## XVI International Conference on Ultrafast Phenomena
## Topical Meeting and Tabletop Exhibit

**Download Conference flyer**

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

## ABOUT UP:

The 2008 Ultrafast Phenomena Conference will be the sixteenth 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 2008 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.

## Plan to attend UP 2008!

**Postdeadline Submission Deadline: Monday May 26th**

**Topic Categories:**

• **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.

**General Chairs:**
Paul Corkum, *Steacie Inst. for Molecular Science, Canada*
Sandro De Silvestri, *Politecnico of Milan and ULTRAS INFM-CNR, Italy*
Keith Nelson, *MIT,USA*

**Program Chairs:**
Eberhard Riedle, *Ludwig-Maximilians Univ. of Munich, Germany*
Robert Schoenlein, *Lawrence Berkeley National Laboratory, USA*

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## General Chairs

Paul Corkum, *Steacie Inst. for Molecular Science, Canada*
Sandro De Silvestri, *Politecnico of Milan and ULTRAS INFM-CNR, Italy*
Keith Nelson, *MIT,USA*

## Program Chairs

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AMPLITUDE TECHNOLOGIES

BFi OPTiLAS

CDP SYSTEMS Corp.

COHERENT ITALIA

EXCEL TECHNOLOGY Europe

FASTLITE

FEMTOLASERS PRODUKTIONS GmbH

HAMAMATSU PHOTONICS ITALIA

HORIBA JOBIN Yvon GmbH

KAPTEYN-MURNANE LABORATORIES, Inc.

LASER QUANTUM Ltd

LAURIN PUBLISHING

MENLO SYSTEMS GmbH

NEWPORT SPECTRA-PHYSICS

SWAMP OPTICS, LLC

TOPTICA PHOTONICS AG

VENTEON, Femtosecond Laser Technology by Nanolayers

Tabletop exhibit space will be available at the Conference Centre.
The location of the exhibitor booths will be in a large area in front to the exit of the conference room and close to all activities, in order to allow easy and frequent contacts with the attendees (please visit the Conference Centre website: www.stresacongressi.it).

The exhibition space includes: (i) an individual booth of 3x2 meter size (with a light and three walls); (ii) a sign at the top with the company name and logo; (iii) electricity (10/16 Amp.); (iv) one office table with a glass top; (v) one cabinet; (vi) four chairs. In addition it will be provided: (i) an attendee list for one time mailing (no emails); (ii) one technical badge; (iii) one ticket to the conference reception; (iv) one technical digest; (v) two exhibitor personnel badges. Internet connection will be available at the Conference site without any charge.

The fee is Euro 1200 per booth.

In case of interest, download the contract for an exhibition space here.

All conditions are stipulated on the contract.

In order to be considered, the contract must be duly filled out and accompanied with the payment information.
**Deadline to return the signed contract is 14 March 2008.**

Sponsorship opportunities at UP 2008

Increase your company visibility amongst qualified attendees with a sponsorship at the event.
Current sponsorship opportunities include:
- Coffee break
- Reception
- Attendees bags
- Registration material inserts
- Advertising signage placements

Plus other customizable promotional opportunities.

## Invited Papers :

**MON1.1 - 8:30 "Ultrafast coherent X-ray diffractive imaging with the FLASH Free-Electron Laser"**

***H. N. Chapman1, S. Bajt2, A. Barty3, W.H. Benner3, M.J. Bogan3, S. Boutet4, A. Cavalleri5, S. Düsterer2, M. Frank3, J. Hajdu4,6, S.P. Hau-Riege3, B. Iwan6, S. Marchesini7, K. Sokolowski-Tinten8, M.M. Siebert6, R. Treusch2, and B.W. Woods3***

*1Centre for Free-Electron Laser Science, University of Hamburg and DESY, Hamburg, Germany; 2HASYLAB, DESY, Hamburg, Germany; 3Lawrence Livermore National Laboratory, Livermore CA, USA, 4SLAC, Menlo Park CA, USA; 5Department of Physics, Clarendon Laboratory, University of Oxford, Oxford, UK; 6Uppsala University, Uppsala, Sweden; 7Lawrence Berkeley National Laboratory, Berkeley CA, USA; 8Institut für Experimentelle Physik, Universität Duisburg-Essen, Germany.*

**MON3.1 - 14:00 "Automated 2D IR and Vis spectroscopies using pulse shaping"**

***Martin Zanni***

***University of Wisconsin-Madison, USA.***

**MON4A.1 - 16:15 "Ultrabroadband Er:fiber systems and applications"**

***Alfred Leitenstorfer1, Alexander Sell1, Daniel Träutlein1, Florian Adler1, Konstantinos Moutzouris1, Florian Sotier1, Matthias Kahl1, Rudolf Bratschitsch1, Rupert Huber1, and Elisa Ferrando-May2***

*1Department of Physics and Center for Applied Photonics, University of Konstanz, D-78457 Konstanz, Germany; 2Department of Biology and Center for Applied Photonics, University of Konstanz, D-78457 Konstanz, Germany.*

**TUE1.1 - 8:30 "Ultrafast Molecular and Materials Dynamics probed by Coherent X-Rays,"**

***Margaret Murnane and Henry Kapteyn***

***JILA, University of Colorado, Boulder, CO, USA.***

**TUE3.1 - 14:00 "Ultrafast X-ray probing of electron dynamics"**

***Stephen R. Leone***

*University of California and LBNL, Berkeley, CA, USA.*

**TUE4A.1 - 16:15 "Real-time evolution of the valence orbitals in a dissociating molecule as revealed by femtosecond photoelectron spectroscopy"**

***Philippe Wernet1, Michael Odelius2, Kai Godehusen1, Jérôme Gaudin1, Olaf Schwarzkopf1, and***

***Wolfgang Eberhardt1***

*1BESSY, Berlin, Germany; 2Stockholm University, Stockholm, Sweden.*

**WED1.1 - 8:30 "Ultrafast energy transfer and primary processes in photosynthesis"**

***Richard J. Cogdell***

*Division of Biochemistry and Molecular Biology, IBLS. Glasgow Biomedical Research Centre, University of Glasgow, 126 University Place, Glasgow G12 8TA, Scotland, UK.*

**WED2A.1 - 10:45 "The evolving femtosecond laser frequency comb"**

***Scott Diddams, Danielle Braje, Tara Fortier, Leo Hollberg, Matt Kirchner, Vela Mbele, Stephanie Meyer, Qudsia Quraishi, and Shijun Xiao***

*NIST, 325 Broadway, Boulder, Colorado, USA.*

**WED3.1 - 14:00 "Ultrafast photoemission electron microscopy: imaging light with electrons on femto-nano scale"**

***Hrvoje Petek1,2 and Atsushi Kubo1,3***

*1Department of Physics and Astronomy, University of Pittsburgh, Pittsburgh, PA 15260 USA; 2Donostia*

*International Physics Center, Donostia-San Sebastian 20018 Spain; 3PRESTO, Japan Science and Technology Agency, 4-1-8 Honcho Kawaguchi, Saitama, Japan.*

**WED4A.1 - 16:15 "Generation of octave-spanning Raman comb with absolute-phase control"**

***Masayuki Katsuragawa1, Feng-Lei Hong2, Masaki Arakawa1, and Takayuki Suzuki1***
*1Department of Applied Physics and Chemistry, University of Electro-Communications, 1-5-1 Chofugaoka, Chofu, Tokyo 182-8585, Japan; 2National Institute of Advanced Industrial Science and Technology, 1-1-1, Umezono, Tsukuba 305-8563,Ibaraki, Japan.*

**THU1.1 - 8:30 "Ultrafast structural dynamics of polar solids studied by femtosecond X-Ray diffraction"**

***Thomas Elsaesser1, Clemens von Korff Schmising1, Nickolai Zhavoronkov1, Matias Bargheer1,2, Michael Woerner1, Markus Braun3, Peter Gilch3, Wolfgang Zinth3, I. Vrejoiu4, D. Hesse4, and M. Alexe4***
*1Max-Born-Institut für Nichtlineare Optik und Kurzzeitspektroskopie, D-12489 Berlin, Germany; 2Institut für*
*Physik, Universität Potsdam, D-14469 Potsdam, Germany; 3Biomolekulare OPtik, Department für Physik,*
*Ludwig-Maximilians-Universität, D-80538 München, Germany; 4Max-Planck-Institut für Mikrostrukturphysik, D-06120 Halle, Germany.*

**THU2A.1 - 10:45 "Femtosecond X-Ray absorption spectroscopy of a photoinduced spin-crossover process"**

***Christopher Milne1, Van-Thai Pham1, Wojciech Gawelda1,3, Amal El Nahhas1, Renske M. van der Veen1,2, Steven L. Johnson2, Paul Beaud2, Gerhard Ingold2, Camelia Borca2, Daniel Grolimund2, Rafael Abela2, Majed Chergui1, and Christian Bressler1***
*1Laboratoire de Spectroscopie Ultrarapide, Ecole Polytechnique Fédérale de Lausanne, CH-1015 Lausanne, Switzerland ; 2Swiss Light Source, Paul-Scherrer Institut, CH-5232 Villigen-PSI, Switzerland; 3Present Address: Laser Processing Group, Instituto de Óptica, CSIC, Serrano 121, E-28006 Madrid, Spain.*

**THU3.4 - 14:45 "Dynamic metamaterials at terahertz frequencies"**

***Hou-Tong Chen1, Abul Azad1, John O'Hara1, Antoinette Taylor1, Willie Padilla2, and Richard Averitt3***
*1MPA-CINT, MS K771, Los Alamos National Laboratory, Los Alamos, New Mexico 87545, Mexico; 2Department of Physics, Boston College, Chestnut Hill,Massachusetts 02467, USA; 3Department of Physics and*
*Photonics Center, Boston University, Boston, Massachusetts 02215, USA.*

**FRI1A.1 - 8:30 "Ultrafast 2D-IR spectroscopy of a molecular monolayer"**

***Jens Bredenbeck1,2, Avishek Ghosh1, Marc Smits1, and Mischa Bonn1***
*1FOM Institute for Atomic and Molecular Physics,Kruislaan 407, 1098 SJ, Amsterdam, the Netherlands; 2Institut für Biophysik, Universität Frankfurt, Max von Laue-Str. 1, 60438 Frankfurt, Germany.*

**FRI2.1 - 10:45 "Sub-100-as soft-X-ray pulses"**

***Eleftherios Goulielmakis1, Martin Schultze1, Michael Hofstetter2, Matthias Uiberacker2, Justin Gagnon1, Vladislav Yakovlev2, Ulf Kleineberg2, and Ferenc Krausz1,2***
*1Max-Planck-Pnstitut f¨ur Quantenoptik, Hans-Kopfermann-Strasse 1, D-85748 Garching, Germany; 2Department für Physik, Ludwig-Maximilians-Universität, am Coulombwall 1, Germany.*

## Conference Programme

### Monday, June 9, 2008

| | | | |
|---|---|---|---|
| | 08:15 - 08:30 | Auditorium | Welcome and Opening Remarks |
| MON1 | 08:30 - 10:15 | Auditorium | Photon and Electron Sources of the Future |
| | 10:15 - 10:45 | | Coffee Break |
| MON2A | 10:45 - 12:30 | Auditorium | Attosecond Spectroscopy |
| MON2P | 10:45 - 12:30 | Panoramica | Dynamics of Low-Dimensional Systems |
| | 12:30 - 14:00 | | Lunch Break |
| MON3 | 14:00 - 15:45 | Auditorium | Two-Dimensional Spectroscopy |
| | 15:45 - 16:15 | | Coffee Break |
| MON4A | 16:15 - 18:00 | Auditorium | Novel Fiber and High Power Sources |
| MON4P | 16:15 - 18:00 | Panoramica | Liquid Dynamics |
| MONIa | 18:00 - 20:00 | Poster Area | Poster I a - Applications |
| MONIc | 18:00 - 20:00 | Poster Area | Poster I c - Generation and Measurement |
| MONId | 18:00 - 20:00 | Poster Area | Poster I d - Physics |
| MONIe | 18:00 - 20:00 | Poster Area | Poster I e - Chemical Physics |
| MONIf | 18:00 - 20:00 | Poster Area | Poster I f - Chemistry |
| MONIg | 18:00 - 20:00 | Poster Area | Poster I g - Biology |

### Tuesday, June 10, 2008

| | | | |
|---|---|---|---|
| TUE1 | 08:30 - 10:15 | Auditorium | High Harmonics as Structural Probes |
| | 10:15 - 10:45 | | Coffee Break |
| TUE2A | 10:45 - 12:30 | Auditorium | Control of Molecular Processes |
| TUE2P | 10:45 - 12:30 | Panoramica | Applications of Ultrafast Pulses |
| | 12:30 - 14:00 | | Lunch Break |
| TUE3 | 14:00 - 15:45 | Auditorium | Coherent Molecular Dynamics |
| | 15:45 - 16:15 | | Coffee Break |
| TUE4A | 16:15 - 18:00 | Auditorium | Photoinduced Reactions |
| TUE4P | 16:15 - 18:00 | Panoramica | Ultrafast Electronics and Optoelectronics |
| TUEIIa | 18:00 - 20:00 | Poster Area | Poster II a - Applications |
| TUEIIb | 18:00 - 20:00 | Poster Area | Poster II b - Electronics and Optoelectronics |
| TUEIIc | 18:00 - 20:00 | Poster Area | Poster II c - Generation and Measurement |
| TUEIId | 18:00 - 20:00 | Poster Area | Poster II d - Physics |
| TUEIIe | 18:00 - 20:00 | Poster Area | Poster II e - Chemical Physics |

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|---|---|---|---|
| TUEIIf | 18:00 - 20:00 | Poster Area | Poster II f - Chemistry |

**Wednesday, June 11, 2008**

| | | | |
|---|---|---|---|
| WED1 | 08:30 - 10:15 | Auditorium | Light Harvesting |
| | 10:15 - 10:45 | | Coffee Break |
| WED2A | 10:45 - 12:30 | Auditorium | Frequency Combs and Waveform Synthesis |
| WED2P | 10:45 - 12:30 | Panoramica | Structural Dynamics in Biological Systems |
| | 12:30 - 14:00 | | Lunch Break |
| WED3 | 14:00 - 15:45 | Auditorium | Electron Dynamics and Plasmonics |
| | 15:45 - 16:15 | | Coffee Break |
| WED4A | 16:15 - 18:00 | Auditorium | Octave-Spanning Pulse Generation |
| WED4P | 16:15 - 18:00 | Panoramica | Nanooptics and Microscopy |
| | 20:00 | | Gala Dinner at Hotel Regina Palace |

**Thursday, June 12, 2008**

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|---|---|---|---|
| THU1 | 08:30 - 10:15 | Auditorium | Ultrafast X-Ray and Electron Diffraction |
| | 10:15 - 10:45 | | Coffee Break |
| THU2A | 10:45 - 12:30 | Auditorium | Ultrafast Charge Transfer |
| THU2P | 10:45 - 12:30 | Panoramica | Ultrafast Diagnostics |
| | 12:30 - 14:00 | | Lunch Break |
| THU3 | 14:00 - 15:45 | Auditorium | Ultrafast Condensed Phase Dynamics |
| | 15:45 - 16:15 | | Coffee Break |
| THUIIIa | 16:15 - 18:15 | Poster Area | Poster III a - Applications |
| THUIIIc | 16:15 - 18:15 | Poster Area | Poster III c - Generation and Measurement |
| THUIIId | 16:15 - 18:15 | Poster Area | Poster III d - Physics |
| THUIIIe | 16:15 - 18:15 | Poster Area | Poster III e - Chemical Physics |
| THUIIIf | 16:15 - 18:15 | Poster Area | Poster III f - Chemistry |
| THUIIIg | 16:15 - 18:15 | Poster Area | Poster III g - Biology |
| THU4 | 18:30 - 20:00 | Auditorium | Postdeadline session |

**Friday, June 13, 2008**

| | | | |
|---|---|---|---|
| FRI1A | 08:30 - 10:15 | Auditorium | Dynamics at Interfaces |
| FRI1P | 08:30 - 10:15 | Panoramica | Tunable Ultrafast Pulse Generation |
| | 10:15 - 10:45 | | Coffee Break |
| FRI2 | 10:45 - 12:30 | Auditorium | High Harmonic and Attosecond Pulse Generation |

**MON1 • Photon and Electron Sources of the Future**

*Auditorium*
**8:30–10:15**
**MON1 • Photon and Electron Sources of the Future**
*Chair: Paul Corkum, Steacie Institute for Molecular Science, Ottawa, Canada*

**MON1.1 • 8:30** **•Invited•**

**Ultrafast coherent X-ray diffractive imaging with the FLASH Free-Electron Laser**, •*Henry N. Chapman*[1], *S. Bajt*[2], *A. Barty*[3], *W.H. Benner*[3], *M.J. Bogan*[3], *S. Boutet*[4], *A. Cavalleri*[5], *S. Düsterer*[2], *M. Frank*[3], *J. Hajdu*[4,6], *S.P. Hau-Riege*[3], *B. Iwan*[6], *S. Marchesini*[7], *K. Sokolowski-Tinten*[8], *M.M. Siebert*[6], *R. Treusch*[2], and *B.W. Woods*[3]; [1]*Centre for Free-Electron Laser Science, University of Hamburg and DESY, Hamburg, Germany*, [2]*HASYLAB, DESY, Hamburg, Germany*, [3]*Lawrence Livermore National Laboratory, Livermore CA, USA*, [4]*SLAC, Menlo Park CA, USA*, [5]*Department of Physics, Clarendon Laboratory, University of Oxford, Oxford, UK*, [6]*Uppsala University, Uppsala, Sweden*, [7]*Lawrence Berkeley National Laboratory, Berkeley CA, USA*, [8]*Institut für Experimentelle Physik, Universität Duisburg-Essen, Germany*.
High-resolution ultrafast coherent diffractive imaging has been carried out at the FLASH FEL. Reconstructed images show no effect of sample destruction. Time resolved imaging was achieved by time-delay holography and with a synchronized optical laser.

**MON1.2 • 9:00**

**X-ray induced transient optical reflectivity for fs X-ray/ optical cross-correlation at Free-Electron Lasers**, *Cornelius Gahl*[1,3], *Armin Azima*[5], *Martin Beye*[2], *Martin Deppe*[2], *Kristian Döbrich*[1], *Urs Hasslinger*[2], *Franz Hennies*[2,4], *Alexej Melnikov*[1], *Mitsuru Nagasono*[2], *Annette Pietzsch*[2], *Martin Wolf*[1], *Wilfried Wurth*[2], and •*Alexander Föhlisch*[2]; [1]*Fachbereich Physik, Freie Universität Berlin, Arnimalle 14, 14195 Berlin, Germany*, [2]*Institut für Experimentalphysik, Universität Hamburg, Luruper Chaussee 149, 22761 Hamburg, Germany*, [3]*Max-Born-Institut für nichtlineare Optik und Kurzzeitphysik, Max-Born-Strasse 2A, 12489 Berlin, Germany*, [4]*MAX-Lab, Lund Universität, Ole Römers väg 1, Box 118, 22100 Lund, Sweden*, [5]*HASYLAB/DESY, Notkestrasse 85, 22607 Hamburg, Germany*.
Using the high peak brilliance of the X-ray Free-Electron Laser at Hamburg, we have studied the X-ray pulse induced transient optical reflectivity on GaAs and established a novel tool for fs X-ray/optical cross-correlation.

**MON1.3 • 9:15**

**An All-Optical Synchrotron Light Source**, •*Heinrich Schwoerer*[1,2], *Hans-Peter Schlenvoigt*[2], *Kerstin Haupt*[2], *Alexander Debus*[2], *Erich Rohwer*[1], *Jordan Gallacher*[3], and *Dino Jaroszynski*[3]; [1]*Laser Research Institute, Physics Department, University of Stellenbosch, Private Bag X1, Matieland 7602, South Africa*, [2]*Institut fuer Optik und Quantenelektronik, Universitaet Jena, Max-Wien-Platz 1, 07743 Jena, Germany*, [3]*Department of Physics, Scottish Universities Physics Alliance, University of Strathclyde, Glasgow G4 ONG, UK*.
We report on the generation of synchrotron radiation from laser accelerated relativistic electrons propagating through an undulator and present a detailed analysis of stability, reproducibility and future potential in terms of coherence, wavelength and brilliance.

**MON1.4 • 9:30**

**Monoenergetic Electron Acceleration Driven by a Sub-10-fs OPCPA System**, •*László Veisz*[1], *Karl Schmid*[1,2], *Sofia Benavides*[1], *Franz Tavella*[1], *Raphael Tautz*[1], *Daniel Herrmann*[1], *Andrius Marcinkevicius*[1,3], *Michael Geissler*[1,4], *Ulrich Schramm*[5], *Jürgen Meyer-ter-Vehn*[1], *Dietrich Habs*[2], *Ferenc Krausz*[1,2], and *Bernhard Hidding*[6]; [1]*Max-Planck-Institut für Quantenoptik, Hans-Kopfermann-Strasse 1, 85748 Garching, Germany*, [2]*Department für Physik, Ludwig-Maximilians-Universität München, am Coulombwall 1, 85748 Garching, Germany*, [3]*IMRA America Inc., 1044 Woodridge Avenue, Ann Arbor, Michigan 48105, USA*, [4]*Centre for Plasma Physics, Department of Physics and Astronomy, Queens University Belfast, Belfast BT7 1NN, UK*, [5]*Forschungszentrum Dresden-Rossendorf e. V., Bautzner Landstrasse 128, 01328 Dresden, Germany*, [6]*Institut für Laser- und Plasmaphysik, Heinrich-Heine-Universität Düsseldorf, 40225 Düsseldorf, Germany*.
Electrons were accelerated to 5-30 MeV energy in a He gas jet with a 8.5 fs, 10 TW OPCPA system.

**MON1.5 • 9:45**

**Absolute phase signature in THz emission from a femtosecond filament in argon**, •*Christoph Hauri*[1], *Ivan Medvedev*[2], *Jonathan Wheeler*[2], *Chris Roedig*[2], *Gilles Doumy*[2], and *Louis DiMauro*[2]; [1]*Paul Scherrer Institute, PSI West, WSLA 004 5232 Villigen, Switzerland*, [2]*Physics Department, Ohio State Univeristy, Columbus, Ohio, USA*.
We investigate THz emission from femtosecond filaments in argon and propose a scheme for single-shot determination of the absolute phase with a 2-$\pi$ ambiguity.

**MON1.6 • 10:00**

**Shaping Entangled Photon Pairs with Attosecond Precision**, •*Florian Zäh* and *Thomas Feurer*; *University of Bern, Institute of Applied Physics, Sidlerstr. 5, CH-3012 Bern, Switzerland*.
We demonstrate automated amplitude and phase modulation of entangled photon pairs with attosecond precision, different autocorrelation measurements, and the observation of nonlocal effects, such as an increase of the coherence time due to spectral filtering.

**MON2A • Attosecond Spectroscopy**

*Auditorium*
**10:45–12:30**
**MON2A • Attosecond Spectroscopy**
*Chair: Marc Vrakking, AMOLF, Amsterdam, The Netherlands*

**MON2A.1 • 10:45**
**Attosecond angular streaking: an ideal technique to measure electron tunneling time?**, •*Petrissa Eckle*[1], *Adrian Peiffer*[1], *Claudio Cirelli*[1], *Ursula Keller*[1], *Reinhard Dörner*[2], *André Staudte*[3], *Harm-Geert Muller*[4], and *Markus Büttiker*[5]; [1]*Physics Department, ETH Zurich, CH-8093 Zurich, Switzerland*, [2]*Institut für Kernphysik, Johann Wolfgang Goethe Universität, Max-von-Laue-Str. 1, 60438 Frankfurt am Main, Germany*, [3]*Steacie Institute for Molecular Sciences, National Research Council of Canada, 100 Sussex Drive, Ottawa, Ontario K1A 0R6, Canada*, [4]*FOM-Institute for Atomic and Molecular Physics, Kruislaan 407, 1098 SJ Amsterdam, The Netherlands*, [5]*Physics Department, University of Geneva, CH-1211 Geneva, Switzerland*.
We explore the possibility to measure tunneling time and provide initial experimental results using attosecond angular streaking that demonstrated a temporal localization accuracy of 24 as rms and an estimated resolution of ˜200 as.

**MON2A.2 • 11:00**
**Attosecond excitation of electron wave packets**, •*Marko Swoboda*[1], *Giuseppe Sansone*[2], *Thomas Remetter*[1], *Johan Mauritsson*[1], *Kathrin Klünder*[1], *Per Johnsson*[3], *Matthias F. Kling*[4], *Freek Kelkensberg*[3], *Wing-Kiu Siu*[3], *Omair Ghafur*[3], *Sergey Zherebtsov*[4], *Irina Znakovskaya*[4], *Thorsten Uphues*[4], *Enrico Benedetti*[2], *Federico Ferrari*[2], *Franck Lépine*[5], *Marc J. J. Vrakking*[3], *Kenneth J. Schafer*[6], *Anne L'Huillier*[1], and *Mauro Nisoli*[2]; [1]*Department of Physics, Lund Institute of Technology, P.O. Box 118, SE-221 00 Lund, Sweden*, [2]*National Laboratory for Ultrafast and Ultraintense Optical Science CNR Instituto Nazionale per la Fisica della Materia, Department of Physics, Politecnico, Piazza Leonardo da Vinci 32,20133, Italy*, [3]*FOM-Institute AMOLF, Kruislaan 407, 1098 SJ Amsterdam, The Netherlands*, [4]*Max-Planck Insitut für Quantenoptik, Hans-Kopfermann Strasse 1, D-85748 Garching, Germany*, [5]*Université Lyon 1; CNRS; LASIM, UMR 5579, 43 bvd. du 11 novembre 1918, F-69622 Villeurbanne, France*, [6]*Department of Physics and Astronomy, Louisiana State University, Baton Rouge, Louisiana*.
We present experiments, supported by time-dependent calculations, on the dynamics of helium bound states after coherent attosecond excitation in the presence of a strong infrared laser field.

**MON2A.3 • 11:15**
**Strong Field Coherent Control Using 2D Spatio-Temporal Mapping**, •*Barry D. Bruner*, *Haim Suchowski*, *Adi Natan*, and *Yaron Silberberg*; *Department of Physics of Complex Systems, Weizmann Institute of Science, Rehovot 76100, Israel*.
Multiphoton excitation in Rubidium can be effectively controlled using simple pulse shaping parameters. Interplay between ionization and dynamic Stark shifts is revealed by mapping onto 2D landscapes using a recently developed spatio-temporal coherent control technique.

**MON2A.4 • 11:30**
**Femtosecond Buildup of Ultrastrong Light-Matter Interaction**, *Georg Günter*[1], •*Aji A. Anappara*[2], *Jakob Hees*[1], *Silvan Leinß*[1], *Lucia Sorba*[2], *Giorgio Biasiol*[2,3], *Alessandro Tredicucci*[2], *Alfred Leitenstorfer*[1], and *Rupert Huber*[1]; [1]*Department of Physics and Center for Applied Photonics, University of Konstanz, Universitätsstraße 10, 78464 Konstanz, Germany*, [2]*NEST CNR-INFM and Scuola Normale Superiore, Piazza dei Cavalieri 7, I-56126 Pisa, Italy*, [3]*Lab. Nazionale TASC CNR-INFM, Area Science Park, I-34012 Trieste, Italy*.
An intersubband transition in a GaAs/AlGaAs quantum well waveguide structure is optically switched on by 12-fs pulses. Multi-THz field transients resonantly trace the non-adiabatic formation of a squeezed quantum vacuum of ultrastrongly coupled cavity polaritons.

**MON2A.5 • 11:45**
**Attosecond control of electron localization in one- and two-color dissociative ionization of H2 and D2**, •*Giuseppe Sansone*[1], *Freek Kelkensberg*[2], *Matthias Kling*[3], *Wing Kiu Siu*[2], *Omair Ghafur*[2], *Per Johnsson*[2], *Sergey Zherebtsov*[3], *Irina Znakovskaya*[3], *Thorsten Uphues*[3], *Enrico Benedetti*[1], *Frederico Ferrari*[1], *Franck Lépine*[4], *Marko Swoboda*[5], *Thomas Remetter*[5], *Anne L'Huillier*[5], *Mauro Nisoli*[1], and *Marc Vrakking*[2]; [1]*National Laboratory for Ultrafast and Ultraintense Optical Science CNR Istituto Nazionale per la Fisica della Materia, Department of Physics, Politecnico, Piazza Leonardo da Vinci 32,20133, Italy*, [2]*FOM-Institute AMOLF, Kruislaan 407, 1098 SJ Amsterdam, The Netherlands*, [3]*Max-Planck Insitut für Quantenoptik, Hans-Kopfermann Strasse 1, D-85748 Garching, Germany*, [4]*Université Lyon 1; CNRS; LASIM, UMR 5579, 43 bvd. du 11 novembre 1918, F-69622 Villeurbanne, France*, [5]*Department of Physics, Lund University, P.O. Box 118, SE-221 00 Lund, Sweden*.
We report experiments where an attosecond pulse launches a wavepacket on the dissociative state of D2+, and a few-cycle IR pulse localizes the electron on one ionic fragment with attosecond sensitivity to the XUV-IR delay.

**MON2A.6 • 12:00**
**Simultaneous Description of Electron and Nuclear Dynamics: A Quantum Approach for Multi-Electron Systems**, *Philipp von den Hoff*, *Dorothee Geppert*, and •*Regina de Vivie-Riedle*; *Department Chemie und Biochemie, LMU München, Butenandtstr. 11, 81377 München, Germany*.
A new and efficient approach to describe molecular electron and nuclear dynamics simultaneously is presented. The method is tested for the photodissociation of $D_2^+$ and allows for a successive extension to multi-electron systems.

**MON2A.7 • 12:15**
**Attosecond Photoelectron Spectroscopy of Electron Tunneling in Dissociating Hydrogen Molecular Ion**, •*Stefanie Gräfe*[1], *Volker Engel*[2], and *Misha Yu. Ivanov*[1]; [1]*Steacie Institute of Molecular Sciences, National Research Council Canada, 100 Sussex Drive, Ottawa ON K1A 0R6 Canada*, [2]*Institute for Physical Chemistry, Würzburg University, Am Hubland, 97074 Würzburg, Germany*.
We demonstrate the potential of intense-field pump-probe (attosecond XUV)photoelectron spectroscopy to monitor coupled nuclear-electronic tunneling dynamics between the two protons during dissociative ionization of the hydrogen molecular ion.

**MON2P • Dynamics of Low-Dimensional Systems**

*Panoramica*
**10:45–12:30**
**MON2P • Dynamics of Low-Dimensional Systems**
*Chair: Michael Wörner, Max-Born-Institute, Berlin, Germany*

**MON2P.1 • 10:45**
**Ultrafast Coherent Interactions in Quantum Wells Studied by Two-Dimensional Fourier-Transform Spectroscopy**, *Tianhao Zhang*[1], *Irina Kuznetsova*[2], *Lijun Yang*[3], •*Alan Bristow*[1], *Xingcan Dai*[1], *Xiaoqin Li*[4], *Torsten Meier*[5], *Peter Thomas*[2], *Shaul Mukamel*[3], *Richard Mirin*[6], and *Steven Cundiff*[1]; [1]*JILA, University of Colorado & NIST, Boulder, USA,* [2]*Department of Physics, Philipps University, Marburg, Germany,* [3]*Department of Chemistry, University of California, Irvine, USA,* [4]*Department of Physics, University of Texas, Austin, USA,* [5]*Department Physik, Universitaet Paderborn, Paderborn, Germany,* [6]*National Institute of Standards and Technology, Boulder, USA*.
Many-body effects dominate the polarization studies of heavy- and light-hole excitons. Accurate simulations require Coulomb correlations beyond Hartree-Fock approximation. Raman coherences are isolated with a new two-dimensional projection.

**MON2P.2 • 11:00**
**Two-quantum Two-dimensional Fourier Transform Electronic Spectroscopy of Biexcitons in GaAs Quantum Wells**, •*Katherine Stone*[1], *Kenan Gundogdu*[1], *Daniel Turner*[1], *Xiaoqin Li*[2], *Steven Cundiff*[3], and *Keith Nelson*[1]; [1]*Department of Chemistry, Massachusetts Institute of Technology, Cambridge, Massachusetts 02139, USA,* [2]*Department of Physics, University of Texas at Austin, Austin, Texas 78712, USA,* [3]*JILA, University of Colorado and National Institute of Standards and Technology, Boulder, Colorado 80309, USA*.
Coherent excitonic interactions in GaAs quantum wells are observed by two-quantum two-dimensional Fourier transform electronic spectroscopy. Biexcitonic spectral phase information revealed by this method deconvolves many-body phenomena described by the Hamiltonian for multiple interacting electrons.

**MON2P.3 • 11:15**
**Three-Pulse Echo Peak Shift Spectroscopy of Disordered Semiconductor Quantum Wells and Dense Atomic Vapors**, •*Steven Cundiff*[1], *Virginia Lorenz*[1], *Sam Carter*[1], *Zhigang Chen*[1], *Shaul Mukamel*[2], and *Wei Zhuang*[2]; [1]*JILA, University of Colorado and National Institute of Standards and Technology, Boulder, Colorado, 80309-0440 USA,* [2]*Department of Chemistry, University of California, Irvine, Calfornia, 92697-2025 USA*.
Three-pulse echo peak shift spectroscopy yields the correlation function of the frequency fluctuations due to acoustic phonons for excitons in disordered semiconductor quantum wells and fluctuations due to atomic motion in a potassium vapor.

**MON2P.4 • 11:30**
**Teasing a Quasiparticle the Ultrafast Nonlinear Response of the Fröhlich Polaron in GaAs**, •*Michael Woerner*[1], *Peter Gaal*[1], *Wilhelm Kuehn*[1], *Klaus Reimann*[1], *Thomas Elsaesser*[1], and *Rudolf Hey*[2]; [1]*Max-Born-Institut für Nichtlineare Optik und Kurzzeitspektroskopie, 12489 Berlin, Germany,* [2]*Paul-Drude-Institut für Festkörperelektronik, 10117 Berlin, Germany*.
Ultrafast acceleration of polarons in a strong THzfield results in an oscillatory occurrence of midinfrared gain/absorption with the LO phonon frequency. THzpump midinfraredprobe measurements give the first insight into the internal motion of a quasiparticle.

**MON2P.5 • 11:45**
**Coherently controlled ballistic charge currents in unbiased bulk silicon and single-walled carbon nanotubes**, •*Markus Betz, Louis Costa, Marko Spasenovic, Ryan W. Newson, Jean-Michel Menard, Christian Sames, Alan D. Bristow*, and *Henry M. van Driel*; *Department of Physics and Institute for Optical Sciences, University of Toronto, Toronto, ON M5S 1A7, Canada*.
Phase-related fundamental and second harmonic femtosecond pulses induce directional charge motion in group IV materials at 300K. THz emission reveals peak current densities of 0.5 kA/cm2 in silicon and currents of 1 nA per nanotube.

**MON2P.6 • 12:00**
**Ultrafast dynamics of coherent phonons in the aligned single-walled carbon nanotubes**, •*Keiko Kato*[1], *Kunie Ishioka*[1], *Masahiro Kitajima*[1], *Jie Tang*[2], and *Hrvoje Petek*[3]; [1]*Advanced Nano-Characterization Center, National Institute for Materials Science, Tsukuba, Ibaraki, Japan,* [2]*Innovative Materials Engineering Laboratory, National Institute for Materials Science, Tsukuba, Ibaraki, Japan,* [3]*Department of Physics and Astronomy, University of Pittsburgh, Pittsburgh, PA, USA*.
Sub-10-fs pulses allow real time observation of coherent phonons in aligned bundles of single-walled carbon nanotubes. While electronic excitation is strongly dependent on the axis of carbon nanotubes, G-mode coherent phonons is not.

**MON2P.7 • 12:15**
**Evidence for electron correlation in (6,5) carbon nanotubes from pump-probe spectroscopy with broadband pulses**, •*Larry Lüer*[1], *Jared Crochet*[2], *Tobias Hertel*[2], *Dario Polli*[3], and *Guglielmo Lanzani*[3]; [1]*National Laboratory for Ultrafast and Ultraintense Optical Science, INFM-CNR, Dipartimento di Fisica, Politecnico di Milano, Italy,* [2]*Department of Physics and Astronomy & Vanderbilt Institute of Nanoscale Science and Engineering (VINSE), Vanderbilt University, 6301 Stevenson Center Lane, Nashville, TN 37235, USA,* [3]*CNISM and Dipartimento di Fisica, Politecnico di Milano, P.za L. da Vinci 32, 20133 Milano(Italy)*.
Pump-probe spectroscopy with 10 fs time resolution is performed on (6,5) carbon nanotubes. We decompose the spectra into contributions from the first and second exciton, demonstrating their electronic correlation.

## MON3 • Two-Dimensional Spectroscopy

*Auditorium*
**14:00–15:45**
**MON3 • Two-Dimensional Spectroscopy**
*Chair: Erik Nibbering, Max-Born-Institute, Berlin, Germany*

**MON3.1 • 14:00** **•Invited•**

**Automated 2D IR and Vis spectroscopies using pulse shaping**, •*Martin Zanni*; *University of Wisconsin-Madison, USA*.
We present a method for collecting 2D infrared and visible spectroscopies that uses a pulse shaper and a pump-probe beam geometry. This approach reduces the technical hurdles for implementing these techniques and makes many new experiments possible.

