UP 2012

XVIII INTERNATIONAL CONFERENCE ON ULTRAFAST PHENOMENA
Topical meeting and tabletop exhibit

CONFERENCE DIGEST

Venue: EPFL - UNIL
Lausanne, Switzerland

July 9 -13, 2012

Europhysics Conference Abstracts Volume 36B
ISBN N° 2-914771-76-2
The papers included in this digest comprise the short summaries of the XVIII International Conference on Ultrafast Phenomena held in Lausanne, Switzerland from July 9th to 13th 2012. The extended version of the papers (2-page summaries in pdf format) will be made available on-line within 2 months after the conference. A link with login and password is provided on a separate sheet.

All web browsers (Firefox, Internet Explorer, Safari or similar) allow you to download the digest. A pdf viewer (tested with Adobe Acrobat) is necessary to view the papers. This software can be downloaded from www.adobe.com

The papers reflect the authors’ opinion and are published as presented, without any changes in the interest of timely dissemination. Their inclusion in this publication and the extended on-line version does not necessarily constitute endorsement by the editors, the European Physical Society.

© 2012 by the European Physical Society. All rights reserved.

Copyright and Reprint permissions:

The European Physical Society is assigned copyright ownership for the papers included in the XVIII International Conference on Ultrafast Phenomena digest to be effective as of the date of publication, to the extent transferable under applicable national law.

Abstracting is permitted with credit to the source. Libraries are permitted to print copies beyond the limits of copyright in the US and in Europe, where applicable, for private use of patrons. Fair use for scholarly purposes is also permitted. For other copying, reprint or publication permission, write to European Physical Society, 6 rue des Frères Lumière, F-68200 Mulhouse, France.

Authors (or their employers, in the case of works made for hire) reserve all other rights to the above indicated publication including: (a) The right to use the work in future works of their own; (b) All proprietary rights other than copyright; (c) The right of the employer to make copies of the work.

Better Ultrafast, Every Day.


Legend Elite Duo CEP seeded by Vitara CEP

RegA 9040 seeded by Vitara-T

Near-Field Beam Profile
(Duo HE+ USP)

Your research moves as rapidly as your creativity and ingenuity. The lasers you use must also keep pace, enabling fast, accurate and reliable results.

Coherent offers:
• Exceptional product performance and flexibility so you can expand your set up as your research evolves over time

• The most comprehensive range of ultrafast lasers available today: from pump lasers to optical parametric amplifiers

• The best worldwide and regional support no matter where your laboratory is located

Discover the broadest ultrafast laser portfolio on the market today. Our newest ultrafast catalog will be available at our UP 2012 booth. Pick one up while visiting us at the show.

Visit us at www.Cohereent.com/ultrafastlasers to learn more.

COHERENT®

tech.sales@Coherent.com
www.Cohereent.com
toll free: (800) 537-3766
phone: (408) 764-4983

Benelux +31 (30) 280 6060
China +86 (10) 8215 3600
France +33 (0) 8038 1000
Germany +49 (6071) 968 333

Italy +39 (02) 31 03 951
Japan +81 (3) 5635 8700
Korea +82 (2) 460 7900
UK +44 (1933) 658 833

Superior Reliability & Performance
UP2012 is organized in cooperation with

Partners and Sponsors

<table>
<thead>
<tr>
<th>Logo</th>
<th>Institution Name</th>
<th>Website</th>
</tr>
</thead>
</table>
| EPS  | ECQD Division    | http://qecd.epstranslations.org  
|      | www.epstranslations.org |
| EPFL | Swiss Federal Polytechnic of Lausanne | http://lsu.epfl.ch |
| UNIL | Université de Lausanne | www.unil.ch/index.html |

Principal industrial sponsor:

Coherent, Inc.
www.coherent.com

Co-sponsors:

<table>
<thead>
<tr>
<th>Logo</th>
<th>Institution Name</th>
<th>Website</th>
</tr>
</thead>
<tbody>
<tr>
<td>FNSF</td>
<td>Swiss National Foundation</td>
<td><a href="http://www.snf.ch/F/Pages/default.aspx">www.snf.ch/F/Pages/default.aspx</a></td>
</tr>
<tr>
<td></td>
<td><a href="http://www.harima.riken.jp/eng/index.html">www.harima.riken.jp/eng/index.html</a></td>
<td></td>
</tr>
</tbody>
</table>
| NCCR | Molecular Ultrafast Science and Technology | www.kmlabs.com  
|      | www.time-bandwidth.com |
| PSI | Paul Scherrer Institut | www.psi.ch/psi-home |
| Elsevier | | www.elsevier.com |
| ESRF | European Synchrotron Radiation Facility | www.esrf.eu |
| KGF | KontaktGruppe für Forschungsfragen (Contact Group for Research Matters) | www.kgf.ch |
| OSA | Optical Society of America | www.osa.org |
Welcome to Lausanne and to the International Conference on Ultrafast Phenomena!

This year’s event - the XVIII biannual international conference - continues the tradition of bringing together a multidisciplinary group of researchers sharing a common interest in science and technology at the highest temporal resolution. Scientists and engineers from nearly 40 countries and at least three continents will take part to this event.

The conference will include 417 oral and poster contributions, an exceptionally high and all-time record number of presentations. We have scheduled 12 invited, 163 oral and 242 poster presentations from 38 countries for you to consider over what should be five very full days. Not only is the number of submissions and presentations exceptional, but in our opinion also the scientific quality and range of topics. As the technology matures, even more interesting ways of utilizing ultrashort electromagnetic pulses - from X-rays to THz - are found.

A tabletop exhibit featuring leading companies will be held in conjunction with the meeting.

We hope that you will enjoy the unique beauty of Lausanne, the program, and the opportunity to spend time with colleagues from around the globe.

Sincerely,

General Chairs
Majed Chergui, École Polytechnique Fédérale de Lausanne, Switzerland
Antoinette Taylor, Los Alamos National Laboratory, USA

Programme Chairs
Steven Cundiff, JILA, NIST and University of Colorado, USA
Kaoru Yamanouchi, University of Tokyo, Japan
Regina de Vivie-Riedle, Ludwig-Maximilians University, Munich, Germany

Conference Topics

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

Physics
Ultrafast nonlinear optical processes, kinetics of non-equilibrium processes, quantum confinement, coherent transients, nonlinear pulse propagation, novel ultrafast spectroscopic techniques, high intensity physics, attosecond dynamics.

Materials Science
Highly correlated systems, coherent phonons in solids, carrier dynamics in nanoparticles, carbon-based materials, structural dynamics with X-rays and electrons.

Chemistry
Vibrational and conformational dynamics, energy transfer, femtochemistry, proton and electron transfer, solvation dynamics, wave packet dynamics and coherent control of reactions, structural dynamics with X-rays and electrons.

Biology
Photosynthesis, vision, heme proteins, photoactive proteins, photosystemization in chromoproteins, wavepacket dynamics, femtobiology, structural dynamics with X-rays and electrons, medical applications.

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

Applications
Real world applications of ultrafast technology, including ultrafast near-field, nonlinear and confocal microscopes, real-time/real-space electron microscopy, medical applications, high speed communication, micromachining and more.

There will be no oral presentations during this time. Student Happy Hours will be organised during the sessions.

Instructions to Poster Presenters
Poster sessions are scheduled to provide an opportunity for selected papers to be presented in greater visual details and to facilitate discussions among attendees. To display his/her poster, each author is provided with an 84 cm wide x 118,4 cm high space (maximum dimensions). Authors are invited to fix their posters on the boards from the first day of the conference and for the entire week. This should help informal discussions during coffee breaks. Poster presenters are, however, asked to be at their posters during the poster session that their presentation was assigned to. Note: Fixing material will be provided. The boards will be marked with the poster session code.

Speakers’ Information

Duration of oral presentations are:
✓ 15 minutes (including 3 minutes for discussion) for contributed talks,
✓ 30 minutes (including 5 minutes for discussion) for invited talks.

WARNING! Speakers are requested to upload and check their presentations on the computers provided by the conference in the assigned lecture room during the coffee break preceding the talk or the afternoon of the day before for those scheduled early morning. This is mandatory as the schedule is tight and time has to be respected in order for listeners to move from one lecture hall to the other during parallel sessions. A student will be there to assist them. Speakers are asked to check-in with the session chair in the conference room ten minutes before the session begins. The lecture halls are equipped with microphones, projectors and computers, that are connected to the internet.

Post Deadline Contributions

As a tradition, the XVIII International Conference on Ultrafast Phenomena will showcase post deadline presentations. The purpose of these contributions is to give conference participants the opportunity to hear new and significant results in rapidly advancing areas. Only those papers...
judged to be truly excellent and compelling in their timeliness will be accepted for presentation as an oral contribution. The post deadline papers are scheduled for oral presentation on Thursday, July 12th between 20:00 - 21:30 in Lecture Room 350/351. Authors will be notified whether their papers have been accepted on Monday, July 9th directly at the conference desk. Post deadline papers may be included in the proceedings if the authors can submit the manuscript in a timely manner.

**Proceedings**

As at previous conferences, a book of Proceedings of the Ultrafast Phenomena XVIII will be published. Authors of all accepted contributions (invited, oral and poster) are invited to submit a paper for the book of Proceedings. We anticipate the latter to contain around 400 articles of 3 pages each. The Proceedings will be published by EDP Sciences Web of Conferences (www.webofconferences.org), online with open access as well as a black and white hard copy, which will be sent to each conference participant. All papers must follow the same format and style to meet the conditions for publication. These conditions are set by EPJ Web of Conferences to allow for a uniform appearance within the final volume. A detailed description of the paper format and layout is given on the conference web site. The most salient information is the following:
- ✓ The paper is limited to not more than 3 pages, including all text, figures, and references.
- ✓ Papers are to be submitted in pdf format by electronic upload. Papers must be submitted no later than 10:00 pm, July 17th 2012 - GMT+1, Lausanne local time.
- ✓ No late papers, incorrectly formatted papers, or papers longer than 3 pages will be accepted.

**Conference Language**

The official language of the conference is English.

**Conference Digest**

The registration fee includes an online technical digest including the two-page summaries.

**Exhibition**

A tabletop exhibit will be organised. See list of exhibitors in the separate leaflet. The exhibit will run at the same times as the conference, except that Friday will be optional. The exhibition space is located next to the lecture halls and close to the poster area, in order to allow easy and frequent contact with the attendees. Coffee breaks and happy hours are arranged to give the participants the opportunity to visit the stands.

**Exhibitor Information**

The UNIL conference site will be open on Sunday July 8th (10:00 to 18:30) allowing exhibitors to prepare their stands. The conference registration (participants and exhibitors) will begin Sunday July 8th from 16:00 to 18:30. All exhibition equipment/material must be removed by Friday 14:00 at the latest.

**On-site Facilities**

Wireless internet is available inside the building of the conference centre with free access. A message board around the registration area will be installed.

**Lunches**

Lunches are not included in the registration fees. No food or drink is allowed inside the conference rooms. The UNIL has two sites for lunch: Amphimax and Unithèque, with several restaurants. There are also several restaurants on the EPFL site, a few minutes walk from the conference venue. Lunches can be taken outside. The nearby Starling hotel is also open during lunchtime (with a terrace outside the hotel).

**Coffee Breaks**

Morning Coffee breaks are organised on Monday, Tuesday, Wednesday, Thursday and Friday from 10:15 to 10:45. Afternoon Coffee breaks are organised on Monday, Tuesday, Wednesday and Thursday from 15:45 to 16:15. They take place in the corridor of the Amphipôle close to the exhibition area.

**Warning**

Eating or drinking in the lecture rooms is strictly forbidden.

**Social Programme**

Sunday, July 8th, 18:30
- Welcome Reception
  UNIL - Amphimax or outside in case of nice weather

Monday, July 9th, 18:00
- Student Happy Hour
  Poster Area Amphipôle
  Sponsored by COHERENT Inc. and the OSA Foundation.
  Held in conjunction with the poster session (18:00 - 19:30).

Tuesday, July 10th, 18:00
- Student Happy Hour
  Poster Area Amphipôle
  Sponsored by Newport Spectra-Physics
  Held in conjunction with the poster session (18:00 - 19:30).

Wednesday, July 11th, 19:00
- Conference buffet dinner
  Lausanne Palace, Grand Chêne 7 - 9,
  CH 1002 Lausanne
  Phone: +41 (0) 21 331 3131
  www.lausanne-palace.com/fr/index.php
  There will be no shuttle, but the hotel can be easily reached by public transportation. Lausanne CFF Station or the metro station FLON are within 500 metres. The reception will take place outside in case of nice weather. As a rule, due to space limitations and necessary advance reservation, on site registrants will not be able to attend the conference dinner. No fee reduction can be applied.

Thursday, July 12th, 16:45
- Student Happy Hour
  Held in conjunction with the poster session (16:45 - 17:45).

**Registration Information**

The registration fees for the meeting include:
- ✓ Welcome reception at the UNIL (www.unil.ch) on Sunday July 8th at 18:30 (registration desks will be open that day from 16:00 to 18:00).
- ✓ Admission to the technical sessions of the conference.
Tickets for public transports are not included in the fees. However, guests staying in hotels and guesthouses in the greater Lausanne area receive the Lausanne Transportation card for free. The hotel/guesthouse will issue this card, which is personal and non-transferable, upon checking in.

The Lausanne Transportation card entitles its holder to free and unrestricted travel in second class on the network formed by zones 11, 12, 15, 16, 18 and 19 of the Communauté tarifaire vaudoise Mobilis, the passenger transport network for the canton of Vaud (see www.lausanne.ch/view.asp?DomID=64459&Language=E).

Validity period:
The travel card is valid for the entire duration of the guest’s stay on condition that the fields provided for the name of the beneficiary, the name (or stamp) of the hotel or guesthouse and the arrival and departure dates are duly completed by the hotel or guesthouse staff.

The Lausanne Transport Card is valid for one person. The card must be presented upon request for inspection. A means of identification may be required. Please note in particular that a valid ticket is also required for bicycles and dogs.

**Conference Registration Hours:**
- **Sunday, July 8th 2012**
  - 16:00 - 18:00
- **Monday, July 9th 2012**
  - 07:45 - 12:30 and 13:45 - 17:00
  - 08:00 - 12:30 and 13:45 - 17:00
  - 08:00 - 12:30 and 13:45 - 16:30
  - 08:00 - 12:30 and 13:45 - 16:30
- **Tuesday, July 10th 2012**
  - 08:00 - 12:30 and 13:45 - 17:00
- **Wednesday, July 11th 2012**
  - 08:00 - 12:30 and 13:45 - 16:30
- **Thursday, July 12th 2012**
  - 08:00 - 12:30 and 13:45 - 16:30
- **Friday, July 13th 2012**
  - Closed

**Conference Hours:**
- **Monday, July 9th 2012**
  - 08:15 - 12:30 and 14:00 - 19:30
- **Tuesday, July 10th 2012**
  - 08:30 - 12:30 and 14:00 - 19:30
- **Wednesday, July 11th 2012**
  - 08:30 - 12:30 and 14:00 - 18:00
- **Thursday, July 12th 2012**
  - 08:30 - 12:30 and 14:00 - 21:30
- **Friday, July 13th 2012**
  - 08:30 - 12:30

Lunches are not included.

As a rule, due to space limitations and necessary advance reservation, on site registrants will not be able to attend the conference dinner. No fee reduction will be applied. Also, no guest tickets for the conference dinner can be obtained on site.

---

**OUTREACH**

**SEMINARS**

Seminars and colloquia can help broaden the knowledge of young scientists. Visits to industries can boost the integration with research, while providing an outlook on possible employment.

**EDUCATIONAL OUTREACH**

Educational outreach programs to local schools and communities can provide a stimulus for new generations of scientists and increase the awareness for the importance of scientific research.

---

**NETWORK**

International networking creates an environment of exchanges between local Sections, at European-level student conferences, and due to interaction with student groups of other organizations.

**Young Minds is a project of the European Physical Society**

Young Minds is a project of the European Physical Society open to all enthusiastic young researchers in Europe and around the World, oriented to support the next generation of leaders in physics.

More than 100 active members all over Europe in 18 Sections are working together with EPS to promote physics, setting up a bright, brave, creative, determined, passionate and focused environment through their outreach, seminars and networking activities.

Get this stimulus and join the EPS Young Minds Project today!

contact@epsyoungminds.org

---

**On-line digest including the two-page summaries.**

**Hard copy and on-line publication of the proceedings.**

**Conference buffet dinner at the Lausanne Palace** (http://lausanne-palace.com) on Wednesday evening, July 11th at 19:00.

**Exhibition** running from Monday morning to Friday noon time.

**Coffee breaks** (Monday through Friday morning) as mentioned in the programme.

**3 Happy Hours** organised in conjunction with the poster sessions to take place on Monday July 9th, Tuesday July 10th both from 18:00 to 19:00 and Thursday July 12th from 16:15 to 17:45.

---

**✓ On-line digest including the two-page summaries.**

**✓ Hard copy and on-line publication of the proceedings.**

**✓ Conference buffet dinner at the Lausanne Palace** (http://lausanne-palace.com) on Wednesday evening, July 11th at 19:00.

**✓ Exhibition** running from Monday morning to Friday noon time.

**✓ Coffee breaks** (Monday through Friday morning) as mentioned in the programme.

**✓ 3 Happy Hours** organised in conjunction with the poster sessions to take place on Monday July 9th, Tuesday July 10th both from 18:00 to 19:00 and Thursday July 12th from 16:15 to 17:45.

---

**✓ On-line digest including the two-page summaries.**

**✓ Hard copy and on-line publication of the proceedings.**

**✓ Conference buffet dinner at the Lausanne Palace** (http://lausanne-palace.com) on Wednesday evening, July 11th at 19:00.

**✓ Exhibition** running from Monday morning to Friday noon time.

**✓ Coffee breaks** (Monday through Friday morning) as mentioned in the programme.

**✓ 3 Happy Hours** organised in conjunction with the poster sessions to take place on Monday July 9th, Tuesday July 10th both from 18:00 to 19:00 and Thursday July 12th from 16:15 to 17:45.

---

**✓ On-line digest including the two-page summaries.**

**✓ Hard copy and on-line publication of the proceedings.**

**✓ Conference buffet dinner at the Lausanne Palace** (http://lausanne-palace.com) on Wednesday evening, July 11th at 19:00.

**✓ Exhibition** running from Monday morning to Friday noon time.

**✓ Coffee breaks** (Monday through Friday morning) as mentioned in the programme.

**✓ 3 Happy Hours** organised in conjunction with the poster sessions to take place on Monday July 9th, Tuesday July 10th both from 18:00 to 19:00 and Thursday July 12th from 16:15 to 17:45.

---

**✓ On-line digest including the two-page summaries.**

**✓ Hard copy and on-line publication of the proceedings.**

**✓ Conference buffet dinner at the Lausanne Palace** (http://lausanne-palace.com) on Wednesday evening, July 11th at 19:00.

**✓ Exhibition** running from Monday morning to Friday noon time.

**✓ Coffee breaks** (Monday through Friday morning) as mentioned in the programme.

**✓ 3 Happy Hours** organised in conjunction with the poster sessions to take place on Monday July 9th, Tuesday July 10th both from 18:00 to 19:00 and Thursday July 12th from 16:15 to 17:45.

---

**✓ On-line digest including the two-page summaries.**

**✓ Hard copy and on-line publication of the proceedings.**

**✓ Conference buffet dinner at the Lausanne Palace** (http://lausanne-palace.com) on Wednesday evening, July 11th at 19:00.

**✓ Exhibition** running from Monday morning to Friday noon time.

**✓ Coffee breaks** (Monday through Friday morning) as mentioned in the programme.

**✓ 3 Happy Hours** organised in conjunction with the poster sessions to take place on Monday July 9th, Tuesday July 10th both from 18:00 to 19:00 and Thursday July 12th from 16:15 to 17:45.

---

**✓ On-line digest including the two-page summaries.**

**✓ Hard copy and on-line publication of the proceedings.**

**✓ Conference buffet dinner at the Lausanne Palace** (http://lausanne-palace.com) on Wednesday evening, July 11th at 19:00.

**✓ Exhibition** running from Monday morning to Friday noon time.

**✓ Coffee breaks** (Monday through Friday morning) as mentioned in the programme.

**✓ 3 Happy Hours** organised in conjunction with the poster sessions to take place on Monday July 9th, Tuesday July 10th both from 18:00 to 19:00 and Thursday July 12th from 16:15 to 17:45.

---

**✓ On-line digest including the two-page summaries.**

**✓ Hard copy and on-line publication of the proceedings.**

**✓ Conference buffet dinner at the Lausanne Palace** (http://lausanne-palace.com) on Wednesday evening, July 11th at 19:00.

**✓ Exhibition** running from Monday morning to Friday noon time.

**✓ Coffee breaks** (Monday through Friday morning) as mentioned in the programme.

**✓ 3 Happy Hours** organised in conjunction with the poster sessions to take place on Monday July 9th, Tuesday July 10th both from 18:00 to 19:00 and Thursday July 12th from 16:15 to 17:45.

---

**✓ On-line digest including the two-page summaries.**

**✓ Hard copy and on-line publication of the proceedings.**

**✓ Conference buffet dinner at the Lausanne Palace** (http://lausanne-palace.com) on Wednesday evening, July 11th at 19:00.

**✓ Exhibition** running from Monday morning to Friday noon time.

**✓ Coffee breaks** (Monday through Friday morning) as mentioned in the programme.

**✓ 3 Happy Hours** organised in conjunction with the poster sessions to take place on Monday July 9th, Tuesday July 10th both from 18:00 to 19:00 and Thursday July 12th from 16:15 to 17:45.

---

**✓ On-line digest including the two-page summaries.**

**✓ Hard copy and on-line publication of the proceedings.**

**✓ Conference buffet dinner at the Lausanne Palace** (http://lausanne-palace.com) on Wednesday evening, July 11th at 19:00.

**✓ Exhibition** running from Monday morning to Friday noon time.

**✓ Coffee breaks** (Monday through Friday morning) as mentioned in the programme.

**✓ 3 Happy Hours** organised in conjunction with the poster sessions to take place on Monday July 9th, Tuesday July 10th both from 18:00 to 19:00 and Thursday July 12th from 16:15 to 17:45.
Conference Management

The Conference management is provided by the European Physical Society, 6 rue des Frères Lumière, F-68200 Mulhouse, France

Conference Venue

The UP2012 Conference will take place at the Université de Lausanne (UNIL) - 1015 Lausanne (www.unil.ch/index.html) in the Amphimax and the Amphipôle buildings (quartier SORGE). There is a direct access from one building to the other. An interactive map of the UNIL can be found at http://planete.unil.ch/plan.

To reach the conference venue, see below Transportation.

The oral sessions will be held in three lecture rooms:
- Room 350/351 (Amphimax)
- Auditorium A and Auditorium B (Amphipôle)

The Poster sessions and the Exhibition take place in the Amphipôle.

Coffee breaks and Happy Hours take place in the Amphipôle.

The registration desks and the message board are located in the Amphipôle.

Transportation:

Getting around is easy thanks to the modern and punctual public transport services operated by Transports Lausannois (TL). An efficient network of buses, trains and metro links all of the town’s attractions and sites from the lake shore to the heights of the city. Convenience and reliability are at the heart of one of the most compact transport systems in Switzerland and Europe.

See www.lausanne.ch/view.asp?docId=32901&domId=63702&language=E

The UNIL site can be easily reached via metro 1 from Lausanne-Flon direction Renens Gare (around 12 minutes), take exit UNIL-Sorge. See http://en.wikipedia.org/wiki/File:Lausanne_-_Public_transport_map.png

Additional information:
- There is a train every 10 minutes.
- For those without the Lausanne Transport Card, the ticket costs CHF 3.00 and is valid for one hour on all trains (metro & TSOL) and buses of the Lausanne area.
- The trip from the Lausanne train station to the UNIL-Sorge stop lasts about 25 minutes.
- The conference sites (Amphimax and Amphipôle) are located in front of the stop on the left side, near the parking. Other transportation information can be found using the links:
  - or the conference web site: www.up2012.org/venue.

Lausanne, Switzerland

Lausanne, the capital of the canton Vaud, is the result of centuries of hard work. This town is situated on the north shore of Lac Léman (Lake Geneva). It was founded by the Celts, then occupied by the Romans, and eventually destroyed by the Alemannen. This is how Lausanne’s history began - from Lousonna of the Roman era to Lausanne, the modern European city. It has always been a key point on the North-South route from the North Sea to the Mediterranean. Its old town (la cité), dominated by the 13th century Gothic cathedral (4 spires and 105 stained-glass windows), was built in the Middle Ages. To this day, it remains a magnificent architectural and artistic heritage with its paved roads and period houses sporting their shop signs and housing craftsmen’s workshops and cosy pubs.

The city offers vast entertainment opportunities. Steep terraces sloping down to the shores of the lake offer beautiful views of the French Alps. Down by the lakefront, parks, gardens, cafés and restaurants provide endless hours of entertainment for the visitor’s pleasure. Concerts, operas and ballets are staged regularly at the many theatre and concert halls of the city, while street corners provide the setting for impromptu jazz recitals. Throughout the year, the city also hosts many exhibitions and trade fairs.

In Lausanne, the Olympic Games never end! In the middle of a magnificent park overlooking the lake, the Olympic Museum showcases the striking images, highlights and paraphernalia of the games and recalls the commitment of the IOC to foster popular as well as competitive sports.

Thanks to the City of Lausanne, wireless internet access is now available in the city center and by the lake. In fact, seven wi-fi access points have been put in place in the city’s main squares - Flon, Palud, Riponne, St-François, Montbenon, Navigation, Port, Service des automobiles et aéroport de la Blécherette - allowing residents and visitors of Lausanne to have access to internet free of charge. You need a laptop equipped with a wireless network card to take advantage of this option.

Shopping

Many department stores, fashion and luxury boutiques, souvenir shops, watch and jewellery shops, local and crafts markets are located downtown.

Opening hours:
- Mon-Fri: 08.00/08.45 – 18.30/19.00 hours
- Saturday: 08.00/08.45 – 18.00 hours
- Sunday: closed

Population

Lausanne: 128 000 inhabitants
Greater Lausanne: 250 000 inhabitants

Altitude

372 m by the lake
495 m in the city centre
852 m in the northern part of the town

Official language

French. All major languages are generally understood and spoken.

Climate

Annual average temperature 14°C
Average summer temperature 24°C

Currency

The Swiss Franc (CHF) is the official currency of Switzerland.

While Switzerland is not part of the European Union, prices are indicated in both CHF and euros for comparison. Shopkeepers often accept euros but are not obliged to do so. Change given back to the client will most likely be in Swiss francs.

Money exchange places:
- Any Swiss bank
- Airport
- Main railway stations
- Major hotels

Swiss banks offer the best exchange rates for your traveller’s checks or cash for foreign currencies (only bank notes). Official exchange offices and hotels may charge a fee for their services.

Major credit cards (VISA, Mastercard/Eurocard, American Express, Diners...) are generally accepted in airports, train stations, hotels, larger shops etc.

