Process? *Ariel Gordon, Franz X. Kärtner; MIT, USA.* We show that the bound electrons, set to motion by the recolliding electron, emit much of the radiation during high harmonic generation. This may explain the significantly higher conversion efficiencies found with heavier noble gases.

ThD20
Optimal Control of Molecular Alignment with the Feedback of Ion Images, *Takayuki Suzuki, Yu Sugawara, Shinichirou Minemoto, Hirofumi Sakai; Univ. of Tokyo, Japan.* We optimally controlled molecular alignment of N_2 in the nonadiabatic region with the feedback of ion images. Doubly-peaked pulses were obtained as optimum pulses. Advantages of double peaks were investigated by both experiments and simulations.

ThD21
Generation of Sub 3-fs Optical Pulses Using Induced Phase Modulation in an Ar-Gas-Filled Hollow Fiber, *Eiichi Matsubara[1,2], Toshiyuki Naoi[1,2], Toshihiko Kito[1,2], Eisuke Haraguchi[1,2], Taro Sekikawa[1,2], Mikio Yamashita[1,2]; [1]Hokkaido Univ., Japan, [2]Japan Science and Technology Agency (CREST), Japan.* We demonstrate the first pulse compression using induced- and self-phase modulations in an Ar-gas-filled hollow fiber. By feedback chirp compensation, 2.95-fs optical pulses are generated in the visible region.

ThD22
Direct Frequency-Comb Photo-Association of Ultracold Rb_2 Molecules, *Avi Pe'er[1], Evgeny Shapiro[2], Matthew C. Stowe[1], Moshe Shapiro[2], Jun Ye[1]; [1]JILA, Univ. of Colorado, USA, [2]Univ. of British Colombia, Canada.* We describe a novel method for photo-association of vibrationally cold molecules from a cold atomic cloud. The method relies on coherent accumulation of shaped, phase stabilized pulses to coherently control the molecular wave-packet dynamics.

ThD23
Terahertz Amplification in High-Dielectric Materials, *Ka-Lo Yeh, Thomas Hornung, Joshua C. Vaughan, Keith A. Nelson; MIT, USA.* Terahertz polariton amplification is demonstrated via a discrete titled pulse front generated by a glass echelon structure. A conceptual scheme for very substantial further amplification is presented.

ThD24
Realization and Characterization of an All-Fiber Temporal Differentiator for Sub-Picosecond Optical Waveforms, *Yongwoo Park[1], Jose Azana[1], Mykola Kulishov[2], Radan Slavik[3]; [1]Inst. Natl. de la Recherche Scientifique, Canada, [2]Photonic Systems Group, Dept. of Electrical and Computer Engineering, McGill Univ., Canada, [3]Inst. of Radio Engineering and Electroncis, Czech Republic.* A newly-developed all-fiber ultrafast differentiator is fully characterized using a simple and robust fiber optics-based spectral interferometry. The results confirm the reliability of this device for differentiating arbitrary optical signals with sub-picosecond temporal features.

ThD25
Multi-Wavelength Erbium-Doped Fiber Lasers on the Assistance of High-Nonlinear Photonic-Crystal Fibers, *Liu Xueming; Xi'an Inst. of Optics and Precision Mechanics, China.* Based on self-stability effect of four-wave mixings in high-nonlinear photonic-crystal fibers, multi-wavelength erbium-doped fiber lasers are proposed and demonstrated experimentally at room temperature. The proposed lasers have the capacity of switching and tuning with excellent uniformity and stability.

ThD26
Real-Time Investigation of Elementary Steps for Photo-Induced Phase Transition in a Model Dimer, *Larry Lüer[1], Cristian Manzoni[1], Giulio Cerullo[1], Guglielmo Lanzani[1,2], Moreno Meneghetti[2]; [1]Inst. of Photonics and Nanotechnology, Italy, [2]Dept. of Physical Chemistry, Italy.* Using femtosecond pump and probe spectroscopy and ab-initio calculations, we show that photoexcitation of dimers of tetramethyl-tetrathiafulvalene cations induces predominantly coherent phonons that lead to photo-induced phase transitions in linear chains of these materials.

•Friday, August 4, 2006•

Main Lodge
Registration Open
8:00 a.m.–12:00 p.m.

FA • Chemistry II

Merrill Hall
8:30 a.m.–10:00 a.m.
FA • Chemistry II
Norbert Scherer; Univ. of Chicago, USA, Presider

FA1 • 8:30 a.m. **•Invited•**
Single Molecule Pump-Probe Detection on Coupled Quantum Systems, *Niek F. van Hulst[1,2,3], Erik MHP van Dijk[3], Jacob P. Hoogeboom[3], Jordi Hernando[3,4], Maria F. Garcia-Parajo[2,3,5]; [1]ICFO - Inst. of Photonic Sciences, Spain, [2]ICREA - Inst. Catalana de Recerca i Estudis Avancats, Spain, [3]Applied Optics group, MESA+ Inst. for NanoTechnology, Netherlands, [4]Dept. de Quimica, Univ. Autonoma de Barcelona, Spain, [5]CREBEC - Lab of NanoBioEngineering, Spain*. We present a single-molecule study on exciton dynamics in multichromophoric systems, combining fs pump-probe, emission-spectra and fluorescence-lifetime analysis. A wide range of static disorder and exciton delocalisation accelerates dephasing and relaxation rate of the exciton.