**MON3.2 • 14:30**
**Relaxation-Assisted Dual-Frequency Two-Dimensional Infrared Spectroscopy: Measuring Distances and Bond Connectivity**, •*Igor Rubtsov*, *Sri Ram Naraharisetty*, *Christopher Keating*, and *Valeriy Kasyanenko*; *Tulane University, New Orleans, USA*.
Potential of a novel relaxation-assisted 2DIR spectroscopy method is demonstrated on several molecular systems, including model compounds, peptides, and transition metal complexes. Cross-peaks for modes separated by distances greater than 11Å can be easily detected.

**MON3.3 • 14:45**
**Triggered-exchange Two-dimensional Infrared Spectroscopy of Metal Carbonyl Photodissociation Dynamics**, •*Carlos R. Baiz*, *Matthew J. Nee*, *Robert McCanne*, *Jessica M. Anna*, and *Kevin J. Kubarych*; *University of Michigan, Ann Arbor, MI,USA*.
We present an ultrafast study of the excited state dynamics of metal carbonyls using triggered-exchange Fourier transform 2DIR spectroscopy.

**MON3.4 • 15:00**
**Observation of Quantum Coherence in Photosynthetic Complexes by Two-Dimensional Electronic Spectroscopy**, •*Tessa Calhoun*[1], *Gabriela Schlau-Cohen*[1], *Naomi Ginsberg*[1], *Roberto Bassi*[2], and *Graham Fleming*[1]; [1]*Department of Chemistry, University of California, Berkeley and Physical Biosciences Division, Lawrence Berkeley National Laboratory, Berkeley, California 94702, USA*, [2]*Dipartimento Scientifico e Tecnologico, Facolta di Scienze, Universita di Verona, Strada Le Grazie, I-37134, Verona, Italy*.
Two-dimensional Fourier transform electronic spectroscopy is employed to investigate quantum beating in the major light-harvesting complex II. The importance of this beating, arising from the electronically coherent nature of energy transfer between chromophores, is discussed.

**MON3.5 • 15:15**
**Vibrational Beating in Two-Dimensional Electronic Spectra**, •*Alexandra Nemeth*[1], *Franz Milota*[1], *Tomas Mancal*[2], *Vladimir Lukes*[3], *Harald F. Kauffmann*[1], and *Jaroslaw Sperling*[1]; [1]*Department of Physical Chemistry, University of Vienna, Währingerstraße 42, 1090 Vienna, Austria*, [2]*Institute of Physics, Faculty of Mathematics and Physics, Charles University, Ke Karlovu 5, 12116 Prague, Czech Republic*, [3]*Department of Chemical Physics, Slovak Technical University, Radlinskeho 9, 81237 Bratislava, Slovakia*.
We trace vibrational wavepacket motion in two-dimensional electronic spectra of a two-level electronic system. The vibronic evolution induces a periodic beating pattern of the diagonal-to-antidiagonal peak width ratio, similar to the one for electronic coherences.

**MON3.6 • 15:30**
**Novel Coherent Multidimensional Spectroscopy Signals Designed to Probe Electron Correlations in Semiconductors and Molecular Aggregates**, •*Shaul Mukamel*, *Lijun Yang*, *Zhenyu Li*, *Rafal Oszwaldowski*, and *Darius Abramavicius*; *Chemistry department, University of California Irvine, USA*.
Principles for the design of pulse sequences for multidimensional spectroscopy are surveyed. Many-body effects for electrons in molecules and semiconductors, and excitons in molecular complexes, are revealed through correlation-induced signals.

## MON4A • Novel Fiber and High Power Sources

*Auditorium*
**16:15–18:00**
**MON4A • Novel Fiber and High Power Sources**
*Chair: Giulio Cerullo, Politecnico di Milano, Milan, Italy*

**MON4A.1 • 16:15** •Invited•

**Ultrabroadband Er:fiber Systems and Applications**, •*Alfred Leitenstorfer*[1], *Alexander Sell*[1], *Daniel Träutlein*[1], *Florian Adler*[1], *Konstantinos Moutzouris*[1], *Florian Sotier*[1], *Matthias Kahl*[1], *Rudolf Bratschitsch*[1], *Rupert Huber*[1], and *Elisa Ferrando-May*[2]; [1]*Department of Physics and Center for Applied Photonics, University of Konstanz, D-78457 Konstanz, Germany*, [2]*Department of Biology and Center for Applied Photonics, University of Konstanz, D-78457 Konstanz, Germany*.
Compact and low-noise Er:fiber lasers allow efficient frequency conversion from the near ultraviolet into the mid infrared. These widely tunable sources enable multi-color experiments in applications ranging from precision metrology via pump-probe spectroscopy to bioimaging.

**MON4A.2 • 16:45**

**Compact high Power Ytterbium based fs-Oscillator-Amplifier System**, •*Peter Rußbüldt*[1], *Torsten Mans*[2], *Dieter Hoffmann*[1], *Anne-Laure Calendron*[3], *Max Lederer*[3], and *Reinhard Poprawe*[1,2]; [1]*Fraunhofer Institute for Laser Technology, Steinbachstr. 15, 52074 Aachen, Germany*, [2]*Chair for Laser Technology RWTH Aachen, Steinbachstr. 15, 52074 Aachen, Germany*, [3]*High Q Laser Production GmbH, Kaiser-Franz-Josef-Strasse 61, 6845 Hohenems, Austria*.
A compact diode-pumped Yb:YAG Innoslab fs-oscillator-amplifier system, scalable to several 100W, was realized. Nearly transform and diffraction limited 786fs pulses at 77W average output power and 63.2MHz repetition rate are achieved so far.

**MON4A.3 • 17:00**

**Fiber Laser Pumped High Average Power Single-Cycle THz Pulse Source**, •*Matthias C Hoffmann*[1], *Ka-Lo Yeh*[1], *Harold Y Hwang*[1], *Tom Sosnowski*[2], *János Hebling*[1,3], and *Keith A Nelson*[1]; [1]*Massachusetts Institute of Technology, 77 Massachusetts Ave., Cambridge, MA, 02139, USA*, [2]*Clark-MXR, Inc., 7300 West Huron River Drive, Dexter, Michigan 48130, USA*, [3]*Department of Experimental Physics, University of Pécs, 7624 Hungary*.
Single-cycle THz radiation was generated by optical rectification of Yb-fiber laser pulses with 250 fs duration and 10 $\mu$J energy. We obtained an average power of 0.5 mW at 1 MHz repetition rate.

**MON4A.4 • 17:15**

**Millijoule Pulse Energy High Repetition Rate Femtosecond Fiber CPA System: Results, Micromachining Application and Scaling Potential**, •*Fabian Röser*, *Jan Rothhardt*, *Tino Eidam*, *Oliver Schmidt*, *Damian N. Schimpf*, *Antonio Ancona*, *Stefan Nolte*, *Jens Limpert*, and *Andreas Tünnermann*; *Institute of Applied Physics, Friedrich-Schiller-University Jena, Germany*.
We report on an ytterbium-doped fiber CPA system delivering millijoule energy 800 fs pulses at high repetition rates and average powers exceeding 100 W. A micromachining application and average power scaling potential are also presented.

**MON4A.5 • 17:30**

**Femtosecond thin disk lasers with >10 $\mu$J pulse energy for high field physics at multi-megahertz repetition rates**, •*Thomas Südmeyer*[1], *S.V. Marchese*[1], *C. R. E. Baer*[1], *S. Hashimoto*[1], *M. Golling*[1], *A. G. Engqvist*[1], *D. J. H. C. Maas*[1], *U. Keller*[1], *G. Lépine*[2], *G. Gingras*[2], and *B. Witzel*[2]; [1]*Department of Physics, Institute of Quantum Electronics, ETH Zurich, 8093 Zurich, Switzerland*, [2]*Centre d'optique, photonique et laser, Université Laval, Pav. d'optique-photonique, Québec G1V 0A6, Canada*.
We discuss a modelocked femtosecond thin disk laser generating record-high 11 $\mu$J pulse energy. We present photoelectron imaging spectroscopy measurements in argon and xenon at megahertz repetition rate with peak intensities up to $6 \cdot 10^{13}$ $W/cm^2$

**MON4A.6 • 17:45**

**Ultra-High Intensity-High Contrast 300-TW Laser at 0.1 Hz Repetition Rate**, •*Victor Yanovsky*[1], *Vladimir Chvykov*[1], *Galina Kalinchenko*[1], *Pascal Rousseau*[1], *Thomas Planchon*[1], *Takeshi Matsuoka*[1], *Anatoly Maksimchuk*[1], *John Nees*[1], *Gilles Cheriaux*[2], *Gerard Mourou*[2], and *Karl Krushelnick*[1]; [1]*1FOCUS Center and Center for Ultrafast Optical Science, University of Michigan,*, [2]*2LOA, UMR 7639 ENSTA,-CNRS-Ecole Polytechnique, F-91761, Palaiseau Cedex, France*.
We demonstrate the highest intensity -300 TW laser by developing booster amplifying stage to the HERCULES-50 TW-Ti:sapphire laser. To out knowledge this is the first Petawatt-scale laser at 0.1 Hz repetition rate

## MON4P • Liquid Dynamics

*Panoramica*
**16:15–18:00**
**MON4P • Liquid Dynamics**
*Chair: Shaul Mukamel, Department of Chemistry, University of California, Irvine, USA*

**MON4P.1 • 16:15**
**Vibrational energy relaxation in liquid-to-supercritical ammonia studied by femtosecond mid-infrared spectroscopy**, *Tim Schäfer*[1], *Dirk Schwarzer*[1], *Jörg Lindner*[2], and •*Peter Vöhringer*[2]; [1]*Max-Planck-Institut für biophysikalische Chemie, Göttingen, Germany*, [2]*Rheinische Friedrich-Wilhelms-Universität, Bonn, Germany*.
Chemistry textbooks often cite ammonia as an associated liquid forming extended hydrogen-bond networks similar to water. We have conducted the first ever fs-MIR-experiments aimed at exploring the vibrational dynamics in this system under liquid-to-supercritical conditions.

**MON4P.2 • 16:30**
**Probing Intermolecular Couplings in the Two-Dimensional Infrared Photon Echo Spectrum of Liquid Water - Simulation Study**, •*Alexander Paarmann*[1], *Tomoyuki Hayashi*[2], *Shaul Mukamel*[2], and *R. J. Dwayne Miller*[1]; [1]*Institute for Optical Sciences, Departments of Chemistry and Physics, University of Toronto, 80 St George Street, Toronto, Ontario, M5S3H6 Canada.*, [2]*Department of Chemistry, University of California, Irvine, California 92697-2025, USA.*.
The 2D-IR photon echo spectrum of the OH stretching vibration in liquid water is simulated by direct numerical propagation, explicitly including intermolecular coupling. Intermolecular energy transfer times and the 2D-IR spectrum closely agree with experiment.

**MON4P.3 • 16:45**
**Heterogeneous Dynamics of Coupled Vibrations**, *Dan Cringus*, *Thomas l. C. Jansen*, and •*Maxim S. Pshenichnikov*; *Zernike Institute for Advanced Materials, University of Groningen, Nijenborgh 4, 9747 AG Groningen, The Netherlands*.
Frequency-dependent dynamics of coupled stretch vibrations of a water molecule are revealed by 2D IR correlation spectroscopy. These are caused by non-Gaussian fluctuations of the environment around the individual OH stretch vibrations.

**MON4P.4 • 17:00**
**Observation of immobilized water in hydrophobic hydration**, •*Huib Bakker*; *AMOLF, Kruislaan 407, 1098 SJ Amsterdam, The Netherlands*.
Using femtosecond mid-infrared spectroscopy we find that water molecules in the hydration shells of hydrophobes show much slower orientational dynamics than pure liquid water. Each methyl group is observed to immobilize four water OH groups.

**MON4P.5 • 17:15**
**Collective Breakdown of H-Bonding in Ice**, •*Hristo Iglev* and *Marcus Schmeisser*; *Physik-Departmen E11, Technische Universität München*.
We report on ultrafast bulk melting of ice by an infrared laser pulse. Our experiments show that homogeneous melting occurs only for an energy deposition beyond the superheating limit of 330 K.

**MON4P.6 • 17:30**
**The Dynamics of Aqueous Hydroxide Ion Transport Probed via Ultrafast Vibrational Echo Experiments**, •*Sean T. Roberts*, *Poul B. Petersen*, *Krupa Ramasesha*, and *Andrei Tokmakoff*; *Department of Chemistry and George Harrison Spectroscopy Laboratory, Massachusetts Institute of Technology, Cambridge MA 02139*.
We use peakshift, transient grating, and 2D IR measurements to probe the dynamics of NaOD solutions. Our experiments suggest that OD- possesses a stable solvation shell and signatures of fast intermolecular proton transfer are observed.

**MON4P.7 • 17:45**
**Glasslike Behaviour in Aqueous Electrolyte Solutions**, •*David Turton*[1], *Johannes Hunger*[2], *Glenn Hefter*[3], *Richard Buchner*[2], and *Klaas Wynne*[1]; [1]*Department of Physics, SUPA, University of Strathclyde, Glasgow G4 0NG, UK*, [2]*Institut für Physikalische und Theoretische Chemie, Universität Regensburg, D-93040 Regensburg, Germany*, [3]*Chemistry Department, Murdoch University, Murdoch, WA 6150, Australia*.
Ultrafast optical Kerr effect studies and dielectric relaxation spectroscopy applied to the relaxation dynamics of aqueous solutions, resolves the apparent conflicts between viscosity and rotational relaxation, and implies a jamming transition at high concentration.

## MONIa • Poster I a - Applications

*Poster Area*
**18:00–20:00**
**MONIa • Poster I a - Applications**

**MONIa.1 • 18:00**
**Multiphoton Microscopy by Multiexcitonic Ladder Climbing in Colloidal Quantum Dots**, *Nir Rubin Ben-Haim* and •*Dan Oron*; *Dept. of Physics of Complex Systems, Weizmann Institute of Science, Rehovot, Israel..*
Depth resolved multiphoton microscopy is performed by collecting the fluorescent emission of two-exciton states in colloidal quantum dots. This process involves two consecutive resonant absorption events, thus requiring unprecedented low excitation energy and peak power.

**MONIa.2 • 18:00**
**Real-time wave-packet engineering using a sensitive wave-packet spectrometer and a pulse-shaper**, •*Kazuhiko Misawa* and *Kengo Horikoshi*; *Department of Applied Physics, Tokyo University of A&T, Koganei, Japan*.
Real-time wave-packet engineering was demonstrated by full capture of the phase-controlled wave-packet motions. Optimal pulses were obtained for selective excitation of either twisting or bending motion in a cyanine dye molecule.

**MONIa.3 • 18:00**
**Lensless Imaging at 70nm Resolution using Tabletop Coherent Soft X-rays**, •*Richard L. Sandberg*[1], *Changyong Song*[2], *Przemyslaw W. Wachulak*[3], *Daisy A. Raymondson*[1], *Ariel Paul*[1], *Anne E. Sakdinawat*[4], *Chan La-O-Vorakiat*[1], *William F. Schlotter*[5], *Mario C. Marconi*[3], *Carmen S. Menoni*[3], *Margaret M. Murnane*[1], *Jorge J. Rocca*[3], *Henry C. Kapteyn*[1], and *Janwei Miao*[2]; [1]*Department of Physics and JILA, University of Colorado and NIST, Boulder, Colorado, USA*, [2]*Department of Physics & Astronomy and California NanoSystems Institute, University of California, Los Angeles, California, USA*, [3]*Department of Electrical and Computer Engineering, Colorado State University, Fort Collins, Colorado, USA*, [4]*Center for X-ray Optics at Lawrence Berkeley National Laboratory, Berkeley, California, USA*, [5]*Stanford Synchrotron Radiation Laboratory, SLAC, Menlo Park, California, USA*.
We use curvature correction and high-numerical-aperture imaging to demonstrate a soft-x-ray diffraction microscope with 70-90 nm resolution using two tabletop coherent sources. The near-diffraction-limited resolution demonstrated is a first for x-ray diffractive imaging.

**MONIa.4 • 18:00**
**Grating Enhanced Ponderomotive Scattering for Characterization of Femtosecond Electron Pulses**, •*Christoph T. Hebeisen*, *German Sciaini*, *Maher Harb*, *Ralph Ernstorfer*, *Thibault Dartigalongue*, *Sergei G. Kruglik*, and *R. J. Dwayne Miller*; *Institute for Optical Sciences and Departments of Chemistry and Physics, University of Toronto, 80 St. George St., Toronto, ON, M5S 3H6 Canada*.
We demonstrate a method for measuring the duration of femtosecond electron pulses capable of 10 fs accuracy, using the ponderomotive force of the intensity grating produced by counterpropagating laser pulses in the microjoule energy range.

**MONIa.5 • 18:00**
**CARS microspectrometer with a suppressed nonresonant background**, •*Ruben Zadoyan*, *Michael Karavitis*, *Tommaso Baldacchini*, and *John Carter*; *Technology and Applications Center, Newport Corp. 1791 Deere ave. Irvine, CA 92606*.
We describe a multiplex CARS microscpectrometer utilizing a photonic crystal fiber. Enhanced contrast is achieved by subtracting the noresonant signal in real time. The approach is demonstrated on the images of polystyrene beads.

**MONIc • Poster I c - Generation and Measurement**

*Poster Area*
**18:00–20:00**
**MONIc • Poster I c - Generation and Measurement**

**MONIc.1 • 18:00**
**Sub-10-fs XUV Tunable Pulses at the Output of a Time-Delay-Compensated Monochromator**, *Luca Poletto[1], Paolo Villoresi[1], Enrico Benedetti[2], Federico Ferrari[2], Salvatore Stagira[2]*, •*Giuseppe Sansone[2]*, and *Mauro Nisoli[2]*; *[1]CNR-INFM, Università di Padova, Padova, Italy, [2]CNR-INFM, Dipartimento di Fisica, Politecnico di Milano, Milano, Italy*.
Extreme-ultraviolet pulses, produced by high-order-harmonic generation, have been spectrally selected by a time-delay-compensated monochromator. Temporal characterization has been obtained using cross-correlation method: pulses as short as 8 fs, with high photon flux, have been measured.

**MONIc.2 • 18:00**
**Highly Efficient, Low Cost, Diode-Pumped Femtosecond Cr:LiCAF Lasers**, *Umit Demirbas[1]*, •*Alphan Sennaroglu[1,2], Franz X. Kärtner[1]*, and *James G. Fujimoto[1]*; *[1]Department of Electrical Engineering and Computer Science and Research Laboratory of Electronics, Massachusetts Institute of Technology, 77 Massachusetts Avenue, Cambridge, MA 02139, USA, [2]Laser Research Laboratory, Department of Physics, Koç University, Rumelifeneri, Sariyer, 34450 Istanbul, Turkey*.
Low cost, single-mode diode pumping of $Cr^{3+}$:LiCAF generates 72-fs pulses with 178 mW power, at a record 54% slope efficiency. Single-mode and multi-mode diode pumped $Cr^{3+}$:LiCAF are compared as an alternative to femtosecond Ti:Sapphire technology.

**MONIc.3 • 18:00**
**Complete Characterization of High Harmonic Pulses by Photoelectron Spectral Shearing Interferometry**, •*Taro Sekikawa, Eisuke Haraguchi, Tatsuya Okamoto, Takashi Tanigawa*, and *Mikio Yamashita*; *Department of Applied Physics, Hokkaido University and JST-CREST, Kita13 Nishi 8, Kita-ku, Sapporo 060-8628, Japan*.
The complete characterization of the19th harmonic of Ti:sapphire laser was demonstrated using the photoelectron spectral shearing interferometry for the first time. The frequency chirp of a harmonic pulse was sensitively detected by this method.

**MONIc.4 • 18:00**
**Environmentally stable 200-fs Yb-doped fiber laser with dispersion compensation by photonic crystal fiber**, *Samuli Kivistö[1], Robert Herda[1], Aleksey Kosolapov[2], Andrei Levchenko[2], Sergei Semjonov[2], Evgueni Dianov[2]*, and •*Oleg Okhotnikov[1]*; *[1]Optoelectronics Research Centre, Tampere University of Technology, FIN-33101 Tampere, Finland, [2]Fiber Optics Research Centre, Moscow, 119333, Russia*.
We report environmentally stable mode-locked Yb-doped fiber laser with dispersion compensation by index-guided solid-core photonic crystal fiber. The photonic crystal fiber and Faraday rotator in the cavity allow for robust 200-fs operation at 1 um.

**MONIc.5 • 18:00**
**Measurement of Electron Pulse Duration by Attosecond Streaking**, •*Peter Reckenthaeler[1], Martin Centurion[1], Vladislav S. Yakovlev[2], Matthias Lezius[1], Ferenc Krausz[1,2]*, and *Ernst E. Fill[1]*; *[1]Max-Planck-Institut für Quantenoptik, Hans-Kopfermann-Strasse 1, D-85748 Garching, Germany, [2]Department für Physik der Ludwig-Maximilians-Universität München, Am Coulombwall 1, D-85748 Garching, Germany*.
Abstract: We propose a new method to measure the duration of ultrashort electron pulses using the principle of laser assisted Auger-decay.

**MONIc.6 • 18:00**
**Quantum Path Interference in the Wavelength Dependence of High-Harmonic Generation**, •*Kenichi Ishikawa[1,2], Klaus Schiessl[3], Emil Persson[3]*, and *Joachim Burgdörfer[3]*; *[1]University of Tokyo, Tokyo, Japan, [2]PRESTO-JST, Kawaguchi, Japan, [3]Vienna University of Technology*.
We investigate the fundamental-wavelength dependence of high-harmonic generation yield. Superimposed on a smooth power-law dependence, we find surprisingly strong and rapid fluctuations on a fine wavelength scale, due to quantum-path interferences.

**MONIc.7 • 18:00**
**Picosecond Time-Resolved Vibrational Circular Dichroism Spectroscopy**, •*Mathias Bonmarin* and *Jan Helbing*; *Physikalisch-Chemisches Institut, Universität Zürich, Winterthurerstrasse 190, CH-8057 Zürich, Switzerland*.
We report for the first time transient vibrational circular dichroism measurements. An open shell transition metal complex was used as a test molecule for this proof of principle experiment.

**MONIc.8 • 18:00**
**Adapting AOPDF operation for single-molecule experiments**, •*Daan Brinks[1], Fernando D. Stefani[1]*, and *Niek F. van Hulst[1,2]*; *[1]ICFO - Inst. of Photonic Sciences, Castelldefels (Barcelona), Spain, [2]ICREA - Inst. Catalana de Recerca i Estudis Avancats, Barcelona, Spain*.
We propose a configuration for phase control of single molecules that employs an acousto-optic programmable dispersive filter (AOPDF). We use bunched pulses and apply the AOPDF in a double pass configuration to overcome challenges of repetition rate and spatial uniformity.

**MONIc.9 • 18:00**
**Designer Femtosecond Pulse Shaping Using Grating-Engineered Quasi-Phasematching in Lithium Niobate**, •*Łukasz Kornaszewski[1], Markus Kohler[1], Usman Sapaev[2]*, and *Derryck Reid[1]*; *[1]Ultrafast Optics Group, School of Engineering and Physical Sciences, Heriot-Watt University, Edinburgh, EH14 4AS, UK, [2]Laser-Matter Interaction Laboratory, NPO Akadempribor, Academy of Sciences of Uzbekistan, Tashkent 700125, Uzbekistan*.
Tailored femtosecond pulses with fully engineered intensity and phase profiles are demonstrated using second-harmonic generation of an Er:fiber laser in an aperiodically-poled lithium niobate crystal. The profiles created include square, stepped, double and triple pulses.

**MONIc.10 • 18:00**
**Direct Measurement of Spectral Phase for Ultrashort Laser Pulses Based on Intrapulse Interference**, *Bingwei Xu, Vadim Lozovoy, Yves Coello*, and •*Marcos Dantus*; *Michigan State*

*University. Department of Chemistry. East Lansing, MI 48824*.
We present a method for the direct spectral phase measurement of ultrafast laser pulses. The second-derivative of the unknown spectral phase is revealed by the experimental 2D-contour plot and can be measured without mathematical manipulation.

**MONIc.11 • 18:00**

**Generation of Polarization-shaped Ultraviolet Femtosecond Pulses**, *Reimer Selle*[1], •*Patrick Nuernberger*[1,2], *Florian Langhojer*[1,2], *Frank Dimler*[1,2], *Susanne Fechner*[1], *Gustav Gerber*[1], and *Tobias Brixner*[1,2]; [1]*Physikalisches Institut, Universität Würzburg, Am Hubland, 97074 Würzburg, Germany*, [2]*Institut für Physikalische Chemie, Universität Würzburg, Am Hubland, 97074 Würzburg, Germany*.
We demonstrate the generation and characterization of polarization-shaped femtosecond laser pulses in the ultraviolet. Polarization-shaped near-infrared pulses are frequency-converted in an interferometrically stable setup comprising two perpendicularly oriented nonlinear crystals.

**MONIc.12 • 18:00**

**All-Optical Quasi-Phase Matching and Electron Trajectory Control of High-Order Harmonic Generation at 140 eV**, •*Amy Lytle*, *Xiaoshi Zhang*, *Paul Arpin*, *Oren Cohen*, *Margaret Murnane*, and *Henry Kapteyn*; *JILA, University of Colorado at Boulder, Boulder, Colorado 80303 USA*.
We extend all-optical quasi-phase matching of high harmonic generation to 140-150 eV, where conventional phase matching is not possible. We also demonstrate enhancement of a single electron quantum trajectory.

**MONId • Poster I d - Physics**

*Poster Area*
**18:00–20:00**
**MONId • Poster I d - Physics**

**MONId.1 • 18:00**
**Third Harmonic X-waves Generated by Filamentation of Infrared Femtosecond Laser Pulses in Air**, •*Han Xu*[1], *Hui Xiong*[1], *See Leang Chin*[2], *Ya Cheng*[1], and *Zhizhan Xu*[1]; [1]*State Key Laboratory of High Field Laser Physics, Shanghai Institute of Optics and Fine Mechanics, Chinese Academy of Sciences P.O. Box 800-211, Shanghai 201800, China*, [2]*Centre d'Optique, Photonique et Laser (COPL) and Département de physique, de génie physique et d'optique, Université Laval, Québec, Québec G1V 0A6, Canada*.
We report the first measurement of the hyperbolic featured angularly resolved spectrum of the X-shaped third harmonic generated in infrared femtosecond pulses pumped filament in air, and its evolution with increasing pump power.

**MONId.2 • 18:00**
**Ultrafast Carrier Dynamics in Semiconductor Nanowires**, •*Rohit Prasankumar*[1], *Sukgeun Choi*[1], *George Wang*[2], *Stuart Trugman*[1], *Samuel Picraux*[1], and *Antoinette Taylor*[1]; [1]*Center for Integrated Nanotechnologies, Los Alamos National Laboratory, Los Alamos, NM 87545, USA*, [2]*Sandia National Laboratories, P. O. Box 5800, MS-1086, Albuquerque, NM 87185, USA*.
Ultrafast wavelength-tunable optical measurements on semiconductor nanowires allow us to independently probe the dynamics of electrons, holes, and defect states. These investigations reveal the influence of two-dimensional confinement on carrier dynamics in these nanosystems.

**MONId.3 • 18:00**
**Generation of High-power Visible and UV/VUV Supercontinua and Self-compressed Single-cycle Pulses in Metal-dielectric Hollow Waveguides**, •*Joachim Herrmann* and *Anton Husakou*; *Max Born Institute, Max Born Str. 2a, D-12489 Berlin, Germany*.
We investigate high-power soliton-induced supercontinuum generation in visible and UV/VUV based on argon-filled metal-dielectric hollow waveguides. We predict the generation of MW/nm spectral power densities with $\sim$0.1 mJ energy and self-compressed isolated 1.7-fs pulses.

**MONId.4 • 18:00**
**Nonlinear THz-pump/THz-probe measurements of ultrafast avalanche processes in semiconductors**, •*Aaron Lindenberg*[1,2], *Haidan Wen*[1], and *Michael Wiczer*[3]; [1]*PULSE Center, Stanford Linear Accelerator Center, Menlo Park, CA 94025, USA*, [2]*Dept. of Materials Science and Engineering, Stanford University, Stanford, CA 94305, USA*, [3]*Dept. of Physics, University of Illinois, Urbana-Champaign, Urbana, IL 61801, USA*.
A table-top THz source has been employed to study the nonlinear response of semiconductors to near-half-cycle intense femtosecond pulses. We report nonlinear field-induced changes in the far infrared absorption coefficient, associated with impact ionization processes.

**MONId.5 • 18:00**
**Clocking the Collapse of a Mott Gap**, *Simon Wall*[1], *Henry Ehrke*[1], *Arzang Ardavan*[1], *Andrea Cavalleri*[1], •*Daniele Brida*[2], *Strefano Bonora*[2], *Giulio Cerullo*[2], *H. Matsusaki*[3], *Hiroshi Okamoto*[3], *Y. Takahashi*[4], and *T. Hasegawa*[4]; [1]*Clarendon Laboratory, University of Oxford, Oxford, UK*, [2]*Dipartimento di Fisica, Politecnico di Milano, Italy*, [3]*Department of Physics, University of Tokyo, Japan*, [4]*Correlated Electron Research Center, Tsukuba, Japan*.
Impulsive photo-doping is used to initiate the collapse of a correlation gap in the Mott insulator ET-F2TCNQ. This electronic phase transition occurs within 19 fs, driven by carrier de-localization over approximately two unit cells.

**MONId.6 • 18:00**
**Transient Dielectric Function of Fs-Laser Excited Bismuth**, •*Andrei Rode*[1], *Davide Boschetto*[2], *Thomas Garl*[2], and *Antoine Rousse*[2]; [1]*Laser Physics Centre, The Australian National University, Canberra, ACT 0200, Australia*, [2]*Laboratory of Applied Optics, ENSTA/Ecole Polytechnic, Chemin de la huniere, Palaiseau, France*.
Time-resolved study of dielectric function of femtosecond laser excited bismuth demonstrates that excitation of coherent phonons leads to a solid-plasma phase transition, and into a quasi-stable excited state, which lasts up to 4 ns.

**MONId.7 • 18:00**
**Comparison of parallel and perpendicular polarized counterpropagating light for quasi-phase-matching high harmonic generation**, •*Tom Robinson*[1], *Kevin O'Keeffe*[1], *Matt Landreman*[2], *Brendan Dromey*[3], *Matt Zepf*[3], and *Simon Hooker*[1]; [1]*Department of Physics, Clarendon Laboratory, Oxford University, Parks Road, Oxford, OX1 3PU, United Kingdom*, [2]*Department of Physics, Massachusetts Institute of Technology, Cambridge, Massachusetts 02139, USA*, [3]*Department of Physics and Astronomy, Queend University Belfast, BT7 1NN, United Kingdom*.
The effect of the polarization of counter-propagating pulses on suppression of high harmonic generation is investigated. The results agree well with simple models of harmonic suppression and have application to quasi-phase-matching of harmonics.

**MONId.8 • 18:00**
**Picosecond electron deflectometry of optical-field ionized plasmas**, •*Martin Centurion*[1], *Peter Reckenthaeler*[1], *Sergei A. Trushin*[1], *Ferenc Krausz*[1,2], and *Ernst E. Fill*[1]; [1]*Max-Planck-Institut für Quantenoptik, , Hans-Kopfermann-Str. 1, D-85748 Garching, Germany*, [2]*Ludwig-Maximilians-Universität München, Am Coulombwall 1, D-85748 Garching, Germany*.
Abstract: We demonstrate a new method to image optical-field ionized (OFI) plasmas. Ultrashort electron pulses are directed onto a laser plasma. The deflection allows determination of features such as the field distribution and plasma charge.

**MONId.9 • 18:00**
**Coherent A1g and Eg Phonons of Antimony**, •*Kunie Ishioka*[1], *Masahiro Kitajima*[1], and *Oleg Misochko*[2]; [1]*Advanced Nano-characterizatrion Center, National Institute for Materials Science, 305-0047 Tsukuba, Japan*, [2]*Institute of Solid State Physics, Russian Academy of Sciences, 142432 Chernogolovka, Russia*.
Femtosecond dynamics of coherent phonons of antimony is investigated as a function of temperature and optical

polarization. Results indicate that coherent A1g phonons couple to photoexcited electrons much more strongly than Eg phonons.

**MONId.10 • 18:00**

**Transient waveguiding in a rotationally excited molecular gas**, •*Francesca Calegari*, *Caterina Vozzi*, *Sergei Gasilov*, *Enrico Benedetti*, *Giuseppe Sansone*, *Mauro Nisoli*, *Sandro De Silvestri*, and *Salvatore Stagira*; *Cnr-Infm Ultras, Dipartimento di Fisica, Politecnico di Milano, Milano, I-20133, Italy*.
Transient waveguiding and spectral broadening of a delayed probe pulse were observed in the wake of a laser filament in Nitrogen and Oxygen. The observed effects are ascribed to the excitation of rotational wavepackets.

**MONId.11 • 18:00**

**Time resolved structure evolution in protein coated gold nanoparticles probed by pulsed x-ray scattering**, •*Anton Plech*[1], *Hyotcherl Ihee*[2], *Marco Cammarata*[3], *Andreas Siems*[1], *Vassilios Kotaidis*[1], *Flavio Ciesa*[1], *Jangbae Kim*[2], *Kyung Hwan Kim*[2], and *Jae Hyuk Lee*[2]; [1]*Center for Applied Photonics, University of Konstanz, Universitätsstr. 10, D-78457 Konstanz*, [2]*ESRF, BP 220, 6, rue J. Horovitz, F-38043 Grenoble*, [3]*National Creative Research Initiative Center for Time-Resolved Diffraction, Department of Chemistry and School of Molecular Science (BK21), Korea Advanced Institute of Science and Technology (KAIST), Daejeon, 305-701, Republic of Korea*.
Laser-excited gold nanoparticles in aqueous suspension as nanoscale heat sources act on a short time on the surrounding. By employing pulsed x-ray scattering the structural reaction of an absorbed protein layer is temporally resolved.

**MONId.12 • 18:00**

**Chirped-pulse Raman amplification for two-color high-intensity**, *Peng Dong*, *Franklin Grigsby*, and •*Mike Downer*; *FOCUS Center, University of Texas at Austin, Department of Physics, Austin, TX 78712, USA*.
The poster has been rescheduled to THUIIIc.12.

**MONId.13 • 18:00**

**Generation of Ultrashort Optical Pulses Using Multiple Coherent Anti-Stokes Raman Scattering Signals in a Crystal and Observation of the Raman Phase**, •*Eiichi Matsubarfa*[1,2], *Taro Sekikawa*[1,2], and *Mikio Yamashita*[1,2]; [1]*Department of Applied Physics, Hokkaido University, Kita-13, Nishi-8, Kita-ku, Sapporo, 060-8628, Japan*, [2]*Core Research for Evolutional Science and Technology, Japan Science and Technology Agency, Japan*.
We have measured and controlled the spectral phase of multiple coherent anti-Stokes Raman-scattering signals in LiNbO3. Isolated pulses with 25-fs duration (640-780 nm) are generated and discrete phase shifts due to Raman coherence are observed.

**MONId.14 • 18:00**

**All dispersive mirrors compressor for femtosecond lasers**, •*Vladimir Pervak*[1], *Catherine Teisset*[2], *Atsushi Sugita*[2], *Ferenc Krausz*[2], and *Alexander Apolonski*[1]; [1]*Ludwig Maximilian University, Muhich, Germany*, [2]*Max-Planck-Institute of Quantum Optics*.
We report on the development of highly dispersive mirrors for chirped-pulse amplifiers (CPA). The designed mirrors are potentially capable of replacing the prisms in the existing CPA compressors making them more compact and stable.

**MONId.15 • 18:00**

**Time resolved photoemission spectroscopy in graphite**, •*Tadashi Togashi*[1,2], *Kazuya Yamamoto*[4,2], *Yukiaki Ishida*[2], *Masashi Tanaka*[3], *Toshiyuki Taniuchi*[3], *Atsushi Shimoyamada*[3], *Takayuki Kiss*[3], *Kyoko Ishizaka*[3], *Ashish Chainani*[2], *Yasutaka Takata*[2], *Makoto Nakajima*[3], *Tohru Suemoto*[3], *Tetsuya Ishikawa*[1,2], and *Shik Shin*[3,2]; [1]*XFEL Project Head Office RIKEN, 1-1-1 Sayo-cho, Sayo-gun, Hyogo 679-5148, Japan*, [2]*SPring8 Centre RIKEN, 1-1-1 Sayo-cho, Sayo-gun, Hyogo 679-5148, Japan*, [3]*Institute for Solid State Physics University of Tokyo, 5-1-5 Kashiwanoha Kashiwa, Japan*, [4]*Graduate School of Engineering, Osaka Prefecture University*.
We study electron dynamics in graphite with time resolved photoemission spectroscopy. Using the fourth harmonic (5.95 eV) and fundamental of a Ti:sapphire laser as a pump-probe, respectively, we observe a biexponential decay of excited electrons.