For more information on Lausanne visit the following website:
www.lausanne-tourisme.ch
Conference Committees

General Chairs

- Majed Chergui, Ecole Polytechnique Federale de Lausanne, Switzerland
- Antoinette Taylor, Los Alamos National Laboratory, USA

Programme Chairs

- Steven Cundiff, JILA, NIST and University of Colorado, USA
- Kaoru Yamazouchi, University of Tokyo, Japan
- Regina de Vivie-Riedle, Ludwig-Maximilians University, Munich, Germany

Ultrafast Phenomena Program Committee

- Martin Aeschlimann, University of Kaiserslautern, Germany
- Richard Averitt, Boston University, USA
- Jens Biegert, ICF0, Barcelona, Spain
- Andrea Cavalleri, University of Oxford, United Kingdom
- Lin Chen, Northwestern University, USA
- Louis Di Mauro, Ohio State University, USA
- Thomas Feurer, University of Bern, Switzerland
- Nuh Gedik, Massachusetts Institute of Technology, Cambridge, USA
- Tony Heinz, Columbia University, USA
- Jan Helbing, University of Zurich, Switzerland
- Kevin Kubarych, University of Michigan, USA
- Alfred Leitenstorfer, University of Konstanz, Germany
- Ruxin Li, Shanghai Institute of Optics & Fine Mechanics, China
- Manho Lim, Pusan National University, Republic of Korea
- Stefan Lochbrunner, University of Rostock, Germany
- Jon Marangos, Imperial College of London, United Kingdom
- Jennifer Ogilvie, University of Michigan, USA
- Greg Scholes, University of Toronto, USA
- Charles Schmuttermaier, Jale University, USA
- Olga Smirnova, Max-Born-Institute, Berlin, Germany
- Fabrice Vallée, University of Lyon, France
- David Villeneuve, University of Ottawa, Canada
- Martin Zanni, University of Wisconsin, USA

Ultrafast Phenomena Advisory Committee

- David Auston, Rice University, USA
- Paul Corkum, Steacie Institute for Molecular Science, Canada
- Sandro De Silvestri, Politecnico di Milano and ULTRAS INFIM-CNR, Italy
- Kenneth Eisenhal, Columbia University, USA
- Thomas Elsaesser, Max-Born-Institute, Berlin, Germany
- Graham Fleming, University of California at Berkeley, USA
- James G. Fujimoto, Massachusetts Institute of Technology, Cambridge, USA
- Charles Harris, University of California at Berkeley, USA
- Robin Hochstrasser, University of Pennsylvania, USA
- Erich Ippen, Massachusetts Institute of Technology, Cambridge, USA
- David Jonas, University of Colorado, USA
- Wolfgang Kaiser, Technical University of Munich, Germany
- Wayne Knox, University of Rochester, USA
- Takayoshi Kobayashi, University of Tokyo, Japan
- Jean-Louis Martin, LOB-ENSTA, France
- Arnold Migus, Ecole Polytechnique, France
- R. J. Dwayne Miller, University of Toronto, Canada
- Gerard Mourou, University of Michigan, USA
- Shaub Mukamel, University of California at Irvine, USA
- Margaret M. Murnane, University of Colorado at Boulder, USA
- Keith Nelson, Massachusetts Institute of Technology, Cambridge, USA
- Tadashi Okada, Osaka University, Japan
- Eberhard Riedle, Ludwig-Maximilians University, Munich, Germany
- Norbert F. Scherer, University of Chicago, USA
- Robert Schoenlein, Lawrence Berkeley National Laboratory, USA
- Charles Shank, Lawrence Berkeley National Laboratory, USA
- Anthony Siegman, Stanford University, USA
- Andrew M. Weiner, Purdue University, USA
- Douwe Wiersma, University of Groningen, the Netherlands
- Tatsu Yajima, Nihon University, Japan
- Keitaro Yoshihara, Institute for Molecular Science, Japan
- Ahmed Zewail, Caltech, USA
- Wolfgang Zinth, Ludwig-Maximilians University, Munich, Germany

NOTES
<table>
<thead>
<tr>
<th>MONDAY JULY 9TH 2012</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Contributions</strong></td>
</tr>
<tr>
<td>---------------------</td>
</tr>
<tr>
<td>Invited, Oral</td>
</tr>
<tr>
<td>Oral</td>
</tr>
<tr>
<td>Oral</td>
</tr>
<tr>
<td>Invited, Oral</td>
</tr>
<tr>
<td>Oral</td>
</tr>
<tr>
<td>Oral</td>
</tr>
<tr>
<td>Poster</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>TUESDAY JULY 10TH 2012</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Contributions</strong></td>
</tr>
<tr>
<td>Invited, Oral</td>
</tr>
<tr>
<td>Invited, Oral</td>
</tr>
<tr>
<td>Oral</td>
</tr>
<tr>
<td>Oral</td>
</tr>
<tr>
<td>Invited, Oral</td>
</tr>
<tr>
<td>Oral</td>
</tr>
<tr>
<td>Oral</td>
</tr>
<tr>
<td>Poster</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>WEDNESDAY JULY 11TH 2012</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Contributions</strong></td>
</tr>
<tr>
<td>Invited, Oral</td>
</tr>
<tr>
<td>Oral</td>
</tr>
<tr>
<td>Invited, Oral</td>
</tr>
<tr>
<td>Oral</td>
</tr>
<tr>
<td>Oral</td>
</tr>
<tr>
<td>Oral</td>
</tr>
<tr>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>THURSDAY JULY 12TH 2012</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Contributions</strong></td>
</tr>
<tr>
<td>Invited, Oral</td>
</tr>
<tr>
<td>Invited, Oral</td>
</tr>
<tr>
<td>Oral</td>
</tr>
<tr>
<td>Oral</td>
</tr>
<tr>
<td>Invited, Oral</td>
</tr>
<tr>
<td>Poster</td>
</tr>
<tr>
<td>Oral</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>FRIDAY JULY 13TH 2012</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Contributions</strong></td>
</tr>
<tr>
<td>Oral</td>
</tr>
<tr>
<td>Oral</td>
</tr>
<tr>
<td>Invited, Oral</td>
</tr>
</tbody>
</table>
## Invited Talks at a Glance

### Monday July 9th 2012

<table>
<thead>
<tr>
<th>Time</th>
<th>Room</th>
<th>Topic</th>
<th>Authors</th>
</tr>
</thead>
<tbody>
<tr>
<td>08:30</td>
<td>Room 350/351</td>
<td><strong>Attosecond Electronic and Nuclear Dynamics in High-Harmonic Generation from Aligned Molecules</strong></td>
<td>Pascal Salières, Zsolt Diveki, Roland Guichard, Antoine Camper, Jérémie Caillat, Stefan Haessler, Ackermannweg 10, 55128 Mainz, Germany, Yvette, France, Atomes et Molécules, 91191 Gif-sur-Yvette, France, 11 rue Pierre et Marie Curie, 75231 Paris Cedex 05, France, 4Photonics Institute, Vienna University of Technology, Gusshausstrasse 27/387, 1040, Vienna, Austria</td>
</tr>
</tbody>
</table>

### Thursday July 12th 2012

<table>
<thead>
<tr>
<th>Time</th>
<th>Room</th>
<th>Topic</th>
<th>Authors</th>
</tr>
</thead>
<tbody>
<tr>
<td>14:00</td>
<td>Room 350/351</td>
<td><strong>Ultrafast Dynamics of Water at the Air-Water Interface Studied by Femtosecond Surface Vibrational Spectroscopy</strong></td>
<td>Mischa Bonn, Cho-Shuen Hsieh, Zsolt Diveki, Lukas Piatkowski, Huib Bakker, Zhen Zhang, Alexander Fischer, Peter Geisler, Erwin-Schrödinger-Str. 46, 67663 Kaiserslautern, Germany, 4AMOLF, Amsterdam, The Netherlands</td>
</tr>
</tbody>
</table>

## Tuesday July 10th 2012

<table>
<thead>
<tr>
<th>Time</th>
<th>Room</th>
<th>Topic</th>
<th>Authors</th>
</tr>
</thead>
<tbody>
<tr>
<td>09:00</td>
<td>Room 350/351</td>
<td><strong>Nonlinear Terahertz Spectroscopy in Solids with Single-Cycle Terahertz Pulses</strong></td>
<td>Koichiro Tanaka, Kyoto University, Institute for Integrated Cell-Material Sciences (WPI-iCeMS), Kyoto, 606-8501, Japan</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Time</th>
<th>Room</th>
<th>Topic</th>
<th>Authors</th>
</tr>
</thead>
<tbody>
<tr>
<td>10:45</td>
<td>Auditorium A</td>
<td><strong>Coherent Spectroscopies on Ultrashort Time and Length Scales</strong></td>
<td>Tobias Brichner, Martin Aeschlimann, Alexander Fischer, Peter Geisler, 22607 Hamburg, Germany</td>
</tr>
</tbody>
</table>

### Wednesday July 11th 2012

<table>
<thead>
<tr>
<th>Time</th>
<th>Room</th>
<th>Topic</th>
<th>Authors</th>
</tr>
</thead>
<tbody>
<tr>
<td>14:00</td>
<td>Auditorium B</td>
<td><strong>Attoptosec Physics at a Nanoscale Metal Tip</strong></td>
<td>Peter Hommelhoff,  Max Planck Institute of Quantum Optics, Garching, Germany</td>
</tr>
</tbody>
</table>

### Wednesday July 11th 2012

<table>
<thead>
<tr>
<th>Time</th>
<th>Room</th>
<th>Topic</th>
<th>Authors</th>
</tr>
</thead>
<tbody>
<tr>
<td>08:30</td>
<td>Room 350/351</td>
<td><strong>Persistent Quantum Coherence in Single Light-Harvesting Complexes</strong></td>
<td>Richard Hildner, Daan Brinks, Richard J. Cogdell, Niek F. van Hulst, 1ICFO - Institute of Photonic Sciences, 08860 Castelldefels (Barcelona), Spain, 2ICREA - Instituto Catalana de Recerca i Estudis Avançats, 08015 Barcelona, Spain, 3University of Glasgow, Glasgow G12 8TA, United Kingdom, 4University of Bayreuth, 95440 Bayreuth, Germany</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Time</th>
<th>Room</th>
<th>Topic</th>
<th>Authors</th>
</tr>
</thead>
<tbody>
<tr>
<td>11:30</td>
<td>Auditorium B</td>
<td><strong>First Experimental Realization of an Atomic Inner-Shell X-ray Laser in the keV Photon-Energy Regime</strong></td>
<td>Nina Rohringer,  Max Planck Advanced Study Group, Center for Free-Electron Laser Science, e/o DESY, 22607 Hamburg, Germany</td>
</tr>
</tbody>
</table>

### Thursday July 12th 2012

<table>
<thead>
<tr>
<th>Time</th>
<th>Room</th>
<th>Topic</th>
<th>Authors</th>
</tr>
</thead>
</table>

### Thursday July 12th 2012

<table>
<thead>
<tr>
<th>Time</th>
<th>Room</th>
<th>Topic</th>
<th>Authors</th>
</tr>
</thead>
<tbody>
<tr>
<td>14:00</td>
<td>Room 350/351</td>
<td><strong>Attoptosec Physics at a Nanoscale Metal Tip</strong></td>
<td>Peter Hommelhoff,  Max Planck Institute of Quantum Optics, Garching, Germany</td>
</tr>
</tbody>
</table>

### Thursday July 12th 2012

<table>
<thead>
<tr>
<th>Time</th>
<th>Room</th>
<th>Topic</th>
<th>Authors</th>
</tr>
</thead>
<tbody>
<tr>
<td>14:00</td>
<td>Room 350/351</td>
<td><strong>High Brightness XUV Frequency Combs via Intracavity High Harmonic Generation</strong></td>
<td>Thomas Allison, Arman Cingöz, Craig Benko, Dylan Yost, Axel Ruehl, Martin Fermann, Ingmar Hartl, Jun Ye, 1JILA, NIST and the University of Colorado, Boulder, CO, USA, 2IMRA America Inc., Ann Arbor, MI, USA</td>
</tr>
</tbody>
</table>

### Thursday July 12th 2012

<table>
<thead>
<tr>
<th>Time</th>
<th>Room</th>
<th>Topic</th>
<th>Authors</th>
</tr>
</thead>
<tbody>
<tr>
<td>14:00</td>
<td>Room 350/351</td>
<td><strong>Ultrafast Pump-Pump Photocurrent Spectroscopy of Organic Photoconversion Systems</strong></td>
<td>Artem Bakulin, Akshay Rao, Yana Vaynzof, Simon Gelinas, Vlad Pavelyev, Maxim Pshenichnikov, Paul van Loosdrecht, Dorota Niedzialek, Jerome Cornil, David Beljonne, Richard Friend, 1University of Cambridge, Cambridge, UK, 2Zernike Institute for Advanced Materials, University of Groningen, Groningen, The Netherlands, 3University of Mons, Mons, Belgium, 4AMOLF, Amsterdam, The Netherlands</td>
</tr>
</tbody>
</table>
A Direct View of the Dynamics of Lattice and Spin with Femtosecond X-ray Diffraction

Steven Johnson¹, Ekaterina Möhr-Vorobeva², Raquel de Souza², Urs Staub², Paul Beaud², Gerhard Ingold³, Andrin Caviezel³, Christopher Milne¹, Jure Demsar¹, Hanjo Schäfer⁴, Alexander Titov⁵, Valerio Scagnoli², William Schlotter⁶, Joshua Turner⁶, Oleg Krupin⁶,⁷, Wei-Sheng Lee⁸,⁹, Yi-De Chuang¹⁰, Luc Patthey², Robert Moore⁶, Donghui Li², Ming Yi⁶, Patrick Kirchmann¹, Mariano Trigo¹¹, Peter Denes¹², Dionisio Doering¹², Zahid Hussain⁵, Zhi-Xun Shen⁵, Dharmalingam Prabhakaran¹², Andrew Boothroyd¹²,

¹Institute for Quantum Electronics, ETH Zurich, Zurich, Switzerland,
²Swiss Light Source, Paul Scherrer Institut, Villigen, Switzerland,
³Laboratoire de Spectroscopie Ultrarapide, ISIC-FSB, Ecole Polytechnique Fédérale de Lausanne, Lausanne, Switzerland,
⁴Physics Department and Center of Applied Photonics, University of Konstanz, Germany,
⁵Institute of Metal Physics and Institute of Metallurgy UrDRAS, Ekaterinburg, Russia,
⁶The Linac Coherent Light Source, SLAC National Accelerator Laboratory, Menlo Park, CA, USA,
⁷European XFEL GmbH, Hamburg, Germany,
⁸SIMES, SLAC National Accelerator Laboratory and Stanford University, Menlo Park, CA, USA,
⁹SSRL, SLAC National Accelerator Laboratory, Menlo Park, CA, USA,
¹⁰Lawrence Berkeley National Laboratory, Berkeley, CA, USA,
¹¹PULSE, SLAC National Accelerator Laboratory, Menlo Park, CA, USA,
¹²Department of Physics, University of Oxford, Clarendon Laboratory, Oxford, UK

Friday July 13th 2012

12:00 Room 350/351 FRI.2.6

4D Electron Microscopy: Development and Applications

Ahmed H. Zewail, California Institute of Technology (Caltech), Pasadena, CA, USA
Welcome and Opening Remarks
8:15–8:30

MON.1: High Harmonic Spectroscopy
Chair: Kaoru Yamanouchi, The University of Tokyo, Tokyo, Japan
8:30–10:15 Room 350/351 MON.1

Attosecond Electronic and Nuclear Dynamics in High-Harmonic Generation from Aligned Molecules,
●Pascal Salières\(^1\), Zsolt Divéki\(^2\), Roland Guichard\(^2,3\), Antoine Camper\(^1\), Jérémie Caillat\(^2,3\), Stefan Haessler\(^4\), Thierry Ruchon\(^1\), Thierry Auguste\(^1\), Alfred Maquere\(^2,5\), Bertrand Carré\(^1\), and Richard Taïeb\(^2,3\).
1 CEA-Saclay, IRAMIS, Service des Photons, Atomes et Molécules, 91191 Gif-sur-Yvette, France.
2 UPMC Univ. Paris 06, UMR 7614, LCPMR, 11 rue Pierre et Marie Curie, 75231 Paris Cedex 05, France.
3 CNRS, UMR 7614, LCPMR F-75005 Paris, France.
4 Photonics Institute, Vienna University of Technology, Gusshausstrasse 27/387, 1040, Vienna, Austria.

We show that the spectral phase of the attosecond emission from aligned molecules encodes a wealth of information: structure of the radiating molecular orbitals, multi-channel electron dynamics and nuclear dynamics occurring during the emission process.

9:00 Room 350/351 MON.1.2
When does an electron exit a tunneling barrier?\(^6\), Dörr Shafir\(^3\), Itadas Sofer\(^3\), Barry D. Bruner\(^1\), Michal Dagan\(^1\), Yann Maïressa\(^2\), Serguei Patchkovskii\(^1\), Misha Yu. Ivanov\(^1,2\), Olga Smirnova\(^2\), and Nirit Dudovich\(^1\).
1 Department of Physics of Complex Systems, Weizmann Institute of Science, Rehovot 76100, Israel.
2 Department of Physics and Coherent X-ray Research Center (CXRC), KAIST, Daejeon 305-701, Korea.
3 FOM Institute AMOLF, Science Park 104, NL-1098 XG Amsterdam, The Netherlands.
4 Max-Born-Institut, Max Born Strasse 2A, D-12489 Berlin, Germany.
5 Université Paris-Est, MSME UMR 8208 CNRS, 5 bd Descartes, 77454.

We probe dynamics of tunnel ionization via high harmonic generation. We characterize the ionization dynamics in helium atoms, and apply our approach to resolve subtle differences in ionization from different orbitals of a CO\(_2\) molecule.

9:15 Room 350/351 MON.1.3

By exploiting singularities of the semiclassical model that describes high harmonic generation (HHG), we are able to demonstrate a new level of control over the emitted attosecond pulse, reaching a narrow tunable spectral enhancement.

9:30 Room 350/351 MON.1.4
Inhomogeneous High Harmonic Generation in Krypton Clusters.
• Hartmut Ruj\(^2\), Charles Handschin\(^1\), Raluca Cireasa\(^2\), Nicolas Thiré\(^2\), Dominique Descamps\(^3\), Eric Mével\(^1\), Eric Constant\(^1\), Valérie Blanchet\(^2\), Baptiste Fabre\(^1\), and Yann Maïressa\(^1\).
1 Université de Bordeaux, CELIA, F33405 Talence, France.
2 Université de Toulouse, LCAR, F31062 Toulouse, France.

By performing high harmonic generation in a cluster and monomer mixture, we isolate the signal originating only from clusters. Surprisingly this is depolarized but shows that it is produced by a new recoil mechanism.

9:45 Room 350/351 MON.1.5
Vibrational motion in N\(_2\)O\(_3\) studied by high-harmonic transient grating spectroscopy. • Alisa Rupenyan\(^1\), Julien B. Bertrand\(^2\), David M. Villeneuve\(^2\), and Hans Jakob Wörner\(^1\).
1 Laboratorium für Physikalische Chemie, ETH Zürich, 2 Joint Laboratory for Attosecond Science, National Research Council of Canada and University of Ottawa, 100 Sussex Drive, Ottawa, Canada.

We report high-grating transient grating measurements of vibrational dynamics in N\(_2\)O\(_3\). The measurement allows us to determine the phase and amplitude modulations of the high harmonics induced by the vibrational wave packet motion.

10:00 Room 350/351 MON.1.6
Scanning potential energy surfaces with attosecond precision using high-harmonic spectroscopy. • Peter Kraus and Hans Jakob Wörner; Laboratorium für physikalische Chemie, Eidgenössische Technische Hochschule Zürich, Wolfgang-Pauli-St. 10, 8093 Zürich, Switzerland.

We record new types of nuclear motion using high-harmonic generation and present a novel model based on photoelectron spectroscopy, which enables us to characterize the shape of potential energy surfaces of ammonia and allene cations.

Coffee Break
10:15–10:45

MON.2A: Attosecond Dynamics
Chair: François Légaré, INRS-EMT, Varennes, QC, Canada
10:45–12:30 Auditorium A MON.2A

Strong field-induced attosecond dynamics in SiO\(_2\), Martin Schultz\(^1,3\), Elisabeth M. Bothschafter\(^1,3\), Annkatrin Sommer\(^3\), Simon Holzner\(^3\), Markus Fies\(^3\), Michael Hofstetter\(^3\), Reinhard Kienberger\(^4\), Vadym Apalkov\(^2\), Vladislav Yakovlev\(^3\), Mark Stockman\(^2\), and Ferenc Krausz\(^1,3\).
1 Max-Planck-Institut für Quantenoptik, Hans-Kopfermann-Str. 1, 85748 Garching, Germany.
2 Department of Physics, Georgia State University, Atlanta, GA 30340, USA.
3 Fakultät für Physik, Ludwig-Maximilians-Universität, Geschwister-Scholl-Platz 1, 80539 München, Germany.
4 Physik-Department, Technische Universität München, James-Franck-Str., 85748 Garching, Germany.

Striking field-induced changes in the absorption near the Si L-edge of SiO\(_2\) exposed to a near-infrared laser field of several \(\mu\)J delivered by a few-cycle pulse are observed with sub-100 attosecond extreme ultraviolet pulses.

11:00 Auditorium A MON.2A.2
Ultrafast Relaxation Dynamics of Highly-excited States in N\(_2\)Molecules Excited by Femtosecond XUV Pulses, Matteo Lucchini\(^1\), Kyung Seung Kim\(^2\), Francesca Calegari\(^2\), Freerk Kelkensberg\(^2\), Wing Kiu Siu\(^1\), Giuseppe Sansone\(^1\), Marc Vrakking\(^2\), Majdi Hochlaf\(^5\), and Mauro Nisoli\(^5\).
1 Department of Physics, Politecnico di Milano, IFN-CNR, Piazza L. da Vinci 32, 20133 Milano, Italy.
2 Department of Physics and Coherent X-ray Research Center (CXRC), KAIST, Daejeon 305-701, Korea.
3 FOM Institute AMOLF, Science Park 104, NL-1098 XG Amsterdam, The Netherlands.
4 Max-Born-Institut, Max Born Strasse 2A, D-12489 Berlin, Germany.
5 Université Paris-Est, MSME UMR 8208 CNRS, 5 bd Descartes, 77454.
Marne-la-Vallée, France.
We used velocity-map-imaging to measure electronic and nuclear dynamics in N2 molecules excited by extreme-ultraviolet pulses. A time-to-space mapping of autoionization channel is demonstrated; complex dynamics of highly-excited states on sub-8-femtosecond time-scale is found.

11:15 Auditorium A MON.2A.3
Attosecond Control of Strong-Field Phenomena in Helium. ● Jens Herrmann1, Mathias Wegler2, Reto Locher1, Maziar Sabbab1, Paula Rivière2, Ulf Saalmann3, Jan-Michael Rost1, Lukas Galmann1, and Ursula Keller1; 1Physics Department, ETH Zurich, CH-8093 Zürich, Switzerland, 2Departamento de Química, Universidad Autónoma de Madrid, ES-28049 Madrid, Spain, 3Max-Planck Institute for the Physics of Complex Systems, D-01187 Dresden, Germany.
Attosecond transient absorption is used to observe electron dynamics in helium. Rapid sub-femtosecond absorption modulations are attributed to wavepacket interference whereas femtosecond absorption and re-emission structures are explained by a simple two-level model.

11:30 Auditorium A MON.2A.4
Attosecond Streaking of Shake-up and Auger Electrons in Xenon. ● Aart Verhoef1, Alexander Mitrofanov1, Maria Krikunova1,2, Nikolay Kabachnik4,5, Markus Drescher1, and Andrius Baltuska1; 1Institut für Photonik, Technische Universität Wien, Gußhausstraße 27/387, Vienna, Austria, 2Institut für Experimentalphysik, Universität Hamburg, Luruper Chaussee 149, 22761 Hamburg, Germany, 3Institut für Optik und Atomare Physik, Technische Universität Berlin, Hardenbergstraße 36, 10623 Berlin, Germany, 4Institute of Nuclear Physics, Moscow State University, Moscow 119991, Russia, 5European XFEL GmbH, Albert-Einstein-Ring 19, 22761 Hamburg, Germany.
We present first results of simultaneous attosecond streaking measurements of shake-up electrons and Auger electrons emitted from xenon. The spectral overlap of the electronic wavepackets allows for reliable reconstruction of the relative phases.

11:45 Auditorium A MON.2A.5
Two-Electron Wave-Packet Observation in Helium. ● Andreas Kaldun1,2, Christian Ott1,2, Philip Raith1,2, Kristina Meyer1,2, Martin Lau1,2, Yizhu Zhang1,2, Steffen Hagstotz1,2, Thomas Ding1,2, Robert Heck1,2, and Thomas Pfeifer1,2; 1Max-Planck-Institut für Kernphysik, Saupfercheckweg 1, 69117 Heidelberg, Germany, 2Center for Quantum Dynamics, Ruprecht-Karls-Universität Heidelberg, 69120 Heidelberg, Germany.
A two-electron wave packet among the lowest-lying doubly-excited states in helium is experimentally observed. It creates a 1-femtosecond modulation in the transient-absorption signal modified by a time-delayed coupling laser.

12:00 Auditorium A MON.2A.6
Laser-driven attosecond electron dynamics in hydrogen molecular ion. ● Andreas Becker1, Norio Takemoto1,2, Antonio Picon1, and Daniel Wffen1; 1JILA and Department of Physics, University of Colorado, Boulder, Colorado 80309, USA, 2Department of Chemical Physics, Weizmann Institute of Science, 76100 Rehovot, Israel, 3Argonne National Laboratory, Argonne, Illinois 60439, USA.
We report about a complex laser driven electron dynamics inside the hydrogen molecular ion on the attosecond time scale which influences the instant of ionization of the molecule and the final electron momentum distributions.

12:15 Auditorium A MON.2A.7
Efficient Attosecond Control of Electron Dynamics in Molecules. ● Hendriek Braun1, Philipp von den Hoff2, Tim Bayer1, Robert Siemerling2, Regina de Vieville-Riedel2, Matthias Wollenhaupt2, and Thomas Baumert1; 1Institute of Physics and CINaT, University of Kassel, D-34132 Kassel, Germany, 2Department of Chemistry, Ludwig-Maximilians-Universität München, D-81377 München, Germany.
We demonstrate how the fast electron dynamics in molecules and hence the reaction of the system can be efficiently manipulated by controlling the temporal phase of an ultra short laser pulse with attosecond precision.

MON.2B: X-Ray Absorption Spectroscopy

10:45-12:30 Auditorium B MON.2B

10:45 Auditorium B MON.2B.1
Mapping chemical bonding of reaction intermediates with femtosecond X-ray laser spectroscopy. ● Philippe Wernet1, Martin Beye1, Frank de Groof2, Stefan Düsterer3, Kelly Gaffney4, Sebastian Grubel3, Robert Hartsrock5, Franz Henninger6, Ida Josefson7, Brian Kennedy8, Kristjan Kunnas1, Torsten Leitner1, Tommaso Mazza2, Michael Meyer9, Dennis Nordlund2, Michael Odelius1, Wilson Quevedo2, Paul Radcliffe3, Ivan Rajkovic5, Bill Schlotter10, Markus Scholz5, Simon Schreck1, Edlira Suljot1, Simone Tschert5, Josh Turner10, Christian Weniger1, Wenkai Zhang4, and Alexander Föhlisch1; 1Helmholtz-Zentrum Berlin, GmbH, Albert-Einstein-Str. 15, 12489 Berlin, Germany, 2Department of Inorganic Chemistry and Catalysis, Utrecht University, Universiteitsweg 99, 3584 CG Utrecht, Netherlands, 3DESY, Notkestr. 85, 22670 Hamburg, Germany, 4PULSE Institute, SLAC National Accelerator Laboratory, Menlo Park, CA 94025 USA, 5Max Planck Institute for Biophysical Chemistry, Am Fassberg 11, 37077 Göttingen, Germany, 6MAX IV Laboratory, Lund, Sweden, 7Department of Physics, Stockholm University, AlbaNova University Center, 10691 Stockholm, Sweden, 8European XFEL GmbH, Albert-Einstein-Ring 19, 22761 Hamburg, Germany, 9Stanford Synchrotron Radiation Lightsource, SLAC National Accelerator Laboratory, Menlo Park, CA 94025 USA, 10Linac Coherent Light Source, SLAC National Accelerator Laboratory, Menlo Park, CA 94025 USA.
We determine the pathways in the photo-dissociation reactions of Fe( CO)5 both in the gas phase and in solution by mapping the valence electronic structure of the reaction intermediates with femtosecond X-ray laser spectroscopy.

11:00 Auditorium B MON.2B.2
An X-ray absorption spectroscopy study of the structure and bonding of halide Re-carbonyl diimine complexes. ● Thomas Penfold1,2,3, Amal El Nahhas1, Renske van der Veen1, Ana Maria Blanco-Rodriguez4, Frederico Lima1, Rafael Abel3, Stanislav Zális1, Antonín Vlcek1,2, Ivano Tavernelli1, and Majed Cherqui1; 1Ecole Polytechnique Fédérale de Lausanne, EPFL, FSB-BSP, CH-1015 Lausanne, Switzerland, 2Ecole Polytechnique Fédérale de Lausanne, EPFL, FSB-BSP, CH-1015 Lausanne, Switzerland, 3SwissFEL, Paul Scherrer Inst, CH-5232 Villigen, Switzerland, 4School of Biological and Chemical Sciences, Queen Mary, University of London, Mile End Road, London E1 4NS,
11:15 Auditorium B MON.2B.3

Elucidating Charge Delocalization in the High-Spin State of aqueous Fe(II) Spin-Crossover Compounds via Time-Resolved Spectroscopy in the X-ray Water Window. Nils Huse1,2, Benjamin E. Van Kuiken3, Hana Cho2,4, Matthew L. Strader2, Tae Kye Kim1, Junira Khalti1, and Robert W. Schoenlein1; 1Max Plank Research Department for Structural Dynamics, University of Hamburg & Center for Free Electron Laser Science, 22607 Hamburg, Germany, 2Ultrafast X-ray Science Lab, Chemical Sciences Division, Lawrence Berkeley National Laboratory, Berkeley, CA 94720, USA, 3Department of Chemistry, University of Washington, Seattle, Washington 98195, USA, 4Department of Chemistry, Pusan National University, Geumjeong-gu, Busan 609-735, Korea.

We report the first time-resolved spectroscopy of aqueous solution in the X-ray water window. Nitrogen K-edge spectra combined with ab initio calculations reveal distinct charge delocalization, shedding light on the origins of ultrafast spin crossover.

11:30 Auditorium B MON.2B.4

Short-Time Events, Coherence, and Structural Dynamics in Photochemistry of Aqueous Halogenated Transition Metal Dianions. Alexander Tarnovsky1, Igor Zheldakov2, Patrick El-Khoury3, Suman Pat4, Andrey Mereshchenko5, Mikhail Ryazantsev5, Evgenia Butaeva1, Pascher Pascher6, Jens Uhlig6, Christopher Milne7, and Steven Johnson7; 1Department of Chemistry, Center for Photochemical Sciences, Bowling Green State University, Bowling Green, OH, USA, 2Department of Chemistry, University of Kansas, Lawrence, KS 66045, USA, 3Department of Chemistry, University of California, Irvine, California 92697, USA, 4School of Basic Sciences, Indian Institute of Technology, Mandi, Himachal Pradesh 175 001, India, 5Department of Chemistry, Emory University, Atlanta, GA 30322, USA, 6Department of Chemical Physics, Lund University, Lund, Sweden, 7Laboratory of Ultrafast Spectroscopy, EPFL, CH-1015 Lausanne, Switzerland, 8Institut für Quantenelektronik, Eidgenössische Technische Hochschule Zürich, Zurich CH-8093, Switzerland.

Ultrafast pump-probe spectroscopy, time-resolved x-ray absorption, and computational photochemistry elucidate the photochemical pathway of hexabromoplatinate dianions that propagates through distortions of nascent pentabromoplatinate anions caused by Jahn-Teller conical intersections and terminates at aquated product complexes.

12:00 Auditorium B MON.2B.6

Picosecond X-ray absorption study of the photo-induced structural changes of nitrosyl-myoglobin in physiological solutions. Frederico Lima1, Christopher Milne1, Mercedes Hannelore Rittmann-Frank1, Marco Reinhard1, Thomas Penfold1,2,3, Maurizio Benfatto4, and Majed Chergui5; 1Ecole Polytechnique Fédérale de Lausanne, Laboratoire de Spectroscopie Ultrarapide, ISIC, FSB-BSP, CH-1015 Lausanne, Switzerland, 2Ecole Polytechnique Fédérale de Lausanne, Laboratoire de Chimie Et Biochimie Computationnelles, ISIC, FSB-BSP, CH-1015 Lausanne, Switzerland, 3SwissFEL, Paul Scherrer Institute, CH-5232 Villigen, Switzerland, 4Laboratori Nazionali di Frascati, Istituto Nazionale di Fisica Nucleare CP13, 00044 Frascati, Italy.

Pronounced changes are observed in the XANES spectrum of MbNO 50 ps after ligand photo-detachment, which point to trapping of NO at a nearby location. This can explain the fast recombination time of 216 ± 24 ps.

12:15 Auditorium B MON.2B.7

Nucleobase photoprotection probed by soft x-rays. Joseph P. Farrell1,2, Brian K. McFarland1, Nora Berrah1, Christoph Bostedt1, John Bozek2, Philip H. Bucksbaum1,2, Ryan Coffey3, James Cryan1,2, Li Fang3, Raimund Feil3, Kelly Gaffney1, James M. Glownia1,3, Michael Mantese, Christmas Martin, and William White4,5; 1Max-Born-Institut, 12489 Berlin, Germany, 2Department of Physics and Applied Physics, Stanford University, Stanford, CA 94305, 3Physics Department, Western Michigan University, Kalamazoo, MI 49008, 4LCLS, SLAC National Accelerator Laboratory, Menlo Park, CA 94025, 5Department of Physics, Universita di Perugia, and ISTM-CNR, 06123 Perugia, Italy.

We present our first results of a UV-pump X-ray-probe study of the photoprotection mechanism of thymine. The experiment used element specific Auger spectroscopy and was carried out at the LCLS.
Ackermannweg 10, 55128 Mainz, Germany, FOM-Institute AMOLF, Science Park 104, 1098 XG Amsterdam, The Netherlands.

We study the dynamics of water molecules at the water-air interface, using surface-specific two-dimensional infrared sum-frequency generation (2D-SFG) spectroscopy. The data reveal the occurrence of surprisingly fast energy transfer and reorientational dynamics at aqueous interfaces.

14:30 Room 350/351 MON.3.2

Two Dimensional Heterodyne-Detected VSFG Spectroscopy of Water Molecules at Charged Interfaces. Satoshi Nihonyanagi, Prashant Singh, Shioichi Yamaguchi, and Tahei Tahara; RIKEN, Wako, Satitama 351-0198 Japan. Two-dimensional heterodyne-detected vibrational sum-frequency generation spectroscopy has been developed and used to investigate the ultrafast vibrational dynamics of water at the charged aqueous interface.