FA2 • 9:00 a.m.
Observation of Anharmonic Coupling in the Time Domain with Femtosecond Stimulated Raman, *Renee R. Frontiera, Philipp Kukura, Richard A. Mathies; Univ. of California at Berkeley, USA*. Coherent motion of low frequency bending vibrations is impulsively excited in $CDCl_3$ and subsequent couplings between the C-D stretch and the low frequency coherences are detected in real time by femtosecond stimulated Raman spectroscopy (FSRS).

FA3 • 9:15 a.m.
Coherently Controlled Multidimensional Optical Spectroscopy, *Katherine W. Stone, Thomas Hornung, Joshua C. Vaughan, Keith A. Nelson; MIT, USA*. Multidimensional optical spectroscopy of potassium dimer is demonstrated using a 2D femtosecond pulse shaper with excellent phase stability. Coherent control of intramolecular dynamics is achieved by introducing specific pulse sequences and chirps.

FA4 • 9:30 a.m. **•Invited•**
Coherent Nuclear Motion in Ultrafast Reactions in Solution, *Tahei Tahara; RIKEN (The Inst. of Physical and Chemical Res.), Japan*. Coherent nuclear motions in ultrafast photoisomerization, photodissociation and excited-state proton transfer were investigated by pump-probe spectroscopy with time-resolution of 30-70 fs. The observed nuclear motion and its relevance to the reaction coordinate are discussed.

Kiln
10:00 a.m.–10:30 a.m.
Coffee Break

FB • Ultrafast Electron Studies

Merrill Hall
10:30 a.m.–12:00 p.m.
FB • Ultrafast Electron Studies
Tobias Brixner; Univ. Würzburg, Germany, Presider

FB1 • 10:30 a.m. **•Invited•**
A Nanometer-Sized Femtosecond Electron Source at 80 MHz Repetition Rate, *Christoph Lienau, Claus Ropers, Daniel R. Solli, Claus Peter Schulz, Thomas Elsaesser; Max Born Inst., Germany*. We observe multiphoton electron emission from ultrasharp metallic tips illuminated with 7-fs-light pulses. Local field enhancement confines this emission to the tip apex, demonstrating the potential of this source for ultrafast electron imaging with nanometer-resolution.

FB2 • 11:00 a.m.
Time-Resolved Photoemission of an Insulator-Metal Transition, *Luca Perfetti, Panagiotis A. Loukakos, Martin Lisowski, Uwe Bovensiepen, Martin Wolf; Freie Univ. Berlin, Germany*. Time-resolved photoemission is employed to visualize directly an ultrafast insulator to metal transition and the excitation of a coherent phonon mode in the Mott insulator 1T-TaS_2.

FB3 • 11:15 a.m.
Electronic Thermal Expansion and the Mechanism of Coherent Acoustic Phonons Generation in Metals, *Shouhua Nie, Hyuk Park, Xuan Wang, Rick Clinite, Jim Cao; Physics Dept., Natl. High Magnetic Field Lab, USA*. We have investigated the thermal expansion dynamics of metal film using femtosecond electron diffraction. We show that the electronic thermal expansion from the transient heating of conduction electrons contributes significantly in driving coherent acoustic phonons.

FB4 • 11:30 a.m.
Femtosecond Electron Diffraction Study on the Melting Dynamics of Gold, *Ralph Ernstorfer, Maher Harb, Christoph T. Hebeisen, Thibault Dartigalongue, Robert E. Jordan, Lili Zhu, R. J. Dwayne Miller; Univ. of Toronto, Canada*. The melting process in gold was resolved using femtosecond electron diffraction. The results support a thermally-driven melting mechanism with homogeneous nucleation, which is in qualitative agreement with previous work on aluminum.

FB5 • 11:45 a.m.
Time-Resolved Photoemission Spectroscopy of the Photo-Induced Phase Transition in VO_2, *Tadashi Togashi[1], Kazuya Yamamoto[1], Ritsuko Eguchi[1], Yasutaka Takata[1], Ashish Chainani[1], Takayuki Kiss[2], Syunsuke Tsuda[3], Yosuke Nagao[3], Yuji Muraoka[3], Zenji Hiroi[3], Shik Shin[1,3]; [1]Spring8 Ctr., Riken, Japan, [2]Riken, Japan. , [3]Inst. for Solid State Physics, Univ. Tokyo, Japan*. We have demonstrated the photo-induced insulator-metal transition in VO_2 using time resolved photoemission spectroscopy with a near infrared (1.48 eV) pump, vacuum ultraviolet (8.85 eV) probe technique.

Merrill Hall
12:00 p.m.–12:15 p.m.
Closing Remarks