**MONId.16 • 18:00**

**Femtosecond spectral phase shaping for CARS spectroscopy and imaging**, •*Sytse Postma*, *Martin Jurna*, *Alexander van Rhijn*, *Jeroen Korterik*, *Jennifer Herek*, and *Herman Offerhaus*; *Optical Sciences Group, Department of Science and Technology, MESA+ Institute for Nanotechnology, University of Twente, P.O. Box 217, 7500 AE Enschede, The Netherlands*.
By high resolution spectral phase shaping of femtosecond pump and probe pulses in coherent anti-Stokes Raman scattering (CARS) we demonstrate spectroscopy with a precision of 1 $cm^{-1}$ and shaped CARS imaging.

**MONId.17 • 18:00**

**Exploring strong fields of laser irradiated foils and mass-limited targets**, •*Thomas Sokollik*[1], *Matthias Schnürer*[1], *Sargis Ter-Avetisyan*[1], *Peter- Viktor Nickles*[1], *Wolfgang Sandner*[1], *Toma Toncian*[2], *Munib Amin*[2], and *Oswald Willi*[2]; [1]*Max Born Institut, Max Born Str. 2a, D-12489 Berlin, Germany*, [2]*Heinrich Heine Universität Düsseldorf, D-40225 Düsseldorf, Germany*.
We present novel proton imaging techniques like ”streak deflectometry” and gated multi channel plates for the proton beam detection. Our investigations reveal well directed field components of irradiated water droplets responsible for ion beam formation.

**MONId.18 • 18:00**

**Electron density gradient measurement for laser wakefield accelerator**, •*Jaehoon Kim*[1], *Hyojae Jang*[2], *Min Sup Hur*[1], and *Jong-Uk Kim*[1]; [1]*Korea Electrotechnology Research Institute, Changwon, Kyungnam, 641-120, Rep. Korea*, [2]*Phohang University of Science and Technology, Pohang, Kyungbuk, 790-784, Rep. Korea*.
To make a sharp downward electron density transition, a shock structure of plasma channel was studied. Just after laser pulse, we could generate very sharp electron density transition which was measured by an interferometer.

**MONId.19 • 18:00**

**Cancellation of the coherent accumulation in rubidium atoms excited by a train of femtosecond pulses**, •*Ticijana Ban*, *Damir Aumiler*, *Hrvoje Skenderovic*, *Silvije Vdovic*, *Natasa Vujicic*, and *Goran Pichler*; *Institute of Physics, Bijenicka 46, Zagreb, Croatia*.

In present experiments gradual change from the frequency comb excitation to pulse by pulse excitation of Rb atoms is observed. Shown results could lead to the development of a new method for system coherence monitoring.

**MONId.20 • 18:00**

**Magnon-enhanced phonon damping at Gd(0001) and Tb(0001) surfaces**, *Alexey Melnikov*[1], *Alexey Povolotskiy*[2], and •*Uwe Bovensiepen*[1]; [1]*Freie Universität Berlin, Department of Physics, Arnimallee 14, 14195 Berlin-Dahlem, Germany*, [2]*St. Petersburg State University, Laser Research Institute, St. Petersburg, 198505, Russia*.

Phonon damping is investigated by time-resolved second harmonic generation at lanthanide surfaces. Near the Curie temperature we encounter an anomaly originating from phonon-magnon scattering evidenced by a more pronounced effect for Tb compared to Gd.

**MONId.21 • 18:00**

**Coherent Orbital Excitations in Photo-excited Manganites**, *Simon Wall*[1], *Dario Polli*[2], *Giulio Cerullo*[2], *Dharmalingam Prabhakaran*[1], *Andrew Boothroyd*[1], *Yoshinori Tokura*[3], *Yasuhide Tomioka*[3], and •*Andrea Cavalleri*[1]; [1]*Department of Physics, University of Oxford, Clarendon Laboratory, Parks Road, Oxford, OX1 3JP, UK*, [2]*Dipartimento di Fisica, Politecnico di Milano, P.za L. da Vinci 32, 20133 Milano, Italy*, [3]*Correlated Electron Research Center, Tsukuba, Japan*.

10-fs resolution pump-probe experiments are used to observe high-frequency coherent orbital excitations in the room temperature phase of 2D and 3D Colossal Magneto-Resistive manganites.

**MONId.22 • 18:00**

**Exciton Dephasing in Semiconducting Single-Walled Carbon Nanotubes**, •*Ying-Zhong Ma*[1], *Matthew W. Graham*[1], *Alexander A. Green*[2], *Samuel I. Stupp*[2], *Mark C. Hersam*[2], and *Graham R. Fleming*[1]; [1]*Department of Chemistry, University of California, Berkeley, and Physical Biosciences Division, Lawrence Berkeley National Laboratory, Berkeley, California 94720-1460, USA*, [2]*Department of Materials Science and Engineering, Northwestern University, Evanston, Illinois 60208-3108, USA*.

Two-pulse four-wave mixing experiments at various excitation intensities and temperatures enable the contributions of exciton-exciton and exciton-phonon scattering to exciton dephasing to be separated. We identify the dominant phonon mode, and estimate the homogeneous linewidth.

**MONId.23 • 18:00**

**Mode selective Excitation of Coherent Phonons in Bismuth by Femotosecond Pulse Pair**, •*Kazutaka Nakamura*[1], *Hiroshi Takahashi*[1], *Kunie Ishioka*[2], *Masahiro Kitajima*[2], *Jean-Christophe Delagnes*[3], *Hiroyuki Katsuki*[3], *Kouichi Hosaka*[3], *Hisashi Chiba*[3], *Kenji Ohmori*[3], *Kazuya Watanabe*[4], and *Yoshiyasu Matsumoto*[4]; [1]*Tokyo Institute of Technology, Yokohama, Japan*, [2]*National Institute for Materials Science, Tsukuba, Japan*, [3]*Institute of Molecular Science, Okazaki, Japan*, [4]*University of Kyoto, Kyoto, Japan*.

Coherent phonons (A1g and Eg modes) of bismuth are excited by irradiation of two femtosecond pulses. Amplitude and phase are controlled by change of intervals in a time range of vibrational period and/or optical cycle.

**MONId.24 • 18:00**

**Probing Anomalous Spectral Diffusion and Exciton Fluctuations by Coherent Multidimensional Spectroscopy**, •*Frantisek Sanda*[1] and *Shaul Mukamel*[2]; [1]*Charles University, Faculty of Mathematics and Physics, Ke Karlovu 5, 121 16 Praha, Czech Republic*, [2]*University of California, Department of Chemistry, Irvine, CA, USA*.

Novel signatures of anomalous algebraic spectral relaxation, non Gaussian fluctuations and bath-induced transition dipole moments in two dimensional optical lineshapes of excitonic aggregates are predicted using stochastic models with long algebraic relaxation tails.

**MONId.25 • 18:00**

**Efficient and Highly Coherent Extreme-Ultraviolet High-Harmonic Source**, •*Sven Teichmann*[1], *Bo Chen*[2], *Jeffrey Davis*[1], *Lap Van Dao*[1], and *Peter Hannaford*[1]; [1]*ARC Centre of Excellence for Coherent X-Ray Science and Centre for Atom Optics and Ultrafast Spectroscopy, Swinburne University of Technology, Hawthorn, Victoria 3122, Australia*, [2]*ARC Centre of Excellence for Coherent X-Ray Science and School of Physics, The University of Melbourne, Parkville, Victoria 3052, Australia*.

We report on a femtosecond-laser-based high-harmonic generation argon-cell source that efficiently delivers two to seven highly coherent and Gaussian-beam-like harmonics in a tuneable band from 26 to 43 nm.

**MONId.26 • 18:00**

**Electronically Driven Structural Dynamics of Si Resolved by Femtosecond Electron Diffraction**, •*Maher Harb*[1], *Weina Peng*[2], *Germán Sciaini*[1], *Christoph Hebeisen*[1], *Ralph Ernstorfer*[1], *Thibault Dartigalongue*[1], *Mark Eriksson*[2], *Max Lagally*[2], *Sergei Kruglik*[1], and *Dwayne Miller*[1]; [1]*Institute for Optical Sciences and Departments of Physics and Chemistry, University of Toronto, 80 St. George Street, Toronto, Ontario M5S 3H6, Canada*, [2]*University of Wisconsin-Madison, Madison, Wisconsin 53706, US*.

Femtosecond electron diffraction studies of (001)-oriented crystalline Si found that at low excitation, longitudinal and transverse [001] acoustic phonon modes were thermally excited. At ˜11% valence excitation, the lattice collapsed non-thermally in $<$500 fs.

**MONId.27 • 18:00**

**Molecular Recollision Interferometry in High Harmonic Generation**, •*Xibin Zhou*, *Robynne Lock*, *Nick Wagner*, *Wen Li*, *Henry Kapteyn*, and *Margaret Murnane*; *JILA and Department of Physics, University of Colorado, Boulder CO 80309-0440, USA*.

Using extreme-ultraviolet interferometry, we directly observe $\pi$ phase shifts in high harmonics generated from transiently aligned molecules. This data directly reflects the quantum interferences in the electron wave packet due to the two-center molecular structure.

**MONIe • Poster I e - Chemical Physics**

*Poster Area*
**18:00–20:00**
**MONIe • Poster I e - Chemical Physics**

**MONIe.1 • 18:00**
**Non-Condon vibronic coupling of coherent molecular vibration in MEH-PPV induced by a visible few-cycle pulse laser**, •*Takayoshi Kobayashi*[1,2], *Jun Zhang*[1], and *Zhuan Wang*[1]; [1]*Department of Applied Physics and Chemistry and Institute for Laser Science, The University of Electro-Communications, Chofu, Tokyo, 182-8585, Japan*, [2]*Department of Electrophysics, National Chiao Tung University, 1001 Hsin-Chu 3005,Taiwan*.
The dependence of coherent vibrational amplitudes at 128 wavelengths in MEH-PPV (EL polymer) with 1-fs resolution gave the evidence of non-Condon effect due to 11Bu-exciton strongly coupled with m-1Ag state essential in the third-order nonlinearity.

**MONIe.2 • 18:00**
**Discriminating Nearly Identical Biomolecules with Optimal Control**, •*Véronique Boutou*[1], *Matthias Roth*[2], *Laurent Guyon*[1], *Jon Roslund*[2], *François Courvoisier*[1,3], *Luigi Bonacina*[3], *Ariana Rondi*[3], *Jerome Extermann*[3], *Herschel Rabitz*[2], and *Jean-Pierre Wolf*[1,3]; [1]*Université Lyon 1, LASIM, UMR CNRS 5579, 43 bd du 11 Novembre 1918, F69622 Villeurbanne Cedex, France*, [2]*Department of Chemistry, Princeton University, Princeton, NJ 08544, USA*, [3]*GAP, University of Geneva, 20 rue de l'Ecole de Medecine, CH 1211 Geneva 4, Switzerland*.
We demonstrate that discriminating between the optical emission of nearly identical flavins in solution is possible by shaping the UV part of a complex multipulse control field, consistent with the concept of optimal dynamic discrimination.

**MONIe.3 • 18:00**
**Specific Channel of Energy Dissipation in Carotenoids: Coherent Spectroscopic Study**, •*Masazumi Fujiwara*[1], *Kensei Yamauchi*[1], *Mitsuru Sugisaki*[1], *Andrew Gall*[2], *Bruno Robert*[2], *Cogdell Richard*[3], and *Hideki Hashimoto*[1]; [1]*CREST-JST and Department of Physics, Graduate School of Science, Osaka City University, 3-3-138 Sugimoto, Sumiyoshi-ku, Osaka 558-8585, Japan*, [2]*Commissariat a l'Energie Atomique (CEA), Institut de Biologie et Technologies de Saclay (iBiTecS) and Centre National de la Recherche Scientifique (CNRS), Gif-sur-Yvette, F-91191, France*, [3]*Institute of Biomedical & Life Sciences, Glasgow Biomedical Research Centre, University of Glasgow, Glasgow G12 8QQ, Scotland, UK*.
We investigated transient grating signals in $\beta$-carotene homologues which were measured using sub-20-fs optical pulses. The results clearly show that the central C=C stretching mode is the major channel of energy dissipation to the environment.

**MONIe.4 • 18:00**
**Ultrafast dynamics of light-harvesting function of $\beta$-carotene in carbon nanotubes**, •*Masayuki Yoshizawa*[1,2], *Kenta Abe*[1], *Daisuke Kosumi*[1], *Kazuhiro Yanagi*[3], *Yasumitsu Miyata*[3], and *Yutaka Kataura*[2,3]; [1]*Department of Physics, Graduate School of Science, Tohoku University, Sendai 980-8578, Japan*, [2]*JST, CREST, Kawaguchi, Saitama, 332-0012, Japan*, [3]*Nanotechnology Institute, National Institute of Advanced Industrial Science and Technology, Tsukuba, 305-8562, Japan*.
Ultrafast dynamics of $\beta$-carotene encapsulated in single-walled carbon nanotubes (SWCNTs) was investigated by femtosecond absorption spectroscopy. Energy transfer from the excited states of $\beta$-carotene to SWCNTs (light-harvesting function) has been observed.

**MONIe.5 • 18:00**
**Dissociative Ionization Dynamics of Ethanol Molecule with High Intensity Femtosecond Pump-Probe Excitation**, •*Hiroki Yazawa*[1], *Hiroshi Hashimoto*[1], *Kannari Fumihiko*[1], *Itakura Ryuji*[2], and *Yamanouchi Kaoru*[2]; [1]*Department of Electronics and Electrical Engineering, Keio University*, [2]*Department of Chemistry, School of Sciene, The University of Tokyo, 113-0033, Japan*.
Using various types of intense femtosecond pump-probe excitation, the vibrational wavepacket dynamics and the deformation of laser-induced potential energy surface relevant to C-C bond and C-O bond breaking reaction of ethanol molecules was experimentally studied.

**MONIf • Poster I f - Chemistry**

*Poster Area*
**18:00–20:00**
**MONIf • Poster I f - Chemistry**

**MONIf.1 • 18:00**
**Mid-IR-Induced Nuclear Wavepacket Motion of a Hydrogen Bonding System: Effects of Mechanical and Electrical Anharmonic Couplings**, •*Kunihiko Ishii*, *Satoshi Takeuchi*, and *Tahei Tahara*; *Molecular Spectroscopy Laboratory, RIKEN, 2-1 Hirosawa, Wako, Saitama 351-0198, Japan*.
Coherent hydrogen-bond stretching vibration was observed by probing ultrafast visible absorption change after mid-infrared excitation of a hydrogen-bonded chromophore. The underlying mechanism was discussed on a theoretical basis considering mechanical and electrical anharmonicities.

**MONIf.2 • 18:00**
**Ultrafast Photodecomposition of Dibenzoyl Peroxide studied by Time-Resolved Infrared Spectroscopy**, *Christian Reichardt*[1], *Tim Schäfer*[1], *Jörg Schroeder*[2], *Peter Vöhringer*[3], and •*Dirk Schwarzer*[1]; [1]*Max-Planck-Institut für biophysikalische Chemie, Göttingen, Germany*, [2]*Institut für Physikalische Chemie, Georg-August-Universität Göttingen, Göttingen, Germany*, [3]*Institut für Physikal. & Theoret. Chemie, Universität Bonn, Germany*.
The photodissociation of dibenzoyl peroxide is controlled by its S1-lifetime and in 0.4 ps leads to a benzoyloxy/phenyl radical pair plus CO2 via concerted bond breakage of the O-O and the phenyl-C(carbonyl) bond.

**MONIf.3 • 18:00**
**Real-Time Monitoring of Structural Evolution in Cis-Stilbene Photoisomerization by Ultrafast Time-Domain Raman Spectroscopy**, •*Satoshi Takeuchi*[1], *Sanford Ruhman*[2], *Takao Tsuneda*[3], *Mahito Chiba*[4], *Tetsuya Taketsugu*[5], and *Tahei Tahara*[1]; [1]*Molecular Spectroscopy Laboratory, RIKEN, Wako 351-0198, Japan*, [2]*Department of Physical Chemistry, Hebrew University, Jerusalem 91904, Israel*, [3]*School of Engineering, The University of Tokyo, Tokyo 113-8656, Japan*, [4]*National Institute of Advanced Industrial Science and Technology, Tsukuba 305-6568, Japan*, [5]*Graduate School of Science, Hokkaido University, Sapporo 060-0810, Japan*.
We studied the vibrational structure of reactive S1 cis-stilbene through wavepacket motions generated impulsively at various delay-times. They showed gradual frequency downshift, demonstrating highly anharmonic nature of the excited-state potential and structural evolution with photoisomerization.

**MONIf.4 • 18:00**
**Direct Femtosecond Observation of Tight and Loose Ion Pairs upon Photoinduced Bimolecular Electron Transfer**, *Omar F. Mohammed*[1], *Katrin Adamczyk*[2], *Natalie Banerji*[1], *Jens Dreyer*[2], *Bernhard Lang*[1], •*Erik T. J. Nibbering*[2], and *Eric Vauthey*[1]; [1]*Department of Physical Chemistry, University of Geneva, 30 Quai Ernest-Ansermet, CH-1211 Geneva 4, Switzerland*, [2]*Max Born Institut für Nichtlineare Optik und Kurzzeitspektroskopie, Max-Born-Strasse 2 A, D-12489 Berlin, Germany*.
We observe tight and loose ion pairs in bimolecular electron transfer with ultrafast infrared spectroscopy. For large exergonicity tight donor-acceptor pairs do not rearrange into loose complexes before the reaction proceeds, contrasting generally accepted models.

**MONIf.5 • 18:00**
**Orientational dynamics of OH- in liquid water**, •*Søren Rud Keiding*, *Svend Knak Jensen*, *Christian Petersen*, and *Jan Thøgersen*; *Department of Chemistry, University of Aarhus, Denmark*.
Using transient absorption spectroscopy we have studied the rotational anisotropy of the charge transfer to solvent transition in OH- in liquid water. Measurements are performed in a thin liquid jet as function of temperature.

**MONIf.6 • 18:00**
**Pathways of vibrational relaxation after N-H stretching excitation in intermolecular hydrogen bonds**, •*Valeri Kozich*, *Jens Dreyer*, and *Wolfgang Werncke*; *Max-Born-Institut, Max-Born-Strasse 2A, D-12489 Berlin, Germany*.
Pathways of vibrational relaxation of azaindole dimers after NH stretching excitation have been studied by picosecond infrared-pump/anti-Stokes resonance Raman-probe spectroscopy. Our measurements indicate relaxation via a manifold of vibrations with N-H bending character.

**MONIf.7 • 18:00**
**Ultrafast Charge Migration Following Ionization in Oligopeptides**, •*Alexander I. Kuleff*, *Siegfried Lünnemenn*, and *Lorenz S. Cederbaum*; *Theoretische Chemie, PCI, Universität Heidelberg, Im Neuenheimer Feld 229, 69120 Heidelberg, Germany*.
Electron correlation can be the driving force for ultrafast charge migration. Using ab initio calculations we demonstrate that the positive charge created by ionization of an oligopeptide can migrate throughout the system within just few femtoseconds.

**MONIf.8 • 18:00**
**Origin of Negative and Dispersive Anti-Stokes Features in Femtosecond Stimulated Raman Spectroscopy**, •*Renee Frontiera*, *Sangdeok Shim*, and *Richard Mathies*; *Department of Chemistry, University of California, Berkeley, California 94720*.
Negative anti-Stokes femtosecond stimulated Raman features seen off-resonance and dynamic dispersive lineshapes seen on resonance are experimentally characterized and explained by multiple four-wave mixing processes that contribute to the total signal.

**MONIf.9 • 18:00**
**Reactive Dynamics in Constrained Environments**, •*Minako Kondo*, *Ismael Heisler*, and *Stephen Meech*; *University of East Anglia, Norwich, UK*.
Ultrafast excited state reactions of Auramine are studied in inverse micelles with water droplets between 1 and 10nm. Dynamics, inhomogeneous and a function of droplet size, are discussed in terms of interfacial and confinement effects.

**MONIf.10 • 18:00**
**Symmetry Dependent Solvation of Donor-Substituted Triarylboranes**, •*Uwe Megerle*[1], *Christoph Lambert*[2], *Eberhard Riedle*[1], and *Stefan Lochbrunner*[1,3]; [1]*LS für BioMolekulare Optik, LMU München, Oettingenstr. 67, D-80538 Munich, Germany*, [2]*Institut für Organische Chemie, Universität Würzburg, Am Hubland, D-97074 Würzburg, Germany*, [3]*Institut für Physik, Universität Rostock*,

*Universitätsplatz 3, D-18055 Rostock, Germany*.
Femtosecond transient absorption reveals an accelerated solvation for a highly symmetric donor-substituted triarylborane compared to its less symmetric counterpart. We explain this by ultrafast intramolecular charge delocalization over the subchromophores of the symmetric compound.

**MONIf.11 • 18:00**
**Substitution- and Temperature-Effects on Hemithioindigo Photoisomerization - The Relevance of Energy Barriers**, •*Thorben Cordes*[1], *Torsten Schadendorf*[2], *Markus Lipp*[1], *Karola Rück-Braun*[2], and *Wolfgang Zinth*[1]; [1]*LS für BioMolekulare Optik, LMU München, Oettingenstraße 67, D-80538 München, Germany*, [2]*TU-Berlin, Institut für Chemie, Straße des 17. Juni 135, D-10623 Berlin, Germany*.
The kinetics of the Z to E photoisomerization of Hemithioindigo with variations of substitution and temperature are investigated using transient absorption spectroscopy. Effective tuning of energy barriers in the excited electronic state can be achieved by chemical substitution.

**MONIf.12 • 18:00**
**Coherent Control of Retinal Isomerization in Bacteriorhodopsin in the High Intensity Regime**, *Andrei C. Florean*[1], *David Cardoza*[2], *James L. White*[2], *Janos K. Lanyi*[3], •*Roseanne J. Sension*[1], and *Philip H. Bucksbaum*[2,4]; [1]*Department of Physics, University of Michigan, Ann Arbor, MI 48109, USA*, [2]*Department of Physics, Stanford University, Stanford, CA 94305, USA*, [3]*School of Medicine, University of California, Irvine, CA 92697, USA*, [4]*PULSE Center, SLAC, Menlo Park, CA 94025, USA.*
This paper has been moved to TUE2A.2.

**MONIf.13 • 18:00**
**Attosecond electron dynamics in the conduction band of organic electronic materials**, •*Hiromi Ikeura-Sekiguchi*[1] and *Tetsuhiro Sekiguchi*[2]; [1]*National Institute of Advanced Industrial Science and Technology (AIST), Central 2-5, 1-1-1 Umezono, Tsukuba, Ibaraki 305-8568, Japan*, [2]*Japan Atomic Energy Agency (JAEA), Tokai, Naka, Ibaraki 319-1195, Japan*.
Attosecond electron-delocalization time can be probed by core-hole-clock method. The method has been applied to probe electron delocalization through the empty conduction band or electron tunnelling into the continuum for organic electronic materials.

**MONIg • Poster I g - Biology**

*Poster Area*
**18:00–20:00**
**MONIg • Poster I g - Biology**

**MONIg.1 • 18:00**
**Coherent Control of Chirality-Induced 2D Electronic Spectroscopy Signals**, •*Dmitri Voronine*[1], *Darius Abramavicius*[2], and *Shaul Mukamel*[2]; [1]*Physikalisches Institut, Universitaet Wuerzburg, Germany*, [2]*University of California Irvine, California, USA*.
Chirality-induced 2D electronic spectra, calculated to first order in k, reveal new spectral features. Coherent control is used to optimize resolution of energy transfer pathways in Fenna-Matthews-Olson complex from photosynthetic green sulfur bacteria.

**MONIg.2 • 18:00**
**Two Photon Two Color Generation of Zeaxanthin Radical Cation in CP29 Light Harvesting Complex**, •*Sergiu Amarie*[1], *Laura Wilk*[2], *Tiago Barros*[2], *Werner Kühlbrandt*[2], *Andreas Dreuw*[1], and *Josef Wachtveitl*[1]; [1]*Institute for Physical and Theoretical Chemistry, Johann Wolfgang Goethe-University Frankfurt, Max von Laue-Str. 7, 60438 Frankfurt am Main, Germany*, [2]*Max Plank Institute of Biophysics, Department of Structural Biology, Max von Laue-Str. 3, 60438 Frankfurt am Main, Germany*.
Recent theoretical and experimental studies reveal the central role of zeaxanthin radical cations in regulation of photosynthetic light harvesting. Two-color two-photon spectroscopy on LHC-II protein CP29 reveals the in-situ photodynamics of zeaxanthin radical cations.

**MONIg.3 • 18:00**
**Rebinding of Proximal Histidine in the Cytochrome c' from Alcaligenes xylosoxidans Acts as a Molecular Trap for Nitric Oxide**, •*Byung-Kuk Yoo*[1], *Jean-Louis Martin*[1], *Colin R. Andrew*[2], and *Michel Negrerie*[1]; [1]*Laboratory for Optics and Biosciences, INSERM U696, CNRS UMR 7645, Ecole Polytechnique, 91128 Palaiseau cedex, France*, [2]*Department of Chemistry and Biochemistry, Eastern Oregon University, La Grande, Oregon 97850, USA*.
Transient absorption on cytochrome c' was recorded to identify the formation of 5-coordinate(5c)-NO and 5c-His hemes from 4c-heme (99% and 1% amplitudes; 7-ps and 100-ps time constants). We demonstrated that proximal histidine precludes NO rebinding.

**MONIg.4 • 18:00**
**Two-Dimensional Electronic Spectroscopy of the Low-Light Adapted Light Harvesting Complex 4**, •*Elizabeth L. Read*[1,2], *Gabriela S. Schlau-Cohen*[1,2], *Gregory S. Engel*[3], *Toni Georgiou*[4], *Miroslav Z. Papiz*[4], and *Graham R. Fleming*[1,2]; [1]*Department of Chemistry, University of California, Berkeley, CA 94720, USA*, [2]*Physical Biosciences Division, Lawrence Berkeley National Laboratory, Berkeley, CA 94720, USA*, [3]*Current Address: Department of Chemistry, The University of Chicago, Chicago, IL, 60637, USA*, [4]*Department of Synchrotron Radiation, STFC Daresbury Laboratory, Warrington, Cheshire WA4 4AD, United Kingdom*.
Two-dimensional electronic spectroscopy of Light Harvesting Complex 4 from photosynthetic bacteria reveals excited state dynamics on two different timescales and the presence of weakly absorbing states that mediate energy transfer to other complexes.

**MONIg.5 • 18:00**
**Three-pulse photon echo spectroscopy as a probe of flexibility and conformational heterogeneity in protein folding**, •*Emily A. Gibson* and *Ralph Jimenez*; *JILA and Department of Chemistry & Biochemistry, University of Colorado, Boulder USA*.
Abstract: We investigate the equilibrium unfolding of Zn-cytochrome c by three-pulse photon echo peak shift (3PEPS) spectroscopy, revealing denaturant-dependent timescales of protein motion and inhomogenous broadening. Results are consistent with a two-state model.

**MONIg.6 • 18:00**
**Ultrafast rebinding of CO to carboxymethyl cytochrome c probed by femtosecond vibrational spectroscopy**, *Jooyoung Kim*, *Jaeheung Park*, *Taegon Lee*, and •*Manho Lim*; *Department of Chemistry and Chemistry institute for Functional Materials, Pusan National University, Busan, 609-735 Korea*.
The relationships between protein dynamics, structure and function is elucidated by comparing femtosecond vibrational spectra of CO photolyzed from carboxymethyl cytochrome c in aqueous solution with those from ligand binding heme proteins.

## TUE1 • High Harmonics as Structural Probes

*Auditorium*
**8:30–10:15**
**TUE1 • High Harmonics as Structural Probes**
*Chair: Stephen Leone, University of California and Lawrence Berkeley National Laboratory, USA*

**TUE1.1 • 8:30** **•Invited•**

**Ultrafast Molecular and Materials Dynamics probed by Coherent X-Rays**, •*Margaret Murnane* and *Henry Kapteyn*; *JILA, University of Colorado, Boulder, CO, USA*.
Ultrafast short-wavelength light is ideal as a probe of complex, highly-excited, systems. We observe for the first time the decay of core-excited atoms adsorbed onto a surface, and core-excited molecular dissociation.

**TUE1.2 • 9:00**
**Large Amplitude Modulation of High-Order Harmonic Generation from Vibrationally Excited Molecules**, •*Wen Li*[1], *Xibin Zhou*[1], *Robynne Lock*[1], *Henry Kapteyn*[1], *Margaret Murnane*[1], *Serguei Patchkovskii*[2], and *Albert Stolow*[2]; [1]*JILA and Department of Physics, University of Colorado, Boulder, CO, 80309*, [2]*Steacie Institute of Molecular Sciences, National Research Council of Canada, Ottawa, ON Canada*.
We observe large vibrationally-induced modulations in high harmonic conversion in N2O4. We explain this result as due to different electronic states of cations, leading to preferential emission at the outer turning point of the vibration.

**TUE1.3 • 9:15**
**HOMO-1 Contribution in High Harmonic Generation**, •*Markus Guehr*, *Brian K. McFarland*, *Joseph P. Farrell*, and *Philip H. Bucksbaum*; *Stanford PULSE Center, Physics Department, Stanford University CA 94305 and SLAC CA 94025, USA*.
We observe the contribution of the HOMO-1 orbital in high harmonic generation on $N_2$ and discuss the harmonic modulation in the rotational revivals.

**TUE1.4 • 9:30**
**Ultrafast Multiphoton Crystallography**, •*Marina Gertsvolf*[1,2], *Hubert Jean-Ruel*[1], *Pattathil P. Rajeev*[1], *David M. Rayner*[1], and *Paul B. Corkum*[1]; [1]*National Research Council of Canada, Ottawa, Ontario K1A 0R6, Canada*, [2]*University of Ottawa, Ottawa, Ontario K1N 6N5, Canada*.
We show that non-resonant multiphoton ionization of dielectric crystals depends on the alignment of the laser field to the crystal lattice. Through absorption measurements we probe the local symmetry non-invasively, anywhere inside the sample.

**TUE1.5 • 9:45**
**High-order harmonic generation in high intensity laser-solid interactions**, •*Cedric Thaury*[1], *Fabien Quere*[1], *Herve George*[1], *Jean-Paul Geindre*[2], *Pascal Monot*[1], and *Philippe Martin*[1]; [1]*Service des Photons, Atomes et Molécules, Commissariat à l'Energie Atomique, DSM/DRECAM, CEN Saclay, 91191 Gif-sur-Yvette, France*, [2]*Laboratoire pour l'Utilisation des Lasers Intenses, CNRS, Ecole Polytechnique, 91128 Palaiseau, France*.
We will discuss the two mechanisms involved in high-order harmonic generation from plasma mirrors, and show that they can be clearly identified experimentally. The phase and coherence properties of these harmonics will be analyzed.

**TUE1.6 • 10:00**
**Feasibility of probing coherent optical phonons by Extreme Ultraviolet radiation based on high-order harmonic generation**, •*Evangelos Papalazarou*[1], *Davide Boschetto*[1], *Julien Gautier*[1], *Constance Valentin*[1], *Marino Marsi*[2], *Philippe Zeitoun*[1], and *Philippe Balcou*[3]; [1]*Laboratoire d'Optique Appliquée, Chemin de la Hunière, F-91761 Palaiseau, France*, [2]*Laboratoire de Physique des Solides, Bât 510, Université Paris-Sud, 91405 Orsay, France*, [3]*Centre Lasers Intenses et Applications, Université Bordeaux 1, CNRS, CEA, Domaine du Haut Carré, 351 Cours de la Libération, 33405 Talence, France*.
We report a new experimental approach used to time-resolve coherent high-amplitude optical phonons within the Brillouin zone of a Bismuth (111) crystal by extreme ultraviolet (XUV) femtosecond pulses based on high-order harmonic generation in rare gases.

**TUE2A • Control of Molecular Processes**

*Auditorium*
**10:45–12:30**
**TUE2A • Control of Molecular Processes**
*Chair: Regina de Vivie-Riedle, Department Chemie und Biochemie, LMU München, München, Germany*

**TUE2A.1 • 10:45**
**Femtosecond pulse shaping for measurements at the nano-scale**, •*Fernando D. Stefani*[1], *Daan Brinks*[1], and *Niek F. van Hulst*[1,2]; [1]*ICFO, Mediterranean Technology Park, 08860 Castelldefels (Barcelona), Spain*, [2]*ICREA - Inst. Catalana de Recerca i Estudis Avancats, 08015, Barcelona, Spain*.
With the aim of applying shaped optical pulses to the investigation of individual nano-systems and molecules, the implications of spatio-temporal distortions induced by different shaping techniques are investigated.

**TUE2A.2 • 11:00**
**Coherent Control of Retinal Isomerization in Bacteriorhodopsin in the High Intensity Regime**, *Andrei C. Florean*[1], *David Cardoza*[2], *James L. White*[2], *Janos K. Lanyi*[3], •*Roseanne J. Sension*[1], and *Philip H. Bucksbaum*[2,4]; [1]*Department of Physics, University of Michigan, Ann Arbor, MI 48109, USA*, [2]*Department of Physics, Stanford University, Stanford, CA 94305, USA*, [3]*School of Medicine, University of California, Irvine, CA 92697, USA*, [4]*PULSE Center, SLAC, Menlo Park, CA 94025, USA*.
We use a learning algorithm to optimize retinal isomerization in bacteriorhodopsin. The yield increases linearly beyond the saturation of the first excited state. The results are modeled including the influence of one-photon and multiphoton transitions.

**TUE2A.3 • 11:15**
**Quantum Control of the Photoinduced Wolff Rearrangement of Diazonaphthoquinone in the Condensed Phase using Mid-Infrared Spectroscopy**, *Daniel Wolpert*[1], *Marco Schade*[2], *Gustav Gerber*[1], and •*Tobias Brixner*[1,2]; [1]*Physikalisches Institut, Universität Würzburg, Am Hubland, 97074 Würzburg, Germany*, [2]*Institut für Physikalische Chemie, Universität Würzburg, Am Hubland, 97074 Würzburg, Germany*.
A shaped ultraviolet pump - mid-infrared probe setup is employed for spectroscopy and quantum control of the photoinduced Wolff rearrangement of diazonaphthoquinone in the condensed phase.

**TUE2A.4 • 11:30**
**Coherent Control of Matter Waves Passing Through a Conical Intersection in $\beta$-Carotene**, •*Jürgen Hauer*[1], *Tiago Buckup*[1], *Judith Voll*[2], *Regina de Vivie-Riedle*[2], and *Marcus Motzkus*[1]; [1]*Physikalische Chemie, Philipps Universität Marburg, D-35043 Marburg, Germany*, [2]*Department Chemie, Ludwig-Maximilians-Universität, Butenandt-Str. 11, D-81377 München, Germany*.
The interplay between structural and electronic dynamics near a conical intersection in $\beta$-carotene is disclosed by coherent control. A low-frequency coupling mode is found to determine the ultrafast relaxation rate between the involved electronic states.

**TUE2A.5 • 11:45**
**Mode selective single-beam coherent anti-Stokes Raman scattering**, •*Paul Wrzesinski*[1], *Haowen Li*[2], *D. Ahmasi Harris*[1], *Bingwei Xu*[1], *Vadim Lozovoy*[1], and *Marcos Dantus*[1]; [1]*Department of Chemistry, Michigan State University, East Lansing MI 48824*, [2]*BioPhotonic Solutions Inc. Okemos MI 48864*.
We report the detection of chemicals using a single-beam coherent anti-Stokes Raman scattering (CARS) technique. Characteristic Raman lines for several chemicals were successfully obtained from a 12 m standoff distance.

**TUE2A.6 • 12:00**
**Early Time Vibrationally hot Ground-State Dynamics in $\beta$-Carotene Investigated with Pump-Degenerate Four Wave Mixing (Pump-DFWM)**, •*Tiago Buckup*, *Jürgen Hauer*, *Jens Möhring*, and *Marcus Motzkus*; *Physikalische Chemie, Philipps Universität Marburg, D-35043 Marburg, Germany.*.
Pump-DFWM is used to study the early events in structural and electronic population dynamics of the $S_2$, $S_1$ and hot-$S_0$ states of $\beta$-carotene. New evidence to the existence of a long-lived hot-$S_0$ is discussed.

**TUE2A.7 • 12:15**
**Surface Femtochemistry: Investigation and Optimization of Bond-Forming Chemical Reactions**, *Patrick Nuernberger*[1,2], *Daniel Wolpert*[1], *Horst Weiss*[3], and •*Gustav Gerber*[1]; [1]*Physikalisches Institut, Universität Würzburg, Am Hubland, 97074 Würzburg, Germany*, [2]*Institut für Physikalische Chemie, Universität Würzburg, Am Hubland, 97074 Würzburg, Germany*, [3]*BASF AG, Polymer Research Division, 67056 Ludwigshafen, Germany*.
We investigate femtosecond laser-induced surface reactions by varying the properties of the surface, the reactant gases, and the laser. In optimal control experiments, we selectively manipulate the bond-forming catalytic reactions.