14:45 Room 350/351 MON.3.3

Excited state dynamics of liquid water near the surface. Franziska Buchner 1, Hans-Hermann Ritz 1, Marcus Beutler 1, Thomas Schultz 2, Ingolf-Volker Hertel 1, 2, and Andrea Lubcke 2; 1Max-Born-Institute, Berlin, Germany, 2Humboldt University, department of physics, Berlin, Germany. Time resolved photoelectron spectroscopy explores the excited state dynamics of liquid water in presence of cations close to the surface. A transient hydrated electron-cation complex is observed.

15:00 Room 350/351 MON.3.4

Location of water molecules in membranes probed with ultrafast vibrational Förster energy transfer. Huib Bakker, Janneke de Heij, and Lukasz Piatkowski; FOM Institute AMOLF, Science Park 104, 1098 XG Amsterdam, The Netherlands.

We determine the location of water molecules in DOPC membranes by measuring the Förster energy transfer between the water hydroxyl groups with femtosecond nonlinear vibrational spectroscopy. We find that most water is contained in nanoclusters.

15:15 Room 350/351 MON.3.5

Ultrafast Structural and Vibrational Dynamics of the Hydration Shell around DNA. Thomas Elsaesser, Lukasz Szyc, and Ming Yang; Max-Born-Institute, Max-Born-St. 2a, Berlin, 12489, Germany. Two-dimensional infrared spectroscopy serves for a direct mapping of hydration dynamics around DNA. We find a slowing down of structural dynamics and resonant OH stretch energy transfer in the water shell compared to bulk water.

15:30 Room 350/351 MON.3.6

Hydrophobic Hydration of Globular Proteins Studied with 2D-IR Spectroscopy. John King, Evan J. Arthur, Charles Brooks III, and Kevin Kubarych; University of Michigan, Ann Arbor MI, 48109. The dynamical constraints placed on hydration water surrounding globular proteins is studied using two-dimensional infrared spectroscopy. By adding an amphiphilic co-solvent the liberation of constrained water site-observed to be spectrally specific.

Coffee Break

15:45–16:15

MON.4A: Vibrational Coherences

Chair: Regina de Vivie-Riedle, Ludwig-Maximilians University, Munich, Germany

16:15–18:00 Auditorium A MON.4A

Ultrafast-Laser-Induced Backward Stimulated Raman Scattering for Tracking Atmospheric Gases. Pavel Malevich 1, Daniil Kartashov 2, Zou Pu 1, Skirmantas Alisauskas 2, Audrius Pugzlys 2, Andrius Baltuska 2, Linas Giniunas 2, Romualdas Danielius 2, Aleksei Zheltikov 1, 2, Marco Marangoni 3, and Giulio Cerullo 3; 1Photonics Institute, Vienna University of Technology, Gusshausstrasse 27-387, A-1040 Vienna, Austria, 2Light Conversion Ltd., P/O Box 1485, Sauletekio Avenue 10, LT-10223, Lithuania, 3Physics Department, International Laser Center, M.V. Lomonosov Moscow State University, 119992 Moscow, Russia.

Ultrafast Laser-Induced Backward Stimulated Raman Scattering for Tracing Atmospheric Gases. Pavel Malevich 1, Daniil Kartashov 2, Zou Pu 1, Skirmantas Alisauskas 2, Audrius Pugzlys 2, Andrius Baltuska 2, Linas Giniunas 2, Romualdas Danielius 2, Aleksei Zheltikov 1, 2, Marco Marangoni 3, and Giulio Cerullo 3; 1Photonics Institute, Vienna University of Technology, Gusshausstrasse 27-387, A-1040 Vienna, Austria, 2Light Conversion Ltd., P/O Box 1485, Sauletekio Avenue 10, LT-10223, Lithuania, 3Physics Department, International Laser Center, M.V. Lomonosov Moscow State University, 119992 Moscow, Russia.

Ultrafast Measurements of Coherent Vibrations in BenzeneEthiol Monolayer Film. Ken-ichi Shudo 1, Koohiro Dos 1, Ikufumi Katayama 1, Masahiro Kitaiguma 1, and Jun Takeda 1, 2Yokohama Nat’1 Univ., Yokohama 240-8501 Japan, 2National Defense Academy, Yokosuka 239-8686 Japan.

Ultrafast photo-reflectance of Benzenthiol molecule bonded to gold surfaces was measured with an ultrashort pulse laser. Transient response in THz region revealed coherent motion of the molecules affected by the adsorption.

17:00 Auditorium A MON.4A

Controlling Quantum Interferences in Metal Vibrational Excitations in IR Vibrational Excitations in Metal Carbonyls. Satoshi Ashihara, Kaori Enomoto, and Junpei Tayama; Tokyo Univ. of A&T, Tokyo, JAPAN.

Coherent controls over vibrational excitations in metal di-carbonyls were demonstrated by using phase-shaped mid-infrared pulses. The inter-state coherence between two normal-mode excitations and the quantum interference of multiple excitation paths were successfully controlled.

17:15 Auditorium A MON.4A

Femtosecond 2DIR spectroscopy of synthetic hydrogen-bonded wires: From homogeneous to inhomogeneous dynamics. Stephan Knap, Martin Olschewski, and Peter Vohringer; Institut for Physical and Theoretical Chemistry, University of Bonn, Wegelerstrasse 12, 53115 Bonn, Germany.
The complex interrelation between vibrational line broadening and energy relaxation in H-bonded networks is dictated by the strength of the hydrogen donor-acceptor couplings and is uniquely revealed by fs-2DIR spectroscopy on stereoselectively synthesized polyalcohols.

17:30 Auditorium A MON.4A.6

Two-Dimensional Raman-THz Spectroscopy of Water. • Janne Savolainen, Salma Ahmed, and Peter Hamm; Institute of Physical Chemistry, University of Zurich, Zurich, Switzerland.

We demonstrate a hybrid 2D-Raman-THz spectroscopy that circumvents experimental problems of 2D-Raman and 2D-THz spectroscopy. This experiment paves the way towards investigating the lineshape functions and couplings concerning low-frequency intermolecular degrees of freedom of water.

17:45 Auditorium A MON.4A.7

The rotation of NO3-(aq) as a probe of molecular ion-water interactions. • Jan Thugersen1, Jakob Braun Nielsen1, Svend Knak Jensen1, Søren Rud Keiding1, Michael Odelius2, Julien Réhault1, and Jan Helbing1; 1Department of Chemistry, Aarhus University, Langelandsgade 140, DK-8000 Aarhus C, Denmark, 2Department of Physics, Stockholm University, SE-106 91 Stockholm, Sweden.

The interaction of the nitrate anion with water is investigated by UV and IR rotational anisotropy measurements and 2D-IR spectroscopy. The experimental results are compared to molecular dynamics simulations.

MON.4B: Molecules in Strong Fields

Chair: Ursula Keller, ETH Zurich, Zurich, Switzerland

16:15-18:00 Auditorium B MON.4B

16:15 Auditorium B MON.4B.1

Highly Efficient Molecular Ionization Probed by Few-cycle Laser Pulses. Stefan Roither1, Xinhua Xie1, Markus Schoffler1, Danil Kartashov1, Li Zhang1, Atsushi Iwasaki2, Huailiang Xu3, Sergiy Bubin4, Mackenzie Atkinson3, Kálmán Varga2, Kaoru Yamanouchi2, Andrius Baltuška4, and Markus Kitzler1; 1Photonics Institute, Vienna University of Technology, A-1040 Vienna, Austria, 2Department of Chemistry, School of Science, The University of Tokyo, Tokyo 113-0033, Japan, 3Department of Physics and Astronomy, Vanderbilt University, Nashville, Tennessee 37235, USA, 4State Key Laboratory on Integrated Optoelectronics, Jilin University, Changchun 130012, China.

Field ionization of hydrocarbon molecules to high charge states is studied as a function of laser pulse duration and peak intensity. Results are in agreement with the recently proposed mechanism of multi-bond enhanced ionization.

16:30 Auditorium B MON.4B.2

Probing Charge Resonance Enhanced Ionization of CO2 by varying the laser pulse duration. • François Légaré1, Irina Bocharova2, Reza Karimi2, Emmanuel F Perel3, Jean-Paul Brichta1, Philippe Lassonde1, Xiqun Fu4, Jean-Claude Kieffer1, Andre D Bandraud4, Igor Litvinyuk4, and Joseph Sanderson3; 1Institut National de la Recherche Scientifique, Centre EMT, Varennes, QC Canada J3X1S2, 2J.R. Macdonald Laboratory, Physics Department, Kansas State University, Manhattan, KS 66503, 3Department of Physics and Astronomy University of Waterloo, Waterloo, ON Canada N2L 3G1, 4Département de Chimie, Université de Sherbrooke, Sherbrooke, QC Canada J1K2R1.

We demonstrate a hybrid 2D-Raman-THz molecular ions confined in a coulomb crystal are followed by 4 fs ultraviolet pulses. Theoretical calculations predicted the optimal laser parameters for a successful experiment under background free conditions.

17:00 Auditorium B MON.4B.4

Femtosecond Pump-Probe Spectroscopy for Single Trapped Molecular Ions. • Markus Kowalewski1, Steffen Kahra2, Günther Leschhorn2, Tobias Schäf2, and Regina de Vivie-Riedle1; 1Department of Chemistry, Ludwig-Maximilian-Universität, D-81377 Munich, 2Albert-Ludwigs-Universität Freiburg, Hermann-Herder-Str. 3a, 79104 Freiburg, Germany.

The vibrational dynamics of single molecular ions confined in a coulomb crystal are followed by 4 fs ultraviolet pulses. Theoretical calculations predicted the optimal laser parameters for a successful experiment under background free conditions.

17:15 Auditorium B MON.4B.5

Orbital angular momentum transfer in multiple-order coherent Raman sideband generation. • Miaochan Zhi, James Stroheber, Alexei Sokolov, and Hans Schuessler; Institute for quantum Science and Engineering and Department of Physics and Astronomy, Texas AM University, College Station, Texas, 77843-4242, USA.

We produce multiple-order Raman sidebands by focusing a pair of linearly chirped femtosecond pulses into a Raman-active crystal. We use optical vortices to study orbital angular momentum transfer in this broadband coherent Raman generation process.

17:30 Auditorium B MON.4B.6

Correlated Rotational Alignment Spectroscopy of Isolated Molecules and Clusters. • Christian Schröter1, Kyriaki Kosmu2,3, and Thomas Schultz1,2; 1Max Born Institute, Max Born Str. 2A, 12489 Berlin, Germany, 2Now at the Foundation for Research and Technology, Hellas, Post Office Box 1527, 71110 Heraklion, Greece.

We present a novel multi-pulse spectroscopic method for the correlated analysis of molecular mass, rotational structure and electronic structure. First experiments investigate carbon disulfide and butadiene.

17:45 Auditorium B MON.4B.7

Unidirectional Molecular Rotation Measured by Rotational Doppler Effect. • Omer Korech1, Ilya Averbak1, Uri Steinitz1, Robert Gordon2, and Yehiam Prior3; 1Department of Chemical Physics, Weizmann Institute of Science, Rehovot, 76100, Israel, 2Department of Chemistry, University of Illinois at Chicago, Illinois 60607, United States.
MONDAY

18:00 Poster area MON.PI.1

Sub-picosecond Graphene-based Harmonically Mode-locked Fiber Laser With Repetition Rates up to 2.22 GHz, Grzegorz Sobon, Jaroslaw Sotor, and Krzysztof Abramski; Wroclaw University of Technology, Wroclaw, Poland.

Erbium-doped fiber laser passively mode-locked by atomic layer graphene is presented. In harmonic mode-locking regime, the laser could operate at the 21st harmonic of the fundamental resonator frequency (2.22 GHz) with 900 fs pulses.

18:00 Poster area MON.PI.2

Optical parametric chirped pulse amplifier at 1600 nm with all-optical synchronization, Etienne Pelletier, R.J. Dwayne Miller, and Alfred Leitenstorfer; 1Department of Chemistry and Physics, University of Toronto, 80 St. George Street, Toronto, Ontario M5S 3H6, Canada, 2Max Planck Department for Structural Dynamics, Department of Physics, University of Hamburg Centre for Free Electron Laser Science, DESY, Notkestrasse 85, Hamburg 22607, Germany, 3Department of Physics and Center for Applied Photonics, University of Konstanz, 78464 Konstanz, Germany.

We demonstrate the amplification of 1.6 μm pulses by a KTA optical parametric chirped-pulse amplifier based on an all-optical synchronization scheme as a scalable approach to generation of high power tunable mid infrared.

18:00 Poster area MON.PI.3

All-fiber ultrafast Cherenkov source, Xiaomin Liu, Jesper Laegsgaard, Uffe Møller, Haohua Tu, Stephen Boppart, and Dmitry Turchinovich; 1DTU Fotonik, Technical University of Denmark, DK-2800 Kgs. Lyngby, 2Biophotonic Imaging Laboratory, University of Illinois at Urbana-Champaign, Urbana, Illinois 61801, U.S.A., 3Max Planck Institute for Polymer Research, Ackermannweg 10, 55128 Mainz, Germany.

An all-fiber ultrafast Cherenkov radiation source is demonstrated for the first time. The emitted tunable multimilliwatt ultrafast visible output can find applications in practical biophotonics such as bio-imaging and microscopy techniques.

18:00 Poster area MON.PI.4

Actively Stabilized Attosecond Interferometer, Martin H abrupt and Hans Jakob Wörner; ETH Zurich, Wolfgang-Pauli-Strasse 10, CH-8093 Zurich, Switzerland.

Our setup generates a controlled attosecond delay between two ultrashort infrared or ultraviolet and extreme ultraviolet pulses and represents a versatile tool to realize pump-probe measurements of electronic dynamics in polyatomic molecules or solvated systems.

18:00 Poster area MON.PI.5

2D Stimulated Resonance Raman Spectroscopy of Molecules with Broadband X-ray Pulses, Jason D. Biggs, Yu Zhang, Daniel Healion, and Shaül Mukamel; Department of Chemistry, University of California, Irvine.

1D- and 2D-SXRS signals are calculated for trans-N-methyl acetamide (NMA) with broad bandwidth pulses tuned to the oxygen and nitrogen K-edges. Cross-peaks reveal electronic Frank-Condon overlaps.

18:00 Poster area MON.PI.6


We present the realization of an optical nanoantenna to enhance the ultrafast optical response of an individual nanoobject. Our transient nonlinear signal is caused by a single vibrating gold nanodisks and single semiconductor nanocrystals.

18:00 Poster area MON.PI.7

High-power Kerr-lens mode-locked Yb:YAG thin-disk oscillator in positive and negative dispersion regimes, Oleg Pronin, Jonathan Brons, Fabian Lücking, Christian Grasse, Vladimir Pervak, Gerhard Boehm, Marcus-Christian Amann, Vladimir Kalashnikov, Alexander Apolonski, and Ferenc Krausz; 1Max-Planck Institute für Quantenoptik, Garching, Germany, 2Ludwig-Maximilians-Universität München, Garching, Germany, 3Walter Schottky Institut, Garching, Germany, 4Institut für Photonik, TU Wien, Vienna, Austria.

We demonstrate a power-scalable Kerr-lens mode-locked Yb:YAG thin-disk oscillator operating with 200 fs, 17 W and 270 fs, 45 W in negative dispersion regime as well as 190 fs, 17 W in positive dispersion regime.

18:00 Poster area MON.PI.8

Generation of Sub-Two-Cycle Pulses Tunable around 1.8 μm with Passively Stabilized Carrier-Envelope Phase at 100 kHz Repetition Rate, Christian Homann, Maximilian Bruder, Michael Förster, Peter Hommelhoff, and Eberhard Riedle; 1LS für BioMolekulare Optik, LMU München, Germany, 2Max-Planck-Institut für Quantenoptik, Garching, Germany.

We present an efficient concept for generating carrier-envelope phase stable pulses tunable between 1.6 and 2.0 μm with durations down to 8.2 fs together with first applications on emission of electrons from nanoscale metal tips.

18:00 Poster area MON.PI.9

Generation of phase-stable half-cycle mid-infrared pulses through filamentation in gases, Yataka Nomura, Takao Fuji, Hideto Shirai, Noriaki Tsurumachi, Alexander A. Voronin, and Aleksei M. Zheltikov; 1Institute for Molecular Science, 38 Nishigonaka, Myodaiji, Okazaki, 444-8585, Japan, 2Faculty of Engineering, Kagawa University, 2217-20 Hayashi-cho, Takamatsu, 761-0396, Japan, 3Physics Department, International Laser Center, M. V. Lomonosov Moscow State University, 119992 Moscow, Russia, 4Department of Physics and Astronomy, Texas A&M University, College Station, Texas 77843-4242, USA.

Phase-stable half-cycle mid-infrared pulses were produced through filamentation in argon. The pulse width was obtained as 7.9 fs at 4.1 μm carrier wavelength by using frequency-resolved optical gating.
Highly-Efficient 1-GHz Repetition-Frequency Femtosecond Yb3+:KY(WO4)2 Laser for Supercontinuum Generation. • Thomas Schratwieser, Derryck Reid, and Christopher Leburn; Scottish Universities Physics Alliance (SUPA), Institute of Photonics and Quantum Sciences, School of Engineering and Physical Sciences, Heriot-Watt University, Riccarton, Edinburgh EH14 4AS, UK. We present a 1.024-GHz-repetition-rate femtosecond Yb3+:KY(WO4)2 laser with 61% optical-to-optical efficiency and 69% slope efficiency, generating a supercontinuum of bandwidth 400 nm in silica photonic-crystal fibre. RIN measurements of the laser yielded values <0.1%.

Temporal coherence effects on coherent diffractive imaging of a binary sample by a high harmonic source. • Aaron D. Parsons1, Richard T. Chapman2, Benjamin Mills1, Sasa Bajr1, Jeremy G. Frey2, and William S. Brocklesby1; 1Optoelectronics Research Centre, University of Southampton, Highfield, Southampton, SO171BJ, UK, 2School of Chemistry, University of Southampton, Highfield, Southampton, SO171BJ, UK. Coherent Diffractive imaging (CDI) is performed with single and multiple harmonics from an ultrafast HHG source. The effect of HHG source bandwidth on the effectiveness of the reconstruction algorithms is compared.

Sub-100 nm Structures by 3D Two-Photon Polymerization Using Few-Cycle-Laser Sources. • Moritz Emons1, Kotaro Obata2, Marcel Schultz3, Tino Lang4, Thomas Binhammer5, and Uwe Morgner1,2; 1Institut für Quantenoptik, Leibniz Universität Hannover, Welfengarten 1, 30167 Hannover, Germany, 2Laser Zentrum Hannover e.V., Hollerithallee 8, 30419 Hannover, Germany, 3VENTON Laser Technologies GmbH, Hertzstr. 1b, D-30827 Garbsen, Germany. Nano fabrication with fs-based two-photon polymerization (TPP) technique is discussed. The spatial resolution depends on the used polymer material and the pulse duration for fabrication. Here we show the successful creation of sub-100 nm structures.

Broadband multilayer mirror and diffractive optics for attosecond pulse shaping in the 280-500 eV photon energy range. • Alexander Guggenmos1,2, Michael Hofstetter1,2, Roman Rauhut1, Christian Späth1, Bert Nickl1,4, Sanling Yang2, Eric Galliko2, Ferenc Krauss1,2, and Ulf Kleineberg1,2; 1Ludwig-Maximilians-Universität München, 2Friedrich-Alexander-Universität Erlangen-Nürnberg, 3Universität Hannover, Welfengarten 1, 30167 Hannover, Germany, 4Universität Lyon 1, Villeurbanne, France. Broadband multilayer mirrors are key components to shape attosecond pulses in XUV range. Here, we report about the first implementation of multilayers and diffractive optics fulfilling these requirements in the “water-window” spectral range.

Two-dimensional spectroscopy using dual acousto-optic pulse shapers for complete polarization, phase and amplitude control. Pooja Tyagi1, Jonathan Saari1, Vincent Croszatier2, Nicolas Forget1, and Fatamjali Kambhampton1; 1Department of Chemistry, McGill University, Montreal, QC, H3A 08B, Canada, 2FASTLITE, Centre scientifique d’Orsay - Bât.503, Plateau du Moulon - BP 45, Orsay, France. We demonstrate a pulse-shaper capable of independent polarization, phase and amplitude control over each pulse. The set-up is compact and easily switchable between pump-probe and collinear geometries. 2D spectra from each geometry will be compared.

Enhancing temporal resolution in pump-probe experiments with noisy pulses. • Kristina Meyer, Christian Ott, Philipp Raith, Andreas Kaldun, Yuhai Jiang, Arne Senfleben, Moritz Kurka, Robert Moshammer, Joachim Ulrich, and Thomas Pfeifer; Max-Planck Institute for Nuclear Physics, Heidelberg, Germany. We show how light fields that vary statistically in time (e.g. at FELs) enable higher temporal resolution than expected from their average pulse duration. An experimental example in deuterium molecules confirmed this general effect.

Dynamic probe concept for studying aggregation phenomena at liquid interfaces by femtosecond second harmonic generation technique. • Marina Fedoseeva and Eric Vauthey; 1Department of Optics and Quantum Electronics, University of Szeged, Szeged, Hungary, 2CE Optics Kft., Szeged, Hungary, 3LAL, CNRS-IN2P3 Université Paris Sud, Orsay, France, 4CELIA, Université de Bordeaux, Talence, France. Two independent measurements reveal that carrier-envelope phase drift of a picosecond pulse train can be directly obtained from by the spectrally resolved interference pattern of a stabilized multiple-beam interferometer.
Characterizing and optimizing impulsive molecular alignment by mixed gas samples, Malte Oppermann, Sébastien Weber, and Jonathan Marangos; Imperial College London.
Optimisation and characterization of impulsive alignment is achieved by gas mixing of linear molecules with Argon atoms. Fourier Transform is used to determine accurately the rotational temperatures and systematic enhancement of the alignment is shown.

Higher-order Kerr allow quantitative modelling of laser filamentation, Massimo Petrarca, Pierre Béjot, Jérôme Kasparian, and Jean-Pierre Wolf; GAP-Biophotonics, Université de Genève, Chemin de Pincet 22, 1211 Geneva 4, Switzerland; Laboratoire Interdisciplinaire Carnot de Bourgogne (ICB), UMR 5209 CNRS-Université de Bourgogne, BP 47870, F-21078 Dijon Cedex, France.
We show that the consideration of the higher-order Kerr effect allows a quantitative modelling of experimental intensity and electron density in laser filaments.

Dependence of Rydberg Yield on Ellipticity in Strong Field Ionization, Alexandra Landsman; Physics Department, ETH Zurich, CH-8093, Zurich, Switzerland.
We obtain a probability distribution of Rydberg yield that shows very close agreement with recent experiment. Contrary to general expectations, we find that rescattering is not a significant mechanism in the creation of excited neutrals.

Towards Control of Predissociation Dynamics by Strong Ultrafast Laser Pulses, Maria E. Corrales, Garikoitz Balerdi, Vincent Loriot, Luis Buitiares, and Rebeca de Nadal; Departamento de Química Física, Facultad de Ciencias Químicas, Universidad Complutense de Madrid, 28040 Madrid, Spain; Instituto de Química Física Rocasolano, CSIC, C/ Serrano, 119, 28006 Madrid, Spain.
Strong field control scenarios are investigated in the predissociation of CH3I in the second absorption band. Dynamic Stark control and pump-dump strategies are proposed to alter the lifetimes and product quantum yields of the reaction.

Electro-protonic wave function of CH2OH: Time-dependent multi-configuration wave function theory for describing ultrafast hydrogen migration in intense laser fields, Tsuoshi Kato and Kaoru Yamanouchi; Department of Chemistry, School of Science, The University of Tokyo, Tokyo, Japan.
By treating protons in methanol (CH3OH) as a wave function, its geometrical structure in the electro-protonic ground state was constructed for the first time beyond the Born-Oppenheimer approximation by multi-configuration wave function theory.

Optimization of high harmonic generation with 100 kHz repetition rate femtosecond fiber amplifier laser, Amélie Cabasse, Guillaume Machinet, Antoine Dubrovin, Eric Cormier, and Eric Constant; CELIA, Université de Bordeaux CNRS-CEA, UMR5107, 351 Cours de la libération, 33405 Talence Cedex, France.
We analyse the influence of atomic gas media, gas pressure, harmonic order and the interaction gas geometry (gas jet or gas cell) on harmonic efficiency, with a 100 kHz repetition rate femtosecond fiber amplifier system.

The contribution has been withdrawn.

Time-Frequency Coupling effects in the Two-Photon Correlation of Broadband Four Wave Mixing, Rafi Vered, Michael Rosenbluh, and Avi Pe'er; Physics Department and BINA Center for Nano-technology, Bar-Ilan University, Ramat-Gan 52900, Israel.
We precisely measure the time-energy correlation of broadband, spontaneously generated four waves mixing, and demonstrate surprising intensity dependent splitting of the correlation in both time and frequency and coupling effects between the domains.

Ultrafast phenomena and the Dynamical Casimir Effect, Viktor Dodonov; Institute of Physics, University of Brasilia, Brasilia, Brazil.
Ultrafast processes are crucial for the observation of the Dynamical Casimir Effect: the photon creation from vacuum in cavities with time-dependent parameters. I demonstrate recent achievements in this area and problems to be resolved.

Carrier Envelope Phase Effects in Strong Field Ionization of Xenon with Few-Cycle 1800nm Laser Pulses, Bruno E. Schmidt, Max Möller, Max Sayler, Andrew Shiner, Giulio Vampa, François Légaré, David Villeneuve, Gerhard Paulus, and Paul Corkum; Institut National de la Recherche Scientifique Centre Énergie Matériaux et Télécommunications, 1650 Boulevard Lionel-Boulet, Varennes, QC J3X1S2, Canada; Quantenelektronik, Max-Wien-Platz 1, 07743 Jena, Germany; Joint Laboratory for Atto-Second Science, University of Ottawa/NRC, 100 Sussex Dive, Ottawa, K1A 0R6, Canada.
Interferometrically CEP controlled few-cycle IR pulses revealed a strong influence on both, directly ionized and rescattered electrons in xenon for pulse durations from 2 to 5 cycles.

Quantum Resonance, Anderson Localization and Selective Rotational Excitation in Periodically Kicked Molecules, Johannes Floß and Iya Sh. Averbukh; The Weizmann Institute of Science, Rehovot, Israel.
We show that periodically kicked molecules allow to observe effects of the kicked quantum rotor in a real rotor system and that this paves new roads to selective rotational excitations in molecules.

Toward a "Perfect-Wave" HHG Driving With a Multicolor OPA, Tadas Balciunas, Stefan Haessler, Guangyu Fan, Giedrius Andriukaitis, Audrius Pugzlys, Andrius Baltuska, Amelie Zair, Richard Squibb, Luke Chipperfield, Leszek Frasinski, John Tisch, and Jon Marangoz; Photonics Institute, Vienna University of
Technology, Gusshausstrasse 27/387, 1040 Vienna, Austria, 2 Imperial College London, London SW7 2BW, UK. We realize a multicolor, multi-cycle combination of commonly CEP-locked waves from a single femtosecond OPA driven by a CEP-stable 6-mJ kHz Yb laser system and report HHG driving with individual and combined colors.

18:00 Poster area MON.PI.32

Observing Molecular Reactions via Simultaneous Ultrastable X-ray Spectroscopy and Scattering. ●Andreas Galler 1, Wojciech Gawelda 1, Kristoffer Haldrup 2, Kaspar Skov Kjaer 2, Tim Brandt van Driel 2, Anne-Marie March 3, Gilles Doumy 4, Jens Uhlig 4, Sophie Canton 4, Grigory Smolentsev 2, David Fritz 2, Marco Cammarata 5, Henrik Lemke 2, Uwe Bergmann 2, Roberto Alonso Moro 3, Norbert Saß 3, Amelie Bordage 6, György Vanko 6, Dipanwita Ray 5, Elliot Kanter 2, Robert Dunford 2, Pieter Glazet 5, Kelly Gaffney 6, Villy Sundström 3, Linda Young 2, Stephen Southworth 2, Martin M. Nielsen 2, and Christian Bressler 1; 1 European X-ray Freee Electron Laser Facility, Hamburg, Germany, 2 Danish Technical University, Riso, Denmark, 3 APS, Advanced Photon Source, Argonne National Lab, Chicago, USA, 4 University of Lund, Lund, Sweden, 5 LCLS, Linear Coherent Light Source, Stanford, USA, 6 KFKI, Research Institute for Partitcle and Nuclear Physics, Budapest, Hungary, 7 ESRF, European Synchrotron Facility, Grenoble, France, 5 SLAC/PULSE, Stanford Linear Accelerator, Stanford, USA. We present results of benchmark experiments combining complementary structural tools such as x-ray absorption, x-ray emission spectroscopy and x-ray diffuse scattering. These experiments were performed at MHz pump-probe rates at synchrotrons, and at the LCLS.

18:00 Poster area MON.PI.33

Optical and X-ray Time Resolved Study of the Structural Transition in Mixed Valence Manganites. ●Andrin Caviezel 1, Urs Staub 1, Steven L. Johnson 2, Simon O. Mariager 3, Gerhard Ingold 4, Ekaterina Mohr-Vorobeva 5, Marios Gargourakis 6, Shih-Wen Huang 7, Chris J. Milne 8, Quanxi Jia 9, Sang-Wook Cheong 9, and Paul Beaud 1; 1 Laboratory for Synchrotron Radiation, Swiss Light Source, Paul Scherrer Institut, 5232 Villigen PSI, Switzerland, 2 Institute for Quantum Electronics, Physics Department, ETH Zurich, 8093 Zurich, Switzerland, 3 Laboratoire de Spectroscopie Ultrarapide, Ecole Polytechnique Fédérale de Lausanne, 1015 Lausanne, Switzerland, 4 Los Alamos National Laboratory, Los Alamos, New Mexico 87545, USA, 5 Rutgers Center for Emergent Materials, Rutgers University, Piscataway, NJ, USA. Time resolved optical reflectivity and x-ray diffraction techniques are employed to measure the response of the order parameter in charge and orbitally ordered three-dimensional manganites over a wide range of temperatures and excitation fluences.

18:00 Poster area MON.PI.34


18:00 Poster area MON.PI.35

Near-field terahertz imaging of a discontinuity in split ring resonator array. ●François Blanchard 1, Kazufumi Ooi 2, Tomoko Tanaka 2, Atsushi Doi 1, and Koichiro Tanaka 2; 1 Institute for Integrated Cell-Material Sciences (WPI-iCeMS), Kyoto University, Sakyo-ku, Kyoto 606-8501, Japan, 2 CREST, Japan Science and Technology Agency, Kawaguchi, Saitama 332-0012, Japan, 3 Department of Physics Graduate School of Science, Kyoto University, Sakyo-ku, Kyoto 606-8502, Japan, 4 Olympus Corporation 2-3 Kuboyama-cho, Hachioji-shi, Tokyo 192-8512, Japan. We investigate the spatiotemporal evolution of single cycle terahertz pulses transmitted through split ring resonator array including a void. Using large field of view terahertz microscope, confinement and enhancement of defect mode is revealed.

18:00 Poster area MON.PI.36

Dynamically Phase Matched THz Generation in Large Area GaP

Crystallography, ●Daniel Dietze, Karl Unterrainer, and Juraj Darmo; Photonics Institute, Vienna University of Technology, 1040 Vienna, Austria. Dynamically phase matched generation of single-cycle THz pulses by optical rectification in GaP is demonstrated. Dynamic phase matching is achieved by the transient modification of the THz refractive index through stimulated generation of optical phonons.

18:00 Poster area MON.PI.37

Terahertz Sources Based on Polarization in InGaN Films. ●Nathanial Woodward, Chad Gallinat, Lee Rodak, Grace Metcalfe, Hongen Shen, and Michael Wrraback; U.S. Army Research Laboratory, 2800 Powder Mill Rd, Adelphi, MD 20783. We report on terahertz emission due to the carrier drift in polarization-induced electric fields in polar and nonpolar InGaN films.

18:00 Poster area MON.PI.38

Ultrastable Hot-electron Induced Phase Transitions in Vanadium Dioxide. ●Masaki Huda 1, Yasuaki Hontani 2, Robert M. Edward 2, Richard F. Haglund Jr. 3, and Jiro Matsuo 2; 1 Max Planck Research Department for Structural Dynamics, Center for Free Electron Laser Science, University of Hamburg, c/o DESY, Notkestrasse 85, Hamburg, 22607, Germany, 2 Quantum Science and Engineering Center, Kyoto University, Gokasho, Uji, Kyoto 611-0011, Japan, 3 Department of Physics and Astronomy, Vanderbilt University, Nashville TN 37235-1807 USA. The Au/Cr/VO2/Si system was investigated in pump-probe experiments. Hot-electrons generated in the Au were found to penetrate into the underlying VO2 and couple with its lattice inducing a semiconductor-to-metal phase transition in ~1 picosecond.

18:00 Poster area MON.PI.39

Polarization-induced phase shift of ultrafast photocurrents. ●Shekhar Priyadarshi, Klaus Pierz, and Mark Bieler; Physikalisch-Technische Bundesanstalt, Bundesallee 100, D-38116 Braunschweig, Germany. Shift and injection currents are known to occur for linearly and circularly polarized optical excitations of semiconductors, respectively. Here, we show that the frequency dynamics of the coherent polarization changes this phase rule significantly.
Sub-ps-Dynamics of Polaron Gating in Lithium Niobate. Holger Badorreck, Volker Dieckmann, Pia Baeune, and Mirco Inlauer, Department of Physics, University of Osnabrück, Barbarastr. 7, 49069 Osnabrück.

The optical gating of bipolarons is studied in lithium niobate by means of ultrafast spectroscopy. We discover two distinct polaron dynamics ($\tau_1 = 100$ fs and $\tau_2 = 700$ fs) that affect polaron-based dynamic fs-holography.

18:00 Poster area MON.PI.40

Photoinduced Femtosecond Relaxation of Antiferromagnetic Orders in the Iron Pnictides Revealed by Ultrafast Laser Ellipsometry. Aaron Patz, Tianqi Li, Sheng Ran, Sergey Bud’ko, Paul Canfield, and Jigang Wang, Ames Laboratory and Department of Physics and Astronomy, Iowa State University, Iowa, USA.

Abstract: We report fs spin relaxation in photoexcited undoped and weakly Cobalt doped BaFe2As2, which represents the first evidence to identify the antiferromagnetic fluctuations as the origin for the elusive nematic phase in iron pnictides.

18:00 Poster area MON.PI.41

Thermalization of Spins and Charges in Ferromagnetic Ni Films. Mircea Vomir, Eric Beaurepaire, and Jean-Yves Bigot, Institut de Physique et Chimie des Matériaux de Strasbourg, UMR 7504, CNRS - Université de Strasbourg, 23 rue du Loess, 67034 Strasbourg, France.

We show that the thermalization time of the spins in Nickel increases with the thickness of the films for large densities of excitation. It is due to the spins scattering at surfaces.

18:00 Poster area MON.PI.42

Coexistence of Coupled Magnetic Phases in Epitaxial TbMnO3 Films Revealed by Ultrafast Optical Spectroscopy. Jinbo Qi, Li Yan, Jian-Xin Zhu, and Quanxi Jia.

Ultrafast optical pump-probe spectroscopy is used to reveal the coexistence of coupled antiferromagnetic (AFM)/ferroelectric (FE) and ferromagnetic (FM) orders in multiferroic TbMnO3 films, which can guide researchers in creating new kinds of multiferroic materials.

18:00 Poster area MON.PI.43

Dynamics of optical phonons in a Bi2Se3 crystal studied using femtosecond time-resolved reflection measurement. Y. Katsura Norimatsu, Materials and Structures Laboratory, Tokyo Institute of Technology, CREST, Japan Science and Technology Agency.

Time evolution of optical phonons (A1g1, A1g2, and Eg2) in Bi2Se3 has been observed. The initial phases suggest that the potential surfaces transiently shift in the direction of A1g2 eigenvector by photoexcitation.

18:00 Poster area MON.PI.44

Ultrafast nonlinear dynamics in thin GaN films studied by femtosecond digital holography. N. S. Sadowski, A. V. Uehezius, T. Stanislaus, T. M. Malinauskas, V. V. Kabdasov, and A. V. Melynkaitis.

Ultrafast Light-Field Control of Currents in a Dielectric. Agustin Schiffrin, Tim Paasch-Colberg, Nicholas Karpovic, Vandy Apalkov, Daniel Gerster, Sascha Mühlbrand, Joachim Reichert, Johannes Barth, Reinhard Kienberger, Ralph Ernstorfer, Vladislav Yakovlev, Mark Stockman, Ferenc Krauss, Max-Planck-Institut für Quantenoptik, Hans-Kopfermann-Str. 1, D-85748 Garching, Germany.

A well-defined few-cycle optical waveform increases reversibly and directs at the frequency of visible light.

18:00 Poster area MON.PI.45


The Ultrafast photoinduced spin state switching in solids reveals some very interesting prospects: downsizing to nanoscale and cooperativity. We perform ultrafast absorption spectroscopy to identify the primary events involved in the resulting photo-induced spin state switching.

18:00 Poster area MON.PI.46
Monday 18:00 Poster area MON.PI.50


Laser-excited hot electrons generated in a 30 nm Au layer on top of 15 nm Ni travel superdiffusively from Au into Ni and initiate a very efficient and ultrafast demagnetization of the Ni film.

Monday 18:00 Poster area MON.PI.51

Probing the Charge Transfer Dynamics in Cu-doped ZnO Nanowires. Fe Chien Sam, Guozhong Xing, Guichuan Xing, Edbert Jarvis Sie, Tom Wu, and Cheng Hon Alfred Huan; Division of Physics and Applied Physics, School of Physical and Mathematical Sciences, Nanyang Technological University, Singapore, 637371.

Copper is one of the most pervasive and important impurities in ZnO. Ultrafast spectroscopy reveal an electron transfer (CT) process of $\tau = 39 \pm 4$ ps, between the ZnO host and the Cu dopants.

Monday 18:00 Poster area MON.PI.52

Coherent phonons in CdSe quantum dots triggered by ultrafast electron transfer reaction. Lars Dworak, Markus Braun, and Josef Wachtveitl; Johann Wolfgang Goethe-University Frankfurt, Max-von Laue Str. 7, 60438 Frankfurt am Main, Germany.

The origin of coherent oscillations in CdSe quantum dots and in the CdSe/methylviologen electron transfer system is studied. In CdSe/methylviologen coherent phonons are triggered by the electron transfer from the quantum dot to methylviologen.

Monday 18:00 Poster area MON.PI.53

Slow propagation of photon-like polaritons generated by exciton-exciton scattering in ZnO thin films. Hideki Ichida1, Shuji Wakaiki2, Yoshiki Kawase2, Kohji Mizoguchi3, Daeyoung Kim1, Masaaki Nakayama3, and Yasuo Kaminuma1,2; Venture Business Laboratory, Osaka University, 2-1 Yamada-oka, Suita, Osaka 565-0871, Japan.

The existence of the elementary physical process of interatomic Coulombic decay in quantum dots is demonstrated by numerical real-time electron dynamics in general binding potentials. This is indication for related ultrafast phenomena in quantum dots.

Monday 18:00 Poster area MON.PI.54

Dynamic Interactions of CdSe/ZnS Quantum Dots with cyclic solvents probed by femtosecond Four-Wave Mixing. Yasuake Hiroiwa1, Hiroyoshi Kozai1, Hayato Miyagawa1, Noriaki Tsurumachi1, Shin Koshida1, Shunsuke Nakaniishi1, Vasudevan Biju2, and Mitsuru Ishikawa2; 1 Department of Advanced Materials Science, Kagawa University, Hayashi-cho 2217-20, Takamatsu, Kagawa 761-0396, Japan.

We studied dynamic interactions between CdSe/ZnS quantum dots (QDs) and cyclic solvents probed by femtosecond four-wave mixing. We found that the dynamic interactions of QDs strongly depend on the existence of $\pi$-bonds in solvent molecules.

Monday 18:00 Poster area MON.PI.55

Electron Dynamics of Interatomic Coulombic Decay in Quantum Dots. Annika Bande, Kirill Gokhberg, and Lorenz S. Cederbaum; Theoretische Chemie, Physikalisch-Chemisches Institut, Universität Heidelberg, Im Neuenheimer Feld 229, D-69120 Heidelberg, Germany.

The existence of the elementary physical process of interatomic Coulombic decay in quantum dots is demonstrated by numerical real-time electron dynamics in general binding potentials. There is indication for related ultrafast phenomena in quantum dots.

Monday 18:00 Poster area MON.PI.56


Formation of charge-transfer interfacial excitons upon sub-50 fs electron injection from photoexcited molecules into a wide-bandgap semiconductor was evidenced using time-resolved THz spectroscopy. Dynamics of these excitons is strongly dependent upon their direct environment.

Monday 18:00 Poster area MON.PI.57

Dynamics of Charge-Transfer Interfacial Excitons at Dye-Sensitized Donor/ Acceptor Hybrid Heterojunction. Jan C. Brauer, Arianna Marchioro, and Jacques-E. Moser; Ecole Polytechnique Fédérale de Lausanne, Lausanne, Switzerland.

We report transient absorption measurements of the formation and the decay time of exciton-exciton scattering in ZnO thin films, which demonstrates the slower propagation of photon-like polaritons compared to that in bulk by two orders magnitude.
Coherent Electron Dynamics in 10 fs Time Scale in Organic Charge Ordered and Dimer-Mott Insulators, Shinichiro Iwai, Yohei Kawakami, Yuki Ishikawa, Yohei Sakurai, Hirotsuke Itoh, Kaoru Yamamoto, and Takahiko Sasaki. Department of Physics, Tohoku University, Sendai, 980-8578, Japan. We investigate ultrafast dynamics in electronically excited alkylbenzenes. Yuzhu Liu, Thomas Gerber, Peter Rudi, Yaroslav Sych, Pavlo Maksyutenko, and Gregor Knopp. 1Paul Scherrer Institute, Villigen 5232, Switzerland. 2Wuhan Institute of Physics and Mathematics, Chinese Academy of Sciences, Wuhan 430071, PR China. We investigate ultrafast dynamics in electronically excited states of some typical alkylbenzenes by time-resolved four wave mixing and velocity map imaging as complementary methods. Meanwhile an upgraded double-sided time-resolved velocity map imaging setup is proposed.

π-Conjugated Donor-Acceptor Systems as Metal-Free Sensitizers for Dye-Sensitized Solar Cell Applications. Mateusz Wielpolski, Jacques-E. Moser, Magdalena Marszalek, Shaik M. Zakeruddin, and Michael Grätzel. Department of Physics, Fakultät für Physik, Universität Duisburg-Essen, Lotharstr. 1, 47058 Duisburg, Germany, 2Fakultät für Physik, Universität Duisburg-Essen, Lotharstr. 1, 47058 Duisburg, Germany, 3Institut für Strukturphysik, TU-Dresden, Zellescherweg 16, Dresden, Germany, 4CRM2, Institut Jean Barriol, Nancy Université, 54506 Vandoeuvre-les-Nancy, France. A femtosecond visible pump-infrared probe time-resolved absorption experiment makes it possible to reveal the ultrafast vibrational kinetic associated to formation of light-induced linkage isomers in Na₂[Fe(CN)_5(NO)]H₂O single crystals. Galle Geoffrey, Nicoul Mathier, Woiciech Theo, Schaniel Dominik, and Fresz Eric. 1University of Bordeaux, LOMA, UMR-CNRS 5798, 351 cours de la Libération, Talence 33405, France, 2Fakultät für Physik, Universität Duisburg-Essen, Lotharstr. 1, 47058 Duisburg, Germany, 3Institut für Strukturphysik, TU-Dresden, Zellescherweg 16, Dresden, Germany, 4CRM2, Institut Jean Barriol, Nancy Université, 54506 Vandoeuvre-les-Nancy, France. We demonstrate that a table-top ionization in combination with coincidence imaging set-up can detect mass-selected enantiomers with high chirality and sensitivity. Peter Vennekate, Dirk Schwarzer, Joel Torres-Alacan, and Peter Vohringer. Max-Planck-Institute for Biophysical Chemistry, Am Fassberg 11, 37077 Göttingen, Germany, 2Department of Chemistry, Yale University, P.O. Box 208107, New Haven, CT 06520-8107, USA. We characterize the transient solvent-dependent OH-stretching frequency shifts of photoacid 2-naphthol hydrogen-bonded with CH3CN in the S0- and S1-states using a combined experimental and theoretical approach, and disentangle specific hydrogen-bonding contributions from nonspecific dielectric response.

Ultrafast Charge Separation in Low Band-Gap Polymer Blend for Photovoltaics. Margherita Mauro, Giulia Grancini, Daniele Fazzi, Hans-J. Egelaaf, Daniele Brida, Giulio Cerullo, and Gaglielmo Lanzani. IFN-CNR, Dipartimento di Fisica, Politecnico di Milano, Piazza L. da Vinci, 32, 20133 Milano, Italy, 2Center for Nano Science and Technology @ Polimi Istituto Italiano di Tecnologia, Via Pascali 70/3 20135 Milano, Italy, 3Konarka Technologies GmbH, Landgrabenstrasse 94, 90443 Nürnberg, Germany. We track ultrafast charge dissociation in a particularly promising low-band-gap-polymer: fullerene blend for organic photovoltaics. Impulsive photoexcitation with excess energy leads to a 30-fs formation of an hot charge transfer state, precursor of free carriers.

Investigations of ultrafast dynamics in electronically excited alkylbenzenes. Yuzhu Liu, Thomas Gerber, Peter Rudi, Yaroslav Sych, Pavlo Maksyutenko, and Gregor Knopp. 1Paul Scherrer Institute, Villigen 5232, Switzerland. 2Wuhan Institute of Physics and Mathematics, Chinese Academy of Sciences, Wuhan 430071, PR China. We investigate ultrafast dynamics in electronically excited states of some typical alkylbenzenes by time-resolved four wave mixing and velocity map imaging as complementary methods. Meanwhile an upgraded double-sided time-resolved velocity map imaging setup is proposed.

Monitoring of the ultrafast vibrational kinetic during formation of photo-induced linkage isomers in Na₂[Fe(CN)_5(NO)]H₂O single crystals. Galle Geoffrey, Nicoul Mathier, Woiciech Theo, Schaniel Dominik, and Fresz Eric. 1University of Bordeaux, LOMA, UMR-CNRS 5798, 351 cours de la Libération, Talence 33405, France, 2Fakultät für Physik, Universität Duisburg-Essen, Lotharstr. 1, 47058 Duisburg, Germany, 3Institut für Strukturphysik, TU-Dresden, Zellescherweg 16, Dresden, Germany, 4CRM2, Institut Jean Barriol, Nancy Université, 54506 Vandoeuvre-les-Nancy, France. We report femtosecond multi-photon ionization in combination with mass-correlated photoelectron coincidence imaging of chiral molecules. We demonstrate that a table-top coincidence imaging set-up can detect mass-selected enantiomers with high chiral selectivity and sensitivity.

Femtosecond Coincidence Imaging of Chiral Molecules. N. Bhargava Ram, C. Stefan Lehmann, and Maurice H.M. Janssen; LaserLab Amsterdam, VU University Amsterdam, De Boelelaan 1083, 1081 HV Amsterdam, The Netherlands. We report femtosecond multi-photon ionization in combination with mass-correlated photoelectron coincidence imaging of chiral molecules. We demonstrate that a table-top coincidence imaging set-up can detect mass-selected enantiomers with high chiral selectivity and sensitivity.

Femtosecond UV-pump mid-IR probe spectroscopy of the ultrafast photodissociation of azide radicals from an azido-iron(III) complex. Hendrik Vennekate, Dirk Schwarzer, Joel Torres-Alacan, and Peter Vohringer. Max-Planck-Institute for Biophysical Chemistry, Am Fassberg 11, 37077 Göttingen, Germany, 2Department of Physics, University of Bordeaux, Am Fassberg 11, 37077 Göttingen, Germany, 3Institut für Physikalische und Theoretische Chemie, University of Bonn, Wegelerstrasse 12, 53115 Bonn. The cation complex [cyclam-ac]FeN3]+ is a low-molecular-weight photochemical precursor to super-oxidized iron - a metal center frequently implicated in heme biochemistry. Here, its ultrafast primary events are studied by femtosecond UV-pump mid-IR probe spectroscopy.

Femtosecond Coincidence Imaging of Chiral Molecules. N. Bhargava Ram, C. Stefan Lehmann, and Maurice H.M. Janssen; LaserLab Amsterdam, VU University Amsterdam, De Boelelaan 1083, 1081 HV Amsterdam, The Netherlands. We report femtosecond multi-photon ionization in combination with mass-correlated photoelectron coincidence imaging of chiral molecules. We demonstrate that a table-top coincidence imaging set-up can detect mass-selected enantiomers with high chiral selectivity and sensitivity.
**Sigma* Mediated Electronic Relaxation in 200nm Photoexcited Ammonia and Heteroaromatics.**

Susanne Ulrich, Hui Yu, and Nicholas Evans; Department of Physics and Astronomy, The University of Georgia, Athens GA 30602, USA.

Time-resolved photoelectron spectra of ammonia display combination bands of the umbrella and stretching modes associated with the N-H coordinate of sigma* relaxation. Time-resolved photodissociation studies determine timescales < 200fs. Similar sigma* photochemistry is found in heteroaromatics.

**Femtosecond time-resolved Photodissociation Dynamics in CIN3.**

David Staedter1, Nicolas Thire2, Petros Samartzis3, and Valerie Blanchet1;

1Université de Toulouse, UPS, 118 route de Narbonne, F-31062 Toulouse, France;
2Institut National de la Recherche Scientifique, Université du Québec, 1650 Blvd Lionel-Boulet, Varennes, J3X1S2, Québec, Canada;
3The Institute of Electronic Structure and Laser, Foundation of Research and Technology Hellas, Iraklion 71100, Greece.

We report the first time-resolved study of the photochemistry in CIN3 by femtosecond ultra-violet velocity-map imaging. The goal of the experiment is to elucidate ultrafast dynamics that lead to a cyclic-N3 production.

**Precise and Rapid Detection of Optical Activity for Accumulative Femtosecond Spectroscopy.**

Andreas Steinbacher, Johannes Buback, Patrick Nuenberger, and Tobias Brixner; Institut für Physikalische und Theoretische Chemie and Röntgen Research Center for Complex Material Systems, Würzburg, Germany;
2Institute for Theoretical Physics, Vienna University of Technology, Vienna, Austria.

We study the effect of nuclear-electron coupling on time-resolved photoelectron spectra, employing a model system which allows to directly comparing spectra resulting from the adiabatic approximation with those obtained within a non-Born-Oppenheimer description.

**The Dynamohore: Localization of Excited State Dynamics Studied by Time Resolved Photoelectron Spectroscopy.**

Oliver Schalk1,2, Andrey E. Boguslavskiy1, Michael S. Schuermann1, and Albert Stolow1;

1National Research Council of Canada, 100 Sussex Drive, Ottawa, Ontario K1A 0R6, Canada; 2LS für Biomolekulare Optik, LMU München, Oettingenstr. 67, D-80538 Munich, Germany.

Photoinduced dynamics tend to localize at a confined region of a molecule, called dynamohore. Here, we show examples from time-resolved photoelectron spectroscopy.

**Optimal Dynamic Discrimination in Tryptophan-Containing Dipeptides.**

Svetlana Afonina, Ondrej Nenadi, Ariana Rondi, Denis Kiselev, Jerome Extermann, Luigi Bonacina, and Jean-Pierre Wolf; GAP-Biophotonics, University of Geneva, 1205 Geneva (Switzerland).

Optimal Dynamic Discrimination based on the phase-shaping of deep ultraviolet femtosecond pulses was applied to selectively modulate the time-resolved fluorescence depletion of pairs of tryptophan-containing dipeptides.

**Fluorescence Kinetics of Flavin Adenine Dinucleotide in Different Microenvironments.**

Zsuzsanna Heiner1, András Makai2, Ferenc Sarkös3, Csaba Bagyinka1, András Tóth2, Gábor Rakthely1,2, and Géza Groma1; 1Institute of Biophysics, Biological Research Centre, Hungarian Academy of Sciences, H-6701 Szeged, Hungary; 2Department of Biotechnology, University of Szeged, H-6726 Szeged, Hungary.

Fluorescence kinetics of flavin adenine dinucleotide was measured in a wide time and spectral range in different media, affecting its intra- and extramolecular interactions, and analyzed by a new method based on compressed sensing.

**Pulse-shaping-based two-photon FRET microscopy.**

Meredith Brenner1, Dawen Cai2, Samuel Straight2, Joel Swanson1, and Jennifer Ogilvie2;
3Applied Physics Program, University of Michigan, 450 Church Street, Ann Arbor, MI, USA 48109; 4Department of Physics and Biophysics, University of Michigan, 450 Church Street, Ann Arbor, MI, USA 48109; 4Department of Microbiology and Immunology, University of Michigan Medical School, 1150 West Medical Center Drive, Ann Arbor, MI, USA 48109.

We present quantitative pulse-shaping-based two-photon fluorescence resonance energy transfer microscopy. We tailor the spectral phase of the excitation pulses to achieve selective excitation of donor and acceptor, demonstrating the method in live cells.
with Femtosecond Stimulated Raman Spectroscopy, Orihiro Yoshimatsu\textsuperscript{1}, Kenta Abe\textsuperscript{1,2}, Shunsuke Sakai\textsuperscript{1}, Tomoko Horibe\textsuperscript{2,4}, Ritsuko Fujii\textsuperscript{2,5}, Mamoru Nango\textsuperscript{2,5}, Hideki Hashimoto\textsuperscript{2,4,5}, and Masayuki Yoshizawa\textsuperscript{1,2}.\textsuperscript{1} Department of Physics, Graduate School of Science, Tohoku University, Sendai 980-8578, Japan. \textsuperscript{2} JST, CREST, Kagawuchi, Saitama, 332-0012, Japan. \textsuperscript{3} Department of Life and Materials Engineering, Nagoya Institute of Technology, Nagoya 466-8554, Japan. \textsuperscript{4} Department of Physics, Graduate School of Science, Osaka City University, Osaka 558-8585, Japan. \textsuperscript{5} OCARINA, Osaka City University, Osaka 558-8585, Japan.

Vibrational dynamics of dark excited flavoenzyme ThyX studied by time-resolved femtosecond stimulated Raman spectroscopy. Rearrangement of the hydrogen-bonding network surrounding the chromophore during the photocycle is revealed by comparing wild-type PYP with E4Q mutant.

18:00 Poster area MON.PI.79

Time-Resolved Down-Conversion of 2-Aminopurine in a DNA Hairpin: Fluorescence Anisotropy and Solvent Viscosity effects, \textsuperscript{\#}Patricia Tourón-Touceda, Thomas Gelot, Olivier Créguet, Jérémie Léourd, and Stefan Haacke; Institut de Physique et Chimie des Matériaux de Strasbourg, Université de Strasbourg-CNRS, 67034 Strasbourg, France.

Femtosecond fluorescence anisotropy decay measured by type II difference frequency generation provides new insight into the local structural dynamics of AP(-)PBS fragments of the HIV-1 DNA primary binding sequence, labelled with 2-aminopurine.

18:00 Poster area MON.PI.80

Configurational changes and flavin-substrate interactions in the flavoenzyme ThyX studied by time- and spectrally resolved fluorescence. Sergey P. Laptanok, Latifa Bouzhit-Sima, Hanna Myllýkallio, Ursula A. Aberg, Jari H. Hyötyläinen; Network of Excellence in Molecular Spectroscopy, Department of Chemistry, University of Helsinki, FIN-00014, Finland.

The knowledge of UV-induced processes in eumelanin pigments is strongly limited due to the complexity of these systems with increasing complexity and studied excited state processes using ultrafast fluorescence.

18:00 Poster area MON.PI.81

Structural Evolution in Photoactive Yellow Protein Studied by Femtosecond Stimulated Raman Spectroscopy, \textsuperscript{\#}Ryosuke Nakamura\textsuperscript{1}, Norio Hamada\textsuperscript{1}, Yasuo Kanematsu\textsuperscript{1}, Kenta Abe\textsuperscript{3}, and Masayuki Yoshizawa\textsuperscript{2}; \textsuperscript{1} Venture Business Laboratory, Osaka University, Suita 565-0871, Japan. \textsuperscript{2} Department of Physics, Graduate School of Science, Tohoku University, Sendai 980-8578, Japan.

Ultrafast structural evolution in photoactive yellow protein (PYP) is studied by femtosecond stimulated Raman spectroscopy. Rearrangement of the hydrogen-bonding network surrounding the chromophore during the photocycle is revealed by comparing wild-type PYP with E4Q mutant.

18:00 Poster area MON.PI.82

Excited state deactivation channels in epidermal eumelanin model complexes: key to phototoxicity or photoprotection\textsuperscript{?}, \textsuperscript{\#}Annemarie Hujisev\textsuperscript{3,4}, Alessandro Puzzella\textsuperscript{2}, Per-Ake Malmqvist\textsuperscript{1}, Alice Corani\textsuperscript{1}, Marco d’Ischia\textsuperscript{2}, and Villy Sundstrom\textsuperscript{1}; \textsuperscript{1} Department of Chemical Physics, Lund University, Sweden, \textsuperscript{2} Department of Organic Chemistry and Biochemistry, University of Naples Frederico II, Italy, \textsuperscript{3} Department of Theoretical Chemistry, Lund University, Sweden, \textsuperscript{4} Optical Sciences Group, University of Twente, The Netherlands.

The knowledge of UV-induced processes in eumelanin pigments is strongly limited due to the complexity of these systems with increasing complexity and studied excited state processes using ultrafast fluorescence.

18:00 Poster area MON.PI.83

Ultrafast Vibrational Dynamics of Water Confined in Phospholipid Reverse Micelles, \textsuperscript{\#}Rene Costard\textsuperscript{1}, Christian Greve\textsuperscript{2}, Nancy E. Levinger\textsuperscript{2}, Erik T. J. Nibbering\textsuperscript{2}, and Thomas Elsaesser\textsuperscript{1}; \textsuperscript{1} Max-Born-Institut für Nichtlineare Optik und Kurzzeitspektroskopie, Max-Born-Str. 2 A, D-12489 Berlin, Germany, \textsuperscript{2} Department of Chemistry, Colorado State University, Fort Collins, Colorado 80523-1872, USA.

We characterize the hydration-level dependence of spectral diffusion and vibrational energy relaxation of OH stretching excitations of water inside phospholipid reverse micelles. The OH stretching mode is shown to decay via the OH bending vibration.

18:00 Poster area MON.PI.84

Proton Dynamics in Aqueous Nanochannels, \textsuperscript{\#}Liyuan Liu and Huib Bakker; FOM Institute AMOLF, Science Park 104, 1098 XG Amsterdam, The Netherlands.

We investigate the proton dynamics in hydrophilic nanochannels using time-resolved femtosecond mid-infrared pump-probe spectroscopy. We observe the dynamics of Eigen complex and spectral diffusion caused by proton transfer.

18:00 Poster area MON.PI.85

Photomixing for Coherent Retrieval of THz Waveforms from a Frequency Multiplier, \textsuperscript{\#}Florin Lucian Constantin; Laboratoire PhLAM, UMR 8523, 59655 Villeneuve d’Ascq, France.

THz waveforms generated with an electronic frequency multiplier are sampled with a heterodyne detection technique using a LTG-GaAs photomixer and the optical beat of two near-infrared lasers.
TUESDAY

TUE.1: Nonlinear Terahertz Dynamics
Chair: Thomas Elsässer, Max Born Institute and Humboldt University, Berlin, Germany
8:30–10:15 Room 350/351 TUE.1

Metamaterial-enhanced nonlinear terahertz spectroscopy. •Harold Hwang1, Mengkun Liu2, Kebin Fan2, Jingdi Zhang2, Andrew Strikwerda3, Aaron Sternbach2, Nathaniel Brandt1, Bradford Perkins1, Xin Zhang2, Richard Averitt2, and Keith Nelson1; 1Massachusetts Institute of Technology, Cambridge, MA USA, 2Boston University, Boston, MA USA.
We demonstrate large nonlinear terahertz responses in the gaps of metamaterial semiconductors and graphene.

8:45 Room 350/351 TUE.1.1

Coherent sub-cycle magnetization dynamics in cobalt initiated by strong single cycle THz pulses. •Carlo Vicario1, Clemens Ruchert1, Fernando Ardana-Lamas1,2, Jan Luning1, and Christoph Hauri1,2; 1Paul Scherrer Institute, SwissFEL, 5232 Villigen PSI, Switzerland, 2Ecole Polytechnique Federale de Lausanne, 1015 Lausanne, Switzerland.
We present initiation of coherent femtosecond magnetization dynamics in thin-film cobalt by a strong carrier-envelope-phase-stabilized, single-cycle, 0.3 Tesla Terahertz pulse. Coherent magnetization dynamics are governed by the phase and amplitude characteristics of the THz pulse.

9:00 Room 350/351 TUE.1.3

Invited Nonlinear Terahertz Spectroscopy in Solids with Single-Cycle Terahertz Pulses. •Koichiro Tanaka; Kyoto University, Institute for Integrated Cell-Material Sciences (WPI-iCeMS), Kyoto, 606-8501, Japan.
We present a review of the recent progress in the generation methods of intense terahertz (THz) single cycle pulses and their application to THz nonlinear spectroscopy in semiconductors and graphene.

9:30 Room 350/351 TUE.1.4

Nonlinear Ultrafast Dynamics of High Temperature Superconductors Probed with THz Pump / THz Probe Spectroscopy. •Bradford Perkins1, Harold Hwang1, Keith Nelson1, Nathaniel Grady2, Hou-Tong Chen2, and Antoinette Taylor2; 1Massachusetts Institute of Technology, Cambridge, MA, USA, 2CINT, Los Alamos National Laboratory, Los Alamos, NM, USA.
High power THz pulses induce non-linear transparency in superconductive YBCO thin films below the critical temperature. THz pump/THz probe measurements reveal a decay of the induced transparency on the time scale of a few picoseconds.