**TUE2P • Applications of Ultrafast Pulses**

*Panoramica*
**10:45–12:30**
**TUE2P • Applications of Ultrafast Pulses**
*Chair: Uwe Bovensiepen, Fachbereich Physik, Freie Universitaet Berlin, Germany*

**TUE2P.1 • 10:45**
**Filament-induced electric events in thunderstorms**, •*Jérôme Kasparian*[1,2], *Roland Ackermann*[1], *Yves-Bernard André*[3], *Grégoire Méchain*[3], *Guillaume Méjean*[1], *Bernard Prade*[3], *Philipp Rohwetter*[4], *Estelle Salmon*[1], *L.A. Vern Schlie*[5], *Kamil Stelmaszczyk*[4], *Jin Yu*[1], *André Mysyrowicz*[3], *Roland Sauerbrey*[6], *Ludger Wöste*[4], and *Jean-Pierre Wolf*[1,2]; [1]*Teramobile, Université Lyon 1; CNRS; LASIM UMR 5579, 43 Bd du 11 novembre 1918, F-69622 Villeurbanne Cedex, France*, [2]*GAP, Université de Genève, 20 rue de l'ecole de Médecine, CH-1211 Genève 4, Switzerland*, [3]*Teramobile, LOA, UMR CNRS 7639, ENSTA-Ecole Polytechnique, Chemin de la Hunière, F-91761 Palaiseau Cedex, France*, [4]*Teramobile, Institut für Experimentalphysik, Freie Universität Berlin, Arnimallee 14, D-14195 Berlin, Germany*, [5]*Directed Energy Directorate (AFRL/DELS), Air Force Research Laboratory, 3550 Aberdeen Blvd, SE, Kirtland AFB, NM 87117, USA*, [6]*Teramobile, Institut für Optik und Quantenelektronik, Friedrich Schiller Universität, Max-Wien-Platz 1, D-07743 Jena, Germany*.
Following positive laboratory-scale experiments, we investigated the ability to trigger real-scale lightning using ionized filaments generated by ultrashort laser pulses in the atmosphere. Under thunderstorm conditions, we observed electric events synchronized with the laser pulses.

**TUE2P.2 • 11:00**
**Optimizing laser-induced refractive index changes in "thermal" glasses**, •*Razvan Stoian*[1], *Alexandre Mermillod-Blondin*[1], *Cyril Mauclair*[1], *Nicolas Huot*[1], *Eric Audouard*[1], *Igor M. Burakov*[2], *Nadezhda M. Bulgakova*[2], *Yuryi P. Meschcheryakov*[3], *Arkadi Rosenfeld*[4], and *Ingolf V. Hertel*[4]; [1]*Laboratoire Hubert Curien (UMR 5516 CNRS), Université Jean Monnet, 18 rue Pr. Benoit Lauras, 42000 Saint Etienne, France*, [2]*Institute of Thermophysics SB RAS, 1 Acad. Lavrentyev Avenue, 630090 Novosibirsk, Russia*, [3]*Design and Technology Branch of Lavrentyev Institute of Hydrodynamics SB RAS, Tereshkovoi Street 29, 630090 Novosibirsk, Russia*, [4]*Max-Born-Institut für Nichtlineare Optik und Kurzzeitspektroskopie, Max-Born-Straße 2a, 12489 Berlin,*.
Ultrafast laser radiation induces negative refractive index changes in glasses characterized by high thermal expansion. Programmable tailoring of laser intensity envelopes can create positive refractive index changes and guiding structures may thus be generated.

**TUE2P.3 • 11:15**
**Femtosecond laser fabrication for the integration of optical sensors in microfluidic lab-on-chip devices**, •*Roberto Osellame*[1], *Rebeca Martinez Vazquez*[1], *Chaitanya Dongre*[2], *Roland Dekker*[2], *Hugo Hoekstra*[2], *Roberta Ramponi*[1], *Markus Pollnau*[2], and *Giulio Cerullo*[1]; [1]*IFN-CNR, Dipartimento di Fisica del Politecnico, Milano, Italy*, [2]*IOMS, University of Twente, The Netherlands*.
Femtosecond lasers enable the fabrication of both optical waveguides and buried microfluidic channels on a glass substrate. The waveguides are used to integrate optical detection in a commercial microfluidic lab-on-chip for capillary electrophoresis.

**TUE2P.4 • 11:30**
**Tailored Femtosecond Pulses for Nanoscale Laser Processing of Dielectrics**, *Lars Englert*[1], *Matthias Wollenhaupt*[1], *Lars Haag*[1], *Cristian Sarpe-Tudoran*[1], *Baerbel Rethfeld*[2], and •*Thomas Baumert*[1]; [1]*Institut fuer Physik und CINSaT, Universitaet Kassel, , Heinrich-Plett-Str. 40, D-34132 Kassel, Germany*, [2]*Fachbereich Physik, Technische Universitaet Kaiserslautern, Erwin-Schroedinger-Strasse 46, D-67663 Kaiserslautern, Germany*.
Laser control of two basic ionization processes in dielectrics on intrinsic time and intensity scales with temporally asymmetric pulse trains is investigated. We create robust structures one order below the diffraction limit.

**TUE2P.5 • 11:45**
**Electric Field Detection of Near-Infrared Light Using Photoconductive Sampling**, •*Masaaki Ashida*[1,2], *Ryota Akai*[1], *Hiroshi Shimosato*[1], *Ikufumi Katayama*[3], *Katsuhiko Miyamoto*[4], and *Hiromasa Ito*[4,5]; [1]*Graduate School of Engineering Science, Osaka University, 1-3 Machikaneyama-cho, Toyonaka, 560-8531, Japan*, [2]*PRESTO, Japan Science and Technology Agency, 4-1-8, Honcho, Kawaguchi, Saitama 332-0012, Japan*, [3]*Interdisciplinary Research Center, Yokohama National University, 79-7 Tokiwadai, Hodogaya, Yokohama, 240-8501, Japan*, [4]*RIKEN, 519-1399 Aramaki-Aoba, Aoba, Sendai 980-0845, Japan*, [5]*Graduate School of Engineering, Tohoku University, 6-6-04 Aramaki-Aoba, Aoba, Sendai 980-8579, Japan*.
We demonstrated electric field detection of light using photoconductive sampling with a combination of ultrashort laser pulses of 5fs duration and a DAST crystal. We successfully observed near-infrared component beyond 170THz.

**TUE2P.6 • 12:00**
**Fluorescence-detected two-dimensional electronic coherence spectroscopy by acousto-optic phase modulation**, *Patrick F. Tekavec*, *Geoffrey A. Lott*, and •*Andrew H. Marcus*; *University of Oregon, Eugene, USA*.
We present a robust and high signal-to-noise strategy for phase-selective ultrafast electronic coherence spectroscopy. We demonstrate our approach using atomic Rb, isolating specific non-linear signal contributions to the excited state population.

**TUE2P.7 • 12:15**
**Single-pulse stand-off nonlinear Raman spectroscopy**, •*Adi Natan*[1], *Ori Katz*[1], *Salman Rosenwaks*[2], and *Yaron Silberberg*[1]; [1]*Department of Physics of Complex Systems, Weizmann Institute of Science, Rehovot, 76100 Israel*, [2]*Department of Physics, Ben Gurion University of the Negev, Beer Sheva 84105, Israel*.
We demonstrate fast stand off single-pulse coherent anti-Stokes Raman spectroscopy, from trace amounts of various materials, under ambient light conditions, using shaped femtosecond pulses.

## TUE3 • Coherent Molecular Dynamics

*Auditorium*
**14:00–15:45**
**TUE3 • Coherent Molecular Dynamics**
*Chair: Margaret Murnane, JILA, University of Colorado, Boulder, CO, USA*

**TUE3.1 • 14:00** •Invited•

**Ultrafast X-ray probing of electron dynamics**, •*Stephen R Leone*; *University of California and LBNL, Berkeley, CA, USA*.
High order harmonic generation is used both to probe atomic and molecular processes through core level spectroscopy and to generate isolated attosecond pulses to study the timescales of electronic dynamics.

**TUE3.2 • 14:30**
**Polarization-Resolved Pump-Probe Spectroscopy with High Harmonics**, •*Eric Mével*[1], *Yann Mairesse*[1], *Stefan Haessler*[2], *Baptiste Fabre*[1], *Julien Higuet*[1], *Willem Boutu*[2], *Pierre Breger*[2], *Eric Constant*[1], *Dominique Descamps*[1], *Stéphane Petit*[1], and *Pascal Salières*[2]; [1]*CELIA, Université Bordeaux 1, UMR 5107 (CNRS, Bordeaux 1, CEA), 351 Cours de la Libération, 33405 Talence Cedex, France*, [2]*CEA-Saclay, DSM, Service des Photons, Atomes et Molécules, 91191 Gif-sur-Yvette, France*.
High Harmonic generation can be used as a probe of the emitting medium with attosecond and Angström resolutions. We show that polarization-resolved pump-probe spectroscopy with high harmonics improves the detection sensitivity of rotationally excited molecules.

**TUE3.3 • 14:45**
**Direct measurement of the angular-dependence of molecular ionization cross-sections by time-resolved extreme-ultraviolet spectroscopy**, •*Isabell Thomann*, *Robynne Lock*, *Chan La-O-Vorakiat*, *Etienne Gagnon*, *Arvinder Sandhu*, *Henry C. Kapteyn*, *Margaret M. Murnane*, and *Wen Li*; *JILA, University of Colorado, 440 UCB, Boulder, CO 80309-0440,USA*.
We present a novel method for determining molecular neutral-to-ionic transition dipoles, by measuring time-dependent ionization yields from transiently aligned molecules. Results for N2 and CO2 are presented.

**TUE3.4 • 15:00**
**Field-Free Unidirectional Molecular Rotation**, *Sharly Fleischer*, *Ilya Sh. Averbukh*, and •*Yehiam Prior*; *Department of Chemical Physics, Weizmann Institute of Science, Rehovot, Israel 76100*.
By varying the polarization and delay between two ultrashort laser pulses, we control the plane, speed, and sense of molecular rotation. This control may be implemented to individual components within a molecular mixture.

**TUE3.5 • 15:15**
**Attosecond Control of Quantum Interferences in Aligned Molecules**, •*Stefan Haessler*[1], *Willem Boutu*[1], *Hamed Merdji*[1], *Pierre Breger*[1], *Gavin Waters*[2], *Marek Stankiewicz*[3], *Leszek Fransinski*[4], *Richard Taieb*[5], *Jeremie Caillat*[5], *Alfred Maquet*[5], *Patrick Monchicourt*[1], *Bertrand Carre*[1], and *Pascal Salieres*[1]; [1]*CEA-Saclay, DSM, Service des Photons, Atomes et Molécules, 91191 Gif sur Yvette, France*, [2]*J.J. Thomson Physical Laboratory, University of Reading, Whiteknights, Reading RG6 6AF, UK*, [3]*Institute of Physics, Jagellonian University, ul. Reymonta 4, 30-059 Kraków, Poland*, [4]*The Blackett Laboratory, Imperial College London, Prince Consort Road, London SW7 2BW, UK*, [5]*UPMC Univ Paris 06,Laboratoire de Chimie Physique-Matière et Rayonnement, 11 rue Pierre et Marie Curie, 75231 Paris, France*.
We control the quantum interference occurring between a molecular orbital and an ultrafast laser-driven electron wavepacket. The phase jump measured in the resulting harmonic emission contains signatures of Coulombic wavepacket distortion and allows attosecond pulse-shaping.

**TUE3.6 • 15:30**
**Attosecond coincidence spectroscopy of diatomic molecules**, •*M. Lezius*[1], *Z. Ansari*[2], *M. Böttcher*[2], *B. Manschwetus*[2], *W. Sandner*[2], *A. Verhoef*[1], *G.G. Paulus*[3], *A. Saenz*[4], *D.B. Milosevic*[5], and *H. Rottke*[2]; [1]*Max-Planck-Institut für Quantenoptik, Hans-Kopfermann-Str. 1, D-85748 Garching, Germany*, [2]*Max-Born-Institute, Max-Born-Str. 2A, D-12489 Berlin, Germany*, [3]*Dept of Physics, Texas A&M University, College Station, TX 77843, USA*, [4]*Institut für Physik, Humboldt-Universität zu Berlin, Hausvogteiplatz 5-7, D-10117 Berlin, Germany*, [5]*Faculty of Science, University of Sarajevo, Zmaja od Bosne 35, 71000 Sarajevo, Bosnia and Herzegovina*.
Sub-cycle ionization of Ar-dimer by few-cycle laser fields is investigated with COLTRIMS. Low energy photoelectrons show clear deviations from double slit interference. We suggest that breakdown of the single-active electron approximation could be responsible for such effect.

## TUE4A • Photoinduced Reactions

*Auditorium*
**16:15–18:00**
**TUE4A • Photoinduced Reactions**
*Chair: Kaoru Yamanouchi, The University of Tokyo, Japan*

### TUE4A.1 • 16:15 •Invited•

**Real-time Evolution of the Valence Orbitals in a Dissociating Molecule as Revealed by Femtosecond Photoelectron Spectroscopy**, •*Philippe Wernet*[1], *Michael Odelius*[2], *Kai Godehusen*[1], *Jérôme Gaudin*[1], *Olaf Schwarzkopf*[1], and *Wolfgang Eberhardt*[1]; [1]*BESSY, Berlin, Germany*, [2]*Stockholm University, Stockholm, Sweden*.
We follow in real time the evolution of the valence orbitals of Br2 molecules as the bonds break during dissociation with femtosecond vacuum-ultraviolet photoelectron spectroscopy and with simulations of the nuclear and electron dynamics.

### TUE4A.2 • 16:45

**Influence of the Environment on Reaction Dynamics: Excited State Intramolecular Proton Transfer in the Gas Phase and Solution**, •*Christian Schriever*[1], *Stefan Lochbrunner*[2], and *Eberhard Riedle*[1]; [1]*LS für BioMolekulare Optik, LMU München, Oettingenstr. 67, D-80538 Munich, Germany*, [2]*present address: Institut für Physik, Universität Rostock, Universitätsplatz 3, D-18055 Rostock, Germany*.
Femtosecond transient absorption reveals very similar excited state intramolecular proton transfer and associated wavepacket dynamics in the gas phase and in solution. There are striking differences for the kinetics associated with the subsequent internal conversion.

### TUE4A.3 • 17:00

**Photoreaction from a light generated non-equilibrium state**, •*Simone Draxler*[1], *Stephan Malkmus*[1], *Thomas Brust*[1], *Jessica A. DiGirolamo*[2], *Watson J. Lees*[2], *Markus Braun*[1], and *Wolfgang Zinth*[1]; [1]*BioMolekulare Optik, Fakultät für Physik, Ludwig-Maximilians-Universität München, Oettingenstr. 67, D-80538 München, Germany*, [2]*Department of Chemistry and Biochemistry, Florida International University, 11200 SW 8th St., Miami, FL, 33199, USA*.
We report on the acceleration of the $S_1$ photoreaction combined with the dramatic increase of the photochemical quantum efficiency, when the reaction is directly preceded by another ultrafast photoreaction.

### TUE4A.4 • 17:15

**Excited-State Nuclear Wavepacket Motion of an Ultrafast Inorganic Molecular Switch**, *Munetaka Iwamura*, *Hidekazu Watanabe*, *Kunihiko Ishii*, *Satoshi Takeuchi*, and •*Tahei Tahara*; *Molecular Spectroscopy Laboratory, RIKEN, 2-1 Hirosawa, Wako, Saitama 351-0198, Japan*.
Ultrafast photo-induced structural change of [Cu(dmphen)2]+ was studied by pump-probe spectroscopy with 25-fs time-resolution. The observed nuclear wavepacket motion unveiled a new mechanism of photo-induced Jahn-Teller distortion that is a key of inorganic molecular switches.

### TUE4A.5 • 17:30

**Femtosecond Electronic Dynamics via a Conical Funnel**, *Eric Smith*, *William Peters*, and •*David Jonas*; *Department of Chemistry and Biochemistry, University of Colorado, Boulder, Colorado 80309-0215, USA*.
Femtosecond polarization spectroscopy measures electronic wavepacket motion after vibrational wavepackets are excited near an energetically inaccessible conical intersection in a free-base naphthalocyanine. Partial equilibration via the conical funnel takes place within ˜100 fs.

### TUE4A.6 • 17:45

**Capturing Transient Structure in Solution by Transient X-ray Diffraction**, *Jae Hyuk Lee*[1], •*Tae Kyu Kim*[2], *Joonghan Kim*[1], *Qingyu Kong*[3], *Marco Cammarata*[3], *Maciej Lorenc*[3], *Michael Wulff*[3], and *Hyotcherl Ihee*[3]; [1]*Center for Time-Resolved Diffraction, Department of Chemistry, Korea Advanced Institute of Science and Technology, Daejeon, Korea*, [2]*Department of Chemistry, Pusan National University, Busan, Korea*, [3]*European Synchrotron Radiation Facility, Grenoble, France*.
Here we report tracking of structural and kinetic information for photo-induced elimination of 1,2-diiodotetrafluoroethane in solution by transient x-ray diffraction. The transient structur of CF2CF2I is determined to be classical mixture and following structural dynamics is elucidated.

**TUE4P • Ultrafast Electronics and Optoelectronics**

*Panoramica*
**16:15–18:00**
**TUE4P • Ultrafast Electronics and Optoelectronics**
*Chair: Richard Averitt, Boston University, USA*

**TUE4P.1 • 16:15**
**Single Shot Linear Detection of THz Electromagnetic Fields on the Fs to Ps Scale**, •*Uli Schmidhammer*, *Vincent De Waele*, and *Mehran Mostafavi*; *Laboratoire de Chimie Physique - ELYSE, UMR8000 CNRS-Université Paris Sud, 91405 Orsay, France*.
We report single shot electro-optic sampling based on spectral encoding with a supercontinuum as optical probe whose polarization state is analyzed in balanced detection.

**TUE4P.2 • 16:30**
**Intense THz Pulses and 11-fs Electro-optic Sampling with a Multi-Branch Er:fiber/Ti:sapphire Hybrid Amplifier**, •*Alexander Sell*, *Rüdiger Scheu*, *Rupert Huber*, and *Alfred Leitenstorfer*; *Department of Physics and Center for Applied Photonics, University of Konstanz, Universitätsstraße 10, 78464 Konstanz, Germany*.
We combine a four-branch Er:fiber laser with a high-power Ti:sapphire amplifier for high-field THz generation and electro-optic detection with 11-fs pulses. Frequency mixing of phase-correlated fiber branches generates multi-THz seed spectra up to 100 THz

**TUE4P.3 • 16:45**
**Frequency selective surface sensor for terahertz bio-sensing applications**, •*Michael Nagel*[1], *Gregor Klatt*[2], *Mohammad Awad*[1], *Heinrich Kurz*[1], *Albrecht Bartels*[2], and *Thomas Dekorsy*[2]; [1]*Institute of Semiconductor Electronics, RWTH Aachen University, 52074 Aachen, Germany*, [2]*Department of Physics and Center for Applied Photonics, University of Konstanz, D-78457 Konstanz, Germany*.
Using high-speed asynchronous optical sampling, read-out of novel terahertz surface sensors directed at bio-sensing applications is presented. The surface sensor is based on periodically arranged metallic THz split ring resonators on a 27-micrometer-thin polymer membrane.

**TUE4P.4 • 17:00**
**Single cycle THz pulses in 1D and 2D photonic crystal structures**, •*Peter Peier*[1], *Soenke Pilz*[1], *Taras Kononenko*[2], *Sergei Pimenov*[2], and *Thomas Feurer*[1]; [1]*Institute of Applied Physics, University of Bern, Sidlerstrase 5, 3012 Bern, Switzerland*, [2]*General Physics Institute, Russian Academy of Science, Vavilov-Str. 38, 119991 Moscow, Russia*.
We present coherent time-resolved near-field imaging of single-cycle THz pulses in 1D and 2D photonic crystals. The results agree well with simulations and reveal the bandgaps and the dispersive properties of the photonic structures.

**TUE4P.5 • 17:15**
**10-femtosecond Precision, Long-term Stable Timing Distribution Over Multiple Fiber Links**, •*Jonathan Cox*, *Jungwon Kim*, and *Franz Kaertner*; *Massachusetts Institute of Technology, 77 Massachusetts Avenue, Cambridge, Massachusetts 02139, USA*.
The distribution of an ultrafast pulse train over two, 300-meter fiber links with 400 attoseconds of timing jitter [1Hz, 100kHz] and 6.4 femtoseconds of drift over 72 hours of continuous operation [4$\mu$Hz, 0.5Hz] is demonstrated.

**TUE4P.6 • 17:30**
**Measurement of Dispersion Properties of Silver Nanowires Used as Surface Plasmon Waveguides**, •*Jess M. Gunn*, *Scott H. High*, and *Marcos Dantus*; *Department of Chemistry, Michigan State University, East Lansing MI 48824 USA*.
Surface plasmon waves created by shaped femtosecond pulses are used to control the two-photon induced plasmon emission of silver nanoparticles. A quantitative measurement of the dispersion properties of surface plasmon waveguides is given.

**TUE4P.7 • 17:45**
**Hot Dirac Fermions Dynamics in Epitaxial Graphene**, •*Dong Sun*[1], *Zong-Kwei Wu*[1], *Charles Divin*[1], *Xuebin Li*[2], *Claire Berger*[2], *Walt de Heer*[2], *Phillip First*[2], and *Theodore Norris*[1]; [1]*Center for Ultrafast Optical Science,University of Michigan,Ann Arbor,MI,48109-2099*, [2]*School of Physics,Georgia Institute of Technology,Altanta,GA,30332*.
We report the first application of nondegenerate ultrafast pump-probe spectroscopy to epitaxial graphene. The DT spectra can be understood in terms the effect of hot thermal carrier distributions on interband transitions with no electron-hole interaction.

**TUEIIa • Poster II a - Applications**

*Poster Area*
**18:00–20:00**
**TUEIIa • Poster II a - Applications**

**TUEIIa.1 • 18:00**
**Resonant and Nonresonant Stimulated Parametric Fluorescence**, *Xuejun Liu*, •*Mark Mero*, *James L. Thomas*, and *Wolfgang Rudolph*; *Department of Physics and Astronomy, University of New Mexico, Albuquerque, New Mexico 87131, USA*.
A femtosecond four-wave mixing microscopy with polarized detection has been applied to selectively image dyes while suppressing signals from host materials. The image signal persists even after photobleaching, making this technique attractive for biological microscopy.

**TUEIIa.2 • 18:00**
**Femtosecond pump-probe spectroscopy as an instrument for nanostructured materials investigation.**, •*Sergey V. Chekalin*; *Institute of Spectroscopy RAS, 142190 Troitsk, Moscow Region, Russia; e-mail: chekalin@isan.troisk.ru*.
The femtosecond pump-probe technique was used to investigate the difference spectra dynamics in heterophase fullerene-metal nanostructures. The relaxation at the same metal-to-fullerene ratio strongly depends on the mutual distribution of nanocomposite components.

**TUEIIa.3 • 18:00**
**Selective Excitation in Nonlinear Optical Microscopy by Using an Ultra-broadband Pulse**, •*Keisuke Isobe*[1], *Akira Suda*[1], *Masahiro Tanaka*[2], *Fumihiko Kannari*[2], *Hiroyuki Kawano*[3], *Hideaki Mizuno*[3], *Atsushi Miyawaki*[3], and *Katsumi Midorikawa*[1]; [1]*Laser Technology Laboratory, RIKEN, 2-1, Hirosawa, Wako, Saitama 351-0198, Japan*, [2]*Department of Electronics and Electrical Engineering, Keio University, 3-14-1 Hiyoshi, Kohoku-ku, Yokohama, 223-8522, Japan*, [3]*Laboratory for Cell Function Dynamics, RIKEN, 2-1, Hirosawa, Wako, Saitama 351-0198, Japan*.
We show that the selective excitation in two-photon excited fluorescence microscopy and four-wave mixing microscopy is achieved by modulating the spectral phase of a single broadband pulse.

**TUEIIa.4 • 18:00**
**First Step Towards a Femtosecond VUV Microscope: Zone Plate Optics as**, •*Jérôme Gaudin*, *Stefan Rehbein*, *Peter Guttmann*, *Sophie Godé*, *Gerd Schneider*, *Philippe Wernet*, and *Wolfang Eberhardt*; *BESSY, Albert Einstein Strasse 15, 12489 Berlin, Germany*.
We demonstrate the efficiency of zone plate optics as a high-order harmonics monochromator in the photon energy range from 30 to 70 eV. This is the first step towards a VUV microscope with femtosecond time resolution.

**TUEIIa.5 • 18:00**
**Interferometrically detected femtosecond CARS in a single beam of shaped femtosecond pulses**, •*Bernhard von Vacano*, *Jean Rehbinder*, *Tiago Buckup*, and *Marcus Motzkus*; *Physikalische Chemie, Philipps-Universität Marburg, Hans-Meerwein-Strasse, D-35043 Marburg, Germany*.
Photonic integration of functions such as excitation, probing and interferometry in shaped broadband pulses allows huge simplification of coherent anti-Stokes Raman scattering (CARS) for microspectroscopy, paving the way to cost-efficient implementations, *e. g.* all-fibre solutions.

## TUEIIb • Poster II b - Electronics and Optoelectronics

*Poster Area*
**18:00–20:00**
**TUEIIb • Poster II b - Electronics and Optoelectronics**

**TUEIIb.1 • 18:00**
**Two-dimensional pulse shapers capable of more than phase & amplitude modulation**, •*Ge Wang*, *Hiroki Yazawa*, *Yoshiro Esumi*, *Tomoaki Abe*, and *Fumihiko Kannari*; *Department of Electronics and Electrical Engineering, Keio University,3-14-1, Hiyoshi, Kohoku-ku, Yokohama, 223-8522, Japan*.
We perform polarization control as well as phase & amplitude modulation using a 2D LC-SLM, and also pulse shaping on two-color laser with a 2D MEMS-MMA SLM.

**TUEIIb.2 • 18:00**
**Terahertz wave from coherent LO phonon in a GaAs/AlAs multiple quantum well under an electric field**, •*Kohji Mizoguchi*[1], *Yusuke Kanzawa*[2], *Masaaki Nakayama*[2], *Shingo Saito*[3], and *Kiyomi Sakai*[3]; [1]*Osaka Prefecture University, Sakai, Japan*, [2]*Osaka City University, Osaka, Japan*, [3]*National Institute of Information and Communications Technology, Kobe, Japan*.
We report on the enhancement of the terahertz wave from the coherent LO phonon in a GaAs/AlAs multiple quantum well by applying an electric field.

**TUEIIb.3 • 18:00**
**Improved Fast Scanning TeraHz Pulse System**, •*Bernhard Heinemann*[1], *Colleen J. Fox*[2], and *Hermann Harde*[1]; [1]*Helmut-Schmidt-Universitaet, Holstenhofweg 85, 22043 Hamburg, Germany*, [2]*Thayer School of Engineering, Dartmouth College, 8000 Cummings Hall, Hanover, New Hampshire 03755-8001*.
We demonstrate the operation of a fast scanning laser system that was modified to improve and to increase the time resolution as well as spectral width for femtosecond time-resolved optical pump-probe or THz time-domain spectroscopy.

**TUEIIb.4 • 18:00**
**Adaptive Phase Shaping in a Fiber Chirped Pulse Amplification System**, •*Nikita K. Daga*, *Fei He*, *Hazel S. S. Hung*, *Naveed Naz*, *Jerry Prawiharjo*, *David C. Hanna*, *David J. Richardson*, and *David P. Shepherd*; *Optoelectronics Research Centre, University of Southampton, Southampton, UK*.
We demonstrate adaptive spectral phase shaping in a fiber chirped pulse amplification system. The adaptive process, controlled by a simulated annealing algorithm, resulted in three times improvement in the autocorrelation peak intensity of 65uJ pulses.

**TUEIIb.5 • 18:00**
**Near-Field Imaging of Single-Cycle THz Pulses Transmitted Through Sub-Wavelength Plasmonic Structures**, •*Hannes Merbold* and *Thomas Feurer*; *Institute of Applied Physics, University of Berne, Sidlerstr. 5, 3012 Bern, Switzerland*.
We experimentally and numerically investigate the spatiotemporal evolution of single-cycle THz pulses transmitted through sub-wavelength plasmonic structures. Employing a polaritonic approach the near field of the THz wave is monitored and compared to simulations.

**TUEIIc • Poster II c - Generation and Measurement**

*Poster Area*
**18:00–20:00**
**TUEIIc • Poster II c - Generation and Measurement**

**TUEIIc.1 • 18:00**
**Asymptotic pulse shapes and pulse self-compression in femtosecond filaments**, *Carsten Krüger[1,2], Ayhan Demircan[1], Gero Stibenz[2], Nickolai Zhavoronkov[2]*, and •*Günter Steinmeyer[2]*; *[1]Weierstraß-Institut für Angewandte Analysis und Stochastik, Mohrenstr. 39, 10117 Berlin, Germany, [2]Max-Born-Institut, Max-Born-Straße 2a, 12489 Berlin, Germany*.
The balance of Kerr-type and plasma-mediated self-amplitude modulations can give rise to self-stabilizing asymptotic pulse shapes in filament propagation. These soliton-like solutions resemble experimental data and constitute the major mechanism for self-compression in femtosecond filaments.

**TUEIIc.2 • 18:00**
**Two dimension spatial light modulator with an over-two-octave bandwidth for high-powered mono-cycle optical pulses**, •*Kouji Hazu, Takashi Tanigawa, Naoya Nakagawa, Yu Sakakibara, Shao boo Fang, Taro Sekikawa*, and *Mikio Yamashita*; *Departtment of Applied Physics, Hokkaido Universiyy, and Core Research for Evolutional Science and Technology, Japan Science and Technology Agency, Kita-13, Nishi-8, Kita-ku, Sapporo, 060-8628 Japan*.
We performed feedback phase compensation experiment using a two-dimension spatial light modulator operating from 260 to 1100 nm, which is useful for ultrabroadband and high-powered optical pulses.

**TUEIIc.3 • 18:00**
**Noncollinear Optical Parametric Amplification Pumped by the Third Harmonics of a Ti:sapphire Laser**, •*Takashi Tanigawa, Keisaku Yamane, Taro Sekikawa*, and *Mikio Yamashita*; *Department of Applied Physics, Hokkaido University, and Core Research Evolutional Science and Technology, Japan Science and Technology Agency, Kita-13 Nishi-8, Kita-ku, Sapporo, 060-8628 Japan*.
Broadband amplification in the 380-490 nm region was achieved by ultraviolet (UV) pumped noncollinear optical parametric amplification. This result leads to 6 fs UV pulse generation and can be utilized to amplify monocycle pulses.

**TUEIIc.4 • 18:00**
**Vector Pulse Shaper Assisted Short Pulse Characterization**, •*Andreas Galler* and *Thomas Feurer*; *Institute of Applied Physics, University of Bern, Sidlerstrasse 5 CH-3012 Bern, Switzerland*.
We demonstrate that shaper-assisted pulse characterization is able to imitate most standard pulse characterization methods. If a polarization shaper is used even more complex schemes, such as SPIDER, can be realized.

**TUEIIc.5 • 18:00**
**Femtosecond Spectral Interferometry with Attosecond Accuracy by Correction for Spectrometer Resolution Asymmetry**, *Michael Yetzbacher*, •*Trevor Courtney, William Peters*, and *David Jonas*; *Department of Chemistry and Biochemistry, University of Colorado, Boulder, Colorado 80309-0215, USA*.
Asymmetry in the line spread function of the spectrometer causes delay dependent nonconstant phase shifts. Fourier deconvolution with the complex-valued optical transfer function allows accurate spectral phase recovery.

**TUEIIc.6 • 18:00**
**Sub-10 fs Pulse Generation in Vacuum Ultraviolet Using Chirped Four Wave Mixing in Hollow Fibers**, •*Joachim Herrmann, Ihar Babushkin*, and *Frank Noack*; *Max Born Institute for Nonlinear Optics and Short Pulse Spectroscopy, Max-Born-Str. 2a, D-12489 Berlin, Germany*.
We investigate the potential of four-wave mixing for VUV pulse generation in hollow waveguides with unprecedented short pulse durations (up to 2.5fs) at 160nm using broadband chirped 800nm idler pulses.

**TUEIIc.7 • 18:00**
**Compression of an Ultraviolet Pulse by Molecular Phase Modulation and Self-Phase Modulation**, •*Yuichiro Kida[1], Shin-ichi Zaitsu[1]*, and *Totaro Imasaka[1,2]*; *[1]Department of Applied Chemistry, Graduate School of Engineering, Kyushu University, 744, Motooka, Fukuoka 819-0395, Japan, [2]Division of Translational Research, Center for Future Chemistry, Kyushu University, 744, Motooka, Fukuoka 819-0395, Japan*.
A compression scheme for an ultraviolet pulse to sub-15 fs is reported. Frequency modulation of an ultraviolet pulse by molecular rotations and by self-phase modulation results in a compressed pulse with small intensities of sub-pulses.

**TUEIIc.8 • 18:00**
**Temporal Optimization of Ultrabroadband Optical Parametric Chirped Pulse Amplification**, •*Jeffrey Moses[1], Cristian Manzoni[2], Shu-Wei Huang[1], Giulio Cerullo[2]*, and *Franz X. Kärtner[1]*; *[1]Department of Electrical Engineering and Computer Science and Research Laboratory of Electronics, Massachusetts Institute of Technology, Cambridge, MA 02139, USA, [2]ULTRAS-INFM-CNR Dipartimento di Fisica, Politecnico, Piazza L. da Vinci 32, 20133 Milano, Italy*.
Critical optimization considerations are presented for ultrabroadband, high-power optical parametric chirped-pulse amplifiers, where simultaneous suppression of superfluorescence and maximization of both conversion efficiency and bandwidth is required. Numerical simulations verify theory.

**TUEIIc.9 • 18:00**
**Frequency Comb Spectroscopy on Calcium Ions in a Linear Paul Trap**, •*Anne Lisa Wolf[1], Steven van den Berg[2], Christoph Gohle[1], Edcel Salumbides[1], Wim Ubachs[1]*, and *Kjeld Eikema[1]*; *[1]Laser Centre Vrije Universiteit, Amsterdam, The Netherlands, [2]NMi van Swinden Laboratorium BV, Delft, The Netherlands*.
To add to the debate on a possible variation of the fine structure constant, frequency comb spectroscopy on laser cooled (calcium) ions in a linear Paul trap is pursued.

**TUEIIc.10 • 18:00**
**Carrier envelope offset control of broad Raman sidebands by locking two pump laser frequencies to a single optical cavity**, •*Takayuki Suzuki[1,2], Masataka Hirai[1], Ryo Tanaka[1]*, and *Masayuki Katsuragawa[1,2]*; *[1]Univ. of Electro-Comms., Tokyo, Japan, [2]JST-PRESTO, Saitama, Japan*.
We generate broad Raman sidebands with zero carrier-envelope-offset by frequency-locking the pump lasers to

a single optical cavity. It is shown in both spectral and temporal domains that the carrier-envelope-offset is controlled to discrete values.

**TUEIIc.11 • 18:00**

**Generation of High Energy Pulses from a Fiber-based Femtosecond Oscillator**, •*Jungkwuen An*[1], *Dongeon Kim*[1], *J. W. Dawson*[2], *M. J. Messerly*[2], and *C. P. J. Barty*[2]; [1]*Department of Physics, Pohang University of Science and Technology, Pohang 790-784, South Korea*, [2]*Photon Science and Applications Program, Lawrence Livermore National Laboratory, Livermore, California 94550, USA*.

The high energy pulse can be achieved by exploiting self-similar prapagation regime. In this regime, mode-lock pulse can be generated without dispersive optics such as gratings or prisms in the cavity.

**TUEIIc.12 • 18:00**

**Spatial phase control and applications of high-order harmonics**, •*Constance Valentin*[1], *Julien Gautier*[1], *Evaggelos Papalazarou*[1], *Christoph Hauri*[1], *Gilles Rey*[1], *Philippe Zeitoun*[1], *Stéphane Sebban*[1], *Véra Hajkova*[2], *Jaromir Chalupsky*[2], *Ludek Vysin*[3], and *Libor Juha*[2]; [1]*Laboratoire d'Optique Appliquée - ENSTA, Ecole Polytechnique, CNRS UMR 7639, Chemin de la Hunière, F-91761 Palaiseau Cedex, France*, [2]*Institute of Physics - Na Slovance 2, Cz-18221 Prague, Czech Republic*, [3]*Faculty of Biomedical Engineering - Zikova 4, Cz-16636 Prague, Czech Republic*.

We present experimental results of control of high-order harmonic wave-fronts. We have reached a spatail phase with rms distortions of lambda/7 at 32nm ensuring very tight focusing. Applications using this XUV source are reported.

**TUEIId • Poster II d - Physics**

*Poster Area*
**18:00–20:00**
**TUEIId • Poster II d - Physics**

**TUEIId.1 • 18:00**
**Third Harmonic Generation enhanced by a laser-induced plasma and**, •*Klaus Hartinger* and *Randy Bartels*; *Colorado State Universtiy, Fort Collins, CO 80523, USA*.
We demonstrate THG enhanced more than 60-fold by a laser-induced plasma and the subsequent modulation of conversion efficiency due to the presence of a rotational wave packet, induced by a short moderately intense laser pulse.

**TUEIId.2 • 18:00**
**Detection of THz Frequency Acoustic Waves via Coherent THz Radiation Emission**, •*Evan Reed*[1], *Michael Armstrong*[1], *Kiyong Kim*[2], and *James Glownia*[3]; [1]*Lawrence Livermore National Laboratory, Livermore, CA, USA,* [2]*Los Alamos National Laboratory, Los Alamos, NM, USA,* [3]*DOE Office of Basic Sciences, Washington, D.C., USA*.
Using molecular dynamics simulations, we find that acoustic waves of THz frequencies can be detected via THz radiation coherently emitted when they propagate past an interface between materials with different piezoelectric coefficients.

**TUEIId.3 • 18:00**
**Non-interferometric two-dimensional Fourier transform spectroscopy**, •*Jeffrey Davis*[1], *Lap van Dao*[1], *Harry Quiney*[2], *Peter Hannaford*[1], and *Keith Nugent*[2]; [1]*Centre for Atom Optics and Ultrafast Spectroscopy, Swinburne University of Technology, Victoria 3122, Australia,* [2]*School of Physics, University of Melbourne, Victoria 3010, Australia*.
We demonstrate a technique that determines the phase of the femtosecond photon echo emission from spectrally resolved intensity data. The validity is shown using simulated data, and its significance revealed in real two-colour experiments.

**TUEIId.4 • 18:00**
**Single-stage Pulse Compression and High-Energy Supercontinuum generation from a Chirped-pulse oscillator**, •*Alexander Fuerbach*[1,2], *Christopher Miese*[1], and *Wolfgang Koehler*[2]; [1]*Centre for Ultrahigh bandwidth Devices for Optical Systems and MQPhotonics Research Centre, Macquarie University, Sydney, NSW 2109, Australia,* [2]*Femtolasers Produktions GmbH, Fernkorngasse 10, 1100 Wien, Austria*.
We demonstrate the generation of high-energy supercontinuum pulses by coupling the uncompressed pulses of a Ti:sapphire Chirped-pulse oscillator into a microstructure fibre which features a highly anomalous dispersion at the centre wavelength of the laser.

**TUEIId.5 • 18:00**
**Simulations of Frequency-Resolved Optical Gating for measuring very complex pulses**, •*Lina Xu*, *Erik Zeek*, and *Rick Trebino*; *School of Physics, Georgia Institute of Technology, Atlanta, GA, USA, 30332*.
We study the performance of the iterative algorithm in the Frequency-Resolved Optical Gating (FROG) family of techniques and find that it can reliably retrieve the intensity and phase of even very complex ultrashort laser pulses.

**TUEIId.6 • 18:00**
**Nanoscale Heat Transport Probed with Ultrafast Soft X-Rays**, •*Mark Siemens*[1], *Qing Li*[1], *Margaret Murnane*[1], *Henry Kapteyn*[1], *Ronggui Yang*[1], and *Keith Nelson*[2]; [1]*University of Colorado at Boulder, 440 UCB, Boulder, Colorado 80309, USA,* [2]*Massachusetts Institute of Technology, 77 Massachusetts Avenue, Cambridge, Massachusetts 02139, USA*.
We characterize heat transport in nanostructures using coherent soft x-rays to probe thermally induced surface deformation. By varying the substrate temperature, we observe the transition from diffusive to quasi-ballistic heat transport regimes.

**TUEIId.7 • 18:00**
**Ultrafast Dynamics of Electron-Hole Plasma Coupled to Optical Phonons in a ZnO Thin Film**, •*Hideki Ichida*[1], *Shuji Wakaiki*[2], *Kohji Mizoguchi*[3], *Degi Kim*[2], *Yasuo Kanematsu*[1], and *Masaaki Nakayama*[2]; [1]*Venture Business Laboratory, Center for Advanced Science and Innovation, Osaka University, 2-1 Yamada-oka, Suita, Osaka 565-0871, Japan,* [2]*Department of Applied Physics, Graduate School of Engineering, Osaka City University, 3-3-138 Sugimoto, Sumiyoshi-ku, Osaka 558-8585, Japan,* [3]*Department of Physical Science, Graduate School of Science, Osaka Prefecture University, 1-1 Gakuen, Naka-ku, Sakai, Osaka 599-8531, Japan*.
We report on ultrafast photoluminescence dynamics of electron-hole plasma coupled to longitudinal-optical phonons in a ZnO thin film. The dynamical change of the electron-hole-pair density is characterized by time-resolved-photoluminescence spectra measured with an optical-Kerr-gating method.

**TUEIId.8 • 18:00**
**Time-resolved X-ray Absorption Spectroscopy of Photoinduced Insulator-Metal Transition in a Colossal Magnetoresistive Manganite**, •*Matteo Rini*[1], *Ron Tobey*[2], *Simon Wall*[2], *Yi Zhu*[1], *Yasuhide Tomioka*[3], *Yoshinori Tokura*[3], *Andrea Cavalleri*[2], and *Robert Schoenlein*[1]; [1]*Lawrence Berkeley National Laboratory, 1 Cyclotron Road, MS 2-300, Berkeley, CA 94720,* [2]*Department of Physics, Clarendon Laboratory, University of Oxford, Parks Road, Oxford OX1 3PU, United Kingdom,* [3]*Correlated Electron Research Center, AIST Tsukuba Central 4, Tsukuba, Ibaraki, 305-8562 Japan*.
We studied the ultrafast insulator-metal transition in a manganite by means of picosecond X-ray absorption at the O K- and Mn L-edges, probing photoinduced changes in O-2p and Mn-3d electronic states near the Fermi level.

**TUEIId.9 • 18:00**
**Large-amplitude coherent phonons in semimetals**, •*Oleg Misochko*[1], *Michael Lebedev*[1], *Kunie Ishioka*[2], *Masahiro Kitajima*[2], *Sergey Chekalin*[3], and *Thomas Dekorsy*[4]; [1]*Institute of Solid State Physics, Russian Academy of Sciences,142432 Chernogolovka, Moscow region, Russia,* [2]*National Institute for Materials Science,1-2-1 Sengen, Tsukuba, 305-0047 Ibaraki, Japan,* [3]*Institute of Spectroscopy, Russian Academy of Sciences,142190 Troitsk, Moscow region, Russia,* [4]*Physics Department, Konstanz University, 78457 Konstanz, Germany*.
We report on the ultrafast dynamics of two, different in symmetry, large-amplitude coherent phonons in Bi and Sb. A systematic study was made of the variation of the nonlinear lattice dynamics with pulse duration, excitation strength, temperature and probe wavelength.

**TUEIId.10 • 18:00**

**Generation and control of coherent conical pulses in seeded optical parametric amplification**, •*Ottavia Jedrkiewicz*[1], *Matteo Clerici*[1], *Daniele Faccio*[1], and *Paolo Di Trapani*[1,2]; [1]*Cnism and Dipartimento di Fisica e Matematica, Università dell'Insubria, Como (Italy)*, [2]*Department of Quantum Electronics, Vilnius University, Vilnius (Lithuania)*.
We propose a new technique for high-energy conical pulse generation based on continuum seeded parametric amplification process in quadratic nonlinear media.

**TUEIId.11 • 18:00**

**Laser-induced solid-solid phase transition in As under pressure: A theoretical prediction**, •*Eeuwe S. Zijlstra*, *Nils Huntemann*, and *Martin E. Garcia*; *Theoretische Physik, Universität Kassel, Heinrich-Plett-Str. 40, 34132 Kassel, Germany*.
On the basis of ab initio calculations we predict that in arsenic under pressure a solid-solid phase transition from the A7 into the simple cubic structure can be induced by an ultrashort laser pulse.

**TUEIId.12 • 18:00**

**Rabi Oscillations in a Shallow Donor System Driven by Intense THz Radiation**, *Peter Gaal*[1], *Wilhelm Kuehn*[1], •*Klaus Reimann*[1], *Michael Woerner*[1], *Thomas Elsaesser*[1], and *Rudolf Hey*[2]; [1]*Max-Born-Institut, Berlin, Germany*, [2]*Paul-Drude-Institut, Berlin, Germany*.
Carrier-wave Rabi oscillations between bound impurity levels are demonstrated by ultrafast THz propagation experiments. Modelling with an ensemble of two-level systems yields good agreement up to a driving field of 5 kV/cm.

**TUEIId.13 • 18:00**

**Ultrafast electronic and spin dynamics in thin iron films: electron-magnon and electron-phonon interactions**, •*Ettore Carpene*, *Eduardo Mancini*, *Claudia Dallera*, *Massimiliano Brenna*, *Ezio Puppin*, and *Sandro De Silvestri*; *ULTRAS, CNR-INFM, Dipartimento di Fisica, Politecnico di Milano, p.zza Leonardo da Vinci 32, 20133 Milano, Italy*.
The electronic and spin dynamics in thin iron films have been investigated by means of time-resolved reflectivity and magneto-optical Kerr effect. The electron-magnon and the electron-phonon coupling times are extrapolated and their influence is discussed.

**TUEIId.14 • 18:00**

**Ultrafast terahertz response driven by photoinduced insulator to metal transitions in layered organic salt**, *Hideki Nakaya*[1], *Yoshiyuki Takahashi*[1], •*Shinichiro Iwai*[1], *Kaoru Yamamoto*[2], *Kyuya Yakushi*[2], and *Shingo Saito*[3]; [1]*Department of Physics, Tohoku Universirty, Sendai, Japan*, [2]*Institute of Molecular Science, Okazaki, Japan*, [3]*National Institute of Informations and Communications Technology*.
Photoinduced insulator to metal transition in two-dimensional organic salt alpha-(ET)_2Iˆ3 (ET: [bis(ethylenedithio)]tetrathiafulvalene) was investigated by near-IR-pump and THz-probe spectroscopy. Photoinduced microscopic and semi-macroscopic metallic domains were characterized by a transient THz spectrum.

**TUEIId.15 • 18:00**

**Photoinduced macroscopic oscillation between insulator and metal in layered organic Mott insulator**, *Yohei Kawakami*[1], •*Shinichiro Iwai*[1], *Naoki Yoneyama*[2], *Takahiko Sasaki*[2], and *Norio Kobayashi*[2]; [1]*Department of Physics, Tohoku Universirty, Sendai, Japan*, [2]*Institute for Materials Research, Sendai, Japan*.
Photoinduced insulator to metal transition in two-dimensional organic Mott insulator kapp-(d-ET)_2Cu[N(CN)_2]Br was investigated by mid-IR pump-probe spectroscopy. Photoinduced macroscopic GHz oscillation between the Mott insulator and the metal, reflecting the competitive phase diagram, was observed.

**TUEIId.16 • 18:00**

**X-ray absorption near-edge spectroscopy (XANES) with ultra-short laser-based X-ray source for Warm Dense Al structural study**, •*Fabien Dorchies*, *Marion Harmand*, *Claude Fourment*, *Sebastien Hulin*, *Joao Jorge Santos*, and *Olivier Peyrusse*; *CELIA, UMR 5107 University Bordeaux 1 - CEA - CNRS, 33405 Talence, France*.
A broadband X-ray source is optimized for time-resolved near-edge absorption spectroscopy. High quality absorption spectra are obtained through aluminum samples and compared with calculations. This structural diagnostic is designed for transient Warm Dense Matter studies.

**TUEIId.17 • 18:00**

**Retaining high laser intensities and generating plasma channels over long distances in air by using an axicon**, •*Selcuk Akturk*[1], *Bing Zhou*[1], *Benjamin Pasquiou*[3], *Aurelien Houard*[1], *Michel Franco*[1], *Arnaud Couairon*[2], and *Andre Mysyrowicz*[1]; [1]*Laboratoire dOptique Appliquée, École Nationale Supérieure des Techniques Avancées- École Polytechnique, CNRS UMR 7639 F-91761 Palaiseau cedex France*, [2]*Centre de Physique Théorique, CNRS UMR 7644, École Polytechnique, F-91128 Palaiseau Cedex, France*, [3]*Institut dOptique, Campus Polytechnique, RD 128, 91127 Palaiseau Cedex, France*.
Focusing a Gaussian beam with an axicon generates Bessel beams, which retain high on axis intensity over long distances. We focus ultrashort pulses with an axicon to generate long plasma channels in air.

**TUEIId.18 • 18:00**

**Temporal Dynamics of polaritons in a strongly-coupled organic-semiconductor microcavity**, •*Tersilla Virgili*[1], *Samira Ceccarelli*[2], *Dario Polli*[1], *Guglielmo Lanzani*[1], *Giulio Cerullo*[1], and *David G. Lidzey*[2]; [1]*IFN, CNR Dipartimento di Fisica, Politecnico di Milano, P.zza Leonardo Da Vinci 32, 20132 Milano, Italy*, [2]*Department of Physics and Astronomy, University of Sheffield, Hicks Building, Hounsfield Road, Sheffield S37RH United Kingdom*.
Using pump-probe spectroscopy, we investigate exciton-polariton dynamics in a strongly-coupled organic microcavity. We observe Rabi oscillations, decay of polaritons and the signature of the upper-branch cavity polaritons scattering to the exciton reservoir with phonon emission.

**TUEIId.19 • 18:00**

**Electron emission from atomic clusters irradiated with 10 fs laser pulses**, •*Yasin El-Taha*[1], *Emma Springate*[2], *Rob Carley*[1], *Firoz Rajgara*[3], *Delphine Darios*[1], *Chris Froud*[2], *Stefano Bonora*[2], *Dan Symes*[2], *John Tisch*[1], *Roland Smith*[1], *Deepak Mathur*[3], and *Jon Marangos*[1]; [1]*Blackett Laboratory, Imperial College London, Prince Consort Road, South Kensington,*

*London, SW7 2BZ, UK*, [2]*Rutherford Appleton Laboratory, Central Laser Facility, Harwell Science and Innovation Campus, Didcot, OX11 0QX, UK*, [3]*Tata Institute of Fundamental Research, Homi Bhabha Road, Mumbai 400 005, India*.
We present the first study of atomic clusters irradiated by ultra-short pulses (< 25fs). A weak prepulse has been shown to allow energetic coupling with the clusters enhancing the electron yield.

**TUEIId.20 • 18:00**
**Multi-electron Dynamics In Molecular High Harmonic Generation**, *Gerald Jordan* and •*Armin Scrinzi*; *Photonics Institute, Vienna Univ. of Technology, Vienna, Austria*.
We demonstrate the significance of multi-electron dynamics, in particular core polarization by the laser, in molecular HHG, as various simplifying models of increasing complexity fail in reproducing the multi-electron spectra obtained using the MCTDHF method.

**TUEIId.21 • 18:00**
**Coherent Control of Population Transfer in an Ionic Multilevel System using Phase- and Amplitude-Shaped Femtosecond Pulses**, •*Andreas Galler* and *Thomas Feurer*; *Institute of Applied Physics, University of Bern, Sidlerstrasse 5 CH-3012 Bern, Switzerland*.
We demonstrate selective control of population transfer in a multilevel system through phase- and amplitude-modulated femtosecond pulses. A combination of adiabatic rapid passage and amplitude modulation allows controlling the final population of individual states.

**TUEIId.22 • 18:00**
**Manipulation of the spin-orbit precession**, *Sebastien Weber*, •*Béatrice Chatel*, and *Bertrand Girard*; *Laboratoire Collissions Agregats Réactivité, CNRS, Université de Toulouse, Toulouse, France*.
Spin precession is investigated through a pump-probe technique. The excited wave packet corresponds to a precession of spin and orbital momentum around the total angular momentum. Shaped laser pulses is used to control this dynamics.

**TUEIId.23 • 18:00**
**Laser-Induced Selective Alignment of Water Spin Isomers**, *Erez Gershnabel* and •*Ilya Averbukh*; *Department of Chemical Physics, Weizmann Institute of Science, Rehovot, Israel 76100*.
We consider laser alignment of ortho and para water spin isomers using short off-resonance laser pulses. Selective alignment of individual spin modifications is possible with a proper pair of pulses.

**TUEIId.24 • 18:00**
**Sub-20-fs Optical Pump-X-ray Probe Spectroscopy beyond the Si K Edge**, •*Enikoe Seres* and *Christian Spielmann*; *Physikalisches Institut EP1, Universität Würzburg, D-97074 Würzburg, Germany*.
We report on time resolved X-ray absorption spectroscopy using high harmonic radiation up to 3.5 keV. With our setup we gained insight into the structural dynamic of silicon with a temporal resolution of 20 fs.

**TUEIId.25 • 18:00**
**Terahertz Nonlinear Response and Coherent Quantum Control of Dark Excitons in $Cu_2O$**, •*Tobias Kampfrath*[1], *Silvan Leinß*[2], *Konrad v. Volkmann*[1], *Martin Wolf*[1], *Alfred Leitenstorfer*[2], and *Rupert Huber*[2]; [1]*Department of Physics, Freie Universität Berlin, Arnimallee 14, 14195 Berlin, Germany*, [2]*Department of Physics and Center for Applied Photonics, University of Konstanz,Universitätsstraße 10, 78464 Konstanz, Germany*.
The nonlinear response of a cold 1s-para exciton gas in $Cu_2O$ to intense multi-terahertz pulses is studied. A partial internal Rabi flop coherently promotes 70% of the optically dark quasiparticles into the 2p state.

**TUEIId.26 • 18:00**
**Frequency Shifts at the Fiber-Optical Event Horizon**, •*Stephen Hill*[1], *Christopher E. Kuklewicz*[1], *Thomas G. Philbin*[1,2], *Scott Robertson*[1], *Friedrich König*[1], and *Ulf Leonhardt*[1]; [1]*School of Physics and Astronomy, University of St Andrews,North Haugh, St Andrews, Fife, KY16 9SS, UK*, [2]*Max Planck Research Group of Optics, Information and Photonics, Günther-Scharowsky-Str.1, Bau 24, D-91058 Erlangen, Germany*.
Event horizons can be simulated by waves in a moving medium. Using ultrashort pulses in microstructured optical fibers, we have performed the first experimental demonstration of an artificial event horizon in optics.

**TUEIId.27 • 18:00**
**Study of fast electron transport dynamics in relativistic laser-solid interaction using multispectral, monochromatic X-ray imaging**, •*Luca Labate*[1,2], *Antonio Giulietti*[1,2], *Danilo Giulietti*[1,2,3], *Leonida A. Gizzi*[1,2], *Petra Koester*[1,2,3], *Tadzio Levato*[1,2,3], *Flavio Zamponi*[4], *Andrea Luebcke*[4], *Tino Kaempfer*[4], *Ingo Uschmann*[4], *Eckart Foerster*[4], *Anna Antonicci*[5], and *Dimitri Batani*[5]; [1]*Intense Laser Irradiation Laboratory - IPCF, Consiglio Nazionale delle Ricerche, Pisa, Italy*, [2]*INFN, Sezione di Pisa, Italy*, [3]*Dipartimento di Fisica, Universita' di Pisa, Italy*, [4]*Institut fur Optik und Quantenelektronik, Friedrich-Schiller-Universitat, Jena, Germany*, [5]*Dipartimento di Fisica, Universita' di Milano Bicocca, Italy*.
The results, both experimental and numerical, of a recent experiment aimed to study fast electron propagation in solids are reported. The technique allowed multispectral, monochromatic imaging of the X-ray emission from multi-layer targets.

**TUEIIe • Poster II e - Chemical Physics**

*Poster Area*
**18:00–20:00**
**TUEIIe • Poster II e - Chemical Physics**

**TUEIIe.1 • 18:00**
**Electron Injection Dynamics of Perylene Derivatives into ZnO and TiO2 Particle Films**, *J. Szarko, A. Neubauer, L. Socaciau-Siebert, A. Bartelt, F. Birkner, K. Schwarzburg,* and •*Rainer Eichberger*; *Dynamics of Interfacial Reactions-SE 4, Hahn-Meitner-Institute Berlin, Glienicker Strasse 100, 14109 Berlin, Germany*.
The injection dynamics two perylene dyes bound to ZnO and TiO2 nanoparticles was investigated with femtosecond transient absorption simultaneously monitoring the rise of the cationic and the decay of the excited state.

**TUEIIe.2 • 18:00**
**Coherent phonons in cyanine dye monomers and J-aggregates**, •*Tersilla Virgili*[1], *Samira Ceccarelli*[2], *Larry Luer*[1], *Guglielmo Lanzani*[1], *Giulio Cerullo*[1], and *David G. Lidzey*[2]; [1]*IFN, INFM CNR Dipartimento di Fisica, Politecnico di Milano, P.zza Leonardo Da Vinci 32, 20132 Milano, Italy*, [2]*Department of Physics and Astronomy, University of Sheffield, Hicks Building, Hounsfield Road, Sheffield S37RH United Kingdom*.
Using pump-probe spectroscopy, we investigate coherent oscillations in cyanine dye, in monomeric form and in J-aggregate. We identify a low energetic intramolecular mode amplified in the J-aggregate film producing a modulation of the excitonic coupling.

**TUEIIe.3 • 18:00**
**Ultrafast Dynamics of Photoexcited Sodium-Water Clusters**, •*Hongtao Liu*[1], *Jan Philippe Müller*[1], *Claus Peter Schulz*[1], *Christian Schröter*[1], *Nick Zhavoronkov*[1], and *Ingolf Volker Hertel*[1,2]; [1]*Max-Born-Institut, 12489 Berlin, Germany*, [2]*Fachbereich Physik, Freie Universität Berlin, 14195 Berlin, Germany*.
The lifetimes of the first electronically excited state of $Na(H_2O)_n$ clusters (n up to 40) are measured using two colour pump-probe spectroscopy. The measured lifetimes are compared to those of water cluster anions.

**TUEIIe.4 • 18:00**
**Electronic Excitations in Pentacene Films: Singlet versus Triplet Dynamics**, *Henning Marciniak*[1], *Bert Nickel*[2], and •*Stefan Lochbrunner*[1]; [1]*Institut für Physik, Universität Rostock, Universitätsplatz 3, 18055 Rostock, Germany*, [2]*Fakultät für Physik und CeNS, Ludwig-Maximilians-Universität, Geschwister-Scholl-Platz 1, 80539 München, Germany*.
Polarization dependent femtosecond spectroscopy shows that photoexcited excitons in microcrystalline pentacene films decay within 70 fs to a non fluorescing singlet species while triplets are formed in a small fraction on the picosecond time scale.

**TUEIIe.5 • 18:00**
**Coherent Control of the Exciton Dynamics in the FMO Protein**, •*Maaike Milder*[1], *Ben Brueggemann*[2], *Mette Miller*[3], and *Jennifer Herek*[1,4]; [1]*FOM-Institute for Atomic and Molecular Physics (AMOLF), Amsterdam, The Netherlands*, [2]*Humboldt Universität, Institut für Physik AG Halbleitertheorie, Berlin, Germany*, [3]*University of Southern Denmark, Department of Biochemistry and Molecular Biology, Odense, Denmark*, [4]*Optical Sciences Group, MESA+ Institute for NanoTechnology, University of Twente, Enschede, The Netherlands*.
We have achieved first steps toward coherent control of excitonic energy migration in the FMO pigment-protein complex, by combining femtosecond pulse shaping with a feedback loop using an evolutionary algorithm, as well as complementary simulations.

**TUEIIf • Poster II f - Chemistry**

*Poster Area*
**18:00–20:00**
**TUEIIf • Poster II f - Chemistry**

**TUEIIf.1 • 18:00**
**Coherently Enhanced Ionization and Fragmentation**, •*Xin Zhu*, *Vadim Lozovoy*, and *Marcos Dantus*; *Michigan State University, Department of Chemistry, East Lansing, Michigan 48823*.
We report the observation of coherently enhanced fragment ion ejection pathway. The ions formed through this process exhibit very sensitive dependence upon the time-frequency structures of the laser pulses.

**TUEIIf.2 • 18:00**
**Single-Shot Time Domain Measurement of Phase Response of Ultrafast Vibrational Quantum Beating**, •*Jesse W. Wilson*, *Philip Schlup*, and *Randy A. Bartels*; *Electrical and Computer Engineering Department, Colorado State University, Fort Collins, CO 80523, USA*.
Phase-sensitive time-domain Fourier transform spectroscopy is used to measure vibrational Raman spectra in solid, liquid and gas phase samples. The pump-probe configuration measures phase shifts directly via spectral holography in scanned or single-shot modes.

**TUEIIf.3 • 18:00**
**Vibrational Coherence Transfer in Metal Carbonyls: Solvent Dependence of Coherence Lifetimes Studies with MDIR**, •*Matthew J. Nee*, *Carlos R. Baiz*, *Jessica M. Anna*, *Robert McCanne*, and *Kevin J. Kubarych*; *Department of Chemistry, University of Michigan, Ann Arbor, Michigan, 48109, USA*.
Multidimensional infrared spectra of metal carbonyls in different solvents are presented as a function of the waiting time. The evolution of each peak is discussed with reference to excited-state coherences and coherence transfer.

**TUEIIf.4 • 18:00**
**The finite duration of chemical exchange events can be observed using two-dimensional infrared spectroscopy**, •*Thomas la Cour Jansen* and *Jasper Knoester*; *Center for Theoretical Physics and Zernike Institute for Advanced Materials, University of Groningen, Groningen, The Netherlands*.
We use numerical Langevin simulations to calculate two-dimensional infrared spectra of chemical exchange. We demonstrate that the spectra are not only sensitive to the exchange rate, but also to the finite duration of the exchange.

**TUEIIf.5 • 18:00**
**Chain Length Dependence of Two-Dimensional Infrared Spectral Pattern Characteristic to $3_{10}$-Helix Peptides**, *Hiroaki Maekawa*[1], *Fernando Formaggi*[2], *Claudio Toniolo*[2], and •*Nien-Hui Ge*[1]; [1]*Department of Chemistry, University of California, Irvine, California 92697-2025, USA*, [2]*Institute of Biomolecular Chemistry, CNR, Padova Unit, Department of Chemistry, University of Padova, 35131 Padova, Italy*.
Two-dimensional infrared spectra of Z-(Aib)$_n$-OtBu ($n = 3, 5, 8,$ and 10) were measured to investigate how they depend on the peptide chain length. The onset of the $3_{10}$-helical spectral signature appears to occur at the pentapeptide.

**TUEIIf.6 • 18:00**
**Ultrafast Exciton Dynamics of J- and H-Aggregates of Porphyrin Catechol in Aqueous Solution**, •*Hirendra Ghosh* and *Sandeep Verma*; *Radiation & Photochemistry Division, Bhabha Atomic Research Centre, Trombay, Mumbai - 400 085, INDIA,*.
Porphyrin catechol found to form J- and H-aggregates in different pH at certain concentration. Ultrafast exciton dynamics of J- and H-aggregates found to be 200 fs and 100 fs respectively as monitored by femtosecond spectroscopy.

**TUEIIf.7 • 18:00**
**Chirp Effects on Vibrational Wave Packets in Large Molecules: A Multimode Perspective**, •*Amir Wand*[1], *Ofir Shoshanim*[1], *Shimshon Kallush*[2], *Ronnie Kosloff*[2], and *Sanford Ruhman*[1]; [1]*Department of Physical Chemistry and the Farkas Center for Light-Induced Processes, The Hebrew University, Jerusalem 91904, Israel.*, [2]*Department of Physical Chemistry and The Fritz Haber Research Center, The Hebrew University, Jerusalem 91904, Israel*.
Linear chirp which optimally induces vibronic wave packets in large molecules is addressed by theory and experiment. Results allow better definition for ”following” of nuclear dynamics by the instantaneous pump frequency in the multidimensional case.

**TUEIIf.8 • 18:00**
**Determining Vibrational Huang-Rhys Factors by Photon Echo Spectroscopy**, •*Niklas Christensson*, *Arkady Yartsev*, and *Tönu Pullerits*; *Department of Chemical Physics, Lund University, PO. Box 124, Se-22100, Lund, Sweden*.
Electronic and vibrational dephasing dynamics of Rhodamine 800 has been studied with 3PEPS. With careful analysis, the S-factors of the vibrational modes can be accurately determined. The vibrational dephasing rate displays abnormal frequency dependence.

**TUEIIf.9 • 18:00**
**The solvent dependent conformations of a Glycine-Alanine dipeptide: A two-dimensional infrared study**, •*Marco Candelaresi*[1], *Paolo Foggi*[1,2], and *Manuela Lima*[1]; [1]*Via Nello Carrara 1 50019 Sesto Fiorentino (FI)*, [2]*Via Elce di Sotto 8 06100 Perugia*.
The D2O and DMSO solutions of the Glycine-Alanine-Methylamide are investigated by two-dimensional pump-probe infrared spectroscopy. Differences in the dynamics and in the intensity of the cross peaks are observed between the two solutions.

**TUEIIf.10 • 18:00**
**Observation of High-Frequency Coherent Vibrational Motion with Strongly Chirped Probe Pulses**, •*Dario Polli*, *Daniele Brida*, *Guglielmo Lanzani*, and *Giulio Cerullo*; *Dipartimento di Fisica, Politecnico, Milano, Italy*.
We observe time-domain coherent vibrational wavepackets at 1585-cm$^{-1}$ frequency (21-fs period) using broadband probe pulses strongly chirped up to 150-fs duration. The results are explained using the chronocyclic (Wigner) representation of the chirped pulse.

**TUEIIf.11 • 18:00**
**Coherent Transfer of Molecular Vibrations in the Electronic Excited States**, *Chul Hoon Kim*, *Sohyun Park*, *Intae Eom*, and

•*Taiha Joo*; *Pohang University of Science and Technology, Pohang, South Korea*.
Coherent wave packet motions in the electronic excited states prepared by impulsive nuclear rearrangement such as electronic transition, internal conversion, and chemical reaction are observed directly by ultrafast 35 fs time-resolved spontaneous fluorescence

**TUEIIf.12 • 18:00**

**Ultrafast isomerization dynamics of biomimetic photoswitches**, •*Julien Briand*[1], *Divya Sharma*[1], *Jérémie Léonard*[1], *Jan Helbing*[2], *Andrea Cannizzo*[3], *Majed Chergui*[3], *Vittorio Zanirato*[4], *Stefan Haacke*[1], and *Massimo Olivucci*[5]; [1]*Institut de Physique et Chimie des Matériaux de Strasbourg, UMR 7504 ULP CNRS, F-67034 Strasbourg, France*, [2]*Physikalisch-Chemisches Institut, Universität Zürich Winterthurerstr. 190, CH-8057 Zürich (CH)*, [3]*Laboratoire de Spectroscopie Ultrarapide, ISIC - EPFL, BSP, CH-1015 Lausanne (CH)*, [4]*Dipartimento di Scienze Farmaceutiche, Università di Ferrara, 44100 Ferrara (I)*, [5]*Dipartimento di Chimica, Università degli Studi di Siena, 53100 Siena (I)*.
Femtosecond UV-VIS and mid-IR experiments show that a new class of biomimetic photoswitches photo-isomerizes in less than 300 fs. In close analogy to rhodopsin, the isomerization is driven by motion along stretch and torsional coordinates.

**TUEIIf.13 • 18:00**

**Exchange Transient 2D-IR Spectroscopy probes the remixing of vibrational eigenstates upon electronic excitation - a benchmark for DFT calculations**, •*Andreas Messmer*[1,2], *Peter Hamm*[1], *Ana Maria Blanco Rodríguez*[3], *Antonín Vlček Jr.*[3,4], *Stanislav Záliš*[4], and *Jens Bredenbeck*[2]; [1]*Institute for Physical Chemistry, University of Zurich, Winterthurerstr. 190, CH-8057 Zurich, Switzerland*, [2]*Institute for Biophysics, Johann Wolfgang Goethe-University Frankfurt, Max von Laue-Str.1, D-60438 Frankfurt (Main), Germany*, [3]*School of Biological and Chemical Sciences, Queen Mary, University of London, Mile End Road, London E1 4NS, United Kingdom*, [4]*J. Heyrovský Institute of Physical Chemistry, Academy of Sciences of the Czech Republic, Dolejškova 3, CZ-18223 Prague, Czech Republic*.
The composition of excited state vibrations can be disentangled by projecting the groundstate vibrations on them using exchange transient two-dimensional IR spectroscopy. The results challenge time-dependent DFT calculations.

## WED1 • Light Harvesting

*Auditorium*
**8:30–10:15**
**WED1 • Light Harvesting**
*Chair: Wolfgang Zinth, Ludwig-Maximilians-Universität, Munich, Germany*

**WED1.1 • 8:30** •Invited•

**Ultrafast Energy Transfer and Primary Processes in Photosynthesis**, •*Richard J. Cogdell*; *Division of Biochemistry and Molecular Biology, IBLS. Glasgow Biomedical Research Centre, University of Glasgow, 126 University Place, Glasgow G12 8TA, Scotland, UK*.
This paper uses purple photosynthetic bacteria to present an overview of the primary reactions in photosynthesis, since there are both x-ray crystal structures of all the pigment-protein complexes involved and extensive ultrafast studies using them.

**WED1.2 • 9:00**
**Mapping Parallel Pathways of Energy Flow in LHCII with Broadband 2D Electronic Spectroscopy**, •*Gabriela S. Schlau-Cohen*[1,2], *Gregory S. Engel*[3], *Elizabeth L. Read*[1,2], *Donatas Zigmantas*[4], *Roberto Bassi*[5], and *Graham R. Fleming*[1,2]; [1]*Department of Chemistry, University of California, Berkeley, CA 94720-1460, USA*, [2]*Physical Biosciences Division, Lawrence Berkeley National Laboratory, Berkeley, CA 94720, USA*, [3]*Current address: Department of Chemistry, University of Chicago, Chicago, IL 60637, USA*, [4]*Current address: Department of Chemical Physics, Lund University, P.O. Box 124, SE-22100, Lund, Sweden*, [5]*Dipartimento Scientifico e Tecnologico, Facoltá di Scienze, Universitá di Verona, Strada Le Grazie, I-37134, Verona, Italy*.
Two-dimensional femtosecond broadband electronic spectroscopy was used to observe two dominant parallel pathways of energy transfer in the major light harvesting complex of Photosystem II in plants.

**WED1.3 • 9:15**
**Anti-Correlated Pigment Fluctuations of Allophycocyanin Can Impact Photosynthetic Light Harvesting in Cyanobacteria**, *Andrew M. Moran*[1], *Rene A. Nome*[2], and •*Norbert F. Scherer*[2]; [1]*Department of Chemistry, University of North Carolina at Chapel Hill, Chapel Hill, NC, 27599 USA*, [2]*Department of Chemistry and James Franck Institute, The University of Chicago, 929 East 57th Street, Chicago, Illinois, 60637 USA*.
2-D photon echo measurements and simulations establish that the energy level fluctuations of the phycocyanobilin pigment dimer become anti-correlated after 100fs due to protein motions on the several nanometer scale.

**WED1.4 • 9:30**
**Coherent Exciton Dynamics in Photosynthetic Complexes Revealed by Multidimensional Spectroscopy**, •*Darius Abramavicius*, *Dmitri Voronine*, and *Shaul Mukamel*; *Chemistry department, University of California Irvine, USA*.
The photon-echo signal is invariant to certain permutation symmetries of optical pulses. These are used to unravel coherence and population energy transfer pathways and design chirality-induced techniques for probing coherent and dissipative dynamics.

**WED1.5 • 9:45**
**Photoselection polarization experiments reveal ultrafast electron hopping between distinct aromatic residues in the flavoprotein DNA photolyase**, •*Andras Lukacs*[1], *André P.M. Eker*[2], *Martin Byrdin*[3], *Klaus Brettel*[3], and *Marten H. Vos*[1]; [1]*Laboratoire d'Optique et Biosciences, Ecole Polytechnique, Palaiseau, France*, [2]*Dept. of Cell Biology and Genetics, Medical Genetics Centre, Erasmus University Medical Centre, Rotterdam, The Netherlands*, [3]*Sérvice de Bioénergétique, CEA, Saclay, France*.
Flavin-excitation initiated electron transfer along three tryptophan amino acids in DNA photolyase was studied. Combining ultrafast polarization and mutagenesis approaches the chain was shown to act as efficient nanowire allowing transprotein electron-transfer in $<$4 ps.

**WED1.6 • 10:00**
**Quantum Coherence Accelerating Photosynthetic Energy Transfer**, •*Hohjai Lee*, *Yuan-chung Cheng*, and *Graham Fleming*; *Department of Chemistry, University of California, Berkeley and Physical Bioscience Division, Lawrence Berkeley National Laboratory, Berkeley, CA 94720, USA*.
We present how a long-lasting coherence enhances energy transfer efficiency in a photosynthetic complex based on an analysis of data collected by a newly developed two-color electronic coherence photon echo technique and theoretical simulations.

**WED2A • Frequency Combs and Waveform Synthesis**

*Auditorium*
**10:45–12:30**
**WED2A • Frequency Combs and Waveform Synthesis**
*Chair: Franz Kaertner, Massachusetts Institute of Technology, Cambridge, USA*

**WED2A.1 • 10:45** **•Invited•**

**The evolving femtosecond laser frequency comb**, •*Scott Diddams*, *Danielle Braje*, *Tara Fortier*, *Leo Hollberg*, *Matt Kirchner*, *Vela Mbele*, *Stephanie Meyer*, *Qudsia Quraishi*, and *Shijun Xiao*; *NIST, 325 Broadway, Boulder, Colorado, USA*.
The femtosecond laser frequency comb has evolved from the frequency-domain representation of a train of ultrashort pulses to an enabling tool for atomic timekeeping, high-resolution spectroscopy, and ultrafast optical waveform synthesis.

**WED2A.2 • 11:15**
**CEO-Phase Stabilized Few-Cycle Waveform Synthesizer**, •*Stefan Rausch*[1], *Thomas Binhammer*[1], *Anne Harth*[1], *Niels Meiser*[1], *Franz X. Kärtner*[2], and *Uwe Morgner*[1,3]; [1] *Institute for Quantum Optics, Leibniz Universität Hannover, Welfengarten 1, 30167 Hannover, Germany*, [2] *Department of Electrical Engineering and Computer Science, Massachusetts Institute of Technology (MIT), Cambridge, MA, USA*, [3] *Laserzentrum Hannover (LZH), 30419 Hannover, Germany*.
We present a waveform synthesizer consisting of a CEO-phase stabilized octave-spanning Ti:sapphire laser-oscillator and prism-based pulse shaper allowing for full control of the electric field on a sub-femtosecond time-scale.