9:45 Room 350/351 TUE.1.5

Excitation of Spin-Waves in DyFeO3 by THz magnetic pulses. •Alexander Reid1, Nick Hartmann2, Alexey Kimel3, Theo Rasing3, Roman Pisarev3, Hermann Durr3, and Matthias Hoffmann3; 1SIMES, SLAC National Accelerator Laboratory, Menlo Park, CA 94025, USA, 2LCLS Laser Department, SLAC National Accelerator Laboratory, Menlo Park, CA 94025, USA, 3Radboud University Nijmegen, Institute for Molecules and Materials, 6525 AJ Nijmegen, Netherlands.
Single-cycle terahertz (THz) pulses are used to excite coherent spin waves in the canted ferrimagnet dysprosium orthoferrite. Analysis of the excitation suggests that the spin-waves couple directly to the magnetic field of the terahertz pulse.

10:00 Room 350/351 TUE.1.6

Transient Density Wave Order Induced in the Normal State of BaFe2As2 by Coherent Lattice Oscillations. Kyungwan Kim1,2,3, •Alexej Pashkin1, Hanjo Schäfer1, Markus Beyer1, Michael Porcar1,4, Thomas Wolf5, Christian Bernhardt5, Jure Demsar1,6, Rupert Huber1,4, and Alfred Leitenstorfer1; 1Department of Physics and Center for Applied Photonics, University of Konstanz, Konstanz, Germany, 2University of Fribourg, Department of Physics and Fribourg Center for Nanomaterials, Fribourg, Switzerland, 3Department of Physics, Chungbuk National University, Cheongju, Korea, 4Department of Physics, University of Regensburg, Regensburg, Germany, 5Karlsruhe Institute of Technology, Institute for Solid State Physics, Karlsruhe, Germany, 6Complex Matter Department, Jozef Stefan Institute, Ljubljana, Slovenia.
We demonstrate that the spin density wave gap in BaFe2As2 can be induced in the normal state by a coherent lattice oscillation at a frequency of 5.5 THz indicating a pronounced spin-phonon coupling.

Coffee Break
10:15–10:45

TUE.2A: 2D Spectroscopy of Electronic States
Chair: Greg Scholes, University of Toronto, Toronto, Canada
10:45–12:30 Auditorium A TUE.2A

10:45 Auditorium A TUE.2A.1

Invited Coherent Spectroscopies on Ultrashort Time and Length Scales. •Tobias Brixner1, Martin Aeschlimann2, Alexander Fischer2, Peter Geissler3, Sebastian Götz1, Bert Heck1, Jer-Shing Huang1,4, Thomas Keitz1, Christian Kramer1, Pascal Melchior2, Walter Pfeiffer3, Gary Razinkas3, Christian Rewitz1, Christian Schneider3, Christian Strüber3, Philip Tuchscherr1, and Dmitri V. Voronine1; 1Institut für Physikalische und Theoretische Chemie, Universität Würzburg, Am Hubland, 97074 Würzburg, Germany, 2Fachbereich Physik und Research Center OPTIMAS, TU Kaiserslautern, Erwin-Schrödinger-Str. 46, 67663 Kaiserslautern, Germany, 3Nano-Optics and Biophotonics Group, Experimentelle Physik 5, Universität Würzburg, Am Hubland, 97074 Würzburg, Germany, 4Department of Chemistry, National Tsing Hua University, Hsinchu 30013, Taiwan, 5Fakultät für Physik, Universität Bielefeld, Universitätsstr. 25, 33615 Bielefeld, Germany.
Three spectroscopic techniques are presented that provide simultaneous spatial and temporal resolution: modified confocal microscopy with spectral interferometry detection, space-time-resolved spectroscopy using coherent control concepts, and coherent two-dimensional nano-spectroscopy. Latest experimental results are discussed.

11:15 Auditorium A TUE.2A.2

Ultrafast Charge Transfer Visualized by Two-dimensional Electronic Spectroscopy. Oliver Bixner1, Niklas
Christensson\textsuperscript{1}, Vladimir Lukes\textsuperscript{2}, Tomas Mancal\textsuperscript{3}, Juergen Hauer\textsuperscript{4}, Franz Milota\textsuperscript{1}, and Harald F. Kauffman\textsuperscript{1,4};
\textsuperscript{1}Faculty of Physics, University of Vienna, Strudlhofgasse 4, 1090 Vienna, Austria, \\
\textsuperscript{2}Department of Chemical Physics, Slovak Technical University, Radlinského 9, 81237 Bratislava, Slovakia, \\
\textsuperscript{3}Institute of Physics, Faculty of Mathematics and Physics, Charles University, Ke Karlovu 5, Prague 121 16, Czech Republic, \\
\textsuperscript{4}Ultrafast Dynamics Group, Faculty of Physics, Vienna University of Technology, Wiedner Hauptstrasse 8-10, 1040 Vienna, Austria.

Tow-dimensional electronic spectroscopy is used to resolve 30 fs excited-state charge transfer in a lutetium bisphthalocyanine dimer. The combination of density matrix propagation and quantum chemistry provides a molecular view of the charge transfer steps.

11:30 Auditorium A  TUE.2A.3
Comparison of the Photophysics of the Dark and Light Adapted Orange Carotenoid Protein using 2D Electronic Spectroscopy, •Elenora De Re\textsuperscript{1,3}, Gabriela Schlau-Cohen\textsuperscript{2,3}, Vanessa Haxter\textsuperscript{2,3}, Ryan Leverenz\textsuperscript{2}, Richard Mathies\textsuperscript{2}, and Graham Fleming\textsuperscript{1,2,3}; \textsuperscript{1}Applied Science and Technology Graduate Group, University of California, Berkeley, Berkeley, California 94720, USA, \textsuperscript{2}Department of Chemistry, University of California, Berkeley, California 94720, USA, \textsuperscript{3}Physical Biosciences Division, Lawrence Berkeley National Laboratory, 1 Cyclotron Road, Berkeley, California 94720, USA.

Broadband two-dimensional electronic spectroscopy is applied to investigate the photophysics of the photoactive orange carotenoid protein. Differences in dynamics between the light and dark forms arise from the role of this protein in energy dissipation.

11:45 Auditorium A  TUE.2A.4
Exploring Higher-Lying Electronic States of a Molecular Switch by Coherent Triggered-Exchange 2D Electronic Spectroscopy, •Stefan Ruezel, Martin Kullmann, Johannes Baback, Patrick Nuernberger, and Tobias Brixner; Institut für Physikalische und Theoretische Chemie, Universität Würzburg, Am Hubland, 97074 Würzburg, Germany.

We introduce triggered-exchange two-dimensional (TE2D) electronic spectroscopy in which pump-pump-repump-probe sequences are used to reveal photochemical reaction pathways involving higher-lying electronic excited states.

12:00 Auditorium A  TUE.2A.5
Vibrionic Coupling in Excited Electronic States Investigated with Resonant 2D Raman Spectroscopy, •Tiago Buckap, Jan Philip Kraack, Marie Sophie Marek, and Marcus Motzkus; Physikalisch Chemisches Institut, Rapprecht-Karls Universität Heidelberg, D-69120, Germany.

The coupling between molecular vibrational modes in the excited state is investigated by resonant Raman two-dimensional time resolved spectroscopy. We apply this approach to several (bio-)chromophores in solution and simulate the time-resolved signal contributions.

12:15 Auditorium A  TUE.2A.6
Optical Multidimensional Spectroscopy of Atomic Vapor, •Hebin Li\textsuperscript{1}, Galan Moody\textsuperscript{1,2}, Alan Bristow\textsuperscript{1}, Mark Siemens\textsuperscript{1}, and Steven Cundiff\textsuperscript{2}; \textsuperscript{1}JILA, National Institute of Standards and Technology, and University of Colorado, Boulder, CO 80309-0440, USA, \textsuperscript{2}Department of Physics, University of Colorado, Boulder, CO 80309-0440, USA.

Optical single- and double-quantum three-dimensional Fourier-transform spectra are obtained for atomic vapors. We show that three-dimensional spectra can be used to identify the Hamiltonian of complex systems and to reveal the nature of many-body interactions.

TUE.2B: Ultrafast Pulse Generation
Chair: Jens Biegert, ICFO, Barcelona, Spain
10:45–12:15 Auditorium B  TUE.2B

10:45 Auditorium B  TUE.2B.1
Programmable Broadband Ultra-Fine Resolution 2-D Pulse Shaping, Andrew J Metcalf\textsuperscript{1}, Victor Torres-Company\textsuperscript{1,2}, V R Supradeepa\textsuperscript{1,3}, Daniel E Leaird\textsuperscript{1}, and Andrew M Weiner\textsuperscript{1}; \textsuperscript{1}School of Electrical and Computer Engineering, Purdue University, West Lafayette, Indiana 47906, USA, \textsuperscript{2}Department of Physics, Universitat jaume I, 12071 Castello de la Plana, Spain, \textsuperscript{3}OFS research laboratories, New Jersey, USA.

We demonstrate a fully programmable two dimensional pulse shaper, capable of fine resolution control over a broad bandwidth. Experimental results show line-by-line shaping of frequency combs, highlighting an application in radio frequency arbitrary waveform generation.

11:00 Auditorium B  TUE.2B.2
Broadband Circularity-Polarized THz Pulse Generation by Optical Rectification of Vector-Field Shaped Pulses, •Masaaki Sato\textsuperscript{1,4}, Natsuki Kanda\textsuperscript{2,4}, Takuya Hijuchi\textsuperscript{2,4}, Takayuki Suzuki\textsuperscript{1,4}, Kuniaki Konishi\textsuperscript{1,4}, Kosuke Yoshida\textsuperscript{2,4}, Kazuhiro Misawa\textsuperscript{1,4}, and Makoto Kavata-Gonokami\textsuperscript{1,4}; \textsuperscript{1}Department of Applied Physics, Tokyo University of A and T, 2-24-16 Naka-cho, Koganei, Tokyo 184-8588, Japan, \textsuperscript{2}Department of Applied Physics, University of Tokyo, 7-3-1 Hongo, Bunkyo-ku, Tokyo 113-8656, Japan, \textsuperscript{3}Department of Physics, University of Tokyo, Hongo, Bunkyo-ku, Tokyo 113-8656, Japan, \textsuperscript{4}CREST Japan Science and Technology Agency, Sanbancho Bldg., 5 Sanbancho, Chiyoda-ku, Tokyo 102-0075, Japan.

We proposed and demonstrated a method to generate circularly-polarized broadband terahertz pulses from ZnTe(111) using vector shaped optical pulses. This method will lead to new polarimetry schemes in the THz region.

11:15 Auditorium B  TUE.2B.3
Pico(second) pulse generation from whispering gallery mode parametric oscillators. Scott Papp, Pascal Del Haye, and Scott Diddams; NIST, Boulder, Colorado, USA.

We demonstrate the generation of a stable 36 GHz pulse train of 2.5 picosecond pulses from a CW-pumped whispering gallery mode parametric oscillator. The timing jitter and phase relationship among the optical modes are investigated.

11:30 Auditorium B  TUE.2B.4
Ultrafast thin disk lasers: sub-100 fs pulse duration and carrier envelope offset phase detection, •Clara Saraceno\textsuperscript{1}, Selina Pekare\textsuperscript{2}, Oliver Heckl\textsuperscript{1}, Cyrill Baer\textsuperscript{1}, Cinia Schriver\textsuperscript{1}, Matthias Golling\textsuperscript{1}, Kolja Beil\textsuperscript{1}, Christian Kränkel\textsuperscript{1,2}, Günter Huber\textsuperscript{2}, Thomas Südmeyer\textsuperscript{1,3}, and Ursula Keller\textsuperscript{1}; \textsuperscript{1}Department of Physics, Institute for Quantum Electronics, ETH Zurich, 8093, Zurich, Switzerland, \textsuperscript{2}Institute of Laser-Physics, University of Hamburg, Luruper Chaussee 149, 22761 Hamburg, Germany, \textsuperscript{3}Department of Physics, University of Neuchâtel, 2000 Neuchâtel, Switzerland.

We demonstrate a sub-100-fs SESAM-modelocked thin disk laser and...

We have demonstrated a new pulse characterization technique, cross-correlation frequency-resolved optical gating with electro-optic sampling. Sub-single-cycle mid-infrared pulses were characterized with the absolute carrier-envelope phase values by using the method.


The effective g-tensor of L-valley electrons in germanium is deduced from time-domain magneto-optical experiments. Electron spin decoherence markedly depends on the crystallographic orientation of an external B-field and is closely related to intervalley scattering.

Three-Dimensional Electronic Spectroscopy of Excitons in Asymmetric Double Quantum Wells. Christopher Hall, Lap Van Dao, Keith Nugent, Harry Quiney, and Christoph Boltz. Swinburne University of Technology, Victoria 3122, Australia.

We reveal coherent coupling between spatially separated excitons in an asymmetric double quantum well using multidimensional spectroscopy. In the time domain Raman-like beats are seen for the first time between heavy-hole excitons in different wells.


We examine absorption spectra of a semiconductor quantum well and use a cluster-expansion transformation to project a large set of quantitative classical measurements onto the true quantum responses. Classical and quantum responses yield significantly different results.

Ultrafast Two-Dimensional THz Spectroscopy of Graphene. Pamela Bowden, Elias M. Moreno, Klaus Reimann, Michael Woerner, and Thomas Elsaesser, Max-Born-Institut, Berlin, Germany.

With two-dimensional THz spectroscopy the dynamics of low-energy carriers in graphene is determined. Both intra- and interband absorption contribute to the observed ultrafast pump-probe signals.


We study the ultrafast dynamics of non-thermal electron relaxation in graphene upon impulsive excitation. The 10-fs resolution two color pump-probe allows us to unveil the non-equilibrium electron gas decay at early times.

Lunch Break

12:30–14:00

Quantum-Optical Spectroscopy of Semiconductors. Steven Cundiff, Andrew Hunter, Ryan Smith, Martin Mootz, Mackillo Kira, and Stephan Koch. JILA, University of Colorado and National Institute of Standards and Technology, Boulder, Colorado, 80309 USA.

We have performed time-domain magneto-optical experiments driven by ultrafast TDLs. We detect for the first time the carrier envelope offset (CEO) of a TDL, two key enabling milestones for future nonlinear experiments driven by ultrafast TDLs.
Strong-field photoemission from nanostructures driven by few-cycle IR fields. Georg Herink, Daniel R. Solli, Max Gulde, and Claus Ropers; Courant Research Center Nanoo-Spectroscopy and X-Ray Imaging, University of Göttingen, 37077 Göttingen, Germany.

We present strong-field photoemission from plasmonic nanotips driven by ultrashort pulses at mid-IR wavelengths, reaching Keldysh parameters down to 0.1. We identify a sub cycle acceleration regime that is exclusive to confined fields in nanostructures.

15:00 Auditorium B TUE.3B.4

Strong Field Acceleration of Attosecond Electron Pulses emitted by an Sharp Metallic Nanoprobe. Doogae Park, Slawa Schmidt, Björn Piglosiewicz, and Christoph Lienau; Institute of Physics, Carl von Ossietzky University, D-26129 Oldenburg, Germany.

We report near-field acceleration of attosecond electron pulses from sharp nanometer-sized gold tips. Angle-resolved kinetic energy spectra are explained in terms of the spatiotemporal electron dynamics in the strong field gradient at the tip apex.

15:15 Auditorium B TUE.3B.5

Shake-up and double-ionization by ultra-short pulses: ab initio calculations using t-SURFF. Armin Scrinzi; Ludwig Maximilians University, Munich, Germany.

Shake-up and fully differential double-ionization spectra of two-electron atoms in few-cycle IR laser pulses are computed ab initio. The time-dependent surface-flux method needs simulation radii of 20-50 Bohr. Pronounced phase- and pulse-duration dependence is found.

Coffee Break 15:45–16:15

TUE.4A: Ultrafast Dynamics of Biomolecules

Chair: Jan Helbing, University of Zurich, Zurich, Switzerland

16:15 Auditorium A TUE.4A.1

Fast Exciton Dynamics and Coherent Oscillations Revealed by Coherent 2D Spectroscopy in Chlorosomes. Jakub Dostál1,2, Tomas Mancal2,2, František Vacha1, Ramunas Augulis1, Jakub Psencík1, and Donatas Zigmantas1; 1Department of Chemical Physics, Lund University, Sweden, 2Faculty of Mathematics and Physics, Charles University in Prague, Czech Republic.

In this study ultrafast energy transfer dynamics in chlorosomes were explored. Observed dynamics were attributed to incoherent downhill excitation diffusion between disordered domains within chlorosomes. On the longer timescale vibrational coherent oscillations were investigated.

16:30 Auditorium A TUE.4A.2

Towards Understanding Allosteric Dynamics Through Ultrafast IR Spectroscopy. Steven A Waldauer1, Brittitte Buchli1, Reoto Walse1,3, Rolf Pfister2, Oliver Zerbe2, and Peter Hamm1; 1Physical Chemistry Institute, University of Zurich, 8057 Zurich, Switzerland, 2Organic Chemistry Institute, University of Zurich, 8057 Zurich, Switzerland.

Allostery, an intra-protein property where interactions at one location affect properties at distal sites, is of great biological importance. Here we probe the kinetics of an allosteric mimic in real time using ultrafast IR spectroscopy.

16:45 Auditorium A TUE.4A.3

Nonequilibrium Active Site Dynamics of de novo Metalloenzymes Probed with 2D-IR. Matthew R. Ross, Fangting Yu, John T. King, Aaron M. White, Evan J. Arthur, Vincent L. Pecoraro, and Kevin J. Kubarych; Department of Chemistry, University of Michigan, 930 North University Avenue, Ann Arbor, MI 48109, USA.

Ultrafast 2D-IR spectroscopy of a CO ligand bound to a copper active site of an artificial metalloenzyme is used as a sensitive probe of both the flexibility and the electrostatic environment of the engineered catalyst.

17:00 Auditorium A TUE.4A.4

Ultrafast Spectroscopy of UV-induced DNA-lesions- on the search for strategies which keep DNA alive. Wolfgang Zinth1, Benjamin P. Fingerhut2, Teja T. Herzog2,1, Gerald R. Ryeck1,3, Karin Haiser1, Franziska F. Graupner1, Korbinian Heil1,4, Peter Gilch1,2, Wolfgang J. Schreier1, Thomas Carell1,2, and Regina de Vivie-Riedle2; 1Faculty of Physics, Ludwig Maximilians University Munich, Munich, Germany, 2Department of Chemistry, Ludwig Maximilians University Munich, Munich,

...
Germany, 3 Institut für Physikalische Chemie, Heinrich-Heine-Universität Düsseldorf, Düsseldorf, Germany, 4 Department of Chemistry, Center for Integrative Protein Science, Ludwig Maximilians University Munich, Munich, Germany. UV-induced photoisomerization in flavin and tryptophan after photoexcitation in GOX and in Y21W AppA mutant.

TUE.4B: Nonlinear Optics and Plasmonics
Chair: Steven Cundiff, JILA, NIST and University of Colorado, USA
16:15–18:00 Auditorium B TUE.4B

First measurement of the non-instantaneous response time of a $\chi^{(3)}$ nonlinear optical effect, Susanta K. Das1, M. Bock2, R. Granwald1, B. Borchers1, J. Hynnä2, G. Steinmeyer1,2, D. Ristau1,4, A. Hartl1, T. Vockeroth1, T. Nagy3, and U. Morgner1,2, 3 Max-Born-Institut für Nichtlineare Optik und Karzettpektroskopie, 12489 Berlin, Germany, 2 Optoelectronics Research Centre, Tampere University of Technology, 33101 Tampere, Finland, 3 Laser Zentrum Hannover e.V., Holle, 30419 Hannover, Germany, 4 Institut für Quantenoptik, Leibniz Universität Hannover, Welfengarten 1, 30167 Hannover, Germany.

The third harmonic of a few-cycle pulse, generated at a dielectric surface, is investigated via IFROG. We present direct experimental evidence for a non-instantaneous nonlinear response in TiO$_2$.

17:00 Auditorium B TUE.4B.4

Laser Filament Induced Water Condensation, Stefano Henin1, Kamil Stelmarsczyk2, Massimo Petrarca1, Philipp Rohwetter2, ZuoQuang Hao2, Johannes Lüder1, Yannick Petit1, Andreas Vogel1, Konradin Weher3, Jerome Kasparian1, Ludger Woeste2, and Jean-Pierre Wolf1, 1 GAP, Université de Genève, rue de l’École de Médecine 20, CH 1211 Genève 4, Switzerland, 2 Institut für Experimentalphysik, Freie Universität Berlin, Arnimallee 14, D 14195 Berlin, Germany, 3 University of Applied Sciences, Düsseldorf, Josef-Gockeln-Str. 9, D-40474 Düsseldorf, Germany. At relative humidities above 70%, femtosecond laser filaments generate aerosol particles and water droplets in the atmosphere. The water vapour condensation and droplet stabilization are assured by soluble species produced in the laser plasma.

17:15 Auditorium B TUE.4B.5

Coherent Transfer of Angular Momentum through Impulsive Stimulated Raman Scattering: the Role of Envelope Helicity, Takaya Higuchi, Hiroharu Tamura, and Makoto Kawata-Gonokami, The University of Tokyo, Tokyo, Japan. We propose a method to selectively transfer optical angular momentum to media via impulsive stimulated Raman scattering by shaping femtosecond laser pulses so that the envelope functions of their electromagnetic vectors exhibit helical trajectories.
17:30 Auditorium B  TUE.4B.6
Non-perturbative Four-wave Mixing in InSb with Intense Off-resonant Multi-THz Pulses. ●Bernhard Mayer1, Friederike Junginger1, Christian Schmid1, Sebastian Mährlein1, Olaf Schubert2, 3, Alexej Pashkin2, Rupert Huber1, 2, and Alfred Leitenstorfer1; 1Department of Physics and Center for Applied Photonics, University of Konstanz, Universitätsstraße 10, 78464 Konstanz, Germany, 2Department of Physics, University of Regensburg, Universitätstraße 31, 93053 Regensburg, Germany.
High-field multi-THz pulses are employed to analyze the nonlinear response of InSb driven off-resonantly. Field-resolved four-wave mixing signals manifest the onset of a non-perturbative regime of Rabi flopping in agreement with numerical simulations.

17:45 Auditorium B  TUE.4B.7
Influencing the ultrafast plasmon damping time with Fano resonances for nonlinear plasmonics. ●Krishnan Thiyagarajan, Benjamin Gallinet, and Olivier Martin; Nanophotonics and Metrology Laboratory (NAM), Swiss Federal Institute of Technology Lausanne (EPFL), 1015 Lausanne, Switzerland.
We explore the possibility of strongly influencing the plasmon damping time in nanostructures for efficient SHG, using the tunability of the narrow linewidth feature in the scattering cross-section of Fano resonances.

TUE.PII: Poster Session II
18:00–19:30 Poster area  TUE.PII
18:00 Poster area  TUE.PII.1
Control of High Harmonic Generation using an off-axis beam. ●Khruong Dinh, Peter Hannaford, and Lap Dao; ARC Centre of Excellence for Coherent X-Ray Science and Centre for Atom Optics and Ultrafast Spectroscopy, Swinburne University of Technology, Hawthorn Vic 3122, Australia.
An off-axis beam is used to control the phase matching condition in the high harmonic generation process in a semi-infinite gas cell leading to suppression or enhancement of the harmonic emission.

18:00 Poster area  TUE.PII.2
Optimization of ultrafast Yb-doped fiber amplifiers to achieve high-quality compressed-pulses. ●Jinkang Lim1, Hung-Wen Chen1, Anne-Laure Calendron2, Guoqing Chang1, and Franz Kartner1, 2; 1Department of Electrical Engineering and Computer Science and Research Laboratory of Electronics, Massachusetts Institute of Technology, 77 Massachusetts Ave, Cambridge MA 02139, 2Center for Free-Electron Laser Science, DESY and Dept. of Physics, University of Hamburg, Notkestraße 85, D-22607 Hamburg, Germany.
We demonstrate the rotating-crystal method in femtosecond x-ray diffraction. Structural dynamics of a photoexcited bismuth crystal is mapped in a pump-probe scheme by measuring intensity changes of many Bragg reflections simultaneously.

18:00 Poster area  TUE.PII.3
We report on manipulation and characterization of highly-discrete coherent spectrum. It is shown that trains of arbitrary optical waveforms are generated and furthermore they revive repeatedly by adding material positive dispersions.

18:00 Poster area  TUE.PII.4
Spectral high-speed sweeping of high power fs-pulses from a Non-collinear Optical Parametric Oscillator (NOPO). ●Tino Lang, Thomas Binhammer1, Stefan Rausch2, Guido Palmer1, Moritz Emons1, Marcel Schultze1, Anne Harth1, and Uwe Morgner1; 1Institute of Quantum Optics, Leibniz Universität Hannover, Welfengarten 1, D-30167 Hannover, Germany, Tel: +49 511 | 762 - 17294, 2Center for Quantum Engineering and Space-Time Research (QUEST), Welfengarten 1, 30167 Hannover, Germany. 3VENTEON Laser Technologies GmbH, Hertzstr. 1b, D-30827 Garbsen, Germany.
We demonstrate robust control over attosecond pulse generation and shaping by optimizing the synthesis of few-cycle to sub-cycle driver waveforms in an ultrabroad spectral band covering the ultraviolet-infrared domain.

18:00 Poster area  TUE.PII.5
We demonstrate the rotating-crystal method in femtosecond x-ray diffraction. Structural dynamics of a photoexcited bismuth crystal is mapped in a pump-probe scheme by measuring intensity changes of many Bragg reflections simultaneously.

18:00 Poster area  TUE.PII.6
Adaptive attosecond pulse control with synthesized light. Baldwin Bödtl1, 2, Emmeric Balogh1, Elefterios Goulielmakis1, 2, Katalin Varjú1, 2, and ●Péter Dombi1, 1Wigner Research Centre for Physics, 2Dept. for Optics and Quantum Electronics, University of Szeged, 3Max-Plank-Institut für Quantenoptik.
We demonstrate robust control over attosecond pulse generation and shaping by optimizing the synthesis of few-cycle to sub-cycle driver waveforms in an ultrabroad spectral band covering the ultraviolet-infrared domain.

18:00 Poster area  TUE.PII.7
Fully coherent spectral broadening of femtosecond pulses from an Er:fiber system. ●Sören Kumkar, Günther Krauss, Daniele Brida, and Alfred Leitenstorfer; Department of Physics and Center for Applied Photonics, University of Konstanz, D-78457 Konstanz, Germany.
Coherence properties of the ultrabroadband output from a highly nonlinear germanosilicate fiber pumped by a femtosecond Er:fiber source are investigated. Conditions necessary to achieve full spectral coherence are demonstrated experimentally and analyzed theoretically.

18:00 Poster area  TUE.PII.8
Generation of single-cycle THz pulses with MV/cm field strength by highly efficient frequency conversion in organic crystals. ●Clemens Ruchert1, 2, Carlo Vicario1, Fernando Ardanu1, 2, and Christoph P. Hauri1; 1Institute of Quantum Optics and Quantum Technologies, University of Berne, 3012 Bern, Switzerland, 2University of Berne, 3012 Bern, Switzerland, 3Ecole Polytechnique Federale de Lausanne, 1015 Lausanne, Switzerland.
We present the generation of high-power single-cycle THz pulses in organic salt crystals. Broadband THz radiation with MV/cm electric field strength is produced by optical rectification driven with a powerful femtosecond optical parametric amplifier.
Ultra-broadband mid-IR source based on non-collinear optical parametric amplification with a spatially dispersed signal.  

- Sha-Wei Huang and Franz X. Kärner  
- Department of Electrical Engineering and Computer Science and Research Laboratory of Electronics, Massachusetts Institute of Technology, Cambridge, Massachusetts 02139, USA.  
- Center for Free-Electron Laser Science, DESY, and Department of Physics, University of Hamburg, Notkestraße 85, D-22607 Hamburg, Germany.

A scheme for the generation of an ultra-broadband 2-µm pulse is demonstrated with the aim to seed a high-energy OPCPA for long-wavelength-driven high-harmonic-generation. The concept can be generalized for ultra-broadband mid-IR generation.

Towards optical attosecond pulses: broadband phase coherence between an ultrafast laser and OPO using lock-to-zero CEO stabilization.  

- Richard A. McCracken  
- Jinghua Sun  
- Christopher G. Leburn  
- Derryc T. Reid  
- Scottish Universities Physics Alliance (SUPA), Institute of Photonics and Quantum Sciences, School of Engineering and Physical Sciences, Heriot Watt University, Riccarton, Edinburgh EH14 4AS, UK.  
- School of Physics, Huazhong University of Science and Technology, Wuhan, Hubei 430074, China.

The carrier-envelope-offset frequencies of the pump, signal, idler and related sum-frequency mixing pulses have been locked to 0 Hz in a 20-fs-Ti:sapphire-pumped optical parametric oscillator, satisfying a critical prerequisite for optical attosecond pulse synthesis.

Femtosecond pulse generation at 50 W average powers from an Yb:YAG planar-waveguide MOPA.  

- Cristel Yoloxochitl Ramirez Corral  
- Ian James Thomson  
- Christopher Gilmour Leburn  
- Denis R. Hall  
- Derryc Telford Reid  
- Howard J. Baker  
- Scottish Universities Physics Alliance (SUPA), Institute of Photonics and Quantum Sciences, School of Engineering and Physical Sciences, Heriot-Watt University, Riccarton, Edinburgh, EH14 4AS, UK.  
- James Watt Institute for High Value Manufacturing, School of Engineering and Physical Sciences, Heriot-Watt University, Riccarton, Edinburgh, EH14 4AS, UK.

Femtosecond laser writing nanograting in fused silica shows strong dependence on the mutual orientation of polarization plane azimuth and intensity front tilt of light pulses. This phenomenon is in terms with intrinsic anisotropy of modification.

Second harmonic generation in NLO polymers excited by Surface Plasmon enhanced electric field induced by femtosecond optical pulses.  

- Atsushi Sugita  
- Kaname Sato  
- Tsukasa Ono  
- Wataru Inami  
- Yoshimasa Kawata  
- Shizuoka University, Hamamatsu, Shizuoka, 432-8561 Japan.

We report second-order nonlinearity of NLO polymer-coated silver films at surface plasmon (SP) resonance. The nonlinearity in the polymer was greatly enlarged under the SP-enhanced fields and it has ultrafast response shorter than 150 fs.

Low Frequency Region Mid-Infrared Spectroscopy by Chirped Pulse Up-Conversion.  

- Jingyi Zhu  
- Tilo Mathes  
- Andreas D. Stahl  
- Marie Louise Groot  
- Department of Physics and Astronomy, Faculty of Sciences, Vrije Universiteit, De Boelelaan 1081, 1081 HV Amsterdam, The Netherlands.

We demonstrate experiments on GaAs and the photoreceptor protein Slr1694.

Polarization Dependence of Nanograting in Fused Silica Irradiated by Ultrashort Pulse Laser with Tilted Intensity Front.  

- Ye Dai  
- Guorui Wu  
- Xian Lin  
- Department of Physics, Shanghai University, Shanghai, 200444, China.  
- Laboratory for Microstructures, Shanghai University, Shanghai, 200444, China.