**WED2A.3 • 11:30**
**High-power, mHz linewidth Yb:fiber optical frequency comb for high harmonic generation**, •*Thomas R. Schibli*[1], *Dylan C. Yost*[1], *Michael J. Martin*[1], *Jun Ye*[1], *Ingmar Hartl*[2], *Andrius Marcinkevičius*[2], and *Martin E. Fermann*[2]; [1] *JILA, National Institute of Standards and Technology and University of Colorado, Boulder, CO 80309, USA*, [2] *IMRA America, Inc., 1044 Woodridge Ave., Ann Arbor, MI 48105, USA*.
We present a fully phase-stabilized, high-power Yb:fiber frequency comb with record-low sub-mHz relative linewidths. Utilizing coherent pulse-addition inside a passive optical cavity, we achieve >3kW average power for HHG at a 136MHz pulse repetition rate.

**WED2A.4 • 11:45**
**High Harmonic Frequency Combs for High Resolution Spectroscopy**, •*Akira Ozawa*[1], *Jens Rauschenberger*[1,2], *Christoph Gohle*[1], *Maximilian Herrmann*[1], *David Walker*[1], *Volodymyr Pervak*[2], *Alma Fernandez*[1], *Alexander Apolonski*[2], *Ronald Holzwarth*[1], *Thomas Udem*[1], *Ferenc Krausz*[1,2], and *Theodor Hänsch*[1,2]; [1] *Max-Planck-Institut für Quantenoptik, Hans-Kopfermann-Strasse 1, 85748 Garching, Germany*, [2] *Department für Physik der Ludwig-Maximilians-Universität München, Am Coulombwall 1, 85748 Garching, Germany*.
Intracavity high harmonic generation was demonstrated with a Ti:sapphire mode-locked laser at a repetition rate of 10.8MHz. Harmonics up to 19th order at 43 nm were observed with plateau harmonics at the uW power level.

**WED2A.5 • 12:00**
**Ultrafast double pulse parametric amplification for precision Ramsey metrology**, •*Dominik Z. Kandula*, *Amendine Renault*, *Christoph Gohle*, *Anne Lisa Wolf*, *Stefan Witte*, *Wim Hogervorst*, *Wim Ubachs*, and *Kjeld S. E. Eikema*; *Laser Centre, Vrije Universiteit Amsterdam, De Boelelaan 1081, 1081HX Amsterdam, Netherlands*.
An optical parametric chirped pulse amplifier system for pulse pairs is presented. The differential phase stability of the pulse pairs is 20 mrad, giving good prospects for high resolution Ramsey spectroscopy in the extreme ultraviolet.

**WED2A.6 • 12:15**
**Towards Versatile Coherent Pulse Synthesis using Femtosecond Laser and Optical Parametric Oscillator**, •*Barry Gale*, *Jinghua Sun*, and *Derryck Reid*; *Heriot Watt University, Edinburgh, Scotland*.
Pulses from a femtosecond optical parametric oscillator and its Ti:sapphire pump laser were phase-locked as a prerequisite to coherent synthesis from different wavelengths. Mutual coherence was demonstrated using spectral interferometry and cross-correlation.

**WED2P • Structural Dynamics in Biological Systems**

*Panoramica*
**10:45–12:30**
**WED2P • Structural Dynamics in Biological Systems**
*Chair: Sandy Ruhman, The Hebrew University, Jerusalem, Israel*

**WED2P.1 • 10:45**
**Energy transfer along a Poly(Pro) - peptide**, •*Wolfgang Zinth*[1], *Wolfgang J. Schreier*[1], *Tobias E. Schrader*[1], *Florian O. Koller*[1], *Markus Löweneck*[2,3], *Hans-Jürgen Musiol*[2], and *Luis Moroder*[2]; [1]*LS für BioMolekulare Optik, LMU München, München, Germany*, [2]*Max-Planck Institut für Biochemie, Martinsried, Germany*, [3]*present address: Senn Chemicals, Dielsdorf, Switzerland*.
Using a novel molecular thermometer, p-nitro-phenylalanine, we investigate the transport of vibrational excess energy along a poly(Pro) sequence. Time resolved IR-spectroscopy reveals that heat transfer proceeds at a speed of several Å per picosecond.

**WED2P.2 • 11:00**
**Energy Transport in Peptide Helices around the Glass Transition**, •*Ellen Backus*[1], *Phuong Nguyen*[2], *Virgiliu Botan*[1], *Rolf Pfister*[1], *Alessandro Moretto*[3], *Marco Crisma*[3], *Claudio Toniolo*[3], *Gerhard Stock*[2], and *Peter Hamm*[1]; [1]*Physikalisch-Chemisches Institut, Universität Zürich, Winterthurerstrasse 190, CH-8057 Zürich, Switzerland*, [2]*Institut für Physikalische und Theoretische Chemie, J.W. Goethe Universität, Max-von-Laue-Strasse 7, D-60438 Frankfurt, Germany*, [3]*Institute of Biomolecular Chemistry, University of Padova, via Marzola 1, I-35131 Padova, Italy*.
The energy transport through a small helical peptide has been studied as function of temperature. Surprisingly, the diffusive transport dominates at high temperature, while at low temperature ballistic transport seems to be important.

**WED2P.3 • 11:15**
**Ultrafast Vibrational Dynamics of Adenine-Thymine Base Pairs in Hydrated DNA**, *Jason R. Dwyer*, *Lukas Szyc*, •*Erik T. J. Nibbering*, and *Thomas Elsaesser*; *Max-Born-Institute, Max-Born-Str. 2 A, D-12489 Berlin, Germany*.
We report femtosecond two-color pump-probe studies of the congested N-H/O-H stretching absorption of high-quality thin films of DNA oligomers in a broad hydration range. Different vibrational excitations are separated and their characteristic relaxation times identified.

**WED2P.4 • 11:30**
**Photodynamics of Blue Light Sensing Proteins Viewed Through Ultrafast Vibrational Spectroscopy: BLUF Domain of AppA and Its Mutants**, *Allison Stelling*[1], *Minako Kondo*[2], *Kate Ronayne*[3], *Peter Tonge*[1], and •*Stephen Meech*[2]; [1]*SUNY Stonybrook, New York, UDA*, [2]*University of East Anglia, Norwich, UK*, [3]*Rutherford Appleton Laboratory, STFC, Didcot, UK*.
The mechanism of blue light sensing in the photoactive protein AppA is investigated by transient infra-red spectroscopy, mutagenesis and isotope editing. Modes associated with the flavin excited state and perturbation of the protein are detected.

**WED2P.5 • 11:45**
**Direct observation of ligand transfer and bond formation in cytochrome c oxidase using mid-infrared chirped-pulse upconversion**, *Johanne Treuffet*, *Kevin Kubarych*, *Jean-Christophe Lambry*, *Eric Pilet*, *Jean-Baptiste Masson*, *Jean-Louis Martin*, *Marten Vos*, *Manuel Joffre*, and •*Antigoni Alexandrou*; *Laboratoire d'Optique et Biosciences, Ecole Polytechnique, Palaiseau, France*.
We time resolved the CO ligand transfer process in the bimetallic active site of cytochrome c oxidase, using mid-infrared chirped-pulse upconversion to observe the full vibrational signature of Fe-CO bond breaking and Cu-CO bond formation.

**WED2P.6 • 12:00**
**Tryptophan Residues as Natural Ultrafast Voltmeters in Retinal Proteins**, •*Jérémie Léonard*[1], *Erwin Portuondo-Campa*[2], *Andrea Cannizzo*[2], *Franck Van Mourik*[2], *Jörg Tittor*[3], *Stefan Haacke*[1], and *Majed Chergui*[2]; [1]*Institut de Physique et Chimie des Matériaux de Strasbourg, UMR 7504 ULP - CNRS, F-67034 Strasbourg, France*, [2]*Laboratoire de Spectroscopie Ultrarapide, ISIC - EPFL, BSP, CH-1015 Lausanne, Switzerland*, [3]*Max-Planck-Institut für Biochemie, 82152 Martinsried, Germany*.
The comparison between UV transient absorption spectra of wild type bacteriorhodopsin and two tryptophan-mutant proteins gives evidence for the possibility to use tryptophans as ultrafast probes for the photo-induced dipole moment change in retinal proteins.

**WED2P.7 • 12:15**
**Interrogating fiber formation kinetics with automated 2D-IR spectroscopy**, •*David Strasfeld*, *Yun Ling*, *Sang-Hee Shim*, and *Martin Zanni*; *Department of Chemistry, University of Wisconsin - Madison, Madison, WI 53706-1396*.
We extract structural kinetics towards better understanding the aggregation pathway of amylin, the protein component of the amyloid fibers found to inhibit pancreatic cell function in type II diabetes patients, using automated 2D-IR spectroscopy.

## WED3 • Electron Dynamics and Plasmonics

*Auditorium*
**14:00–15:45**
**WED3 • Electron Dynamics and Plasmonics**
*Chair: Alfred Leitenstorfer, University of Konstanz, Germany*

**WED3.1 • 14:00** **•Invited•**

**Ultrafast photoemission electron microscopy: imaging light with electrons on femto-nano scale**, •*Hrvoje Petek*[1,2] and *Atsushi Kubo*[1,3]; [1]*Department of Physics and Astronomy, University of Pittsburgh, Pittsburgh, PA 15260 USA,* [2]*Donostia International Physics Center, Donostia-San Sebastian 20018 Spain,* [3]*PRESTO, Japan Science and Technology Agency, 4-1-8 Honcho Kawaguchi, Saitama, Japan*.
Attosecond movies (330 as/frame) of surface plasmon polariton dynamics at a nanostructured silver/vacuum interface are recorded with a photoelectron emission microscope employing phase-locked pulse pair excitation. Examples of simple surface plasmon optical elements are given.

**WED3.2 • 14:30**
**X-ray Absorption Spectroscopy on the fs Time Scale: Ultrafast Electron and Spin Dynamics in Nickel**, •*Christian Stamm*[1], *Niko Pontius*[1], *Torsten Kachel*[1], *Karsten Holldack*[1], *Torsten Quast*[1], *Rolf Mitzner*[1,2], *Shaukat Khan*[1,3], *Marko Wietstruk*[1], *Hermann A. Dürr*[1], and *Wolfgang Eberhardt*[1]; [1]*BESSY, Berlin, Germany,* [2]*Universität Münster, Münster, Germany,* [3]*Universität Hamburg, Hamburg, Germany*.
We present femtosecond x-ray absorption experiments investigating the electron and spin dynamics in a thin nickel film after excitation by an optical fs laser pulse. A temporal response as fast as 120 fs is found.

**WED3.3 • 14:45**
**Ultrafast Electron Dynamics in Quantum Well States of Pb/Si(111)**, *Patrick Kirchmann* and •*Uwe Bovensiepen*; *Fachbereich Physik, Freie Universitaet Berlin, Arnimallee 14, DE-14195 Berlin*.
We investigated ultrafast energy relaxation in unoccupied quantum well states of Pb/Si(111) with femtosecond time-resolved two-photon photoemission. Decay rates of $6p_z$ quantum well states are compatible with Fermi liquid theory if inter-subband scattering is considered.

**WED3.4 • 15:00**
**Direct Visualization of Electron Emission from a Metal Surface under Intense Laser Illumination**, •*Christoph T. Hebeisen*, *Ralph Ernstorfer*, *Maher Harb*, *Thibault Dartigalongue*, and *R. J. Dwayne Miller*; *Institute for Optical Sciences and Departments of Chemistry and Physics, University of Toronto, 80 St. George St., Toronto, ON, M5S 3H6 Canada*.
We report on a method for the direct imaging of charge distributions and transient electric fields in the early stages of femtosecond laser plasma generation from a metal surface.

**WED3.5 • 15:15**
**Attosecond Nanoplasmonic Field Microscope**, •*Mark Stockman*[1,2], *Matthias Kling*[2], *Ulf Kleineberg*[3], and *Ferenc Krausz*[2,3]; [1]*Department of Physics and Astronomy, Georgia State University, Atlanta, GA 30303, USA,* [2]*Max-Planck-Institut für Quantenoptik, Hans-Kopfermann-Straße 1, D-85748 Garching, Germany,* [3]*Ludwig-Maximilians-Universität München, Department für Physik, Am Coulombwall 1, D-85748 Garching, Germany*.
We propose an approach that will provide direct, non-invasive access to the nanoplasmonic collective dynamics, with nanometer-scale spatial resolution and ˜100 attosecond temporal resolution. It combines techniques of photoelectron emission microscopy and attosecond streaking spectroscopy.

**WED3.6 • 15:30**
**Coherent Control of Surface Plasmon Propagation Directions**, *SooBong Choi*[1], *DooJae Park*[1], *YeoChan Yoon*[1], *HyunWoo Kim*[1], *JeeHoon Kang*[2], *Q. Han Park*[2], and •*DaiSik Kim*[1]; [1]*Department of Physics and Astronomy, Seoul National University, 151-747, Seoul, Korea,* [2]*Department of Physics, School of science, Korea University, 136-71,3 Seoul, Korea*.
We demonstrate directional control of surface plasmon polariton waves via femtosecond coherent control in an asymmetric Bragg-mirror structure. Our finding paves way towards directional control of surface plasmon propagation direction and minimization of two-way loss.

**WED4A • Octave-Spanning Pulse Generation**

*Auditorium*
**16:15–18:00**
**WED4A • Octave-Spanning Pulse Generation**
*Chair: Kjeld Eikema, FOM Institute for Atomic and Molecular Physics, Amsterdam, The Netherlands*

**WED4A.1 • 16:15** **•Invited•**

**Generation of octave-spanning Raman comb with absolute-phase control**, •*Masayuki Katsuragawa*[1], *Feng-Lei Hong*[2], *Masaki Arakawa*[1], and *Takayuki Suzuki*[1]; [1]*Department of Applied Physics and Chemistry, University of Electro-Communications, 1-5-1 Chofugaoka, Chofu, Tokyo 182-8585, Japan*, [2]*National Institute of Advanced Industrial Science and Technology, 1-1-1, Umezono, Tsukuba 305-8563, Ibaraki, Japan*.
We show a novel octave-spanning comb generation having precise frequency-spacing of a Raman transition. We also demonstrate that the carrier-envelope-offset of the Raman comb is precisely controlled by stabilizing the comb to an optical frequency-standard.

**WED4A.2 • 16:45**
**Tunable, octave-spanning supercontinuum driven by X-Waves formation in condensed Kerr media.**, •*Alessandro Averchi*[1], *Daniele Faccio*[1], *Miroslav Kolesik*[2], *Jerome V. Moloney*[2], *Arnaud Couairon*[3], and *Paolo Di Trapani*[1,4]; [1]*CNISM and Department of Physics and Mathematics, University of Insubria, Via Valleggio 11, 22100 Como, Italy*, [2]*ACMS and Optical Science Center, University of Arizona, Tucson, 85721 AZ*, [3]*Centre de Physique Théorique, CNRS, Ecole Polytechnique, F-91128, Palaiseau, France*, [4]*Department of Quantum Electronics, Vilnius University, Sauletekio Ave. 9, bldg. 3, LT-10222, Vilnius, Lithuania*.
We generate octave-spanning blue-shifted continuum in ultrashort laser pulse filamentation in fused silica. Bandwidth and central wavelength can be tuned modyfing the input pulse focusing condition. The process is explained in terms of X-Waves generation.

**WED4A.3 • 17:00**
**Toward Ultrafast Optical Waveform Synthesis with a Stabilized Ti:Sapphire Frequency Comb**, •*Matthew Kirchner*[1], *Tara Fortier*[1], *Danielle Braje*[1], *Andy Weiner*[2], *Leo Hollberg*[1], and *Scott Diddams*[1]; [1]*National Institute of Standards and Technology, Boulder, Colorado 80305, USA*, [2]*Electrical and Computer Engineering, Purdue University, West Lafayette, Indiana 47907, USA*.
We have developed a system for line-by-line control of a stabilized Ti:Sapphire optical frequency comb. We show individually-addressed 20 GHz comb modes around 970 nm and apply simple masks to demonstrate individual mode control.

**WED4A.4 • 17:15**
**Multimillijoule Optically Synchronized and Carrier-Envelope-Phase-Stable Chirped Parametric Amplification at 1.5 $\mu$m**, •*Oliver D. Mücke*[1], *Dmitry Sidorov*[1], *Peter Dombi*[1], *Audrius Pugžlys*[1], *Andrius Baltuška*[1], *Skirmantas Ališauskas*[2], *Jonas Pocius*[3], *Linas Giniunas*[3], and *Romualdas Danielius*[3]; [1]*Photonics Institute, Vienna University of Technology, Gusshausstrasse 27-387, A-1040, Vienna, Austria*, [2]*Laser Research Center, Vilnius University, Saulėtekio av. 10, LT-10223 Vilnius, Lithuania*, [3]*Light Conversion Ltd., P/O Box 1485, Light Conversion Ltd., P/O Box 1485, Saulėtekio av. 10, LT-10223 Vilnius, Lithuania av. 10, LT-10223 Vilnius, Lithuania*.
Efficient infrared 35-THz-wide parametric amplification with energies $>$3 mJ is obtained in a 3-stage OPCPA using a combination of a 1030-nm 200-fs Yb- and a 1064-nm 60-ps Nd amplifier seeded with a common Yb oscillator.

**WED4A.5 • 17:30**
**5-fs multi-mJ CEP-locked parametric chirped-pulse amplifier at 1 kHz**, •*Shunsuke Adachi*[1,3], *Nobuhisa Ishii*[1,3], *Hiroki Ishii*[1,3], *Teruto Kanai*[1,3], *Atsushi Kosuge*[1,3], *Yohei Kobayashi*[2,3], *Dai Yoshitomi*[2,3], *Kenji Torizuka*[2,3], and *Shuntaro Watanabe*[1,3]; [1]*Institute for Solid State Physics, University of Tokyo, Kashiwanoha 5-1-5, Kashiwa Chiba 277-8581, Japan*, [2]*National Institute of Advanced Industrial Science and Technology (AIST), 1-1-1 Umezono, Tsukuba 305-8568 Japan*, [3]*CREST, Japan Science and Technology Agency, Sanbancho 5, Chiyoda-ku, Tokyo 102-0075, Japan*.
We report an optical parametric chirped-pulse amplifier with 5.5-fs pulse duration at a 1-kHz repetition rate, pumped by a 450-nm pulse from a frequency-doubled Ti:sapphire laser.

**WED4A.6 • 17:45**
**Sub-two-cycle pulses at 1.6 $\mu$m from an optical parametric amplifier**, *Daniele Brida*[1], *Giovanni Cirmi*[1], *Cristian Manzoni*[1], *Marco Marangoni*[1], *Stefano Bonora*[1,2], *Paolo Villoresi*[2], *Sandro De Silvestri*[1], and •*Giulio Cerullo*[1]; [1]*National Laboratory for Ultrafast and Ultraintense Optical Science - INFM-CNR, Dipartimento di Fisica, Politecnico di Milano, Piazza L. da Vinci 32, 20133 Milano, Italy*, [2]*LUXOR - Laboratory for UV and X ray Optical Research - CNR-INFM, D.E.I. - Università di Padova, Italy.*.
We demonstrate two optical parametric amplifier schemes, based on $\beta$-barium-borate and periodically-poled lithium tantalate respectively, generating ultrabroadband pulses in the 1-2 $\mu$m range. Using a deformable mirror compressor we obtain 8.5-fs pulses at 1.6 $\mu$m.

## WED4P • Nanooptics and Microscopy

*Panoramica*
**16:15–18:00**
**WED4P • Nanooptics and Microscopy**
*Chair: Hrvoje Petek, University of Pittsburgh, PA, USA*

**WED4P.1 • 16:15**
**Simultaneous Spatial and Temporal Control of Nanooptical Fields**, *Martin Aeschlimann*[1], *Michael Bauer*[2], *Daniela Bayer*[1], *Tobias Brixner*[3,4], *Stefan Cunovic*[5], *Frank Dimler*[3,4], *Alexander Fischer*[1], •*Walter Pfeiffer*[5], *Martin Rohmer*[1], *Christian Schneider*[1], *Felix Steeb*[1], *Christian Strüber*[5], and *Dimitri V. Voronine*[3,4]; [1]*Fachbereich Physik, TU Kaiserslautern, Erwin-Schrödinger Str. 46, 67663 Kaiserslautern, Germany*, [2]*Institut für Experimentelle und Angewandte Physik, Universität Kiel, Leibnizstr. 19, 24118 Kiel, Germany*, [3]*Institut für Physikalische Chemie, Universität Würzburg, Am Hubland, 97074 Würzburg, Germany*, [4]*Physikalisches Institut, Universität Würzburg, Am Hubland, 97074 Würzburg, Germany*, [5]*Fakultät für Physik, Universität Bielefeld, Universitätsstr. 25, 33516 Bielefeld, Germany*.
Using time-resolved two-photon photoemission electron microscopy we demonstrate simultaneous spatial and temporal control of nanooptical fields. Cross correlation measurements reveal the ultrafast spatial switching of the local excitation on a subdiffraction length scale.

**WED4P.2 • 16:30**
**Nano-Confined Light and Electron Sources Driven by Few-Cycle Optical Pulses**, •*Catalin C. Neacsu*[1,2], *Claus Ropers*[1], *Thomas Elsaesser*[1], *Martin Albrecht*[3], *Rob Olmon*[2], *Markus B. Raschke*[2], and *Christoph Lielnau*[4]; [1]*Max-Born-Institut für Nichtlineare Optik und Kurzzeitspektroskopie, D-12489 Berlin, Germany*, [2]*Department of Chemistry, University of Washington, Seattle, Washington 98195-1700, USA*, [3]*Institut für Kristallzüchtung, D-12489 Berlin, Germany*, [4]*Institut für Physik, Carl von Ossietzky Universität Oldenburg, D-26129 Oldenburg, Germany*.
Flat and nanostructured metal nano-tips driven by sub-10 fs pulses at an 80-MHz repetition rate serve for nano-confined light and electron generation. We demonstrate control of spatial emission properties and analyze nonlinear generation processes.

**WED4P.3 • 16:45**
**Attosecond Free Electron Pulses for Diffraction and Microscopy**, •*Peter Baum*[1,2] and *Ahmed H. Zewail*[1]; [1]*California Institute of Technology, 1200 E. California Bld, Pasadena CA 91125, USA*, [2]*Ludwig-Maximilians-Universität München, Oettingenstr. 67, 80538 München, Germany*.
In synthesized gratings of optical fields, free non-relativistic electrons compress to pulses of 15 attosecond duration. Such pulses have potential to advance ultrafast electron diffraction and microscopy to the domain of attosecond electron dynamics.

**WED4P.4 • 17:00**
**Ultrafast Wide-Field Fluorescence Microscopy**, •*Lars Gundlach* and *Piotr Piotrowiak*; *Department of Chemistry, Rutgers University Newark, 73 Warren St, Newark, NJ 07102, USA*.
We present an ultrafast Kerr-gated microscope capable of collecting diffraction limited 2D fluorescence images with sub 100 fs resolution. The ultrafast fluorescence dynamics of gold nanoparticles is presented to exemplify the capabilities of the instrument.

**WED4P.5 • 17:15**
**Nanoscale Optical Microscopy in the Vectorial Focusing Regime**, •*Keith Serrels*, *Euan Ramsay*, *Richard Warburton*, and *Derryck Reid*; *Heriot-Watt University, School of Engineering and Physical Sciences, Edinburgh, EH14 4AS, UK*.
By using extreme numerical-aperture solid-immersion microscopy at 1553 nm we demonstrate, under certain circumstances, polarisation-sensitive imaging with resolution values approaching 100 nm which substantially surpass the classical scalar diffraction-limit embodied by Sparrow's resolution criterion.

**WED4P.6 • 17:30**
**Fiber-optical analogue of the event horizon**, •*Friedrich Koenig*[1], *Thomas Philbin*[1,2], *Christopher Kuklewicz*[1], *Scott Robertson*[1], *Stephen Hill*[1], and *Ulf Leonhardt*[1]; [1]*School of Physics and Astronomy, University of St. Andrews, North Haugh, St. Andrews, KY168QR, UK*, [2]*Max Planck Research Group of Optics, Information and Photonics, Guenther-Scharowsky-Str. 1, Bau 24, D-91058 Erlangen, Germany*.
We present a realistic scheme for an artifcial event horizon in optics with ultrashort pulses in microstructured fibers that can probe the quantum effects of horizons, particularly Hawking radiation. We also show experimental progress.

**WED4P.7 • 17:45**
**Factoring numbers with interfering random waves**, •*Sébastien Weber*, *Béatrice Chatel*, and *Bertrand Girard*; *Laboratoire Collisions, Agrégats, Réactivité, IRSAMC (CNRS, Université de Toulouse, UPS), France*.
Factorisation of numbers using Gauss sums is improved by choosing randomly the terms in the sum. Ghost factors are so eliminated and the required number of terms of the truncated sum varies as ln N.

**THU1 • Ultrafast X-Ray and Electron Diffraction**

*Auditorium*
**8:30–10:15**
**THU1 • Ultrafast X-Ray and Electron Diffraction**
*Chair: Dwayne Miller, University of Toronto, Canada*

**THU1.1 • 8:30** **•Invited•**

**Ultrafast Structural Dynamics of Polar Solids Studied by Femtosecond X-Ray Diffraction**, •*Thomas Elsaesser*[1], *Clemens von Korff Schmising*[1], *Nickolai Zhavoronkov*[1], *Matias Bargheer*[1,2], *Michael Woerner*[1], *Markus Braun*[3], *Peter Gilch*[3], *Wolfgang Zinth*[3], *I. Vrejoiu*[4], *D. Hesse*[4], and *M. Alexe*[4]; [1]*Max-Born-Institut für Nichtlineare Optik und Kurzzeitspektroskopie, D-12489 Berlin, Germany*, [2]*Institut für Physik, Universität Potsdam, D-14469 Potsdam, Germany*, [3]*Biomolekulare OPtik, Department für Physik, Ludwig-Maximilians-Universität, D-80538 München, Germany*, [4]*Max-Planck-Institut für Mikrostrukturphysik, D-06120 Halle, Germany*.
We study photoinduced structural dynamics in ferroelectric superlattices and polar molecular crystals. Elongations of coupled phonon modes affecting ferroelectric polarizations and structural changes connected with the solvation of molecular dipoles are determined quantitatively.

**THU1.2 • 9:00**
**Atomic Motion in Laser Excited Bismuth Studied with Femtosecond X-Ray Diffraction**, •*Paul Beaud*[1], *Steve L. Johnson*[1], *Chris J. Milne*[2], *Faton Krasniqi*[1], *Ekaterina Vorobeva*[1], and *Gerhard Ingold*[1]; [1]*Swiss Light Source, Paul Scherrer Institut, CH-5232 Villigen, Switzerland*, [2]*Laboratoire de Spectroscopie Ultrarapide, Ecole Polytechnique Fédérale de Lausanne, CH-1015 Lausanne, Switzerland*.
Asymmetric grazing incidence femtosecond x-ray diffraction is applied to investigate carrier transport, carrier relaxation and phonon coupling in laser excited bismuth crystals.

**THU1.3 • 9:15**
**Ultrafast Heating of Bismuth Observed by Time Resolved Electron Diffraction**, *Ping Zhou*[1], •*Ivan Rajković*[1], *Manuel Ligges*[1], *Thomas Payer*[1], *Frank Meyer zu Heringdorf*[1,2], *Michael Horn-von Hoegen*[1,2], and *Dietrich von der Linde*[1]; [1]*Institut für Experimentelle Physik, Universität Duisburg-Essen, Lotharstr. 1, 47048 Duisburg, Germany*, [2]*Center for Nanointegration Duisburg-Essen (CeNIDE), Universität Duisburg-Essen, Lotharstr. 1, 47048 Duisburg, Germany*.
We describe time resolved electron diffraction on bismuth films. Lattice heating following femtosecond laser excitation is observed via the transient Debye-Waller-effect. Different heating processes with different time constants were observed.

**THU1.4 • 9:30**
**Atomic View of the Photoinduced Collapse of Gold and Bismuth**, •*Ralph Ernstorfer*[1], *Maher Harb*[1], *Christoph T. Hebeisen*[1], *German Sciaini*[1], *Thibault Dartigalongue*[1], *Ivan Rajkovic*[2], *Manuel Ligges*[2], *Dietrich von der Linde*[2], *Thomas Payer*[3], *Michael Horn-von-Hoegen*[3], *Frank-Joachim Meyer zu Heringsdorf*[3], *Sergei Kruglik*[1], and *R.J. Dwayne Miller*[1]; [1]*Institute for Optical Sciences and Departments of Chemistry and Physics, University of Toronto, 80 St. George St., Toronto, Ontario M5S 3H6, Canada*, [2]*Fachbereich Physik, Universität Duisburg-Essen, 47057 Duisburg, Germany*, [3]*Fachbereich Physik and Center for Nanointegration Universität Duisburg-Essen (CeNIDE), 47057 Duisburg, Germany*.
Two different mechanisms of photoinduced melting were studied by femtosecond electron diffraction. The structural response of gold indicates an electronically-induced increase of the melting temperature. Bismuth was found to disorder within one vibrational period.

**THU1.5 • 9:45**
**Femtosecond X-Ray Diffraction Study of the Ultrafast Coupling between Magnetization and Structure in the Ferromagnet SrRuO$_3$**, •*Clemens von Korff Schmising*[1], *Matias Bargheer*[2], *Anders Harpoeth*[1], *Nikolai Zhavoronkov*[1], *Zunaira Ansari*[1], *Michael Woerner*[1], *Thomas Elsaesser*[1], *Ionela Vrejoiu*[3], *Dietrich Hesse*[3], and *Marin Alexe*[3]; [1]*Max-Born-Institut für Nichtlineare Optik und Kurzzeitspektroskopie, 12489 Berlin, Germany*, [2]*Institut für Physik, Universität Potsdam, 14469 Potsdam, Germany*, [3]*Max-Planck-Institut für Mikrostrukturphysik, 06120 Halle, Germany*.
Femtosecond optical excitation of magnetically ordered $SrRuO_3$ nanolayers leads to an ultrafast demagnetization and a concomitant magnetoelastic contractive stress. The resulting ultrafast structural response of the sample is imaged by femtosecond X-ray diffraction.

**THU1.6 • 10:00**
**Four-dimensional Visualization of Transitional Structures in Phase Transformations by Electron Diffraction**, •*Peter Baum*[1,2], *Ding-Shyue Yang*[1], and *Ahmed H. Zewail*[1]; [1]*California Institute of Technology, 1200 E. California Bld, Pasadena CA 91125, USA*, [2]*Ludwig-Maximilians-Universität München, Oettingenstr. 67, 80538 München, Germany*.
Imaging with ultrashort electron pulses allows visualizing atomic-scale motions in all four dimensions of space and time. We report the transitional structures and mechanism of the ultrafast insulator-to-metal phase transformation in crystalline vanadium dioxide.

## THU2A • Ultrafast Charge Transfer

*Auditorium*
**10:45–12:30**
**THU2A • Ultrafast Charge Transfer**
*Chair: Tahei Tahara, Molecular Spectroscopy Laboratory, RIKEN, Japan*

**THU2A.1 • 10:45** •Invited•

**Femtosecond X-Ray Absorption Spectroscopy of a Photoinduced Spin-Crossover Process**, *Christopher Milne*[1], *Van-Thai Pham*[1], *Wojciech Gawelda*[1,3], *Amal El Nahhas*[1], *Renske M. van der Veen*[1,2], *Steven L. Johnson*[2], *Paul Beaud*[2], *Gerhard Ingold*[2], *Camelia Borca*[2], *Daniel Grolimund*[2], *Rafael Abela*[2], *Majed Chergui*[1], and •*Christian Bressler*[1]; [1]*Laboratoire de Spectroscopie Ultrarapide, Ecole Polytechnique Fédérale de Lausanne, CH-1015 Lausanne, Switzerland*, [2]*Swiss Light Source, Paul-Scherrer Institut, CH-5232 Villigen-PSI, Switzerland*, [3]*Present Address: Laser Processing Group, Instituto de Óptica, CSIC, Serrano 121, E-28006 Madrid, Spain*.
We present ultrafast x-ray absorption studies of photoexcited aqueous iron tris-bipyridine with 160 fs and with 70 ps temporal resolution to monitor the structural evolution in this spin-crossover complex.

**THU2A.2 • 11:15**
**Aqueous Proton Transfer Pathways in Bimolecular Acid-Base Neutralization**, *Omar F. Mohammed*[1], *Katrin Adamczyk*[1], *Dina Pines*[2], *Ehud Pines*[2], and •*Erik T. J. Nibbering*[1]; [1]*Max Born Institut für Nichtlineare Optik und Kurzzeitspektroskopie, Max-Born-Strasse 2 A, D-12489 Berlin, Germany*, [2]*Department of Chemistry, Ben Gurion University of the Negev, P.O. Box 653, Beer-Sheva 84125, Israel*.
We expand the classic Eigen-Weller reaction model with solvent-switch pathways, mediating proton transfer between acids and bases, having one or several water molecules, activated by the solvent and controlled by the base strength.

**THU2A.3 • 11:30**
**The solvated electron dynamics in aqueous solutions: first measurement of the lifetime of the contact pair by using three-pulse-spectroscopy**, •*Hristo Iglev*, *Martin K. Fischer*, and *Alfred Laubereau*; *Physik-Departmen E11, Technische Universität München*.
We demonstrate manipulation of the ultrafast electron detachment and recombination dynamics using femtosecond pump-repump-probe spectroscopy. The predicted electron-atom-contact pair is verified for the first time and its lifetime directly measured in aqueous halide solutions.

**THU2A.4 • 11:45**
**Naphthalene Bisimides: on the Way to Ultrafast Opto-electronic Devices**, •*Igor Pugliesi*[1], *Patrizia Krok*[1], *Alfred Błaszczyk*[2], *Marcel Mayor*[2,3], and *Eberhard Riedle*[1]; [1]*LS für BioMolekulare Optik, LMU München, Oettingenstrasse 67, D-80538 Munich, Germany*, [2]*Institute for Nanotechnology, Forschungszentrum Karlsruhe GmbH, P.O. Box 3640, D-76021 Karlsruhe, Germany*, [3]*Department für Chemie, Universität Basel, St. Johanns-Ring 19, CH-4056 Basel, Switzerland*.
For core-substituted naphthalene bisimides and their dimers we observe ultrafast charge transfer and Förster resonance energy transfer processes that change their conduction properties. This makes them suitable candidates for optoelectronic switches with terahertz response times.

**THU2A.5 • 12:00**
**Ultrafast Charge Photogeneration in MEH-PPV Charge-Transfer Complexes**, •*Artem Bakulin*[1], *Dmitry Paraschuk*[2], *Maxim Pshenichnikov*[1], and *Paul van Loosdrecht*[1]; [1]*Zernike Institute for Advanced Materials, University of Groningen, Groningen, The Netherlands*, [2]*Faculty of Physics and International Laser Center, Lomonosov Moscow State University, Moscow, Russia*.
Visible-pump IR-probe spectroscopy is used to study the ultrafast charge dynamics in MEH-PPV based charge-transfer complexes and donor-acceptor blends. Transient anisotropy of the polymer polaron band provides invaluable insights into excitation localisation and charge-transfer pathways.

**THU2A.6 • 12:15**
**Generation of Narrowband Ultrashort Pulses Tunable in the mid-IR and the Application to Vibrational Energy Transfer in a Modified Amino Acid**, •*Karin Haiser*, *Florian O. Koller*, *Markus Huber*, *Tobias E. Schrader*, *Nadja Regner*, *Wolfgang J. Schreier*, and *Wolfgang Zinth*; *Lehrstuhl für BioMolekulare Optik, Department für Physik der Ludwig-Maximilians-Universität München, Öttingenstr. 67, 80538 München*.
Difference frequency mixing of pulses with adjustable chirp produce narrowband tunable pulses in the mid infrared. They are used for selective excitation of vibrational modes in IR-pump-IR-probe experiments on a modified amino acid.

## THU2P • Ultrafast Diagnostics

*Panoramica*
**10:45–12:30**
**THU2P • Ultrafast Diagnostics**
*Chair: Rick Trebino, Georgia Institute of Technology, Swamp Optics, LLC, Atlanta, USA*

**THU2P.1 • 10:45**
**Single-shot carrier-envelope phase measurement of few-cycle laser pulses**, •*Tibor Wittmann*[1], *Balint Horvath*[1], *Wolfram Helml*[1], *Michael Schätzel*[1], *Xun Gu*[1], *Adrian L Cavalieri*[1], *Gerhard G Paulus*[2,3], and *Reinhard Kienberger*[1]; [1]*Max-Planck-Institut für Quantenoptik, D-85748 Garching, Germany*, [2]*Institute of Optics and Quantum Electronics, Friedrich-Schiller-University, 07783 Jena, Germany*, [3]*Department of Physics, Texas A&M University, College Station, Tx 77843*.
Above-threshold ionization spectra of rescattered electrons were captured using a single-shot stereo-ATI phase meter, allowing measurement of the carrier-envelope phase of individual laser pulses, consecutively, and at multi-kHz repetition rate for the first time.