Femtosecond laser writing nanograting in fused silica shows strong dependence on the mutual orientation of polarization plane azimuth and intensity front tilt of light pulses. This phenomenon is in terms with intrinsic anisotropy of modification.

Mid-IR ultra-short pulse characterization with.  

- Alexandre Trisorio  
- Stephanie Grabielle  
- Marta Divall  
- Nicolas Forget  
- Christoph Peter Hauri  
- Paul Scherrer Institute, Villigen, Switzerland.  
- Fastlite, Orsay, France.  
- Ecole Polytechnique Federale de Lausanne, Lausanne, Switzerland.

We demonstrate a novel measurement device for ultra-short broadband mid-IR pulses characterization based on Self-Referenced Spectral Interferometry. The achronic temporal filter based on XPW allows broadband operation in the 1.4-2 µm spectral range.

Ultrafast CARS with Improved Spectral Resolution.  

- Matthias Lütgens  
- Susana Chatzipapadopoulos  
- Stefan Lochbrunner  
- Institut für Physik, Universität Rostock, Universitätsplatz 3, 18051 Rostock, Germany.

Molecular vibrations are investigated by time and frequency resolved CARS applying ultrafast excitation and picosecond probing for high spectral resolution. Enhanced spectral structure and beating phenomena are demonstrated for coalescing Raman bands.
We report on high-order harmonic generation in micrometer-sized water droplets. Spectral broadening, splitting and blueshift of the harmonic radiation are observed and attributed to phase-matching effects and spatiotemporal behaviour of the target.

18:00  Poster area  TUE.PII.22

Pulse Duration Dependence of Ethylene Fragmentation in Strong Laser Fields. •Xinhua Xie1, Stefan Roithner2, Markus Schöffler2, Daniiil Kartashov2, Li Zhang1, Erik Löstedi2, Atsushi Iwasaki2, Kaooru Yamanouchi2, Andrius Baltuška1, and Markus Kitzler1; 1Photonics Institute, Vienna University of Technology, Gusshausstrasse 27, A-1040 Vienna, Austria, 2Department of Chemistry, School of Science, The University of Tokyo, 7-3-1 Hongo, Bunkyo-ku, Tokyo 113-0033, Japan.

With Coulomb explosion imaging technique, we experimentally demonstrated the dependence of three-body Coulomb explosion of ethylene molecules on the pulse duration of a strong laser field. Both concerted and sequential fragmentation processes were observed.

18:00  Poster area  TUE.PII.23

Mid-Infrared Femtosecond Filament and Three Octaves Continuum Generation in Gases. •Skirmantas Ališauskas1, Daniiil Kartashov2, Andrius Pugžlys1, Aleksandr Voronin1, Aleksiej Zhetlikov1,2, Massimo Petrarca2, Pierre Béjot1, Jérôme Kasparian1, and Andrius Baltuška1; 1Photonics Institute, Vienna University of Technology, Gusshausstrasse 27-387, A-1040 Vienna, Austria, 2Physics Department, International Laser Center, M.V. Lomonosov Moscow State University, 119992 Moscow, Russia. 3Department of Physics and Astronomy, Texas A&M University, College Station TX, 77843-4242, USA. 4Université de Genève. Rue de l’École de Médecine 20, 1211 Genève, Switzerland.

We report experimental and theoretical results on mid-infrared femtosecond pulse filamentation in different gases. Highly efficient generation of a three-octave-wide spectral continuum in argon, covering the main atmospheric transparency windows, is demonstrated and explained.

18:00  Poster area  TUE.PII.24

Elongation of C-O Distance in Methanol in Ultrashort Intense Laser Fields by Time-dependent Adiabatic Molecular Dynamics Simulation. Yoshihiro Nishiguchi, •Katsunori Nakai, and Kaooru Yamanouchi; Department of Chemistry, School of Science, The University of Tokyo, Japan.

Chemical-bond elongation necessary for the enhancement of ionization of molecules in an intense ultrashort-pulsed laser field was found theoretically to be achieved when the first ionization proceeds at the leading edge of the laser pulse.

18:00  Poster area  TUE.PII.25

High-harmonic generation from oriented OCS molecules. •Peter Kraus, Stefan Vlajkovic, Alisa Rapunyan, and Hans Jakob Wörner; Laboratorium für physikalische Chemie, Eidgenössische Technische Hochschule Zürich, Wolfgang-Pauli-Str. 10, 8093 Zurich, Switzerland.

We report even-order high-harmonic generation from OCS, which was oriented by a femtosecond laser-pulse superimposed with its second harmonic. We show full coherent control over the even-harmonic intensity through the relative phase of the two-color-field.

18:00  Poster area  TUE.PII.26

Sub-Cycle Switching of a Photonic Bandstructure via Ultrastrong Light-Matter Coupling. •Jean-Michel Ménard1,2, Michael Porer1,2, Alfred Leitenstorfer1, Rupert Huber1,2, Riccardo Dei’l Innocenti1, Simone Zanotto1, Giorgio Biasiol1, Lucia Sorba1, and Alessandro Tredicucci1; 1Department of Physics, University of Konstanz, 78457 Konstanz, Germany, 2Department of Physics, University of Regensburg, 93040 Regensburg, Germany. 3NEST, Istituto Nanoscienze-CNR and Scuola Normale Superiore, 56127 Pisa, Italy.

Phase-locked multi-terahertz transients map out the full photonic bandstructure of a plasmonic crystal while ultrastrong coupling with quantized electronic transitions in semiconductor quantum wells is optically switched on within less than a cycle of light.

18:00  Poster area  TUE.PII.27

Low-Energy Peak Structure in Strong-Field Ionization by Mid-Infrared Laser Pulses: Two-Dimensional Focusing by the Atomic Potential. Christoph Lemell1, Konstantinos Dimitriou1,2, Xiao-Min Tong4, Joachim Burgdörfer1, and Stefanie Graft1; 1Institute for Theoretical Physics, Vienna University of Technology, Vienna, Austria, 2Department of Physical Science and Applications, Hellenic Army Academy, Vari, Greece. 3National Hellenic Research Foundation, Inst. of Theoretical and Physical Chemistry, Athens, Greece, 4Materials Science, University of
Tsukuba, Ibaraki, Japan.
We analyze the formation of the low-energy structure in above-threshold ionization spectra by strong-field midinfrared laser pulses by using both quasiclassical and quantum approaches.

18:00 Poster area TUE.PI28

Probing the longitudinal momentum spread of the electron wave packet at the tunnel exit. •Claudio Circelli1, Adrian N. Pfeiffer1, Alexandra S. Landsman2, Mathias Smolarski3, Darko Dimitrovski2, Lars B. Madsen2, and Ursula Keller1; 1Physics Department, ETH Zurich, CH-8093 Zurich, Switzerland, 2Landbeck Foundation Theoretical Center for Quantum System Research, Department of Physics and Astronomy, Aarhus University, 8000 Aarhus C, Denmark.
We present an ellipticity resolved study of momentum distributions arising from tunnel ionization of Helium. The presence of a longitudinal momentum spread of the electron at the tunnel exit can explain the features observed experimentally.

18:00 Poster area TUE.PI29

Harmonic Generation with Single-Cycle Light Pulses. Arkady Drozdov1, Sergey Kozlov1, Andrey Sukhorukov2, and Yuri Kivshar1,2; 1National Research University Higher School of Economics, Moscow, Russia, 2Australian National University, Canberra ACT 0200, Australia.
We study spatiotemporal pulse dynamics in cubic nonlinear media with normal dispersion and reveal new features of harmonic generation when the pulse duration is reduced, including the suppression of third-harmonic generation for single-cycle optical pulses.

18:00 Poster area TUE.PI30

High energy pulse compression to Terawatt level 10 fs pulses. •Ondřej Hort, Antoine Dubrouil, Coralie Fourcade-Dutin, Stéphane Petit, Eric Mével, Dominique Descamps, and Eric Constant; Center Lasers Intenses et Applications (Université de bordeaux, CNRS, CEA), Université de Bordeaux, 33405 Talence, France.
By using pulsecompression by gas ionization we compress 45 fs pulses down to 10 fs limit while keeping the pulse energy above 10 mJ. Pulses below 10 fs were obtained with TW peak power.

18:00 Poster area TUE.PI31

The Dynamics of Desorbing CO Probed with an X-Ray Free-electron Laser. •Martin Beye1,2, Tozli Amniyev2, Ryan Coffee2, Martina Dell’Angela1, Alexander Föhlisch1, Jörgen Gladh1, Tetsuo Katayama1, Sarp Kayar2, Oleg Krupin3, Andreas Mogelholz2, Anders Nilsson2, Dennis Nordlund2, Jens Norskov1, Henrik Öberg3, Hirohito Ogusawara4, Henrik Östlund1, Lars G. M. Pettersson4, William F. Schlottke1, Jonas Sellberg1, Florian Sorgenfrei2, Joshua J. Turner1, Martin Wolf2, and Wilfried Warth1,2; 1Helmholtz-Zentrum Berlin für Materialien und Energie GmbH, Berlin, Germany, 2SLAC National Accelerator Laboratory, Menlo Park, USA, 3Universität Hamburg, Hamburg, Germany, 4Stockholm University, Stockholm, Sweden, 5Fritz-Haber-Institut der Max-Planck-Gesellschaft, Berlin, Germany.
Through fs-laser excitation, we induce a transition of adsorbed CO on Ru through vibrationally hot states into a long-lived transient. We follow the electronic structure with soft X-ray absorption and emission spectroscopy.

18:00 Poster area TUE.PI32

Ultrafast dynamics of the photo-induced metal-insulator transition (MIT) of single VO2 micro-crystals. •Andrew Jones1,2, Jade Park1, David Cobden1, and Markus Raschke2; 1Department of Physics, University of Washington, Seattle, WA 98195, USA, 2Department of Physics, Department of Chemistry, and JILA, University of Colorado, Boulder, CO 80309.
We study the photoinduced MIT in homogeneous single VO2 microcrystals and compare with thin-film studies. An anisotropic coherent phonon response and MIT transition time scale of 67±5 fs is observed suggesting strong lattice contributions.

18:00 Poster area TUE.PI33

Ultrafast Time Resolved Reflection High Energy Electron Diffraction with Tilted Pump Pulse Fronts. •Ping Zhou, Carla Streubühr, Annika Kalus, Tim Frigge, Anja Hanisch-Blicharski, Simone Wall, Martin Kammler, Manuel Ligges, Uwe Bovensiepen, Dietrich von der Linde, and Michael Horn-von Hoegen; Department of Physics & Center for Nanointegration CeNIDE, University of Duisburg-Essen, Lotharstr. 1, 47048 Duisburg, Germany.
We present time-resolved RHEED from a Pb(111) surface using an optical setup capable of matching the laser and electron pulse fronts. The response of the surface lattice upon excitation was observed to be 3 ps.

18:00 Poster area TUE.PI34

Recovery of ultra-broadband terahertz pulses from sum-frequency spectograms using a generalized deconvolution method. •Mark D. Thomson, Volker Blank, and Hartmut G. Roskos; Physikalisches Institut, Johann Wolfgang Goethe-Universität, Frankfurt, Germany.
A method to recover the intensity and phase of ultra-broadband THz pulses exceeding 100 THz bandwidth is presented, using a generalized deconvolution algorithm which incorporates an arbitrary phase-matching and non-linear response.

18:00 Poster area TUE.PI35

Ultrafast Electron Dynamics in Graphene under an Ultrashort Intense Terahertz Pulse. •Kenichi I. Ishikawa; Photon Science Center, The University of Tokyo, Tokyo, Japan.
We describe the optical response of graphene to an ultrashort intense terahertz pulse by extended optical Bloch equations, stressing the importance of the interplay of intraband and interband dynamics in the ultrafast graphene electron dynamics.

18:00 Poster area TUE.PI36

Terahertz emission from GaAs nanotips. •Tsong-Ru Tsai1, Da-Yang Huang1, and Chao-Kuei Lee2; 1Institute of Optoelectronic Sciences, National Taiwan Ocean University, Keelung 20224, Taiwan, R.O.C., 2Department of Photonics, National Sun Yat-Sen University, Kaohsiung 80424, Taiwan, R.O.C.
Terahertz emission from GaAs nanotips was studied. We found that the terahertz power from GaAs nanotips can be one- or two-orders of magnitude higher than from GaAs and depends on the length of the nanotips.

18:00 Poster area TUE.PI37

The contribution has been withdrawn.

18:00 Poster area TUE.PI38

Photoinduced Growth of Ferroelectric Charge Order in Organic Dimer-Mott Insulator. Keisuke Itoh1, Hirotake Itoh1, 2, Shinichiro Iwai1,2, Makoto
Naka1, Sumio Ishihara1,2, Shingo Saito1, Naoki Yoneyama1, and Takahiko Sasaki4; 1Department of Physics, Tohoku University, Sendai, 980-8578, Japan, 2JST-CREST, Sendai, 980-8578, Japan, 3National Institute of Informatics and Communications Technology, Koganei, 185-8795, Japan, 4Institute for material Research, Sendai, 980-8577, Japan. Optical pump and THz probe measurement showed that the photoinduced growth of the electric dipole glass or the polar nano region, as a result of the photoinduced collapse of the dimer-Mott insulator.

Gwenaelle Vaudel, Thomas Pezeril, Pascal Ruollo, and Vitalyi Gusev; Institut des Moléculès et Matériaux du Mans (IMMM), CNRS UMR 6283, avenue Olivier Messiaen, 72085 Le Mans cedex 9 France. We experimentally demonstrate that piezoelectric generation of sound can dominate in \(111\) GaAs material over the deformation potential mechanism even in the absence of static externally applied or built-in electric fields in the semiconductor.

Ultrasound Electronic Dynamics in Laser-Excited Crystalline Bismuth. 1Alexey Melnikov1, Oleg Mosiochko2, and Sergey Chekanin1; 1Institute of Spectroscopy Russian Academy of Sciences, Troitsk, Moscow Region, 142190, Russia, 2Institute of Solid State Physics Russian Academy of Sciences, Chernogolovka, Moscow Region, 142432, Russia. Femtosecond spectroscopy was applied to capture complex dynamics of nonequilibrium electrons in bismuth. Data analysis reveals significant wavevector dependence of electron-hole and electron-phonon coupling strength along the trigonal direction of the Brillouin zone.

Coherent control technique using femtosecond laser pulses is employed to manipulate squeezed two-phonon bound states in \(\text{ZnTe}(110)\), such that quantum fluctuations of the atomic displacements can be either suppressed or enhanced.

The contribution has been withdrawn.

Squeezed Thermal Phonons below the Melting Fluence in Silicon. Ewee S. Zijlstra1,2, Alan Kalitsov3,4, Tobias Zier1,2, and Martin E. Garcia1,2; 1Theoretical Physics, University of Kassel, Heinrich-Plett-Str. 40, 34132 Kassel, Germany, 2Center for Interdisciplinary Nanostructure Science and Technology (CINSaT), Heinrich-Plett-Str. 40, 34132 Kassel, Germany, 3Department of Physics, University of Puerto Rico, San Juan, PR 00931, USA. We show that thermal phonon squeezing - an ultrafast phenomenon that has not been reported before - precurses ultrafast melting of solids as a function of fluence.

The contribution has been withdrawn.
We report on magnetic field dependent four wave mixing signals emitted from a Garnet thin film. The coherent and population contributions to the magneto optical response are separately measured in a three beams configuration.

**18:00 Poster area TUE.PII.50**

Coherent phonon frequency comb generated by few-cycle femtosecond pulses in Si. ●Muneaki Hase1,2, Masayuki Katsuragawa3, Anca Monia Constantinescu2, and Hrvoje Petek1;
1Department of Physics and Astronomy, University of Pittsburgh, 3941 O’Hara Street, Pittsburgh, PA 15260, USA, 2Institute of Applied Physics, University of Tsukuba, 1-1-1 Tennodai, Tsukuba 305-8573, Japan, 3Department of Engineering Science, University of Electro-Communications, 1-5-1 Chofugaoka, Chofu, Tokyo 182-8585, Japan.

Using few-cycle femtosecond pulses in near-resonance with the direct band-gap, we demonstrate ultrafast phononic near-resonance with the direct band-gap, and using the optical index of Si, generating a frequency comb up to 109.2 THz of the LO phonon frequency.

**18:00 Poster area TUE.PII.51**

Spatiotemporal Ultrafast Plasmon Control Based on Response Functions of Nanostructures Measured by Interferometric Cross-Correlation Microscopy. ●Fumihiko Kannari, Shutarou Onishi, Miyuki Kasuba, and Jun Oi; Department of Electronics and Electrical Engineering, Keio University, 3-14-1, Hiyoshi, Kohoku-ku, Yokohama 223-8522, Japan.

Deterministic spatiotemporal control of localized plasmon excited by ultrashort laser pulses at gold nanostructures is demonstrated based on plasmon response function measured by interferometric cross-correlation using a dark-field microscope or a near-field optical microscope.

**18:00 Poster area TUE.PII.52**


Based on the use of ultrafast laser pulses, we have developed new methods for mapping the localized field-enhancements in artificially structured plasmonic nano materials. These methods combine speed, user-friendliness and high resolution.

**18:00 Poster area TUE.PII.53**


Picosecond transient absorption spectra of cadmium selenide quantum dots were measured at various excitation intensities. Exciton and multiexciton absorption cross sections were determined and analyzed in terms of the electronic states of the quantum dots.

**18:00 Poster area TUE.PII.54**

Carrier Multiplication Dynamics Studied by Single-Cycle Terahertz Pulses with Amplitudes Exceeding 1 MV/cm. ●Hideki Horig2, Keisuke Shimokita3, Masanobu Shirai1, Shuntaro Tanii1, Yutaka Kadoy1,4, and Koichiro Tanaka1,2; 1Institute for Integrated Cell-Material Sciences, Kyoto University, Kyoto, Japan, 2Core Research for Evolutional Science and Technology, Japan Science and Technology Agency, Kawaguchi, Japan, 3Department of Physics, Graduate School of Science, Kyoto University, Kyoto, Japan, 4Department of Quantum Matter, Hiroshima University, Higashihiroshima, Japan.

We demonstrate that a 1-MV/cm terahertz pulse can generate a substantial number of electron-hole pairs forming excitons in GaAs multiple quantum wells that emit near-infrared luminescence without any band-to-band photo-excitations.

**18:00 Poster area TUE.PII.55**

Ultrafast Low-Energy Dynamics of Graphite Studied by Nonlinear Multi-THz Spectroscopy. ●Christian Schmidt1, Bernhard Mayer1, Friederike Junginger1, Marc Rehbolz1, Alexander Grupp1, Daniele Brida1, Alexej Pashkin1, Rupert Huber1,2, and Alfred Leitenstorfer1; 1Department of Physics and Center for Applied Photonics, University of Konstanz, Universitätsstraße 10, 78464 Konstanz, Germany, 2address: Department of Physics, University of Regensburg, Universitätsstraße 31, 93053 Regensburg, Germany.

Ultraintense few-cycle THz pulses are employed to study the nonlinear response of graphite. Strong pump-probe signals provide insight into ultrafast dynamics and spectral response of the low energy charge carriers.

**18:00 Poster area TUE.PII.56**

Effect of Bridge on Energy Transfer and Photoinduced Charge Separation in Perylene-Diimide-Naphthalene-Diimide-Hexathiophene Based Donor-Bridge-Acceptor Triads. ●Julia Zaks1,2, Jinbin Sun3,4, Saar Kirmayer1,3, Jeffrey Urban2, Don Tilley2, Rachel Segalman1,3,5, and Graham Fleming1,2,4; 1Applied Science and Technology Graduate Group, University of California, Berkeley, Berkeley, California, 94720, USA, 2Department of Chemistry, University of California, Berkeley, Berkeley, California, 94720, USA, 3Department of Chemical and Biomolecular Engineering, University of California, Berkeley, Berkeley, California, 94720, USA, 4Physical Biosciences Division, Lawrence Berkeley National Laboratory, 1 Cyclotron Road, Berkeley, California, 94720, USA, 5The Molecular Foundry and Materials Science Division, Lawrence Berkeley National Laboratory, 1 Cyclotron Road, Berkeley, California, 94720, USA.

Femtosecond transient absorption spectroscopy is performed to assess bridge effects on energy transfer and charge separation in molecular junctions. The chemical structure of bridge has a strong effect on yields and rates of relaxation pathways.

**18:00 Poster area TUE.PII.57**

Photoinduced charge transfer between Indoline D149 and porous ZnO detected in transient absorption. ●Egmont Rohwer1, Christian Liwiński2, Kerstin Strauch3, Christoph Richter3, Tchelbo Nyokong4, Derck Schlettwein4, and Heinrich Schwöer1; 1Stellenbosch University, Stellenbosch, South Africa, 2Rhodes University, Grahamstown, South Africa, 3Justus-Liebig-Universitaet, Giessen, Germany.

The photophysics of charge transfer between electron donating, surface adsorbed D149 dye and electron accepting ZnO, for systematic variations of the production scheme, was investigated by measuring excited state lifetimes using ultrafast transient absorption spectroscopy.
Multi-carrier complexes in single-walled carbon nanotubes: generation mechanisms and dynamics, Bertrand Yuma1, Stéphane Berciaud1, Jean Besbas1, Sylvia Santos2, Jonah Shaver2, Laurent Cognet2, Mathieu Gallart1, Bernd Hönerlage3, Braham Lounis1, and Pierre Gillioz1; 1IPCMS, UMR 7504, CNRS and Université de Strasbourg, 23, rue du Loess, F-67034 Strasbourg, France, 2LPSN, UMR 5298, Université de Bordeaux, Institut d’Optique - Graduate School and CNRS, 351, cours de la Libération, F-33405 Talence, France.

We observe induced absorption signal on single-wall carbon nanotubes that we attribute to trion generation. The dynamics of the charge carrier gas generation and of the multiple carrier complex formation are described.

Dynamics of Ultrafast Interfacial Electron Injection on Phase-Transition Mechanism, Kannatasan Appavo1,2, Nathaniel Brady1, Minah Seo3, Joyeehta Nag4, Rohit Prasankumar4, David Hilton1, and Richard Haglund1,2,5; 1Interdisciplinary Materials Science, Vanderbilt University, Nashville, TN 37235-0106, USA, 2Institute for Nanoscale Science and Engineering, Vanderbilt University, Nashville, TN 37235-0106, USA, 3Department of Physics, University of Alabama at Birmingham, Birmingham AL 35294 USA, 4Center for Integrated Nanotechnologies, Los Alamos National Laboratory, Los Alamos, NM 87545 USA, 5Department of Physics and Astronomy, Vanderbilt University, Nashville, TN 37235-1807, USA.

A novel all-optical method of triggering phase-transition in vanadium dioxide single-wall carbon nanotubes that we observe induced absorption signal on single-wall carbon nanotubes.

Ultrafast dynamics of biomimetic porphyrins in the gas phase, Minh-Huong Ha-Thi1, Niloofar Shaficadde1, Lionel Poisson2, and Benoit Soep; 1Institut des Sciences Moléculaires d’Orsay UMR 8214, CNRS, Université Paris Sud 11, Bat 210, 91405 Orsay Cedex, France, 2Laboratoire Francis Perrin CEA/DSM/IRAMIS/SPAM * CNRS URA 2453, CEA Saclay, 91191 Gif-sur-Yvette Cedex, France. The ultrafast dynamic behavior of a family of iron porphyrins, has been investigated by femtosecond pump-probe spectroscopy in the gas phase. A simple relaxation mechanism is proposed in order to explain the multistep deactivation observed.

Microscopic origin of higher-order Kerr effect in gases, Pierre Béjot1, Eric Cormier2, Edouard Hertz3, Bruno Lavorel1, Jérome Kasparian4, Jean-Pierre Wolf5, and Olivier Faucher1; 1Laboratoire Interdisciplinaire Carnot de Bourgogne (ICB), UMR 5209 CNRS-Université de Bourgogne, BP Zürich, Wolfgang-Pauli-Strasse 10, CH-8093 Zurich, Switzerland, 2Laboratoire for Catalysis and Sustainable Chemistry, Paul Scherrer Institute, CH-5232 Villigen, Switzerland. Our ultrafast pump-probe experiment combines the liquid microjet technique with a high harmonic photoionization source and an attosecond interferometer. This enables the investigation of electron dynamics and electronically excited states of solvated complexes and nanoparticles.

Model-free Investigation of Ultrafast Bimolecular Chemical Reactions: Bimolecular Photo Induced Electron Transfer, Bernhard Lang, Arnulf Rosspeintner, and Eric Vauthey; 1Department of Physical Chemistry, University of Geneva, Switzerland.

18:00 Poster area TUE.PII.58

18:00 Poster area TUE.PII.59

18:00 Poster area TUE.PII.60

18:00 Poster area TUE.PII.61

18:00 Poster area TUE.PII.62

18:00 Poster area TUE.PII.63

18:00 Poster area TUE.PII.64

18:00 Poster area TUE.PII.65

18:00 Poster area TUE.PII.66
Using photo induced bimolecular electron transfer reactions as example, we demonstrate how diffusion controlled bimolecular chemical reactions can be studied in a model-free manner by quantitatively combining different ultrafast spectroscopical tools.

18:00 Poster area TUE.PII.68
Ultrafast Ring-Opening Reactions: A Comparison of α-Terpinene, α-Phellandrene, and 7-Dehydrocholesterol with 1,3-Cyclohexadiene, Brenten Arruda, Edwin Nájera, Broc Smith, Kenneth G. Spears, and Roseanne J. Sension; Department of Chemistry, Department of Physics, and Program in Biophysics, University of Michigan.

Broadband ultrafast transient absorption spectroscopy was used to study excited state dynamics and ground state relaxation following excitation of the 1,3-cyclohexadiene chromophore in four related compounds. Two distinct classes of behaviour were observed.

18:00 Poster area TUE.PII.69
Time-resolved predissociation of the first Rydberg state of CH3I. Nicolas Thire1,2, Raluca Cireasa1, David Staedler1, Stephen T. Pratt2, and Valérie Blanchet1; Laboratoire Collisions Agrégats Réactivité - IRSAMC - Université de Toulouse III, 118 route de Narbonne, Toulouse, France, 2Institut National de la Recherche Scientifique, Université du Québec, 1650 Blvd Lionel-Boulet, Varennes, J3X1S2, Québec, Canada, 3Argonne National Laboratory, 9700 S. Cass Avenue, Lemont, IL 60439, USA.

Predissociation dynamics of the first Rydberg state of CH3I has been studied by femtosecond-resolved VMI. Particularly, the angular distributions and rise times of fragments differ significantly because of an alignment effect of methyl.

18:00 Poster area TUE.PII.70
Coherent Nuclear Wave Packet Dynamics of Laurdan Launched by Intramolecular Charge Transfer. So Young Kim and Taitha Joo; Department of Chemistry, Pohang University of Science and Technology (POSTECH), Pohang 790-784, South Korea.

Coherent nuclear wave packets in the product launched by the ultrafast intramolecular charge transfer are observed by time-resolved fluorescence with 40 fs time resolution. Direct information on reaction coordinates and structural changes can be obtained.

18:00 Poster area TUE.PII.71
Femtosecond two-photon ionization of fluid ammonia at 9.3 eV, Janus Urbanek, Annika Dahmen, Joel Torres-Alacun, and Peter Vöhringer; Institut for Physical and Theoretical Chemistry, University of Bonn, Wegelerstrasse 12, 53115 Bonn, Germany.

Solvated electrons are generated in liquid-to-supercritical ammonia by two-photon ionization with 266-nm, 100-fs pulses via the conduction band of the solvent. Their ion-pair mediated recombination dynamics is observed in the time-domain through femtosecond near-infrared spectroscopy.

18:00 Poster area TUE.PII.72
Ultrafast One-Photon (232 vs 266 nm) Bond-Selective Photochemistry of Bromoiodomethane (CHBrI) in Solution, Evgeniya Butaeva, Andrey Mereshenko, Maxim Panov, and Alexander Tarnovsky; Department of Chemistry, Center for Photochemical Sciences, Bowling Green State University, Bowling Green, Ohio 43403, USA.

Ultrafast broadband transient absorption spectra measured from the deep-ultraviolet to the near-infrared region following single-photon excitation of bromoiodomethane in acetonitrile at different wavelengths manifest chromophore-selective structural rearrangement and carbon-halogen bond dissociation in solution.

18:00 Poster area TUE.PII.73
Shedding Light on Ultrafast Dynamics and Excited States with Real-Time Time-Dependent Density Functional Theory. Kenneth Lopata and Niranjan Govind; Environmental Molecular Sciences Laboratory, Pacific Northwest National Laboratory, Richland, WA USA.

We discuss real-time time-dependent density functional theory, a powerful first principles computational tool for modelling femtosecond-scale electron dynamics. We then demonstrate its utility for describing and visualizing excitations (linear, nonlinear, valence, core, singlet-triplet, spin-orbit).

18:00 Poster area TUE.PII.74
Measuring Enzyme Binding Using Shaped Ultrafast Laser Pulses, Brett J. Pearce1, Chien-hung Tseng2, and Thomas C. Weinacht2; 1Department of Physics and Astronomy, Dickinson College, Carlisle, PA 17013, USA, 2Department of Physics and Astronomy, Stony Brook University, Stony Brook, NY 11794, USA.

We use multiphoton quantum-control spectroscopy to discriminate between unbound and enzyme-bound reduced nicotinamide adenine dinucleotide molecules in solution. Pulse-shape dependent fluorescence allows us to measure enzyme binding without spectrally resolving the emitted light.

18:00 Poster area TUE.PII.75
Do triplet states contribute to the formation of Cyclobutane Pyrimidine Dimers in DNA? Bert Pilles1, Dominik Bacher1, Julia Kubon2, Peter Gilch3, Wolfgang Zinth1, and Wolfgang Schreier1; Lehrstuhl für BiMolekulare Optik, Ludwig-Maximilians-Universität München, Oettingenstr. 67, 80538 München, Germany, 2Institut für Physikalische Chemie, Heinrich-Heine-Universität Düsseldorf, Universitätsstr. 1, 40225 Düsseldorf, Germany.

Cyclobutane pyrimidine dimers are the major photoproducts in DNA exposed to UV radiation. Time-resolved vibrational spectroscopy shows that CPD lesions are formed ultrafast while triplet states are quenched without contributing to the overall CPD yield.

18:00 Poster area TUE.PII.76
Quantum coherence controls the charge separation in a prototypical artificial light harvesting system. Sarah M. Falke1, Carlo A. Rozzi2, Nicola Spallanzani2, Angel Rubio2, Elisa Molinar2, Daniele Brida3, Margherita Maiuri4, Giulio Cerullo5, Heiko Schramm5, Jens Christoffers5, and Christoph Lienau5; 1Carl von Ossietzky Universität Oldenburg, 26129 Oldenburg, Germany, 2CNR, Centro S3, Centro S3, via Campi 213a, I-41125 Modena, Italy, 3Fritz-Haber-Institut der Max-Planck-Gesellschaft, 14195 Berlin, Germany, 4IFN-CNR. Politecnico di Milano, Piazza L. da Vinci 32, I-20133 Milano, Italy.

Ultrafast spectroscopy and quantum-dynamics simulations of an artificial supramolecular light-harvesting system provide strong evidence that the quantum-correlated wavelike motion of electrons and nuclei governs the ultrafast electronic charge transfer.
and Departments of Chemistry and Physics, University of Toronto, 80 St. George Street, Toronto, Ontario M5S 3H6, Canada, 2Department of Biochemistry, University of Toronto, 1 King’s College Circle, Toronto, Ontario M5S 1A8, Canada, 3Max Planck Research Department for Structural Dynamics, Department of Physics, University of Hamburg, Centre for Free Electron Laser Science, DESY, Notkestrasse 85, D-22607 Hamburg, Germany, 4Department of Medical Genetics, University of Toronto, 1 King’s College Circle, Toronto, Ontario M5S 1A8, Canada.

We observe, using electronic two-dimensional photon echo spectroscopy, that the cis and trans potential energy surfaces of the ultrafast isomerization of retinal in bacteriorhodopsin are mixed via the hydrogen out of plane (HOOP) mode.

18:00 Poster area TUE.PII.78

Photophotophysical Processes of the spectrosopic RNA probe 2-(1-Ethynylpyrene)-Adenosine (PyA).

Peter Trojanowski1, Andreas Reuss1, Christian Grünewald2, Joachim Engels2, and Josef Wachtveitl3, 1Institut für Physikalische und Theoretische Chemie, Johann Wolfgang Goethe-Universität, Max-von-Laue-Str. 7, 60438 Frankfurt am Main, Germany, 2Institut für Organische Chemie, Johann Wolfgang Goethe-Universität, Max-von-Laue-Str. 7, 60438 Frankfurt am Main, Germany.

We examine the photoinduced excited state dynamics of pyrene modified adenosine (PyA), a versatile probe for RNA folding and hybridization in different solvents with respect to excimer formation and charge transfer character.

18:00 Poster area TUE.PII.79

Mixed Potential Energy Surfaces of the Ultrafast Isomerization of Retinal in Bacteriorhodopsin. Philip J. M. Johnson1, Alexei Halpin1, Takefumi Morizumi2, Valerlyn I. Prokhorenko3, Oliver Miller4, 1Institute for Optical Sciences and Departments of Chemistry and Physics, University of Toronto, 80 St. George Street, Toronto, Ontario M5S 3H6, Canada, 2Department of Biochemistry, University of Toronto, 1 King’s College Circle, Toronto, Ontario M5S 1A8, Canada, 3Advanced Ultrafast Laser Research Center, University of Electro-communications, 1-5-1 Chofugaoka, Chofu, Tokyo 182-8585-Japan, 4Department of Electrophysics, National Chiao-Tung University, 1001 Ta Hsueh Rd., Hsinchu 300 Taiwan, 5Institute of Laser Engineering, Osaka University, 2-6 Yamada-oka, Uonita, Osaka 565-0971 Japan.

Time-resolved transient absorption spectroscopy for a water solution of cytosine with sub-10fs deep ultraviolet laser pulse is reported. Ultrafast electronic excited state dynamics and recombination are simultaneously observed.

18:00 Poster area TUE.PII.80

Electronic Excited State and Vibrational Dynamics of Water Solution of Cytosine Observed by Time-resolved Transient Absorption Spectroscopy with Sub-10fs Deep Ultraviolet Laser Pulse. Jun Miyazaki1,2, Yaichiro Kida1,2, and Takayoshi Kobyashi1,2,3,4, 1Advanced Ultrafast Laser Research Center, University of Electro-communications, 1-5-1 Chofugaoka, Chofu, Tokyo 182-8585-Japan, 2Department of Electrophysics, National Chiao-Tung University, 1001 Ta Hsueh Rd., Hsinchu 300 Taiwan, 3Institute of Laser Engineering, Osaka University, 2-6 Yamada-oka, Uonita, Osaka 565-0971 Japan.

18:00 Poster area TUE.PII.81

Photoexcitation dynamics of nitric oxide bound ferric myoglobin probed by femtosecond IR spectroscopy.

Jaehyun Park1, Taegon Lee2, Jaehun Park3, and Manho Lim4, 1Department of Chemistry and Chemistry Institute for Functional Materials, Pusan National University, Busan 609-735 Korea, 2Pohang Accelerator Laboratory, Pohang 790-784 Korea.

Time-resolved vibrational spectra show that photolysis quantum yield of NO bound ferric myoglobin is smaller than 0.86, the delayed NO gernimately rebinds with subnanosecond time scale, and the rebinding kinetics depends on protein conformation.

18:00 Poster area TUE.PII.82

Ultrafast Slaving Dynamics at the Protein-Water Interface Studied with 2DIR Spectroscopy. John King and Kevin Kubarych, University of Michigan, Ann Arbor MI, 48109.

The dynamics of hen egg white lysozyme in D2O/glycerol mixtures is studied using two-dimensional infrared spectroscopy. The hydration dynamics and the protein dynamics are studied simultaneously through vibrational probes attached to the protein surface.

18:00 Poster area TUE.PII.83

Different structural motifs driving coherent energy migration in light-harvesting antenna complexes. Elisabetta Collini, Dipartimento di Scienze Chimiche, Università di Padova, via Marzolo 1, 35131 Padova, Italy.

Evidences for coherent energy transport under biological relevant conditions are reported for the light harvesting antenna phycocerythrin PE555 from the marine cryptophyte Hemiselmis refuscens CCMP644, using two-dimensional photon echo spectroscopy.
WEDNESDAY

WED.1: Photosynthesis
Chair: Graham Fleming, University of California at Berkeley, CA, USA
8:30–10:15 Room 350/351 WED.1

8:30 Room 350/351 WED.1.1

Invited Persistent Quantum Coherence in Single Light-Harvesting Complexes. Richard Hildner1,2, Daan Brinks1, Richard J. Cogdell2, and •Niek van Hulst1,2; 1ICFO - Institute of Photonic Sciences, 08860 Castelldefels (Barcelona), Spain, 2ICREA - Institut Catalana de Recerca i Estudis Avancats, 08015 Barcelona, Spain, 3University of Glasgow, 126 Place, Biomedical Research Centre, IBLS, 74203 University of Glasgow, Glasgow G12 8TA, United Kingdom, 4Universitat Bayreuth, 95440 Bayreuth, Germany.
We demonstrate ultrafast quantum coherent energy transfer within single light-harvesting complexes (LH2) under physiological conditions: The quantum coherence persists at least 400 fs. Strikingly, changing transfer pathways in individual complexes are revealed on second timescale.

9:00 Room 350/351 WED.1.2
Broadband 2D Electronic Spectroscopy Reveals Coupling Between Dark 1Bu-State of Carotenoid and Qx State of Bacteriochlorophyll. •Evgeny Ostrovoumov1, Rachel Mulvaney2, Richard Cogdell2, and Gregory Scholes1; 1Department of Chemistry, University of Toronto, 80 St. George St., Toronto, ON, M5S 3H6, Canada, 2Glasgow Biomedical Research Centre, IBiLS, University of Glasgow, 126 Place, Glasgow G12 8TA, Scotland, UK.
The study of LH2 protein of purple bacteria by broadband 2D electronic spectroscopy is presented. The dark 1Bu-carotenoid state is directly observed in 2D spectra and its role in carotenoid-bacteriochlorophyll interaction is discussed.

9:15 Room 350/351 WED.1.3
Oscillatory Dynamics in Bacterial Reaction Centres Studied by Electronic 2D Spectroscopy. David Palecek1, Sebastian Westenhof2, Petra Edlund2, Philip Smith2, and •Donatas Zigmanas2; 1Department of Chemical Physics, Lund University, P.O. Box 124, 221 00 Lund, Sweden, 2Department of Chemistry, University of Gothenburg, Medicinaregatan 9C, 40530 Gothenburg, Sweden.
Coherent dynamics in bacterial reaction centres were studied by electronic 2D spectroscopy at 80 K temperature. Polarization measurements allowed assignment of observed beatings at different frequencies to electronic and vibrational coherences.

9:30 Room 350/351 WED.1.4
Continuum probe two-dimensional electronic spectroscopy of the photosystem II reaction center. Franklin Fuller1 and •Jennifer Ogilvie1,2; 1Department of Biophysics, University of Michigan, Ann Arbor, Michigan 48109, 2Department of Physics of University of Michigan, Ann Arbor, Michigan 48109.
We report two-dimensional electronic spectroscopy of the photosystem II reaction center, collected in the pump-probe geometry employing a continuum probe. This enables observation of ion bands that report on intermediates in the charge separation process.

9:45 Room 350/351 WED.1.5
Two-Dimensional Electronic Spectroscopy of a Model Dimer System. •Alexei Halpin1, Philip J.M. Johnson1, R. Scott Murphy2, Valenty I. Prokhorenko3, and R.J. Dwayne Miller1,2; 1Institute for Optical Sciences and Departments of Chemistry and Physics, University of Toronto, 80 St. George Street, Toronto, Ontario MSS 3H6, Canada, 2Department of Chemistry and Biochemistry, University of Regina, 3737 Wascana Parkway, Regina, SK, S4S 0A2, Canada, 3Max Planck Research Department for Structural Dynamics, Department of Physics, University of Hamburg, Centre for Free Electron Laser Science, DESY, Notkestrasse 85, D-22607 Hamburg, Germany.
Two-dimensional spectra of a dimer were measured to determine the timescale for electronic decoherence at room temperature. Anti-correlated beats in the crosspeaks were observed only during the period corresponding to the measured homogeneous lifetime.

10:00 Room 350/351 WED.1.6
Quantitative Analysis of Quantum-Coherent Dynamics from Algal Light-Harvesting Proteins. •Daniel Turner and Gregory Scholes; University of Toronto, Toronto Ontario, Canada.
We present broadband two-dimensional electronic spectra of light-harvesting proteins from photosynthetic algae. We describe methods used to distinguish electronic from vibrational contributions to the quantum coherence using quantitative analysis.

Coffee Break
10:15–10:45

WED.2A: Ultrafast Currents and Metamaterials and Polaron Dynamics
Chair: Eberhard Riedle, Ludwig-Maximilians-University, Munich, Germany
10:45–12:30 Auditorium A WED.2A

10:45 Auditorium A WED.2A.1
Doppler Velocimetry of Spin and Charge Currents in the 2D Fermi Gas. •Jake Koralek1, Luyi Yang1,2, D.R. Tibbetts3, J.L. Reno3, M.P. Lilly3, and Joe Orenstein1,2; 1Materials Science Division, Lawrence Berkeley National Laboratory, Berkeley, California 94720, USA, 2Department of Physics, University of California, Berkeley, California 94720, USA, 3Sandia National Laboratories, Albuquerque, New Mexico 87123, USA.
Phase-sensitive transient grating spectroscopy is used to measure the Doppler shift of light diffracted off moving spin and charge density waves, allowing complete characterization of spin and charge transport in the 2D Fermi gas.

11:00 Auditorium A WED.2A.2
Ultrabroadband Field-Resolved Spectroscopy Utilizing Femtosecond Quantum Interference Control of Electrical Currents. •Claudia Ruppert, Jan Lohrenz, Sebastian Thunich, Elmar Sternemann, and Markus Betz; Experimentelle Physik 2, TU Dortmund, 44227 Dortmund, Germany.
w2w pulse pairs induce phase-sensitive electrical currents in a time-integrating semiconductor detector. Fourier analysis of the current interferogram reveals amplitude and phase of the driving fields. Pump-probe experiments combine femtosecond temporal and "mrad phase resolution.

11:15 Auditorium A WED.2A.3
Two-pulse space-time photocurrent correlations at graphene p-n junctions reveal hot carrier cooling dynamics near the Fermi level. •Matt Graham1,2, Su-Fei Shi1,2, Daniel Ralph1,2, Jiwoong Park1,2, and Paul McEuen1,2,3; 1Kavli Institute at Cornell for Nanoscale Science, Ithaca, NY, USA, 2Laboratory for Atomic and Solid State Physics, Cornell University, Ithaca, NY, USA, 3Department of Chemistry and Chemical Biology, Cornell Univ., Ithaca, NY, USA.
Two-pulse excitation at graphene p-n junctions results in strong temporal and spatial pulse correlations in photocurrent generation. We show this transient photocurrent response measures graphene hot carrier cooling that is dominated by acoustic phonon super-collisions.

11:30 Auditorium A  WED.2A.4

Ultrafast nonlineairties of metallic 3D metamaterials, •Petros Farah, Stefano Salvatore, Silvia Vignolini, Ulli Steiner, and Jeremy Baumberg; Nanophotonics Centre, Cavendish Laboratory, University of Cambridge, United Kingdom.

Block-copolymer-based self-assembly is used to produce highly anisotropic 3D gyroidal metamaterials exhibiting novel optical properties. Ultrafast electron dynamics investigated by pump-probe spectroscopy shows the strong influence of their ultrahigh high surface area and plasmonic birefringence.

11:45 Auditorium A  WED.2A.5

Ultrafast polariton dynamics in an organic semiconductor microcavity, •Tersilla Virgili1, David Coles2, Ali M. Adawi1, Casper Clark1, Paolo Michetti3, Sai Kiran Rajendran1, Daniele Brida1, Dario Polli1, Giulio Cerullo1, and David G. Lidzey1; 1IFN, CNR Dipartimento di Fisica, Politecnico di Milano, Piazza Leonardo Da vinci 32, 20132 Milano Italy, 2Department of Physics and Astronomy, University of Sheffield, Hicks Building Hounsfield Road Sheffield S379 RH, UK, 3Helia Photonics Ltd.

We study an organic semiconductor microcavity operating in the strong coupling regime using femtosecond microcavity operating in the strong coupling regime using femtosecond pump-probe spectroscopy. By probing the photo-induced absorption bands, we characterize the time-dependent population densities of states in the two polariton branches.

12:00 Auditorium A  WED.2A.6

Efficient ultrafast optical switching of surface plasmon polaritons, Pohl Martin1, Belotelov Vladimir2,3,4, Akimov Ilya1,4, Kasture Sachin1, Vengurlekar Arvind2, Gopal Achanta2, Zvezdin Anatoly3, Yakovlev Dmitri1,4, and Bayer Manfred1; 1Experimentelle Physik 2, Technische Universität Dortmund, 44221 Dortmund, Germany, 2M.V. Lomonosov Moscow State University, 119991 Moscow, Russia, 3A.M. Prokhorov General Physics Institute, Russian Academy of Sciences, 119992 Moscow, Russia, 4F. Ioffe Physical-Technical Institute, Russian Academy of Sciences, 194021 St. Petersburg, Russia, 5Tata Institute of Fundamental Research, 400005 Mumbai, India.

We demonstrate that the dispersion of surface plasmon polaritons in a periodically perforated gold film can be efficiently manipulated on a sub-ps timescale in spectral regions far from the intrinsic gold resonances.

12:15 Auditorium A  WED.2A.7

Exciton-Polariton Ultrafast Stark Effect, •Christoph Lange1, Alex Hayat1, Lee Rozema1, Ardavan Darabi1, Heny van Driel1, Aephraim Steinberg1, Bryan Nelson2, David Snoke2, Loren Pfeiffer2, and Kenneth West1; 1Department of Physics, Centre for Quantum Information and Quantum Control, and Institute for Optical Sciences, University of Toronto, Toronto, Ontario M5S 1A7, Canada, 2Department of Physics and Astronomy, University of Pittsburgh, Pittsburgh, Pennsylvania 15260, USA, 3Department of Electrical Engineering, Princeton University, Princeton, New Jersey 08544, USA.

We demonstrate ultrafast phase control of exciton-polaritons in a GaAs/AlGaAs strongly coupled microcavity exploiting the AC Stark effect. Radian-scale phase shifts are achieved without carrier generation, providing a powerful tool towards control of polariton BECs.

13:30 Auditorium A  WED.2B.1

Chirped Auger electron emission due to field-assisted post-collision interaction, •Bernd Schütte1,2, Sebastian Bauce1, Ulrike Frühling1, Marek Wieland1, Michael Gesch1,2, Elke Plönjes1, Thomas Gaumüller1, Armin Azima1, Michael Bonitz1, and Markus Drescher1; 1Universität Hamburg, Germany, 2Christian-Albrechts-Universität Kiel, Germany, 3Max-Born-Institut Berlin, Germany, 4Deutsches Elektronen-Synchrotron DESY, Hamburg, Germany, 5Helmholtz-Zentrum Dresden-Rossendorf, Germany.

We have investigated the Auger decay in xenon and krypton atoms in a terahertz streaking field. Linewidth asymmetries suggest a chirped Auger electron emission which can be understood by field-assisted post-collision interaction.

14:00 Auditorium B  WED.2B.2

Ultrafast Nonlinear Double Excitations of He in Intense EUV FEL Fields, •Mizuho Fushitani1, Yasumasa Hisokasa2, Akitaka Matsuda1, Toru Morishita1, C.-N. Liu4, Eiji Shigemasa3, and Akiyoshi Hishikawa2; 1Nagoya University, Nagoya, Japan, 2University of Electro-Communications, Chofu, Japan, 3Fu-Jen Catholic University, Taipei, Taiwan, 4Institute for Molecular Science, Okazaki, Japan.

Three-photon double excitation of He in intense EUV FEL fields is studied by the shot-by-shot photoelectron spectroscopy, revealing the enhancement by resonances to the doubly excited states converging to the He+ N=3 level.

14:15 Auditorium B  WED.2B.3

Synchronization of FEL and high-order harmonics of ultrashort-pulsed laser for generating intense full-coherent EUV light pulses, •Atsushi Iwasaki1,2, Takahiro Sato1, Shigeki Owada1,2, Tadasa Togashi2, Eiji J. Takahashi4, Katumi Midorikawa5, Makoto Aoyama6, Koichi Yamakawa6, Shinichi Matsubara7, Yaichi Okayasu7, Hiromitsu Tomizawa7, Takahiro Watanabe7, Mitsuhiro Nagasono8, Makina Yabashi7, Tetsuya Ishikawa7, and Kaoru Yamanouchi1,2; 1Department of Chemistry, Graduate School of Science, The University of Tokyo, 7-3-1 Hongo, Bunkyo-ku, Tokyo 113-0033, Japan, 2RIKEN Harima Institute, RIKEN SPRing-8 Center, 1-1-1, Kato, Sayo-cho, Sayo-gun, Hyogo 679-5148, Japan, 3Spring-8/Japan Synchrotron Radiation Research Institute, 1-1-1, Kato, Sayo-cho, Sayo-gun, Hyogo 679-5189, Japan, 4RIKEN Advanced Science Institute, Hirosawa 2-1, Wako, Saitama 351-0198, Japan, 5Kansai Photon Science Institute (Kizu), Japan Atomic Energy Agency, 8-1-7 Umemidai, Kizukawa-cho, Kyoto 619-0215, Japan.

Seeding of free-electron laser by the 13th harmonic of ultrashort-pulsed 800 nm laser light was achieved and a new EO-type synchronization technique to generate intense full-coherent pulsers in the extreme ultraviolet wavelength region was developed.
First experimental realization of an atomic inner-shell x-ray laser in the keV photon-energy regime. Nina Rohringer, Max Planck Advanced Study Group, Center for Free-Electron Laser Science, c/o DESY, 22607 Hamburg, Germany.

Using ultra short, high-intensity pulses from an x-ray free-electron laser, we achieved saturated amplification of spontaneous emission of an inner-shell transition in atomic Neon at 849 eV photon energy, thereby realizing the first atomic x-ray laser.

12:00 Auditorium B WED.2B.5

- Matthias Hoffmann, Ivanova Grigours, Hubertus Bromberger, Sebastian Huber, Gilles Doumy, John Costello, Thomas Kelly, Christopher Behrens, Stefan Duestner, Holger Schlarb, Nikolay Kababich, Andrzej Kazansky, Tommaso Mazzuca, Michael Meyer, Paul Rudolph, Thomas Tsentscher, Wolfram Helm, Reinhard Kienberger, Andreas Maier, Wolfgang Schweinberger, Louis DiMauro, Christoph Bostedt, John Bozek, Ryan Coffee, Yuantao Ding, Jerome Hastings, Sebastian Schorb, Marc Messerschmidt, and Adrian Cavalleri.
- Linac Coherent Light Source, SLAC National Accelerator Laboratory, Menlo Park, CA 94025, USA.
- Max-Planck Research Department for Structural Dynamics, University of Hamburg, CFEL, Notkestrasse 85, 22607 Hamburg, Germany.
- Argonne National Laboratory, Argonne, IL 60439, USA.
- School of Physical Sciences and NCPST, Dublin City University, Dublin 9, Ireland.
- DESY, Notkestrasse 85, 22607 Hamburg, Germany.
- European XFEL, Albert-Einstein-Ring 19, 22761 Hamburg, Germany.
- IKERBASQUE, Basque Foundation for Science, E-48011, Bilbao, Spain.
- DIPC, E-20018 SanSebastian/Donostia, Spain.
- Max Planck Institute of Quantum Optics, Hans-Kopfermann-Str. 1, 85748 Garching, Germany.
- Department of Physics, The Ohio State University, Columbus, OH 43210, USA.

We have achieved temporal profile and time-of-arrival characterization of ultrafast x-rays at free electron lasers by using strong-field single-cycle terahertz pulses, extending the techniques of photoelectron streaking originally developed in the field of attosecond metrology.

12:15 Auditorium B WED.2B.6

Coherent Lensless Imaging with Ultra-Broadband Sources.
- Stefan Witte, Daniël Noom, and Kjeld S. E. Eikema, LaserLab Amsterdam, VU University, De Boelelaan 1081, 1081 HV Amsterdam, The Netherlands.
- We demonstrate high-resolution coherent lensless imaging using an octave-spanning laser. The use of two time-delayed pulses removes all spectral bandwidth limitations, enabling efficient lensless imaging with the full spectrum of ultra-broadband sources.

Lunch Break 12:30–14:00

WED.3: Short Wavelengths and Applications

Chair: Nina Rohringer, Center for Free-Electron Laser Science (CFEL), Hamburg, Germany

14:00 Room 350/351 WED.3.1

Invited

A New Frontier in Nonlinear Optics: Bright Coherent Ultrafast Kiloelectronvolt X-rays on a Tabletop.
- University of Colorado at Boulder, Boulder, CO 80309 USA.
- Photonics Institute, Vienna University of Technology, Vienna 1040, Austria.
- School of Applied and Engineering Physics, Cornell University, Ithaca, NY, USA.
- Grupo de Investigación en Óptica Extrema, Universidad de Salamanca, Salamanca E37008, Spain.

We demonstrate the most extreme phase-matched nonlinear upconversion process to date, coherently combining >5001 mid-infrared femtosecond laser photons to generate bright ultra high harmonics spanning the electromagnetic spectrum from the UV to >1.6 keV.

14:30 Room 350/351 WED.3.2

Resonant Soft X-ray Diffraction probes the Verwey Transition in Mangnetite ultrafast.
- Helmholtz-Zentrum Berlin für Materialien und Energie, 12489 Berlin, Germany.
- SLAC National Accelerator Laboratory, Menlo Park, CA 94025, USA.
- Physikalisches Institut, Universität zu Köln, 50937 Köln, Germany.
- Department of Physics and Center for Free-Electron Laser Science, Universität Hamburg, 22766 Hamburg, Germany.
- Institut für Physik und Astronomie, Universität Potsdam, 14476 Potsdam, Germany.
- School of Materials Engineering, Purdue University, West Lafayette, Indiana 47907, USA.

We studied the Verwey-transition of magnetite apart from equilibrium using time-resolved soft x-ray diffraction at the free-electron-laser LCLS. We get direct insight into the “melting” of charge and orbital order and the lattice response.

14:45 Room 350/351 WED.3.3

A direct view onto the carrier dynamics in graphite at the K point.
- Institut für Experimentelle und Angewandte Physik, Christian-Albrechts Universität zu Kiel, D-24098 Kiel, Germany.

Time-resolved XUV photoemission spectroscopy is employed to monitor the dynamics of excited photo-carriers in graphite at the Brillouin zone boundary. The experiment provides direct access to the momentum region relevant for optical excitation and relaxation.

15:00 Room 350/351 WED.3.4

Single shot characterization of magnetic nano-domains using table-top femtosecond laser harmonics.
- CEA-Saclay, IRAMIS, Service des Photons, Atomes et Molécules, 91919 Gif-sur-Yvette, France.
- Laboratoire d’Optique Appliquée, ENSTA ParisTech CNRS Ecole Polytechnique, Chemin de la
Dynamic evolution of spin ordering across the insulator-metal transition in a correlated manganite. 

Shuyan Zhou1,2,3, Yi Zhu1, Matthew Langner1, Yi-De Chuang2, Thorn Glover2, Marcus Hertlein2, Yasuhide Tomioka4, Yoshi Tokura5,6, Dung-Hai Lee7, Zahid Hussain8, and Robert Schoenlein9; 1Materials Sciences Division, Lawrence Berkeley National Laboratory, Berkeley, CA 94720, USA, 2Advanced Light Source, Lawrence Berkeley National Laboratory, Berkeley, CA 94720, USA, 3Department of Physics, Tsinghua University, Beijing 100084, China, 4Electronics and Photonics Research Institute (ESPRIT), National Institute of Advanced Industrial Science and Technology (AIST) Tsukuba Central 4, I-1-1 Higashi Tsukuba 305-8562, Japan, 5Department of Applied Physics, University of Tokyo, Bunkyo-ku, Tokyo 113-8656, Japan, 6Cross-Correlated Materials Research Group (CMRG) and Correlated Electron Research Group (CERG), Advanced Science Institute, RIKEN, Wako 351-0198, Japan.

We report direct experimental results on the dynamic evolution of CE-type spin ordering covering a temporal window from ~100 fs to tens of seconds and reveal novel physics involved in the insulator-metal transition in Pr0.7Ca0.3MnO3. 

15:30 Room 350/351 WED.3.6

Probing the timescale of the exchange interaction in a ferromagnetic alloy.

Stefan Mathias1,2, Chan La-o-vorakiat3, Patrik Grychtol1,2, Patrick Granitzka1,2, Emrah Turgut1, Justin Shaw1, Roman Adam1, Hans Nembach2, Mark Siemens1, Steffen Eich1, Claus Schneider1, Thomas Silvia1, Martin Aeschlimann1, Margaret Murnane1, and Henry Kapteyn1; 1Department of Physics and JILA, University of Colorado, Boulder, Colorado 80309-0440, USA, 2University of Kaiserslautern and Research Center OPTIMAS, 67663, Kaiserslautern, Germany, 3Peter Grünberg Institute, PGI-6, Research Center Jülich, 52425, Jülich, Germany, 4Electromagnetics Division, National Institute of Standards and Technology, Boulder, Colorado 80305-3328, USA.

We use broadband high-resonances as element-specific probes of ultrafast demagnetization in Permalloy. Distinct demagnetization dynamics are observed for the constituting elements: Ni demagnetizes 10-80fs after Fe, depending on the strength of the exchange interaction energy.

15:15 Room 350/351 WED.3.5

Dynamic evolution of spin ordering across the insulator-metal transition in a correlated manganite. 

Shuyan Zhou1,2,3, Yi Zhu1, Matthew Langner1, Yi-De Chuang2, Thorn Glover2, Marcus Hertlein2, Yasuhide Tomioka4, Yoshi Tokura5,6, Dung-Hai Lee7, Zahid Hussain8, and Robert Schoenlein9; 1Materials Sciences Division, Lawrence Berkeley National Laboratory, Berkeley, CA 94720, USA, 2Advanced Light Source, Lawrence Berkeley National Laboratory, Berkeley, CA 94720, USA, 3Department of Physics, Tsinghua University, Beijing 100084, China, 4Electronics and Photonics Research Institute (ESPRIT), National Institute of Advanced Industrial Science and Technology (AIST) Tsukuba Central 4, I-1-1 Higashi Tsukuba 305-8562, Japan, 5Department of Applied Physics, University of Tokyo, Bunkyo-ku, Tokyo 113-8656, Japan, 6Cross-Correlated Materials Research Group (CMRG) and Correlated Electron Research Group (CERG), Advanced Science Institute, RIKEN, Wako 351-0198, Japan.

We report direct experimental results on the dynamic evolution of CE-type spin ordering covering a temporal window from ~100 fs to tens of seconds and reveal novel physics involved in the insulator-metal transition in Pr0.7Ca0.3MnO3. 

15:30 Room 350/351 WED.3.6

Probing the timescale of the exchange interaction in a ferromagnetic alloy.

Stefan Mathias1,2, Chan La-o-vorakiat3, Patrik Grychtol1,2, Patrick Granitzka1,2, Emrah Turgut1, Justin Shaw1, Roman Adam1, Hans Nembach2, Mark Siemens1, Steffen Eich1, Claus Schneider1, Thomas Silvia1, Martin Aeschlimann1, Margaret Murnane1, and Henry Kapteyn1; 1Department of Physics and JILA, University of Colorado, Boulder, Colorado 80309-0440, USA, 2University of Kaiserslautern and Research Center OPTIMAS, 67663, Kaiserslautern, Germany, 3Peter Grünberg Institute, PGI-6, Research Center Jülich, 52425, Jülich, Germany, 4Electromagnetics Division, National Institute of Standards and Technology, Boulder, Colorado 80305-3328, USA.

We use broadband high-resonances as element-specific probes of ultrafast demagnetization in Permalloy. Distinct demagnetization dynamics are observed for the constituting elements: Ni demagnetizes 10-80fs after Fe, depending on the strength of the exchange interaction energy.

15:15 Room 350/351 WED.3.5

Dynamic evolution of spin ordering across the insulator-metal transition in a correlated manganite. 

Shuyan Zhou1,2,3, Yi Zhu1, Matthew Langner1, Yi-De Chuang2, Thorn Glover2, Marcus Hertlein2, Yasuhide Tomioka4, Yoshi Tokura5,6, Dung-Hai Lee7, Zahid Hussain8, and Robert Schoenlein9; 1Materials Sciences Division, Lawrence Berkeley National Laboratory, Berkeley, CA 94720, USA, 2Advanced Light Source, Lawrence Berkeley National Laboratory, Berkeley, CA 94720, USA, 3Department of Physics, Tsinghua University, Beijing 100084, China, 4Electronics and Photonics Research Institute (ESPRIT), National Institute of Advanced Industrial Science and Technology (AIST) Tsukuba Central 4, I-1-1 Higashi Tsukuba 305-8562, Japan, 5Department of Applied Physics, University of Tokyo, Bunkyo-ku, Tokyo 113-8656, Japan, 6Cross-Correlated Materials Research Group (CMRG) and Correlated Electron Research Group (CERG), Advanced Science Institute, RIKEN, Wako 351-0198, Japan.

We report direct experimental results on the dynamic evolution of CE-type spin ordering covering a temporal window from ~100 fs to tens of seconds and reveal novel physics involved in the insulator-metal transition in Pr0.7Ca0.3MnO3. 

15:30 Room 350/351 WED.3.6

Probing the timescale of the exchange interaction in a ferromagnetic alloy.