**THU2P.2 • 11:00**
**Strong-Field Momentum State Mapping**, *Xinhua Xie*[1], *Armin Scrinzi*[1], *Marlene Wickenhauser*[1], *Andrius Baltuška*[1], *Ingo Barth*[2], and •*Markus Kitzler*[1]; [1]*Photonics Institute, Vienna University of Technology, Austria*, [2]*Institute for Physical and Theoretical Chemistry, Free University of Berlin, Germany*.
We numerically demonstrate novel features in both ionization and high-harmonic generation from bound states with a net internal angular momentum. Applications such as creation of circularly polarized attosecond X-ray pulses are discussed.

**THU2P.3 • 11:15**
**Optical mapping of attosecond ionization dynamics by few-cycle light pulses**, *Aart Jan Verhoef*[1], *Alexander Mitrofanov*[1], *Aleksei Zheltikov*[2], •*Andrius Baltuska*[1], and *Evgeny Serebryannikov*[2]; [1]*Vienna University of Technology*, [2]*Moscow State University*.
Few-cycle light pulses are used to map ultrafast ionization dynamics in time and frequency domains by all-optical means. Tunneling ionization encodes an attosecond phase mask, suggesting a method for attosecond shaping of high-intensity optical fields.

**THU2P.4 • 11:30**
**Polarization, Phase and Amplitude Control and Characterization of Ultrafast Laser Pulses**, •*Philip Schlup*[1], *Omid Masihzadeh*[1], *Lina Xu*[2], *Rick Trebino*[2], and *Randy A. Bartels*[1]; [1]*Colorado State University, Department of Electrical and Computer Engineering, Fort Collins CO 80523, USA*, [2]*School of Physics, Georgia Institute of Technology, Atlanta GA 30332, USA*.
We demonstrate complete control over the polarization, phase and amplitude state of an ultrafast laser pulse using a single, linear spatial light modulator, and introduce a self-referenced method for characterization the polarization state.

**THU2P.5 • 11:45**
**Silicon-Chip-Based Single-Shot Ultrafast Optical Oscilloscope**, •*Mark Foster*, *Reza Salem*, *David Geraghty*, *Amy Turner*, *Michal Lipson*, and *Alexander Gaeta*; *Cornell University, Ithaca, NY, USA*.
We demonstrate a single-shot ultrafast optical oscilloscope using a four-wave-mixing-based parametric temporal lens integrated on a CMOS-compatible silicon photonic chip. Experimentally, we demonstrate waveform measurement with a 100-ps record length and sub-750-fs resolution.

**THU2P.6 • 12:00**
**Time-resolved off-axis digital holography for characterization of ultrafast phenomena in water**, •*Tadas Balciunas*[1], *Andrius Melninkaitis*[1], *Gintaras Tamosauskas*[2], and *Valdas Sirutkaitis*[1]; [1]*Laser Research Centre, Vilnius University, Vilnius LT-10223, Lithuania*, [2]*Department of Quantum Electronics, Vilnius University, Vilnius LT-10222, Lithuania*.
We present the application of time-resolved off-axis digital holography for the investigation of refractive index properties of laser-induced plasma filaments in water. The propagation of femtosecond laser pulse was characterized using time-resolved off-axis digital holography.

**THU2P.7 • 12:15**
**3 GHz RF Streak Camera for Diagnosis of sub-100 fs, 100 keV Electron Bunches**, •*Thijs van Oudheusden*, *Jacco Nohlmans*, *Willem Op 't Root*, and *Jom Luiten*; *Department of Applied Physics, Eindhoven University of Technology, P.O Box 513, 5600 MB Eindhoven, The Netherlands*.
We have designed and built a 3GHz radio-frequency cavity for use as an ultrafast streak camera to measure with 20fs resolution the duration of electron bunches that are suitable for single-shot ultrafast electron diffraction experiments.

**THU3 • Ultrafast Condensed Phase Dynamics**

*Auditorium*
**14:00–15:45**
**THU3 • Ultrafast Condensed Phase Dynamics**
*Chair: Thomas Elsässer, Max-Born-Institute, Berlin, Germany*

**THU3.1 • 14:00**
**THz Slow Motion of an Ultrafast Insulator-Metal Transition in $VO_2$: Coherent Structural Dynamics and Electronic Correlations**, •*Rupert Huber*[1], *Carl Kübler*[1], *Henri Ehrke*[1], *Rene Lopez*[2], *Andrej Halabica*[3], *Richard F. Haglund*[3], and *Alfred Leitenstorfer*[1]; [1]*Department of Physics and Center for Applied Photonics, University of Konstanz, Universitätsstraße 10, 78464 Konstanz, Germany*, [2]*Department of Physics and Astronomy and Institute of Advanced Materials, Nanoscience and Technology, University of North Carolina, Chapel Hill, North Carolina 27599, USA*, [3]*Department of Physics and Astronomy and Institute for Nanoscale Science and Technology, Vanderbilt University, Nashville, Tennessee 37235, USA*.
The multi-THz conductivity of $VO_2$ recorded during a photoinduced insulator-metal transition directly reveals the femtosecond dynamics of V-V stretching modes and electronic correlations. We suggest a novel qualitative model for the nonthermal phase transition.

**THU3.2 • 14:15**
**Phono-Induced Orbital Melting in La3/2Sr1/2MnO4**, •*Raanan Tobey*, *Dharmalingam Prabhakaran*, *Andrew Boothroyd*, and *Andrea Cavalleri*; *Department of Physics, University of Oxford*, *OX1 3PU Oxford, UK*.
Resonant excitation of Mn-O stretching modes results in ultrafast melting of long range orbital order in the layered manganite La3/2Sr1/2MnO4. Our experiments clarify the microscopic mechanism underpinning the recently-discovered phono-induced phase transition in manganites.

**THU3.3 • 14:30**
**Ultrafast Gigantic Photo-Response in Charge-Ordered Organic Salt (EDO-TTF)2PF6 on 10-fs time scales**, •*Jiro Itatani*[1,2], *Matteo Rini*[1], *Andrea Cavalleri*[3], *Ken Onda*[2], *Tadahiko Ishikawa*[4], *Sho Ogihara*[4], *Shin-ya Koshihara*[2,4], *XiangFeng Shao*[2,5], *Yoshiaki Nakano*[2,5], *Hideki Yamochi*[2,5], *Gunzi Saito*[6], and *Robert W. Schoenlein*[1]; [1]*Lawrence Berkeley National Laboratory, Berkeley, CA, USA*, [2]*ERATO, Japan Science and Technology Agency, 3-5 Sanbanchou, Tokyo, Japan*, [3]*Department of Physics, Clarendon Laboratory, University of Oxford, Oxford, United Kingdom*, [4]*Department of Materials Science, Tokyo Institute of Technology, Tokyo, Japan*, [5]*Research Center for Low Temperature and Materials Scnces, Kyoto University, Kyoto, Japan*, [6]*Division of Chemistry, Graduate School of Science, Kyoto University, Kyoto, Japan*.
The initial dynamics of photo-induced phase transition in (EDO-TTF)2PF6 was investigated using 10-fs laser pulses. We observed sub-20-fs gigantic photo-responses ($|DR/R| > 100\%$) and a clear signature of a structural bottleneck (˜60 fs) for the first time.

**THU3.4 • 14:45** **•Invited•**

**Dynamic Metamaterials at Terahertz Frequencies**, *Hou-Tong Chen*[1], *Abul Azad*[1], *John O'Hara*[1], *Antoinette Taylor*[1], *Willie Padilla*[2], and •*Richard Averitt*[3]; [1]*MPA-CINT, MS K771, Los Alamos National Laboratory, Los Alamos, New Mexico 87545, Mexico*, [2]*Department of Physics, Boston College, Chestnut Hill, Massachusetts 02467, USA*, [3]*Department of Physics and Photonics Center, Boston University, Boston, Massachusetts 02215, USA*.
Metamaterials fabricated for operation at terahertz frequencies are presented. Optical excitation enables control of the metamaterial resonance amplitude and frequency.

**THU3.5 • 15:15**
**The Effect of Spin-Polarized Electrons on the THz Emission from Photoexcited GaAs(111)**, *James Schleicher*, *Shayne Harrel*, and •*Charles Schmuttenmaer*; *Yale University, Department of Chemistry, 225 Prospect St., New Haven, CT 06520, USA*.
We report the dependence of optical rectification and shift currents in unbiased GaAs(111) on the excitation beam polarization using THz emission spectroscopy. The emission when exciting slightly above bandgap is strongly influenced by spin-polarized electrons.

**THU3.6 • 15:30**
**Nonlinear Lattice Response Observed Through Terahertz SPM**, •*János Hebling*[1,2], *Matthias C. Hoffmann*[1], *Ka-Lo Yeh*[1], *György Tóth*[2], and *Keith A. Nelson*[1]; [1]*Massachusetts Instittute of Technology, 77 Massachusetts Ave., Cambridge, MA, 02139*, [2]*Department of Experimental Physics, University of Pécs, 7624 Hungary*.
Self-phase-modulation of ultrashort THz pulses was observed in lithium niobate at 100 MW/cm2 intensity level. The effect, observed in time and frequency domains, suggests 1000x larger n2 than at visible wavelengths.

## THUIIIa • Poster III a - Applications

*Poster Area*
**16:15–18:15**
**THUIIIa • Poster III a - Applications**

**THUIIIa.1 • 16:15**
**Ultrafast Laser Calligraphy**, •*Peter Kazansky*[1], *Weijia Yang*[1], *Yuri Svirko*[2], *Yasuhiko Shimotsuma*[3], and *Kazuyuki Hirao*[3]; [1]*Optoelectronics Research Centre, University of Southampton, SO17 1BJ, United Kingdom,* [2]*Department of Physics and Mathematics, University of Joensuu, FI-80101, Finland,* [3]*Department of Material Chemistry, Graduate School of Engineering, Kyoto University, Kyoto, Sakyo-ku 606-8501, Japan*.
Control of structural modifications inside transparent materials by varying the direction of pulse front tilt is demonstrated, achieving a calligraphic style of writing. Anisotropic ulrafast laser cavitation in the irradiated region is observed.

**THUIIIa.2 • 16:15**
**Spatio-temporal optimization of transient electron plasma formation in bulk dielectrics for waveguide writing with fs laser pulses**, •*Jan Siegel, Wojciech Gawelda, Daniel Puerto, Andres Ferrer*, *Alejandro Ruiz de la Cruz*, and *Javier Solis*; *Laser Processing Group, Instituto de Óptica, C.S.I.C., 28006 Madrid, Spain*.
This poster has been withdrawn by the authors.

**THUIIIa.3 • 16:15**
**Advantages of two-photon microscopy with ultrashort pulses**, •*Yair Andegeko*, *Peng Xi*, *Kyle Sprague*, and *Marcos Dantus*; *Department of Chemistry, Michigan State University, East Lansing MI 48824*.
We demonstrate qualitatively and quantitatively higher fluorescence intensity, deeper penetration, and improved signal-to-noise ratio for biomedical imaging with dispersion free ultrashort sub-10 fs pulses.

**THUIIIa.4 • 16:15**
**Ultraprecisely machined microoptics for fs-pulse shaping and replication**, •*Hans Knuppertz*[1], *Michael Bohling*[1], *Jürgen Jahns*[1], *Martin Bock*[2], and *Rüdiger Grunwald*[2]; [1]*Lehrgebiet Optische Nachrichtentechnik, FernUniversität Hagen, Universitätsstr. 27/PRG, D-58084 Hagen, Germany,* [2]*Max-Born-Institute for Nonlinear Optics and Short-Pulse Spectroscopy, Max-Born-Str. 2a, D-12489 Berlin, Germany*.
Two reflective systems for the filtering and replication of optical fs-pulses are presented: an integrated microoptical pulse shaper and an interferometer using a retroreflector array. We describe design, fabrication and demonstration experiments and compare results.

**THUIIIa.5 • 16:15**
**Development of laser-based imaging systems for medical diagnostics**, •*Stefan Witte*[1], *Erwin Peterman*[1], *Ruud Brakenhoff*[2], *Guus van Dongen*[2], *Ruud Toonen*[3], *Huib Mansvelder*[3], and *Marie Louise Groot*[1]; [1]*Laser Centre Vrije Universiteit, De Boelelaan 1081, 1081 HV Amsterdam, The Netherlands,* [2]*Otolaryngology/Head-Neck Surgery, Vrije Universiteit Medical Centre, De Boelelaan 1117, 1081 HV Amsterdam, The Netherlands,* [3]*Center for Neurogenomics and Cognitive Research, Vrije Universiteit, De Boelelaan 1085, 1081 HV Amsterdam, The Netherlands*.
We present a laser system with high wavelength flexibility, suitable for nonlinear microscopy and optical coherence tomography, for visualization of disease-related morphological changes in vivo. First results on in-vitro samples are discussed.

**THUIIIc • Poster III c - Generation and Measurement**

*Poster Area*
**16:15–18:15**
**THUIIIc • Poster III c - Generation and Measurement**

**THUIIIc.1 • 16:15**
**Femtosecond passively mode-locked fiber lasers using saturable Bragg reflectors**, •*Hyunil Byun*, *Jason Sickler*, *Jonathan Morse*, *Jeff Chen*, *Dominik Pudo*, *Erich Ippen*, and *Franz Kärtner*; *Massachusetts Institute of Technology, 77 Massachusetts Ave, Cambrdige, MA 02139 USA*.
We demonstrate a soliton fiber laser with 280-fs pulses at 408-MHz repetition rate, and a stretched-pulse regime fiber laser with 179-fs pulses at 234-MHz repetition rate. Both use saturable Bragg reflectors for mode-locking and/or self-starting.

**THUIIIc.2 • 16:15**
**Nano-FROG: Frequency Resolved Optical Gating by a Nanometric Object at the Focal plane of a high NA Objective**, •*Jérôme Extermann*[1], *Luigi Bonacina*[1], *François Courvoisier*[2], *Denis Kiselev*[1], *Yannick Mugnier*[3], *Ronan Le Dantec*[3], and *Jean-Pierre Wolf*[1]; [1]*GAP-Biophotonics Université de Genève, Genève, Switzerland*, [2]*Institut FEMTO-ST Université de Franche-Comté, UMR CNRS 6174, Besançon, France*, [3]*Symme Polytech' Savoie, Annecy le Vieux, France*.
We present a technique to characterize ultrashort pulses at the focal plane of a high numerical aperture (NA) objective with unprecedented spatial resolution, by performing a FROG measurement with a single nanocrystal as nonlinear medium.

**THUIIIc.3 • 16:15**
**A New Generalized Projections Algorithm Geared Towards Sub-100 Attosecond Pulse Characterization**, •*Justin Gagnon*[1], *Vladislav Yakovlev*[1,2], *Eleftherios Goulielmakis*[1], *Martin Schultze*[1], and *Ferenc Krausz*[1,2]; [1]*Max-Planck-Institut für Quantenoptik, D-85748 Garching, Germany*, [2]*Department für Physik, Ludwig-Maximilians-Universität München, D-85748 Garching, Germany*.
We developed a new algorithm for characterizing attosecond pulses from streaked spectra. We compare our algorithm to the current one used for attosecond characterization, and show that it is better suited for sub-100 attosecond pulses.

**THUIIIc.4 • 16:15**
**Autocorrelation Experiments with Ultrashort Soft X-ray FEL Pulses**, •*Rolf Mitzner*[2], *Wolfgang Eberhardt*[1], *Matthias Neeb*[1], *Tino Noll*[1], *Mathias Richter*[3], *Sebastian Roling*[2], *Marco Rutkowski*[2], *Björn Siemer*[2], *Andrej Sorokin*[3], *Kai Tiedtke*[4], and *Helmut Zacharias*[2]; [1]*BESSY GmbH, Albert-Einstein-Str. 15,12489 Berlin, Germany*, [2]*Physikalisches Institut, Universität Münster, D-48149 Münster, Germany*, [3]*PTB,Abbe_Str. 2-12,D-10587 Berlin, Germany*, [4]*DESY, Nottkestr.85, 22603 Hamburg, Germany*.
We report first direct measurements of the average coherence time and pulse length of fs soft X-ray pulses from the free electron laser at DESY (FLASH) by means of linear and nonlinear autocorrelation.

**THUIIIc.5 • 16:15**
**Characterization of Mid-Infrared Pulses**, •*Kevin F. Lee*[1,2], *Adeline Bonvalet*[1,2], and *Manuel Joffre*[1,2]; [1]*Laboratoire d'Optique et Biosciences, Ecole Polytechnique, Centre National de la Recherche Scientifique, 91128 Palaiseau, France*, [2]*Institut National de la Santé et de la Recherche Médicale, U696, 91128 Palaiseau, France*.
We characterize mid-infrared pulses using upconversion to the visible regime by mixing with two collinear time-delayed replicas of an 800 nm chirped pulse. The phase is encoded as a function of the time-delay.

**THUIIIc.6 • 16:15**
**Noncollinear optical parametric amplification of cw light, continua and vacuum fluctuations**, •*Markus Breuer*, *Christian Homann*, and *Eberhard Riedle*; *LS für BioMolekulare Optik, Ludwig-Maximilians-Universität München, Oettingenstraße 67, 80538 München, Germany*.
Seed sources for NOPAs are compared. Single-mode cw light renders Fourier-limited femtosecond and fully tunable picosecond $\mu$J output pulses, OPG leads to random spectral fluctuations and a sapphire continuum delivers identical pulses on every shot.

**THUIIIc.7 • 16:15**
**Intensity and phase measurements of the spatio-temporal electric field of focusing ultrashort pulses**, •*Pamela Bowlan*, *Pablo Gabolde*, and *Rick Trebino*; *Georgia Tech School of Physics, 837 state st, Atlanta GA 30332,USA*.
We present the first technique for directly measuring the complete spatio-temporal field of ultrashort pulses at and near a focus. Our method uses an experimentally simple and high-spectral-resolution variant of spectral interferometry (SEA TADPOLE).

**THUIIIc.8 • 16:15**
**Modeling of octave-spanning sub-two cycle Titanium:sapphire lasers: simulation and experiment**, •*Michelle Y. Sander*, *Helder M. Crespo*, *Jonathan R. Birge*, and *Franz X. Kaertner*; *Department of Electrical Engineering and Computer Sciene and Research Laboratoy of Electronics, Massachusetts Institute of Technology, Cambridge, Massachusetts, 02139, USA*.
It is shown that a one-dimensional temporal model can quantitatively predict the spectral output and pulse shape of a sub-two-cycle octave-spanning Ti:sapphire laser.

**THUIIIc.9 • 16:15**
**Ultra-Broadband Infrared Pulses from a Potassium-Titanyl Phosphate Optical Parametric Amplifier for VIS-IR-SFG Spectroscopy**, •*Oleksandr Isaienko* and *Eric Borguet*; *Chemistry Department, Temple University, 1901 N. 13th Street, Philadelphia, Pennsylvania, 19122, USA*.
A non-collinear KTP-OPA to provide ultra-broadband mid-infrared pulses was designed and characterized. With proper pulse-front and phase correction, the system has a potential for high-time resolution vibrational VIS-IR-SFG spectroscopy.

**THUIIIc.10 • 16:15**
**Spatially resolved Ar* and Ar+* imaging as a diagnostic for capillary based high harmonic generation**, •*Richard Chapman*[1], *Jeremy Frey*[1], *Christopher Froud*[2], *Edward Rogers*[2], *William Brocklesby*[2], *Matthew Praeger*[3], *James Grant-Jacob*[2], and *Sarah Stebbings*[3]; [1]*Department of Chemistry, University of Southampton SO17 1BJ, UK*, [2]*Optoelectronics Research Centre, University of Southampton, SO17 1BJ, UK*, [3]*Department of*

*Physics & Astronomy, University of Southampton, SO17 1BJ, UK*.
Spectrally resolved imaging of Ar/Ar+ created by high harmonic generation is demonstrated, and used as a diagnostic of capillary geometry on XUV generation efficiency.

**THUIIIc.11 • 16:15**
**Polarization, ionization and spatial gates in single attosecond pulse generation**, •*Valer Tosa*[1], *Carlo Altucci*[2], and *Raffaele Velotta*[2]; [1]*National Institute R&D Isotopic and Molecular Technologies, 400293 Cluj-Napoca, Romania*, [2]*CNISM, Dipartimento Scienze Fisiche, Universita FedericoII, 80126, Napoli, Italia*.
We show that in polarization-gating techniques ionization dynamics and three-dimensional propagation effects act as additional gates in single attosecond pulse generation. We propose novel laser field configurations generating single harmonic bursts using long laser pulses

**THUIIIc.12 • 16:15**
**Chirped-pulse Raman amplification for two-color high-intensity**, *Peng Dong*, *Franklin Grigsby*, and •*Mike Downer*; *FOCUS Center, University of Texas at Austin, Department of Physics, Austin, TX 78712, USA*.
We report generation and compression of millijoule-level first Stokes sideband (873nm) of 800nm TW pulses by inserting a multi-stage barium nitrate Raman shifter-amplifier into a conventional Ti:sapphire chirped pulse amplification system.

**THUIIId • Poster III d - Physics**

*Poster Area*
**16:15–18:15**
**THUIIId • Poster III d - Physics**

**THUIIId.1 • 16:15**
**On the Absence of Carrier Multiplication in InAs Core/Shell/Shell Nanocrystals**, •*Meirav Ben-Lulu*, *David Mocatta*, *Uri Banin*, and *Sanford Ruhman*; *Department of Physical Chemistry and the Farkas Center for Light Induced Processes, The Hebrew University, Jerusalem 91904, Israel.*.
An ultrafast pump-probe methodology for detecting spontaneous carrier multiplication is applied to InAs/CdSe/ZnSe Core/Shell1/Shell2. Contrary to previous reports no carrier multiplication following above-band gap photoexcitation is observed, questioning the ubiquity of this phenomenon.

**THUIIId.2 • 16:15**
**Ultrafast Laser-Induced Electron Emission from Field Emission Tips and First Applications**, •*Catherine Kealhofer*[1], *Peter Hommelhoff*[2], *Seth Foreman*[1], and *Mark Kasevich*[1]; [1]*Physics Department, Stanford University, Stanford, California, 94305*, [2]*Max Planck Institute of Quantum Optics, Garching, Germany*.
We describe a laser-triggered electron source based on a field emission tip. Numerical results indicate that the electron emission times can be sub-femtosecond. We are exploring applications of this source to ultrafast SEM.

**THUIIId.3 • 16:15**
**Three-Dimensional Electronic Spectroscopy of Excitons in GaAs Quantum Wells**, •*Daniel Turner*, *Katherine Stone*, *Kenan Gundogdu*, and *Keith Nelson*; *Massachusetts Institute of Technology, Cambridge Massachusetts 02139, USA*.
Three-dimensional electronic four wave-mixing spectroscopy of GaAs quantum wells is demonstrated. A previously inaccessible two-dimensional projection correlating events between the first two time periods is used to more accurately measure the biexciton binding energy.

**THUIIId.4 • 16:15**
**Temporal Splitting of Ultrashort Laser Pulses Undergoing Self-Focusing in the Anomalous Dispersion Regime**, •*Samuel E Schrauth*, *Bonggu Shim*, *Aaron D Slepkov*, *Luat T Vuong*, and *Alexander L Gaeta*; *Applied and Engineering Physics, Cornell University, Ithaca, New York 14853 USA*.
We show that the dynamics of ultrashort pulses undergoing self-focusing can be greatly altered via temporal pulse shaping. Specifically, we observe that super-Gaussian pulses undergo pulse-splitting, whereas Gaussian pulses undergo spatio-temporal collapse.

**THUIIId.5 • 16:15**
**Nonlinear Optical Response of Metal Nanoantennas**, •*Barbara Wild*, *Jörg Merlein*, *Tobias Hanke*, *Alfred Leitenstorfer*, and *Rudolf Bratschitsch*; *Department of Physics and Center for Applied Photonics, University of Konstanz, D-78464 Konstanz, Germany*.
We have excited bowtie-shaped metal nanoantennas fabricated via colloidal lithography with ultrashort light pulses. The spectrum emitted by the nanoantennas consists of a broadband continuum overlapped with a narrowband second harmonic signal.

**THUIIId.6 • 16:15**
**Ultrafast spin dynamics in wide bandgap semiconductors and semiconductor nanostructures**, •*Nils Janßen*[1], *Tobias Hanke*[1], *Florian Sotier*[1], *Markus Beyer*[1], *Tobias Graf*[2], *Mario Gjukic*[2], *Martin Brandt*[2], *Kelly Whitaker*[3], *Daniel Gamelin*[3], *Clemens Simbrunner*[4], *Andrea Navarro-Quezada*[4], *Alberta Bonanni*[4], and *Rudolf Bratschitsch*[1]; [1]*Departement of Physics and Center for Applied Photonics, University of Konstanz, D-78457 Konstanz, Germany*, [2]*Walter Schottky Institut, Technical University of Munich, D-85748 Garching, Germany*, [3]*Departement of Chemistry, University of Washington, Seattle, WA 98195, USA*, [4]*Institute of Semiconductor and Solid State Physics, Johannes Kepler University, A-4040 Linz, Austria*.
Time-resolved Faraday rotation measurements on doped GaN layers reveal exchange coupling of itinerant carriers to dopants in different oxidation states. In colloidal ZnO quantum dots competing recombination processes result in a biexponentially decaying spin coherence.

**THUIIId.7 • 16:15**
**Phonon Softening in Bi and Sb Single Crystal: Toward a Simple Cubic Phase?**, •*Daniele Fausti*[1], *Oleg Mishoco*[2], and *Paul van Loosdrecht*[1]; [1]*Rug, Groningen, The Netherlands*, [2]*Institute of Solid State Physics, Moscow, Russia*.
We use time-resolved Raman spectroscopy to reveal ultrafast thermodynamical and structural information simultaneously. The ultafast phonon softening in Bismuth and Antimony is interpreted as a precursor of a non-thermodynamical cubic phase.

**THUIIId.8 • 16:15**
**Filament-induced ultrafast AND-gate in rare gas**, •*Pierre Béjot*, *Yannick Petit*, *Luigi Bonacina*, *Jérome Kasparian*, *Michel Moret*, and *Jean-Pierre Wolf*; *GAP-Biophotonics Université de Genève, Genève, Switzerland*.
We demonstrate that strong birefringence can be induced in Argon by ultrashort laser filamentation. This process is used to build an ultrafast optical AND gate between the driving pulse and a probe beam.

**THUIIId.9 • 16:15**
**Observing Signatures of Molecular Structure by High-order Harmonic Generation**, •*Ricardo Torres*[1], *Nathaniel Kajumba*[1], *Thomas Siegel*[1], *Immacolata Procino*[2], *Jonathan Underwood*[2], *Joseph Robinson*[1], *Sarah Baker*[1], *John Tisch*[1], *Rebeca de Nalda*[3], *Will Bryan*[4], *Raffaele Velotta*[5], *Carlo Altucci*[5], *Edmond Turcu*[4], and *Jon Marangos*[1]; [1]*The Blackett Laboratory, Imperial College London, London SW7 2BW, UK*, [2]*Department of Physics and Astronomy, University College London, London WC1E 6BT, UK*, [3]*Instituto de Quimica Fisica Rocasolano, CSIC, 28006 Madrid, Spain*, [4]*Central Laser Facility, CCLRC Rutherford Appleton Laboratory, Chilton, Didcot, Oxon OX11 0QX, UK*, [5]*CNSIM and Dipartimento di Scienze Fisiche, Universita di Napoli Federico II, Naples, Italy*.
We demonstrate experimentally how high harmonic generation can show signatures of the orbital structure of polyatomic molecules. Calculations in the strong field approximation are shown in good agreement with the results, and new experimental approaches are discussed.

**THUIIId.10 • 16:15**

**VUV Thomson Scattering in Warm Dense Matter at FLASH**, •*R.R. Fäustlin*[7], *S. Toleikis*[7], *Th. Bornath*[1], *L. Cao*[2], *T. Döpner*[1], *S. Düsterer*[7], *E. Förster*[2], *C. Fortmann*[1], *S.H. Glenzer*[3], *S. Göde*[1], *G. Gregori*[4], *A. Höll*[1], *R. Irsig*[1], *T. Laarmann*[5], *H.J. Lee*[6], *K.-H. Meiwes-Broer*[1], *A. Przystawik*[1], *P. Radcliffe*[7], *R. Redmer*[1], *H. Reinholz*[1], *G. Röpke*[1], *R. Thiele*[1], *J. Tiggesbäumker*[1], *N.X. Truong*[1], *Th. Tschentscher*[7], *I. Uschmann*[2], and *U. Zastrau*[2]; [1]*Universität Rostock, Universitätsplatz 3, 18051 Rostock, Germany*, [2]*Friedrich-Schiller-Universität Jena, Max-Wien-Platz 1, 07743 Jena, Germany*, [3]*LLNL, 7000 East Av., Livermore, CA 94550, USA*, [4]*University of Oxford, Parks Road, Oxford OX1 3PU, United Kingdom*, [5]*MBI, Max-Born-Str. 2A, 12489 Berlin, Germany*, [6]*University of California, Berkley, CA 94720, USA*, [7]*DESY, Notkestr. 85, 22607 Hamburg, Germany*.
We present the first attempt to diagnose electron temperature and density of a plasma via Thomson Scattering in the Warm Dense Matter Regime using Vacuum Ultraviolet Free Electron Laser radiation.

**THUIIId.11 • 16:15**
**Time Resolved Photoluminescence (PL) Studies of $In_{0.2}Ga_{0.8}As$/GaAs Quantum Wells in Ultrahigh Magnetic Fields**, •*Jinho Lee*[1], *Xiaoming Wang*[1], *David Reitze*[1], *Stephen McGill*[2], *Young-Dahl Jho*[3], *Junichiro Kono*[4], *Alexey Belyanin*[5], and *Glenn Solomon*[6]; [1]*Department of Physics, University of Florida, Gainesville, Florida 32611*, [2]*National High Magnetic Field Laboratory, Tallahassee, Florida, 32310*, [3]*Department of Information and Comunications, GIST, Oryong-dong, Buk-gu, Gwangju, 500-712, Republic of Korea*, [4]*Department of Electrical and Computer Engineering, Rice University, Houston, Texas 77005*, [5]*Department of Physics, Texas A&M University, College Station,Texas 77843*, [6]*Solid Quantum Processes and Metrology Division, NIST, Gaithersburg, Maryland 20899-8423*.
The dynamics of dense magneto-plasmas excited by intense femtosecond laser pulses in $In_{0.2}Ga_{0.8}As$/GaAs multiple quantum wells were studied by time-resolved methods under ultrahigh magnetic fields.

**THUIIId.12 • 16:15**
**Ultrashort soft x-ray pulses from a femtosecond slicing source for time-resolved laser pump- x-ray probe experiments**, •*Niko Pontius*[1], *Christian Stamm*[1], *Torsten Kachel*[1], *Rolf Mitzner*[2], *Torsten Quast*[1], *Karsten Holldack*[1], *Shaukat Khan*[1,3], *Hermann A. Dürr*[1], and *Wolfgang Eberhardt*[1]; [1]*BESSY GmbH, 12489 Berlin, Germany*, [2]*Physikalisches Institut der Universität Münster, 48149 Münster, Germany*, [3]*Institut für Experimentalphysik, Universität Hamburg, 22761 Hamburg, Germany*.
The new femtosecond-slicing source generates energy-tuneable femtosecond x-ray pulses which are used for time-resolved soft x-ray spectroscopy. We report on the experimental setup and show first results using the laser pump and x-ray probe technique.

**THUIIId.13 • 16:15**
**Non-equilibrium spin-dynamics of Gd(0001) studied by time-resolved second harmonic generation and magnetic linear dichroism in 4f core-level photoemission**, •*Alexey Melnikov*[1], *Helena Prima-Garcia*[2], *Martin Lisowski*[1], *Tanja Gießel*[2], *Ramona Weber*[2], *Roland Schmidt*[2], *Cornelius Gahl*[2], *Nadezhda Bulgakova*[3], *Uwe Bovensiepen*[1], and *Martin Weinelt*[1,2]; [1]*Freie Universität Berlin, Fachbereich Physik, Arnimallee 14, 14195 Berlin, Germany*, [2]*Max-Born-Institut, Max-Born-Straße 2 A, 12489 Berlin, Germany*, [3]*Institute of Thermophysics SB RAS, 1 Lavrentyev Ave., 630090 Novosibirsk, Russia*.
Spin-dynamics in Heisenberg ferromagnets was studied at Gd(0001). Dynamics of valence spins fundamentally differs from that in itinerant ferromagnets. The 4f spin-lattice interaction time is estimated to about 100ps by laser pump-, synchrotron probe experiments.

**THUIIId.14 • 16:15**
**Fast Longitudinal and Transverse Structural Relaxation Dynamics in Liquid Glycerol**, •*Christoph Klieber*[1], *Thomas Pezeril*[1], *Stephane Andrieu*[2], and *Keith Nelson*[1]; [1]*Department of Chemistry, Massachusetts Institute of Technology, Cambridge, MA 02139, USA*, [2]*Laboratoire de Physique des Materiaux UMR7556, Universite H. Poincare, 54506 Vandoeuvre, France*.
Novel picosecond ultrasonic techniques for longitudinal and transverse acoustic pulse generation have been employed to probe structural relaxation dynamics in liquid glycerol at gigahertz frequencies over a wide temperature range.

**THUIIId.15 • 16:15**
**Nonlinear optical effects in germanium in the THz range**, •*János Hebling*[1,2], *Matthias C Hoffmann*[1], *Harold Y Hwang*[1], *Ka-Lo Yeh*[1], and *Keith A Nelson*[1]; [1]*Massachusetts Institute of Technology, 77 Massachusetts Ave., Cambridge, MA, 02139*, [2]*Department of Experimental Physics, University of Pécs, 7624 Hungary*.
Absorption saturation and self-phase-modulation of ultrashort THz pulses was observed in germanium at THz intensities of 100 MW/cm2. These effects, observed both in temporal and frequency domain are likely caused by free carriers.

**THUIIId.16 • 16:15**
**Two-dimensional Fourier transform electronic spectroscopy with a pulse-shaper**, *Jeffrey A. Myers*, *Kristin L. M. Lewis*, *Patrick F. Tekavec*, and •*Jennifer P. Ogilvie*; *Department of Physics and Biophysics, University of Michigan, Ann Arbor, MI, 48109, USA*.
We report 2D electronic spectra obtained using a pulse-shaper in a pump-probe geometry. We demonstrate the method at visible wavelengths on a dye system and discuss the benefits of this approach compared to other implementations.

**THUIIId.17 • 16:15**
**Relativistic Attosecond Electron Pulses from Cascaded Acceleration using Ultra-intense Radially Polarized Laser Beams**, *Charles Varin*[1], *Pierre-Louis Fortin*[2], and •*Michel Piché*[2]; [1]*University of Ottawa, Ottawa, Ontario K1N 6N5, Canada*, [2]*Centre d'optique, photonique et laser, Université Laval, Québec, Qc G1V 0A6 , Canada*.
Attosecond electron pulses with peak energy above 200 MeV could be produced with ultrafast 100-TW radially polarized laser beams in a two-stage configuration. Such electron beams would be collimated and quasi-monoenergetic.

**THUIIId.18 • 16:15**
**Ultrafast dynamics of coherent optical phonons in $\alpha$-quartz**, *Konrad von Volkmann*, *Tobias Kampfrath*, *Marcel Krenz*, *Martin Wolf*, and •*Christian Frischkorn*; *Freie Universität Berlin, Fachbereich Physik, Arnimallee 14, 14195 Berlin, Germany*.

Femtosecond laser excitation of $\alpha$-quartz causes oscillations in the transmission of probe light due to coherent phonons modulating the refractive index of the sample. Polarization, temperature and fluence dependent data will be presented.

**THUIIId.19 • 16:15**
**Frequency dependence of the molecular reorientation of liquid water**, •*Huib Bakker*; *AMOLF, Kruislaan 407, 1098 SJ Amsterdam, The Netherlands*.
Using multi-color femtosecond mid-infrared spectroscopy we find that the reorientation of liquid water involves large frequency jumps. In contrast to recent theoretical predictions, we find that the jumping probability is strongly frequency dependent

**THUIIId.20 • 16:15**
**Structural Dynamics in Organic Semiconductors**, *Henrik T. Lemke*[1], *Tine Ejdrup*[1], *Dag W. Breiby*[2], *Peter Hammershøj*[1], and •*Martin M. Nielsen*[1]; [1]*Centre for Molecular Movies, Niels Bohr Institute, University of Copenhagen, Universitetsparken 5, 2100 Copenhagen, Denmark.*, [2]*Department of Physics, Norwegian University of Science and Technology, Høgskoleringen 5, N-7491 Trondheim, Norway.*.
The first time resolved X-ray structural investigation of electron-phonon coupling in thin films of organic semiconductors. Standing acoustic waves were found, arising from the mechanical coupling at the interface between the film and substrate material.

**THUIIId.21 • 16:15**
**Photoexcitation Decay in DNA-Wrapped Carbon Nanotubes: Exciton Transport and Annihilation**, •*Richard Sutton*[1], *Konstantin Litvinenko*[1], *Konstantinos Bourdakos*[1], *Quan-Hong Yang*[2], *Tom Brown*[3], and *Jeremy Allam*[1]; [1]*Advanced Technology Institute, University of Surrey, Guildford, UK*, [2]*Optoelectronics Research Centre, University of Southampton, Southampton, UK*, [3]*School of Chemistry, University of Southampton, Southampton, UK*.
Intensity-dependent degenerate and non-degenerate pump-probe measurements on DNA-wrapped carbon nanotubes show that the photoexcitation decay is determined by the dimensionality and the enhanced electron-electron interactions in the nanotube.

**THUIIId.22 • 16:15**
**Infuence of Lattice Heating Time on Strain Wave Dynamics in InSb**, •*Faton Krasniqi*, *Steven Johnson*, *Paul Beaud*, *Maik Kaiser*, *Daniel Grolimund*, and *Gerhard Ingold*; *Swiss Light Source, Paul Scherrer Institute, CH-5232 Villigen PSI, Switzerland*.
Time resolved X-ray diffraction with sub-picosecond time resolution is used to investigate the fluence dependence of the lattice heating time in InSb.

**THUIIId.23 • 16:15**
**Ultrafast carrier dynamics in spherical CdSe core / elongated CdS shell nanocrystals.**, •*Maria Grazia Lupo*[1,2], *Margherita Zavelani Rossi*[2], *Guglielmo Lanzani*[2], *Luigi Carbone*[1], *Liberato Manna*[1], and *Roberto Cingolani*[1]; [1]*ItalyNNL CNR-INFM, Università degli Studi di Lecce, Italy*, [2]*Dipartimento di Fisica Politecnico di Milano, piazza Leonardo da Vinci 32 Milano Italy*.
We use femtosecond pump probe transient spectroscopy to study ultrafast carrier dynamics CdSe/CdS asymmetric core/shell nanorods and to obtain information about the different mechanisms responsible of radiative and non radiative recombination.

**THUIIId.24 • 16:15**
**Momentum-resolved lifetime study of image potential states using a novel 500 kHz two-color fiber-laser based NOPA system**, •*Klaus Duncker*, *Mario Kiel*, and *Wolf Widdra*; *Martin-Luther-Universität Halle-Wittenberg, 06120 Halle, Germany*.
The momentum-dependent lifetimes of image potential states at a Ag(001) surface have been determined by the use of a novel fiber-based laser-amplifier working at 500 kHz that drives two independent NOPAs.

**THUIIId.25 • 16:15**
**Ultrafast Photoinduced Ferromagnetic Order in a Magnetic Semiconductor Heterostructure**, •*Ingrid Cotoros*[1], *Jigang Wang*[1], *Xinyu Liu*[2], *Jacek K. Furdyna*[2], and *Daniel S. Chemla*[1]; [1]*Department of Physics, University of California at Berkeley and Materials Science Division, Lawrence Berkeley National Laboratory, Berkeley CA, USA*, [2]*Department of Physics, University of Notre Dame, Notre Dame IN, USA*.
We report ultrafast enhancement of ferromagnetism in GaMnAs via photo-excited holes. The ultrafast magnetization increase close to the critical Curie temperature constitutes the first transient evidence of photoinduced phase transition from para- to ferromagnetic state.

**THUIIId.26 • 16:15**
**A Compact Synchrotron Radiation Source Driven by a Laser-Plasma Wakefield Accelerator**, •*Richard Shanks*[1], *Jordan Gallacher*[1], *Enrico Brunetti*[1], *Mark Wiggins*[1], *Hans Peter Schlenvoigt*[2], *Kerstin Haupt*[2], *Alexander Debus*[2], *Fabian Budde*[2], *Oliver Jackel*[2], *Sebastian Pfotenhauer*[2], *Heinrich Schwoerer*[2,3], *Erich Rohwer*[3], and *Dino Jaroszynski*[1]; [1]*Department of Physics, Scottish Universities Physics Alliance, University of Strathclyde, Glasgow G4 0NG, UK*, [2]*Institut für Optik und Quantenelektronik, Friedrich-Schiller-Universität, 07743 Jena, Germany*, [3]*Laser Research Institute, University of Stellenbosch, 7602 Matieland, South Africa*.
This presentation outlines the first demonstration of a compact synchrotron radiation source driven by a laser-plasma wakefield accelerator. Mono energetic electron bunches were produced and combined with an undulator to produce visible synchrotron radiation.

**THUIIIe • Poster III e - Chemical Physics**

*Poster Area*
**16:15–18:15**
**THUIIIe • Poster III e - Chemical Physics**

**THUIIIe.1 • 16:15**
**Control of Excited-State Population and Vibrational Coherence with Shaped Resonant and Near-Resonant Excitation**, •*Tiago Buckup*[1], *Jürgen Hauer*[1], *Carles Serrat*[2,3], and *Marcus Motzkus*[1]; [1]*Physikalische Chemie, Philipps Universität Marburg ,D-35043 Marburg, Germany*, [2]*ICFO-Institut de Ciències Fotòniques, 08860 Castelldefels, Barcelona, Spain*, [3]*Tecnologies Digitals i de la Informació, Universitat de Vic, 08500 Vic, Spain*.
The enhancement of vibrational coherence and population transfer using tailored pulses has been investigated numerically and experimentally. The general control mechanism is based on the control of the absorption coefficient after excitation with multipulses.

**THUIIIe.2 • 16:15**
**Pump-push-probe transient spectroscopy of isolated conjugated oligomers**, •*Jenny Clark*[1], *Juan Cabanillas-Gonzalez*[1], *Tersilla Virgili*[1], *Luca Bazzana*[2], and *Guglielmo Lanzani*[1]; [1]*Dipartimento di Fisica, IFN, CNR, Politecnico di Milano, Piazza Leonardo Da Vinci 32, Milano, Italy*, [2]*LUCEAT Spa. Viale G. Marconi, 31, Dello (BS) Italy*.
We use a transient pump-push-probe technique to study intrinsic charge photogeneration and subsequent recombination in isolated conjugated molecules. Furthermore, we demonstrate stimulated emission switching with large on/off ratio in doped polymer optical fibers.

**THUIIIe.3 • 16:15**
**Photomodulation of Interfacial Electron Transfer by Optical Switches**, •*Lars Dworak*, *Victor Matylitsky*, and *Josef Wachtveitl*; *Institut für Physikalische und Theoretische Chemie, Max von Laue-Strasse 7, Johann Wolfgang Goethe-Universität Frankfurt, 60438 Frankfurt am Main, Germany*.
The dynamics of 4-(phenylazo)benzoic acid coupled to Al2O3 and TiO2 films is described. The drastically altered photochemistry of the optical switch upon absorption to TiO2 films reflects the competition between electron transfer and intramolecular relaxation.

**THUIIIe.4 • 16:15**
**Two-color two-dimensional Fourier transform spectroscopy of energy transfer**, *Kristin L. M. Lewis*, •*Jeffrey A. Myers*, *Patrick F. Tekavec*, and *Jennifer P. Ogilvie*; *Department of Physics and Biophysics, University of Michigan, Ann Arbor, MI, 48109, USA*.
We report two-color 2D electronic spectra obtained using a diffractive-optics-based approach. We employ the two color method to study a simple system consisting of a donor/acceptor pair exhibiting fluorescence resonance energy transfer.

**THUIIIe.5 • 16:15**
**Energy redistribution in large molecules on the subpicosecond timescale**, •*Mikael Kjellberg*[1], *Olof Johansson*[2], *Eleanor E.B. Campbell*[2], *Alexander V. Bulgakov*[3], and *Klavs Hansen*[1]; [1]*Department of Physics, Göteborg University, SE-41296, Göteborg, Sweden*, [2]*School of Chemistry, Edinburgh University, Edinburgh EH9 3JJ, Scotland*, [3]*Institute of Thermophysics SB RAS, 1 Lavrentyev Ave. 630090 Novosibirsk, Russia*.
Photoelectron spectra of $C_{60}$, $C_{70}$ and several polyaromatic hydrocarbon molecules after 160 fs laser ionization have been measured with a momentum map electron spectrometer. The spectra are thermal in nature.

**THUIIIf • Poster III f - Chemistry**

*Poster Area*
**16:15–18:15**
**THUIIIf • Poster III f - Chemistry**

**THUIIIf.1 • 16:15**
**Ultrafast Dynamics of Dansylated POPAM Dendrimers and Energy Transfer in their Dye Complexes**, •*Jukka Aumanen*[1], *Tero Kesti*[2], *Villy Sundström*[2], *Fritz Vögtle*[3], and *Jouko Korppi-Tommola*[1]; [1]*Department of Chemistry, Nanoscience Center, P.O. Box 35, FIN-40014 University of Jyväskylä, Finland*, [2]*Department of Chemical Physics, Lund University, Chemical Center, Box 124, SE-22100 Lund, Sweden*, [3]*Kekulé-Institut für Organische Chemie und Biochemie der Rheinischen Friedrich-Wilhelms-Universität Bonn, Gerhard-Domagk Strasse 1, D-53121 Bonn, Germany*.
We have studied internal dynamics of dansylated poly(propyleneamine) dendrimers of different generations in solution and excitation energy transfer from dansyl chromophores to xanthene dyes that form van der Waals complexes with the dendrimers.

**THUIIIf.2 • 16:15**
**Broadband femtosecond fluorescence up-conversion and Photon Echo experiments in the UV**, •*Olivier Bräm*, *Andrea Cannizzo*, *Ahmad Ajdarzadeh Oskouei*, *Andreas Tortschanoff*, *Frank van Mourik*, and *Majed Chergui*; *Ecole Polytechnique Fédérale de Lausanne (EPFL), Laboratoire de Spectroscopie Ultrarapide, ISIC, FSB, BSP; CH-1015 Lausanne,Switzerland*.
The study of a small UV dye in different solvents with fluorescence up-conversion and photon-echo techniques in the UV range provides new insight in cooling relaxation and solvation dynamics of non-polar molecules in polar solvents.

**THUIIIf.3 • 16:15**
**Propagation and beam geometry effect on 2D Fourier transform spectra of multi-level systems**, •*Byungmoon Cho*, *Michael Yetzbacher*, *Katherine Kitney*, *Eric Smith*, and *David Jonas*; *Department of Chemistry and Biochemistry, University of Colorado, Boulder, Colorado, 80308, USA*.
We calculate 4-level two-dimensional (2D) Fourier transform relaxation spectra including propagation and beam geometry distortions which are 14% for optical density of 0.2 and 25% for crossing angle of 10 degrees.

**THUIIIf.4 • 16:15**
**Probing Photodynamics of Retinal Protonated Schiff-Base with 7 fs Impulsive Vibrational Spectroscopy**, •*Oshrat Bismuth*[1], *Noga Friedman*[2], *Mordechai Sheves*[2], and *Sanford Ruhman*[1]; [1]*Department of Physical Chemistry and Farkas Center for Light Induced Processes, The Hebrew University, Jerusalem 91904, Israel.*, [2]*Department of Oraganic Chemistry, The Weizmann Institute of Science, Rehovot 76100, Israel.*.
Frequency of C=C coherences following impulsive excitation of Retinal Protonated Schiff-Base blue shifts over time ending near that of S0. Assignment of this feature and relevance to the elusive S1 C=C frequency are discussed.

**THUIIIf.5 • 16:15**
**The 2DIR Spectroscopy on CD Modes of Leucine-d10 Side Chain**, •*Sri Ram G Naraharisetty*[1], *Valeriy M Kasyanenko*[1], *Jörg Zimmermann*[2], *Megan Thielges*[2], *Floyd E Romesberg*[2], and *Igor V Rubtsov*[1]; [1]*Tulane University, New Orleans, LA 70118, USA*, [2]*The Scripps Research Institue , La jolla, CA-9203, USA*.
We show that perdeuterated side chain of leucine amino acid and related compounds can serve as a useful structural reporter, suitable for studying proteins using 2DIR spectroscopy. Strong direct-coupling and relaxation-assisted C-D/C=O and C-D/Am-II cross-peaks were measured.

**THUIIIf.6 • 16:15**
**A Time-resolved Vibrational Spectroscopy Study on Adenine/Thymine Based Nucleic Acid Systems**, •*Susan Quinn*[1], *Gerard W. Doorley*[1], *David A. McGovern*[1], *Anthony W. Parker*[2], *Kate L. Ronayne*[2], *Mike Towrie*[2], and *John M. Kelly*[1]; [1]*School of Chemistry and Centre for Chemical Synthesis and Chemical Biology, Trinity College, Dublin 2, Ireland*, [2]*Central Laser Facility, Science and Technology Research Council, Rutherford Appleton Laboratory, Chilton, Didcot, Oxfordshire. OX11 OQX, UK*.
The excited state properties of adenine and thymine in nucleotide, dinucleotide and polynucleotides (single and double-strands) are probed using ultrafast transient infrared spectroscopy. The differing deactivation processes and the involvement of excimers/exciplexes are considered.

**THUIIIf.7 • 16:15**
**Electron Transfer in a Donor/Acceptor System Coupled to the Surface of Semiconductor Nanoparticles: Direct Electron Transfer vs. Electron Transfer Through Surface**, •*Victor Matylitsky*, *Lars Dworak*, and *Josef Wachtveitl*; *Institute for Physical and Theoretical Chemistry, J. W. Goethe-University Frankfurt, Max-von-Laue-Strasse 7, D-60438 Frankfurt am Main, Germany*.
Photophysics of molecular donor/acceptor pair coupled to surface of semiconductor nanoparticles was studied via transient absorbance spectroscopy. Competition between electron injection to semiconductor nanoparticle and direct electron transfer in donor/acceptor pair through space was observed.

**THUIIIf.8 • 16:15**
**Intramolecular Vibrational Energy Redistribution Measured by Femtosecond Pump-Probe Experiments in a Hollow Waveguide**, •*Alexander Kushnarenko*, *Vitaly Krylov*, *Eduard Miloglyadov*, *Martin Quack*, and *Georg Seyfang*; *Laboratory of Physical Chemistry, ETH-Zurich, Wolfgang-Pauli-Strasse 10, 8092 Zurich, Switzerland*.
In femtosecond pump-probe experiments the intramolecular vibrational energy redistribution was investigated in the gas phase for CF3CHFI, CHBrFI, CHBrClF, C6H6. To increase the measured probe signal the experiments have been performed in a hollow waveguide.

**THUIIIf.9 • 16:15**
**Ultrafast Vibrational Dynamics of Homo- and Hetero-Dimers of Excited-State-Proton-Transfer Compounds**, •*Poul B. Petersen*, *Sean T. Roberts*, *Matthew Kanan*, *Krupa Ramasesha*, *Daniel G. Nocera*, and *Andrei Tokmakoff*; *Department of Chemistry, Massachusetts Institute of Technology, Cambridge, Massachusetts 02139, USA*.
The poster has been withdrawn by the authors.

**THUIIIf.10 • 16:15**
**Femtosecond Time-Resolved Fluorescence Spectroscopy of $N^6$,$N^6$-Dimethyladenine: New Explanation of the ”Dual**

**Fluorescence”Dynamics from Decay and Rise Time Measurements at Threshold**, •*Nina Schwalb* and *Friedrich Temps*; *Institut für Physikalische Chemie, Christian-Albrechts-Universität zu Kiel, Olshausenstr. 40, 24098 Kiel, Germany*.
Femtosecond measurements of the fluorescence-time profiles of $N^6$,$N^6$-dimethyladenine in a wide wavelength range following excitation at threshold and much higher show identical dynamics, requiring a new explanation for the so-called ”dual fluorescence”of the molecule.

**THUIIIf.11 • 16:15**
**Coherent Control of the Efficiency of an Artificial Light-Harvesting Complex**, •*Janne Savolainen*[1,2], *Riccardo Fanciulli*[2], *Niels Dijkhuizen*[2], *Ana Moore*[3], *Jürgen Hauer*[4], *Tiago Buckup*[4], *Marcus Motzkus*[4], and *Jennifer Herek*[1]; [1]*Optical Sciences, University of Twente, The Netherlands*, [2]*FOM Institute AMOLF, Amsterdam, The Netherlands*, [3]*Dept. of Chemistry and Biochemistry, Arizona State University, Tempe, USA*, [4]*Physichalische Chemie, Philipps-Universität, Marburg, Germany*.
Coherent control over the branching ratio between competing pathways for energy flow is realised for artificial light-harvesting complex. Direct insights to the mechanism featuring quantum interference of a low-frequency mode are presented.

**THUIIIf.12 • 16:15**
**Assignment of the Excited-State Infrared-Spectra in the Course of the Ring Opening Reaction of a Photochromic Dihydroazulene**, •*Tobias E. Schrader*[1], *Uli Schmidhammer*[2], *Wolfgang J. Schreier*[1], *Florian O. Koller*[1], and *Igor Pugliesi*[1]; [1]*LS für BioMolekulare Optik, LMU München, Oettingenstr. 67, D-80538 Munich, Germany*, [2]*Laboratoire de Chimie Physique, UMR8000 CNRS-Université Paris Sud, Bât 349, F-91405 Orsay, France*.
With femtosecond infrared spectroscopy and ab initio calculations we could assign the transient spectrum at 1 ps to the ring opened product of the dihydroazulene photo induced reaction. Thus, ring-opening proceeds within 1 ps.

**THUIIIf.13 • 16:15**
**Time-resolved Coincidence Imaging of Ultrafast Molecular Dynamics**, •*Arno Vredenborg*, *Wim G. Roeterdink*, and *Maurice H.M. Janssen*; *Laser Centre and Department of Chemistry, Vrije Universiteit, De Boelelaan 1083, 1081 HV Amsterdam, The Netherlands*.
Time-resolved coincidence imaging of ultrafast molecular dynamics is exemplified on NO2 photodissociation. The combination of coincidence imaging with pulse shaping to study mechanisms in coherent control will be presented.

**THUIIIf.14 • 16:15**
**Ultrafast time and frequency domain vibrational dynamics of the CaF2/H2O interface**, *Ali Eftekhari-Bafrooei*, *Satoshi Nihonyanagi*, and •*Eric Borguet*; *1901 N, 13th Street, Philadelphia PA, 19122, USA*.
The structure of water at the CaF2/KOH interface was studied by vibrational sum-frequency-generation (SFG) spectroscopy and ultrafast SFG-Free Induction Decay, suggesting the presence of weakly hydrogen bonded OH at high pH.

## THUIIIg • Poster III g - Biology

*Poster Area*
**16:15–18:15**
**THUIIIg • Poster III g - Biology**

### THUIIIg.1 • 16:15

**Real-time observation of the bond length modulation of carbon doulbe bond during the photoisomerization of bacteriorhodopsin**, •*Takayoshi Kobayashi*[1,2,3,4] and *Atsushi Yabushita*[3]; [1] *JST, ICORP, Ultrashortp Pulse Laser Project, 3 Bancho-Builing, 5 Banchi, 3 Bancho, Chiyoda-ku, Tokyo, 102-0075, Japan*, [2] *Department of Applied Physics and Chemistry and Institute of Laser Research*, [3] *Department of Electrophysics, National Chiao Tung University,1001 Ta Hsueh Road, Hsinchu, 30050 Taiwan*, [4] *Institute of Laser Engineering, Osaka University, 2-6 Yamada-oka, Suita, Osaka 565-0871 Japan*.
The observation of the real time frequency of C=C stretching mode shows that the bond length is modulated in the order of 10mÅ by torsion of the C13=C14 double bond with a period of 200 fs.

### THUIIIg.2 • 16:15

**Electron Transfer in Photosynthetic Reaction Centers: Optimization in Model and Nature**, •*Benjamin P. Fingerhut*[1], *Wolfgang Zinth*[2], and *Regina de Vivie-Riedle*[1]; [1] *Department Chemie und Biochemie, Ludwig-Maximilians-Universität München, Butenandt-Str. 11, D-81377 Munich, Germany*, [2] *LS für BioMolekulare Optik, Ludwig-Maximilians-Universität München, D-80538 Munich, Germany*.
We discuss the principles of optimal charge separation processes in bacterial reaction centers. Non-adiabatic electron transfer theory is combined with a Darwinian optimization. Our results reveal the fundamental boundary conditions for efficient charge separation.

### THUIIIg.3 • 16:15

**Coherently Controlled Release of Drugs in Ophthalmology**, •*Tiago Buckup*, *Jens Möhring*, *Volker Settels*, *Jens Träger*, *Hee-Cheol Kim*, *Norbert Hampp*, and *Marcus Motzkus*; *Physikalische Chemie, Philipps Universität Marburg, D-35043 Marburg, Germany.*.
The photocleavage of a coumarin derivative dimer is a promising mechanism for laser controlled drug release in medical applications. We investigate the efficiency of the two-photon induced cleavage in open- and closed-loop control schemes.

### THUIIIg.4 • 16:15

**Light Harvesting, Energy Transfer and Photoprotection in the Fucoxanthin-Chlorophyll Proteins of Cyclotella meneghiniana**, •*Nina Gildenhoff*[1], *Sergiu Amarie*[1], *Anja Beer*[2], *Kathi Gundermann*[2], *Claudia Büchel*[2], and *Josef Wachtveitl*[1]; [1] *Institut für Physikalische und Theoretische Chemie, Max von Laue-Strasse 7, Johann Wolfgang Goethe-Universität Frankfurt, 60438 Frankfurt am Main, Germany*, [2] *Institut für Molekulare Biowissenschaften, Siesmayerstraße 70, Johann Wolfgang Goethe-Universität Frankfurt, 60438 Frankfurt am Main, Germany*.
The excitation energy transfer and the protective role of diadinoxanthin and diatoxanthin in two different Fucoxanthin-Chlorophyll-Proteins have been investigated using femtosecond transient absorption spectroscopy.

### THUIIIg.5 • 16:15

**Primary Reaction Dynamics of Green Absorbing Proteorhodopsin Observed by Femtosecond Infrared and Visible Spectroscopy**, •*Karsten Neumann*[1], *Mirka-Kristin Verhoefen*[1], *Ingrid Weber*[2], *Clemens Glaubitz*[2], and *Josef Wachtveitl*[1]; [1] *Institut für Physikalische und Theoretische Chemie, Johann Wolfgang Goethe Universität, Max-von-Laue-Str. 7, 60438 Frankfurt am Main, Germany*, [2] *Institut für Biophysikalische Chemie, Johann Wolfgang Goethe Universität, Max-von-Laue-Str. 9, 60438 Frankfurt am Main, Germany*.
We study the light driven proton pump proteorhodopsin at two pH values. The comparison of transient absorption spectroscopy in the visible and infrared spectral range provides detailed information on the first steps in the photocycle.

### THUIIIg.6 • 16:15

**Photodynamics of Collagen Model Peptides: Towards the Monitoring of Folding and Unfolding of Tertiary Structures in Real Time**, •*Lisa Lorenz*[1], *Karsten Neumann*[1], *Ulrike Kusebauch*[2], *Luis Moroder*[2], and *Josef Wachtveitl*[1]; [1] *Institut für Physikalische und Theoretische Chemie, Max von Laue-Strasse 7, Johann Wolfgang Goethe-Universität Frankfurt, 60438 Frankfurt am Main, Germany*, [2] *Max-Planck-Institute of Biochemistry, Am Klopferspitz 18, D-82152 Martinsried*.
Trans-cis-isomerization of a specially designed collagen-sample and its azobenzene-clamp are examined by time-resolved-spectroscopy. The bistable functionality of the azobenzene-switch is conserved upon binding, making this model peptide suitable for investigation of tertiary structure formation.

## FRI1A • Dynamics at Interfaces

*Auditorium*
**8:30–10:15**
**FRI1A • Dynamics at Interfaces**
*Chair: Peter Hamm, University of Zürich, Switzerland*

**FRI1A.1 • 8:30** **•Invited•**

**Ultrafast 2D-IR spectroscopy of a molecular monolayer**, •*Jens Bredenbeck*[1,2], *Avishek Ghosh*[1], *Marc Smits*[1], and *Mischa Bonn*[1]; [1]*FOM Institute for Atomic and Molecular Physics, Kruislaan 407, 1098 SJ, Amsterdam, the Netherlands,* [2]*Institut für Biophysik, Universität Frankfurt, Max von Laue-Str. 1, 60438 Frankfurt, Germany*.
We report on ultrafast 2-dimensional vibrational surface spectroscopy, providing information on coupling and energy transfer between vibrations of surface molecules. As a 4th order technique, it is bulk-forbidden in centrosymmetric materials and hence surface specific.

**FRI1A.2 • 9:00**

**Frozen Dynamics and Insulation of Water at the Lipid Interface**, •*Artem Bakulin*, *Dan Cringus*, *Maxim Pshenichnikov*, and *Douwe Wiersma*; *Zernike Institute for Advanced Materials, University of Groningen, Groningen, The Netherlands*.
2D IR correlation spectroscopy reveals extremely slow dynamics and splitting of the OH-stretching mode of water in anionic micelles. Water at the lipid interface behaves as if the molecules were isolated in a frozen environment.

**FRI1A.3 • 9:15**

**Vibrational dynamics of water at biological interfaces using ultrafast time-resolved sum frequency spectroscopy**, •*Avishek Ghosh*[1,2], *Richard Kramer Campen*[1], *Maria Sovago*[1], and *Mischa Bonn*[1,2]; [1]*FOM-Institute for Atomic and Molecular Physics (AMOLF), Kruislaan 407, 1098 SJ Amsterdam, The Netherlands,* [2]*2Leiden Institute of Chemistry, Leiden University, P.O. Box 950, 2300 RA Leiden, The Netherlands*.
We report studies on ultrafast vibrational dynamics of water molecules at model biological interfaces using a newly developed surface-specific femtosecond pump-probe spectroscopy technique.

**FRI1A.4 • 9:30**

**Ultrafast Dynamics at Liquid Interfaces Investigated with Femtosecond Time-Resolved Multiplex Electronic Sum-Frequency Generation (TR-ESFG) Spectroscopy**, •*Kentaro Sekiguchi*, *Shoichi Yamaguchi*, and *Tahei Tahara*; *RIKEN (The Institute of Physical and Chemical Research), 2-1 Hirosawa, Wako 351-0198, Japan*.
We developed a new nonlinear spectroscopy, femtosecond time-resolved electronic sum-frequency generation (TR-ESFG) spectroscopy, to investigate ultrafast dynamics at liquid interfaces. Transient electronic spectra of dyes at the air/water interface were obtained for the first time.

**FRI1A.5 • 9:45**

**Radiationless Transitions and Angular Momentum Transfer in Semiconductor Nanocrystals**, •*Gregory Scholes*, *Jeongho Kim*, and *Cathy Wong*; *Department of Chemistry, 80 St. George Street, Institute for Optical Sciences, and Centre for Quantum Information and Quantum Control, University of Toronto, Toronto, Ontario M5S 3H6 (Canada)*.
Measurements of ultrafast relaxation processes for population in the exciton fine structure states of CdSe nanocrystals are reported and discussed. Relationships between the mechanism of these dynamics and size and shape of nanocrystals are described.

**FRI1A.6 • 10:00**

**A New Technique to Measure Time-Resolved Circular Dichroism : Ultrafast Conformational Dynamics of 1,1'-Bi-2-naphthol**, •*Claire Niezborala* and *François Hache*; *LOB, Ecole Polytechnique, 91128 Palaiseau, France*.
Using a new time-resolved circular dichroism technique, we study the conformational relaxation of excited state (R)-1,1'-Bi-2-naphthol and show a twenty degree decrease of the dihedral angle in Ethanol on a one hundred picosecond timescale.

## FRI1P • Tunable Ultrafast Pulse Generation

*Panoramica*
**8:30–10:15**
**FRI1P • Tunable Ultrafast Pulse Generation**
*Chair: Andrius Baltuska, Vienna University of Technology, Austria*

**FRI1P.1 • 8:30**
**Generation of Broadband mid-infrared Pulses from an Optical Parametric Amplifier**, •*Cristian Manzoni*, *Daniele Brida*, *Giovanni Cirmi*, *Marco Marangoni*, *Sandro De Silvestri*, and *Giulio Cerullo*; *Dipartimento di Fisica, Politecnico di Milano, Piazza L. Da Vinci, 32, 20133 Milan, Italy*.
We generate broadband mid-IR pulses from an 800-nm-driven optical parametric amplifier in $LiIO_3$. Exploiting its broad phase-matching bandwidth around 1 $\mu$m, we produced 2-$\mu$J idler pulses in the 3-4 $\mu$m range supporting 30-fs transform-limited duration.

**FRI1P.2 • 8:45**
**Optimized 2-micron Optical Parametric Chirped Pulse Amplifier for High Harmonic Generation**, •*Jeffrey Moses*, *Oliver D. Mücke*, *Shu-Wei Huang*, *Andrew Benedick*, *Edilson L. Falcão-Filho*, *Kyung-Han Hong*, *Aleem M. Siddiqui*, *Jonathan R. Birge*, *F. Ömer Ilday*, and *Franz X. Kärtner*; *Department of Electrical Engineering and Computer Science and Research Laboratory of Electronics, Massachusetts Institute of Technology, Cambridge, MA 02139, USA*.
An optical parametric chirped pulse amplification system producing high-energy, few-cycle pulses at 2.0-micron wavelength for high harmonic generation is demonstrated. Simultaneous optimization of conversion efficiency, bandwidth and signal-to-noise ratio is obtained.

**FRI1P.3 • 9:00**
**Generation of sub-20-fs, two-color deep-ultraviolet pulses by four-wave mixing through filamentation in gases**, •*Takao Fuji*, *Takuya Horio*, and *Toshinori Suzuki*; *Chemical Dynamics Laboratory, RIKEN, Wako, Japan*.
Generation of ultrashort pulses at 260 nm and 200 nm by four-wave mixing through filamentation in neon gas is demonstrated. The both pulses were simultaneously compressed down to sub-20 fs by a grating-based compressor.

**FRI1P.4 • 9:15**
**Efficient ultrafast four-wave optical parametric amplification in condensed bulk media**, •*Audrius Dubietis*[1], *Heli Valtna*[1,2], *Gintaras Tamosauskas*[1], and *Algis Piskarskas*[1]; [1]*Department of Quantum Electronics, Vilnius University, Sauletekio Ave. 9, bldg. 3, LT-10222 Vilnius, Lithuania*, [2]*Institute of Physics, University of Tartu, Riia 142, 51014 Tartu, Estonia*.
Highly efficient broadband four-wave optical parametric amplification in bulk Kerr media (water and fused silica) is demonstrated by means of non-collinear phase-matching and cylindrical focusing geometry without onset of beam break-up and filamentation.

**FRI1P.5 • 9:30**
**Cascaded four-wave mixing technique for high-power few-cycle pulse generation**, *Helder Crespo*[1,2] and •*Rosa Weigand*[3]; [1]*Departamento de Física, Faculdade de Ciências, Universidade do Porto, 4169-007 Porto, Portugal*, [2]*Currently with the Research Laboratory of Electronics, Massachusetts Institute of Technology, Cambridge, MA 02139-4307, USA*, [3]*Departamento de Óptica, Facultad de Ciencias Físicas, Universidad Complutense de Madrid 28040 Madrid, Spain*.
Near-single-cycle 2.7-fs visible-UV pulses are obtained from Fourier synthesis of a 1.4-octave spectrum, generated by cascaded four-wave mixing of amplified ultrashort laser pulses in bulk silica, and characterized using broadband cross-correlation frequency resolved optical gating.

**FRI1P.6 • 9:45**
**2 MHz repetition rate - 15 fs fiber amplifier pumped optical parametric amplifier**, •*Steffen Hädrich*[1], *Jan Rothhardt*[1], *Fabian Röser*[1], *Damian Schimpf*[1], *Jens Limpert*[1], and *Andreas Tünnermann*[1,2]; [1]*Friedrich Schiller Universität Jena, Institute of Applied Physics, Albert-Einstein-Str. 15, 07745 Jena, Germany*, [2]*Institute for Applied Optics and Precision Engineering, Albert-Einstein-Str. 7, 07745 Jena, Germany*.
An optical parametric amplifier pumped by a fiber amplifier producing ultrashort pulses with durations of 15.6 fs at 2 MHz repetition rate is presented together with scaling considerations to tens of $\mu$J pulse energy.

**FRI1P.7 • 10:00**
**Octave-wide tunable NOPA pulses at up to 2 MHz repetition rate**, •*Christian Homann*, *Christian Schriever*, *Peter Baum*, and *Eberhard Riedle*; *LS für BioMolekulare Optik, Ludwig-Maximilians-Universität München, Oettingenstrasse 67, 80538 München, Germany*.
Based on noncollinear parametric amplification, we demonstrate frequency conversion of the 230 fs pulses of a high repetition rate ytterbium-doped fiber amplifier system to octave wide tunable femtosecond pulses with down to 20 fs duration.

## FRI2 • High Harmonic and Attosecond Pulse Generation

*Auditorium*
**10:45–12:30**
**FRI2 • High Harmonic and Attosecond Pulse Generation**
*Chair: Mauro Nisoli, Politecnico di Milano, Milan, Italy*

**FRI2.1 • 10:45** **•Invited•**

**Sub-100-as soft-X-ray pulses**, •*Eleftherios Goulielmakis*[1], *martin Schultze*[1], *Michael Hofstetter*[2], *Matthias Uiberacker*[2], *Justin Gagnon*[1], *Vladislav Yakovlev*[2], *Ulf Kleineberg*[2], and *Ferenc Krausz*[1,2]; [1]*Max-Planck-Pnstitut für Quantenoptik, Hans-Kopfermann-Strasse 1, D-85748 Garching, Germany*, [2]*Department für Physik, Ludwig-Maximilians-Universität, am Coulombwall 1, Germany*.
We demonstrate generation of powerful sub-100-as soft-x-ray pulses by means of 1.5-cycle waveform-controlled laser fields. Our new tool opens the door for exploring electronic processes on a time scale approaching the atomic unit.

**FRI2.2 • 11:15**
**Generation of High-order Harmonics with a Near-IR Self-phase-stabilized Parametric Source**, •*Caterina Vozzi*[1], *Francesca Calegari*[1], *Fabio Frassetto*[2], *Enrico Benedetti*[1], *Mauro Nisoli*[1], *Giuseppe Sansone*[1], *Luca Poletto*[2], *Paolo Villoresi*[2], and *Salvatore Stagira*[1]; [1]*INFM-CNR ULTRAS, Dipartimento di Fisica, Politecnico di Milano*, [2]*INFM-CNR LUXOR, Dei Università di Padova*.
We generated high-order harmonics with self-phase-stabilized near-IR pulses produced by a parametric source. We observed a significant cutoff extension with respect to 800-nm driving pulses at comparable peak intensity.

**FRI2.3 • 11:30**
**Quasi-Phase-Matched High-Order Harmonic Generation in the Soft-X-ray Regime**, •*Jozsef Seres*[1,2], *Vlad S. Yakovlev*[3], *Enikoe Seres*[1,2], *Christina Streli*[4], *Peter Wobrauschek*[4], *Ferenc Krausz*[3,5], and *Christian Spielmann*[1]; [1]*Physikalisches Institut EP1, Universität Würzburg, D-97074 Würzburg, Germany*, [2]*Institut für Photonik, Technische Universität Wien, A-1040 Wien, Austria*, [3]*Dept. für Physik, Ludwig-Maximilians-Universität München, D-85748 Garching, Germany*, [4]*Atominstitut, Technische Universität Wien, A-1020 Wien, Austria*, [5]*Max-Planck-Institut für Quantenoptik, D-85748 Garching, Germany*.
We realized quasi-phase-matched generation soft x-rays emitted from two gas jets. The harmonic signal has been enhanced in a broad range (250eV to 600eV) having a maximum of two orders of magnitude at 400eV.

**FRI2.4 • 11:45**
**Optically-induced phase structures and quasi-phase matching of high harmonic generation at keV energies**, •*Oren Cohen*, *Tenio Popmintchev*, *Amy Lytle*, *Henry Kapteyn*, and *Margaret Murnane*; *JILA, University of Colorado, Boulder, CO 80309-0440 USA*.
Multiple weak quasi-cw waves can induce complex phase modulated structures in the high-harmonic generation process. These ”photonic” structures can be used for quasi-phase-matched frequency upconversion even into the hard x-ray region.

**FRI2.5 • 12:00**
**Study of quantum-paths interference in the high harmonics generation**, •*Amelle Zaïr*[1], *Mirko Holler*[1], *Florian Schapper*[1], *Lukas Gallmann*[1], *Ursula Keller*[1], *Adam Wyatt*[2], *Antoine Monmayrant*[2], *Ian Walmsley*[2], *Eric Cormier*[3], *Thierry Auguste*[4], *Jean-Pascal Caume*[4], and *Pascal Salières*[4]; [1]*Physics Departement, ETH Zurich, CH-8093 Zurich, Switzerland*, [2]*Clarendon Laboratory, Parks Road, Oxford OX1 3PU, UK*, [3]*CELIA, CNRS-CEA-Université Bordeaux 1, 351 cours de la Libération, 33405 Talence, France*, [4]*Services des Photons, Atomes et Molécules, CEA-Saclay, 91191 Gif-sur-Yvette, France*.
We studied the intensity dependent high-order harmonics generated in Neon when several electron trajectories contribute to the emission. We directly experimentally observed quantum-paths interference and highlight the contribution of many trajectories in the generation process.

**FRI2.6 • 12:15**
**Enhanced Harmonic Generation in Gas Jets with Expanding Clusters**, *Bonggu Shim*, *Xiaohui Gao*, *Todd Ditmire*, and •*Mike Downer*; *FOCUS center, Department of Physics, University of Texas at Austin, Austin, TX 78712, USA*.
We report femtosecond-time-resolved enhancement and anisotropy of third-harmonic generation in highly ionized clustered argon at intensities exceeding $10^{15}$ W/cm$^2$. Results suggest a path to phase-match high-order harmonic generation in dense plasmas with ultrahigh intensity.