Stefan Mathias1,2, Chan La-o-vorakiat3, Patrik Grychtol1,2, Patrick Granitzka1,2, Emrah Turgut1, Justin Shaw1, Roman Adam1, Hans Nembach2, Mark Siemens1, Steffen Eich1, Claus Schneider1, Thomas Silvia1, Martin Aeschlimann1, Margaret Murnane1, and Henry Kapteyn1; 1Department of Physics and JILA, University of Colorado, Boulder, Colorado 80309-0440, USA, 2University of Kaiserslautern and Research Center OPTIMAS, 67663, Kaiserslautern, Germany, 3Peter Grünberg Institute, PGI-6, Research Center Jülich, 52425, Jülich, Germany, 4Electromagnetics Division, National Institute of Standards and Technology, Boulder, Colorado 80305-3328, USA.

We use broadband high-resonances as element-specific probes of ultrafast demagnetization in Permalloy. Distinct demagnetization dynamics are observed for the constituting elements: Ni demagnetizes 10-80fs after Fe, depending on the strength of the exchange interaction energy.
photoswitches displaying coherent dynamics. Ground state vibrational coherences are no longer observed when the excited state lifetime exceeds 300fs.

17:30 Auditorium A WED.4A.6

Ultrafast ignition of a uni-directional molecular motor. •Stephen Meech1, Jamie Conyard1, Kiri Addison1, Ismael Heisler2, Arjen Cossen3,1, Wesley Brown1, and Ben Feringa2,1; 1School of Chemistry, University of East Anglia, Norwich NR4 7TJ, UK, 2Stratingh Institute for Chemistry, University of Groningen, Nijenborgh 4, 9747AG Groningen, The Netherlands.

Light-driven molecular motors convert 9-anthranol-Aliphatic Amine System Transfer (PCET) Dynamics in Ultrafast Proton Coupled Electron Spectroscopy of a Single Metal Nanoparticle, •Min Ah Seo, Jinkyoun Yoo, Daniel E. Perea, Shadi A. Dayeh, Tom Picraux, Antoinette J. Taylor, and Rohit P. Prasankumar; Center for Integrated Nanotechnologies, Los Alamos National Laboratory, Los Alamos, New Mexico 87545, USA.

We map space-and-time-dependent carrier dynamics in single nanowires for the first time using ultrafast optical microscopy. This enables us to reveal the influence of radial and axial interfaces on charge transport in these quasi-one-dimensional nanosystems.

17:45 Auditorium A WED.4A.7

Ultrafast Proton Coupled Electron Transfer (PCET) Dynamics in a 9-Anthralon-Aliphatic Amine System, •Hirendra Ghosh1,2,3,2,3,1, Katrijn Adamczyk2,2,3,3,1, Sandeep Verma1,1,2,3,1, Jens Dreyer2,3,1,2,3, and Erik T. J. Nibbering1,1,2,3,1; 1Bhabha Atomic Research Centre, Trombay, Mumbai * 400 085, INDIA., 2Max Born Institute for Nonlinear Optics and Short Pulse Spectroscopy, Max Born Strasse 2A, D-12489, Berlin, Germany.

Femtosecond infrared absorption studies strongly suggest that photoexcited 9-anthralon takes part in an ultrafast electron transfer (ET) reaction in electron-donating triethylamine solvent, but that ultrafast proton coupled electron transfer (PCET) occurs in diethylamine solvent.

WED.4B: Ultrafast Dynamics on the Nanoscale

Chair: Walter Pfeiffer, University of Bielefeld, Bielefeld, Germany

16:15-18:00 Room 350/351 WED.4B

16:15 Room 350/351 WED.4B.1

Femtosecond Optical Control on the Nanoscale, •Samuel Berweger, Joanna M. Atkin, Xiaoji G. Xu, and Markus B. Raschke; Department of Physics, and JILA, University of Colorado, Boulder, CO, 80309.

We demonstrate a generalized route to generate nanometer spatially confined ultrafast optical pulses with arbitrary deterministic femtosecond wavefront control using surface plasmon polarization focusing in 3D taped noble metal tips.

16:30 Room 350/351 WED.4B.2

Tracking Ultrafast Carrier Dynamics in Single Semiconductor Nanowire Heterostructures, •Min Ah Seo, Jinkyoun Yoo, Daniel E. Perea, Shadi A. Dayeh, Tom Picraux, Antoinette J. Taylor, and Rohit P. Prasankumar; Center for Integrated Nanotechnologies, Los Alamos National Laboratory, Los Alamos, New Mexico 87545, USA.

We demonstrate a generalized route to generate nanometer spatially confined ultrafast optical pulses with arbitrary deterministic femtosecond wavefront control using surface plasmon polarization focusing in 3D taped noble metal tips.

16:45 Room 350/351 WED.4B.3

Ultrafast Spectroscopy of a Single Metal Nanoparticle, Hatim Baida, Denis Mongin, Dimitris Christofilos, Aurélien Crut, Paolo Maioli, Natalia Del Fatti, and Fabrice Vallée; LASIM, Université Lyon I and CNRS, Villeurbanne, France.

The ultrafast response of a single metal nano-object is investigated around its surface plasmon resonance. Simultaneous measurement of its linear absorption spectrum permits quantitative comparison to theoretical predictions and elucidation of the involved physical mechanisms.

17:00 Room 350/351 WED.4B.4

Ultrafast infrared near-field molecular nano-spectroscopy, •Xiaoji Xu and Markus Raschke; Department of Physics, University of Colorado, Boulder, CO 80309, USA.

We demonstrate molecular radiative infrared vibrational free-induction decay on the nano-scale and its control via near-field coupling between the transient molecular polarization and optical antenna properties of the metallic scanning near-field probe tip.

17:15 Room 350/351 WED.4B.5

Broadband Microwave emission from the Tunnelling Junction Irradiated by the Ultrafast Laser Pulses, •Dmitry Yarotski1, Anatoly Efimov1, Antoinette Taylor1, and Mark Hagmann1; 1Center for Integrated Nanotechnologies, Los Alamos National Laboratory, Los Alamos, New Mexico 87545, USA, 2NewPath Research L.L.C., 2880 S. Main St. #214, Salt Lake City, Utah 84115, U.S.A.

We use a nonlinear mixing of the ultrafast laser pulses in the tunneling junction to generate a microwave frequency comb from semiconducting and metal surfaces, with harmonics up to n=200 of the pulse repetition rate.

17:30 Room 350/351 WED.4B.6

Spectroscopy of unoccupied states of NiO(001) ulithrin films: A combined two-photon photoemission and scanning tunneling spectroscopy study, •Mario Kiel1, Stephan Großer2, Klaus Duncker1, and Wolf Widdra1,2; 1Martin-Luther-Universität Halle-Wittenberg, Halle, Germany, 2Max-Planck-Institut für Mikrostrukturphysik, Halle, Germany.

The electronic structure of NiO(001) ultrathin films has been investigated by two-photon photoelectron spectroscopy and scanning tunneling spectroscopy. These techniques allow for a combination of atomic spatial and femtosecond temporal resolution.

17:45 Room 350/351 WED.4B.7

Hyperspectral Probing of Exciton Dynamics and Multiplication in PbSe Nanocrystals, •Itay Gdor1,2, Hanan Sachs1,2, Avishy Rotblat1, David Strasfeld2, Mounig Bawendi1, and Sanford Ruanman1; 1Institute of Chemistry and the Farkas Center for Light Induced Processes, the Hebrew University, Jerusalem 91904, Israel, 2Department of Chemistry, Massachusetts Institute of Technology, 77 Massachusetts Avenue, Cambridge, Massachusetts 02139, USA.

Broadband NIR probing records exciton dynamics in PbSe nanocrystals. New aspects of hot carrier cooling are uncovered. While contrary to many reports, MEG is not detected up to photon energy 3.7 times the band gap.
counter-propagating pulses, and investigate the pressure dependence of this scheme.

9:30  Room 350/351  THU.1.4
Plasmonic enhancement of High Harmonic Generation revisited: Predominance of Atomic Line Emission. ●Murat Sivis1, Matthias Duwe1, Bernd Abel2,3, and Claus Ropers1;1 Courant Research Center Nano-Spectroscopy and X-Ray Imaging, University of Göttingen, 37077 Göttingen, Germany, 2Institute for Physical Chemistry, University of Göttingen, 37077 Göttingen, Germany, 3Ostwald-Institute for Physical and Theoretical Chemistry, University of Leipzig, 04103 Leipzig, Germany.
We demonstrate nanostructure-enhanced extreme ultraviolet fluorescence from noble gases driven by low-energy, few-cycle light pulses. Despite sufficient local intensities, plasmon-enhanced high harmonic generation is not observed, which follows from the small, nanometer-size coherent source volume.

9:45  Room 350/351  THU.1.5
Combs of fractional high-order harmonics are generated by split-spectrum field synthesis and explained by the controlled interference of two attosecond pulse trains. Interference-controlled modulation of the instantaneous driver frequency tunes the harmonics’ energies.

10:00 Room 350/351  THU.1.6
Direct High Harmonics Shaping in the XUV, Denis Kiselev1, Stefan Vlajkovic2, Peter Kraus2, Hans-Jakob Wörner2, and ●Jean-Pierre Wolf;1 Group of Applied Physics, University of Geneva, 1205 Geneva (Switzerland), 2Laboratorium für Physikalische Chemie, ETH Zürich, 8093 Zürich, Switzerland.
Direct high harmonics pulse shaping in the XUV is demonstrated, using a reflective MEMS modulator. These first experiments open the way to the coherent manipulation of core and valence electrons on attosecond timescales

Coffee Break 10:15–10:45
A ballistic energy transport to distances up to 60A in azido-PEG-succinimide ester compounds with a number of repeating PEG units of 0, 4, 8, and 12 was found using relaxation-assisted two-dimensional infrared spectroscopy.

11:45 Auditorium A THU.2A.4

Ultrafast Energy Transfer in an Artificial Photonic Crystal Antenna. •Margherita Maiuri1, Joris Snellenburg2, Ivo van Stokkum2, Pim van der Boom3, Devens Gust1, Thomas Moore1, Ana Moore1, Rienk van Grondelle1, Giulio Cerullo1, and Dario Polli1; 1IFN-CNR, Dipartimento di Fisica, Politecnico di Milano, Piazza L. da Vinci, 32, 20133 Milano, Italy, 2Department of Physics and Astronomy, VU University Amsterdam, De Boelelaan 1081, 1081HV Amsterdam, The Netherlands, 3Department of Chemistry & Biochemistry and The Center for Bioenergy and Photosynthesis, Arizona State University, 4Department of Chemistry & Biochemistry and The Center for Bioenergy and Photosynthesis, Arizona State University, Tempe, Arizona 85287-1605, United States.

We temporally resolved energy transfer kinetics in an artificial light-harvesting dyad composed of a phthalocyanine covalently linked to a carotenoid. Upon carotenoid photo-excitation, energy transfers within ~100fs (~52% efficiency) to the phthalocyanine.

12:00 Auditorium A THU.2A.5

New perspectives on ultrafast Förster Resonant Energy Transfer. •Igor Pugliesi1, Heinz Langhals1, Harald Kauffmann2, and Eberhard Riedle1; 1LS für BioMolekulare Optik, Ludwig-Maximilians-Universität München, Oettingenstrasse 67, 80538 München, Germany, 2Department für Chemie, Ludwig-Maximilians-Universität München, Butenandt-Strasse 11, 81377 München, Germany, 3Faculty of Physics, University of Vienna, Strudlhofgasse 4, 1090 Vienna, Austria.

We show that perylene diimide dyads based on a donor-spacer-acceptor motif violate Förster’s dipole-dipole interaction picture for energy transfer in the low picosecond to sub-100 femtosecond regime. First theoretical explanations are presented.

12:15 Auditorium A THU.2A.6

Observation of Two-Exciton States in Perylene Bisimide Aggregates. •Steffen Wolter1, Marcus Seidel1, Frank Wüthner2, and Stefan Lochbrunner1; 1Institut für Physik, Universität Rostock, Universitätsplatz 3, 18051 Rostock, Germany, 2Institut für Organische Chemie und Röntgen Research Center for Complex Material Systems, Universität Würzburg, Würzburg, Germany. The behavior of excitons on perylene bisimide aggregates is investigated at high excitation densities by femtosecond absorption spectroscopy. Indications for a significant population of the two-exciton manifold are found.

THU.2B: Ultrafast Dynamics in Correlated Systems

Chair: Rohit P. Prasankumar, Los Alamos National Laboratory, Los Alamos, NM, USA

10:45–12:30 Auditorium B THU.2B

Photoinduced Femtosecond Formation of Ferromagnetism in a Strongly Correlated Antiferromagnetic Manganite. Tianqi Li1,2,• Aaron Patz1,2, Jiaqiang Yan2, Thomas Lograsso2, Ilias Perakis3, and Jigang Wang1,2; 1Department of Physics and Astronomy, Iowa State University, Ames, Iowa, U.S.A., 2Ames Laboratory – USDOE, Ames, Iowa, U.S.A., 3Department of Physics, University of Crete, Crete, Greece.

We report a pump threshold behavior in fs photoinduced magnetization in a strongly correlated manganite, which indicates the establishment of thermally-inaccessible ferromagnetic ground state and build-up of new magnetic order parameters at fs time scales.

11:00 Auditorium B THU.2B.2

Measuring 3D magnetic correlations during the photo-induced melting of electronic order in La0.5Sr1.5MnO4. •Ru’anan Tobey1,2, Simon Wall1, Michael Foaerst1, Hubertus Bromberger1, Vikaran Khanna1,5,6, Joshua Turner1, William Schlotter1, Marianne Trigo1, Oleg Krupin7,9, Wei-Sheng Lee10, Yi-De Chuang1, Robert Moore1, Adrian Cavaliere1, Stuart Wilkins2, Hong Zheng12, John Mitchell12, Sarnjeet Dhesi1, Andrea Cavalli1,6, and John Hill2; 1Zernike Institute for Advanced Material Sciences Department, University of Groningen, 9747AG Groningen, The Netherlands, 2Condensed Matter and Materials Sciences Department, Brookhaven National Laboratory, Upton, NY 11973, USA, 3Fritz-Haber Institute of the Max Planck Society, Berlin, Germany, 4Max Planck Institute for Structural Dynamics, Center for Free Electron Laser Science, University of Hamburg, Germany, 5Diamond Light Source, Chilton, Didcot, Oxfordshire OX11 0DE, United Kingdom, 6Department of Physics, Clarendon Laboratory, Oxford University, United Kingdom, 7Linac Coherent Light Source, SLAC National Accelerator Laboratory, Menlo Park, CA 94025, USA, 8PULSE Institute, SLAC National Accelerator Laboratory, Menlo Park, CA 94025, USA, 9European XFEL GmbH, Hamburg, Germany, 10The Stanford Institute for Materials and Energy Sciences (SIMES), SLAC National Accelerator Laboratory, Menlo Park, CA 94025, USA, 11Advanced Light Source, Lawrence Berkeley National Laboratory, Berkeley, CA 94720, USA, 12Material Sciences Department, Argonne National Laboratory, Argonne, Illinois 60439, USA.

Time-resolved x-ray diffraction measures the dynamics of antiferromagnetic correlations by reconstructing the reciprocal-space scattering volume for the magnetic Bragg peak. Modifications in the scattering line shape along the three principal reciprocal lattice directions are measured.

11:15 Auditorium B THU.2B.3

Photoinduced Coherent Spin Fluctuation in Primary Dynamics of Insulator to Metal Transition in Perovskite Co Oxide. Yuki Ishikawa1,2, Hirotake Itoh1; 1Shinichiro Iwai1,2, Takahisa Arima1, Shigeki Yamada3, and Takahiko Sasaki2; 2Department of Physics, Tohoku University, Sendai, 980-8578, Japan, 3JST-CREST, Sendai, 980-8578, Japan, 4Department of Advanced Material Science, Univ. Tokyo, 277-8561, Japan, 5International College of Art and Science, Yokohama City Univ., Yokohama, 236-0027, Japan, 6Institute for Material Research, Sendai, 980-8577, Japan.

Coherent spin fluctuation was detected in the photoinduced Mott insulator-metal transition in perovskite cobalt oxide by using 3 optical-cycle infrared pulse. Such coherent spin fluctuation is driven by the perovskite distortion changing orbital gap.

11:30 Auditorium B THU.2B.4

Charge Density Wave Dynamics From Ultrafast XUV ARPES. •Jesse Petersen1,2, Stefan Kaiser1, Nicky Dean2, Alberto Simoncig1, Haiyun Liu1, Adrian Cavaliere1, Cephise Cacho3, Edmond
turcu, emma springate, fabio frasetto, luca poletto, sarnjeet dhesi, helmut berger, and andrea cavalleri; max planck dept. for structural dynamics, centre for free-electron laser science, university of hamburg, hamburg, germany; clarendon laboratory, oxford university, parks road, oxford, uk; central laser facility, stfc rutherford appleton laboratory, harwell, united kingdom; luxor, cnr-infm, padova, italy; diamond light source ltd., harwell, united kingdom; institute of physics of complex matter, epfl, lausanne, switzerland; ultrafast angle-resolved xuv photoemission reveals the time- and angle-dependent electronic structure of 1t-tas2, a hybrid mott and photoemission evidence for a peierls phase-transition in a three-dimensional multiple-charge density wave solid. l. rettig, r. cortés, j.-h. cha, r. fisher, f. schmitz, p.s. kirchmann, r.g. moore, z.-x. shen, r. wolf, and u. bovensien; fachbereich physik, freie universität berlin, arnimalle 14, d-14195 berlin, germany; fakultät für physik, universität duisburg-essen, lotharstr. 1, d-47048 duisburg, germany; abt. physikalische chemie, fritz-haber-institut d. mpg, faradayweg 4-6, d-14195 berlin, germany; department of applied physics, via pueblow mall, stanford, ca 94305, usa; stanford institute for materials and energy science, 476 lomita mall, stanford, ca 94305, usa.

the femtosecond dynamics of the fermi surface of dytes3 and its band structure are investigated by time- and angle-resolved photoemission spectroscopy. an ultrafast collapse of the charge density wave gap within 200 fs is discussed.

time-domain evidence for an excitonic insulator. stefan hellmann, timm rohrer, matthias kalläne, kestine hanfl, adra carr, margaret murnane, henry kaptein, lutz kipp, michael bauer, and kai rossnagel; institute of experimental and applied physics, university of kiel, d-24098 kiel, germany; jila and department of physics, university of colorado and nist, boulder, colorado 80309-0440, usa.

11:45 auditorium b thu2b.5
time-domain evidence for an excitonic insulator. stefan hellmann, timm rohrer, matthias kalläne, kestine hanfl, adra carr, margaret murnane, henry kaptein, lutz kipp, michael bauer, and kai rossnagel; institute of experimental and applied physics, university of kiel, d-24098 kiel, germany; jila and department of physics, university of colorado and nist, boulder, colorado 80309-0440, usa.

time- and angle-resolved photoemission spectroscopy using a high-harmonic-generation source is employed to classify the potential excitonic insulator 1t-tas2 and the reference peierls-mott insulator 1t-tas2 on the basis of their melting times.

12:00 auditorium b thu2b.6

time-resolved fermi surface mapping of the charge density wave material dytes2. l. rettig, r. cortés, j.-h. cha, r. fisher, f. schmitz, p.s. kirchmann, r.g. moore, z.-x. shen, r. wolf, and u. bovensien; fachbereich physik, freie universität berlin, arnimalle 14, d-14195 berlin, germany; fakultät für physik, universität duisburg-essen, lotharstr. 1, d-47048 duisburg, germany; abt. physikalische chemie, fritz-haber-institut d. mpg, faradayweg 4-6, d-14195 berlin, germany; department of applied physics, via pueblow mall, stanford, ca 94305, usa; stanford institute for materials and energy science, 476 lomita mall, stanford, ca 94305, usa.

12:15 auditorium b thu2b.7
evidence for a peierls phase-transition in a three-dimensional multiple-charge density wave solid. b. mansar, m. corder, t. j. penfold, s.b. dungdale, r. tediosi, m. chergui, and f. carbone; laboratory for ultrafast microscopy and electron scattering, ica, ecole polytechnique federale de lausanne, ch-1015 lausanne switzerland; laboratory of ultrafast spectroscopy, isic, ecole polytechnique federale de lausanne, ch-1015 lausanne switzerland; laboratory of computational chemistry and biochemistry, isic, ecole polytechnique federale de lausanne, ch-1015 lausanne switzerland; swissfelf, psi, ch-5232 villigen, switzerland; h.h.wills physics laboratory, university of bristol, tyndall avenue, bristol bs8 1tl, united kingdom; département de physique de la matière condensée, université de genève, ch-1211 genève, switzerland.

we performed a combined experimental and theoretical study of a complex three-dimensional solid. melting the charge order and monitoring the consequent charge redistribution via ultrafast optical spectroscopy, we evidenced the charge density waves’ peierls origin.

lunch break

12:30 – 14:00

thu3a: ultrafast photobiology

14:00–15:45 auditorium a thu3a.1

broadband uv 2-d transient absorption spectroscopy of ferric myoglobin. c. consani, gerald auböck, frank van mourik, and majed chergui; laboratory of ultrafast spectroscopy, epfl, lausanne, switzerland.

we use broadband ultraviolet two-dimensional spectroscopy and transient absorption spectroscopy to characterize the tryptophan and haem photocycles in ferric myoglobins. a new relaxation channel for tryptophan(14), yielding ferrous myoglobin formation, is also reported.

14:15 auditorium a thu3a.2

tracing of backward energy transfer from lh1 to lh2 in photosynthetic membranes grown under high and low irradiation. larry lier, vladimira mousilová, sarah henry, dario poli, tats h. p. brotosudarmo, s. hoseinkhani, daniele brida, guglielmo lanzani, giulio cerullo, and richard j. cogdell; mdea nanoscience, 28049 cantoblanco, spain; faculty of medicine, university of glasgow, glasgow g12 sqq, united kingdom; institute for molecular biology, university of glasgow, glasgow g12 8ta, united kingdom; cnr-ifn, dipartimento di fisica, politecnico di milano, 20133 milan, italy; italian institute of technology, center for nanoscience and technology at politecnico di milano, 20133 milan, italy; ma chung research center for photosynthetic pigments, ma chung university, malang 65151, indonesia; department of material science, università di milano bicocca, 20125 milan, italy.

by introducing derivative transient absorption spectroscopy, we obtain rate constants for backward and forward energy transfer between lh1 and lh2 complexes in purple bacterial membranes. the method is generally applicable to excitonically coupled systems.

14:30 auditorium a thu3a.3

selective assignment of energy transfer and charge separation pathways in reaction centers by pulse polarized 2-d photon echo spectroscopy. b. fingerhut, kochise bennet, olevsky roslyak, and shaal mumakel; chemistry department, university of california, irvine, california 92697-2025, usa.

we present theoretical modelling of the nonlinear optical response of the bacterial reaction center incorporating electron and energy transfer on equal footing. orthogonal polarized pulse sequences allow to dissect the kinetic components in real space.
14:45 Auditorium A THU.3A.4

Femtosecond Transient Absorption Spectroscopy on the Light-Adaptation of Living Plants. •Marc G. Müller1, Peter Jahnss, and Alfred R. Holzwarth1; 1Max-Planck-Institute for Bioorganic Chemistry, Saalfeldstr. 34-36, D-63470 Mülheim/Ruhr, Germany, 2University of Düsseldorf, Institute of Plant Biochemistry, Universitätstr. 1, D-40225 Düsseldorf, Germany. The photoprotection reaction of the photosynthetic system under harsh sun light is for the first time resolved by femtosecond absorption spectroscopy from the visible to near-infrared in intact leaves. The non-photochemical quenching mechanisms are discussed.

15:00 Auditorium A THU.3A.5

B-side Electron Transfer in Bacterial Photosynthetic Reaction Centers Revealed by a Few-Cycle Pulse Laser. •Juan Du1, Takayoshi Kobayashi2,3,4, Kazuyuki Watanabe2, and Hirotoshi Tamiaki2; 1Advanced Ultrafast Laser Research Center, University of Electro-Communications, 1-5-1 Chofugaoka, Chofu, Tokyo 182-8585 Japan, 2JST, CREST, 5 Sanbancho, Chiyoda-ku, Tokyo 102-0075 Japan, 3Department of Physics and Astronomy, University of Oxford, 14 Banbury Road, Oxford OX1 3RA, UK, 4Technische Universität München, Garching, Germany. B-side electron transfer in reaction centers was investigated by broadband real-time vibrational spectroscopy. Surprisingly BB was found to be the initial electron donor rather than P, and possible energy transfer, BB to carotenoid, was observed.

15:15 Auditorium A THU.3A.6

Photoaction Dynamics of Photoactive Yellow Protein Investigated in the near-IR spectral Region. •Jingyi Zhu1, Laura Paparelli1, Ivo van Stokkum1, Marijke Hospes2; 1Laboratory for Microbiology, Swammerdam Institute for Life Sciences, University of Amsterdam, Nieuwe Achtergracht 166, 1010 WV Amsterdam, The Netherlands, 2Department of Physics and Astronomy, Faculty of Sciences, Vrije Universiteit, De Boelelaan 1081, 1081 HV Amsterdam, The Netherlands. Ionization in photoactive yellow protein was investigated by ultrafast spectroscopy in the near-infrared spectral region. Kinetic and diffusion models were applied to extract the dynamic properties of the ionized electron.

15:30 Auditorium A THU.3A.7

Vibrational dynamics resolved with sub-10-fs deep-ultraviolet pulses. •Takayoshi Kobayashi1,2,3,4 and Yuichiro Kida1,2,3; 1Advanced Ultrafast Laser Research Center, University of Electro-Communications, 1-5-1 Chofugaoka, Chofu, Tokyo 182-8585 Japan, 2JST, CREST, 5 Sanbancho, Chiyoda-ku, Tokyo 102-0075 Japan, 3Department of Physics and Astronomy, University of Oxford, 14 Banbury Road, Oxford OX1 3RA, UK, 4Technische Universität München, Garching, Germany. Time-resolved ultrafast spectroscopy with sub-10-fs deep ultraviolet pulses was demonstrated for the first time. The real-time vibrational and electronic excited state dynamics in a thymine molecule were probed with a sub-10-fs time resolution.

THU.3B: Spin, Charge and Lattice Dynamics

Chair: Fabrizio Carbone, Ecole Polytechnique Fédérale de Lausanne (EPFL), Lausanne, Switzerland

14:00–15:45 Auditorium B THU.3B

Invited

A direct view of the dynamics of lattice and spin with femtosecond x-ray diffraction. •Steven Johnson1, Ekaterina Möhr-Vorobeva2, Raquel de Souza2, Urs Staub2, Paul Beaud2, Gerhard Ingold2, Andrin Caviezel2, Christopher Milne3, Jure Demsar4, Hanjo Schäfer4, Alexander Titov5, Valerio Scagnoli5, William Schlotter6, Joshua Turner6, Oleg Krupin7, Wei-Sheng Lee8, Yi-De Chuang8, Luc Patthey9, Robert Moore9, Donghui Li9, Ming YF9, Patrick Kirchmann9, Mariarosa Triggo10, Peter Denes10, Dlonisio Doering10, Zahid Hussain10, Zhi-Xun Shen10, Dharmalingam Prabhakaran12, and Andrew Boothroyd2; 1Institute for Quantum Electronics, ETH Zürich, Zurich, Switzerland, 2Swiss Light Source, Paul Scherrer Institut, Villigen, Switzerland, 3Laboratoire de Spectroscopie Ultrarapide, ISIC-FSB, Ecole Polytechnique Fédérale de Lausanne, Lausanne, Switzerland, 4Physics Department and Center of Applied Photonics, University of Konstanz, Germany, 5Institute of Metal Physics and Institute of Metallurgy UdRNAS, Ekaterinburg, Russia, 6The Linac Coherent Light Source, SLAC National Accelerator Laboratory, Menlo Park, CA, USA, 7European XFEL GmbH, Hamburg, Germany, 8SINES, SLAC National Accelerator Laboratory and Stanford University, Menlo Park, CA, USA, 9SSRL, SLAC National Accelerator Laboratory, Menlo Park, CA, USA, 10Lawrence Berkeley National Laboratory, Berkeley, CA, USA, 11PULSE, SLAC National Accelerator Laboratory, Menlo Park, CA, USA, 12Department of Physics, University of Oxford, Clarendon Laboratory, Oxford, UK.

Pump-probe femtosecond x-ray diffraction is a powerful method for extracting direct information on long-range order dynamics, exposing new avenues for stimulated, impulsive control over the state of strongly correlated materials. Here we present recent examples.

14:30 Auditorium B THU.3B.2

Non-retarded pairing interaction in a high-Tc cuprate from coherent charge fluctuation spectroscopy. •Barbara Mansart1,2, José Lorenzana1,2, Mariateresa Scarnogella3, Majed Cherqui4, and Fabrizio Carbone5; 1Laboratory for Ultrafast Microscopy and Electron Scattering, ICMP, Ecole Polytechnique Federale de Lausanne, CH-1015 Lausanne Switzerland, 2Laboratory of Ultrafast Spectroscopy, ISIC, Ecole Polytechnique Federale de Lausanne, CH-1015 Lausanne Switzerland, 3Institute for Complex Systems-CNR and Physics Department, Sapienza, University of Rome, Piazzale Aldo Moro 5 I-00185 Italy. Charge fluctuations in a high-Tc cuprate are coherently generated and detected in real-time via ultrafast broadband optical spectroscopy. These results imply a substantial contribution of non-retarded interactions to the pairing mechanism, as in unconventional theories.

14:45 Auditorium B THU.3B.3

Ultrafast Mid-infrared Spectroscopy of the Charge- and Spin-Ordered Nickelate La1.75Sr0.25NiO4. •Giacomo Coslovich1, Bernhard Huber1, Wei-Sheng Lee2, Yi-De Chuang3, Yi Zhu4,
To monitor the dynamics exactly at the single photon photoemission, we are able to spin-resolved photoemission. Using dynamics in Fe$_3$O$_4$ by means of time-resolved experiments, we observe dephasing times $T_2^*$ on the order of nanoseconds at room temperature in sol-gel ZnO films due to charge-separated states. In ZnCoO the mean-field electron-Co$_2^+$ exchange energy $N_0$ is determined to be $+0.25 - 0.02$ eV.

15:30 Auditorium B THU.3B.6

Vibrationally Mediated Ultrafast Relaxation in Nitrogen-Vacancy Diamond. •Vanessa M. Huxter$^1$, Thomas A. A. Oliver$^1$, Dmitry Budker$^2$, and Graham R. Fleming$^2$; $^1$Department of Chemistry, University of California, Berkeley and Physical Bioscience Division, Lawrence Berkeley National Laboratory, Berkeley, CA, USA 94720, $^2$Department of Physics, University of California, Berkeley and Nuclear Science Division, Lawrence Berkeley National Laboratory, Berkeley, CA USA 94720. Two dimensional electronic spectroscopy and transient grating measurements were performed for the first time on nitrogen-vacancy centers in diamond. These measurements reveal energy transfer and vibrational pathways with consequences for spin coherence.

Coffee Break 15:45–16:15

THU.PII: Poster Session III 16:15–17:45 Poster area THU.PII.1

16:15 Poster area THU.PII.1

Air-clad Chirally-coupled-core Yb-fiber Femtosecond Oscillator with >10W Average Power. •Hung-Wen Chen$^1$, Guoqing Chang$^2$, Cheng Zhu$^2$, Xinquan Ma$^2$, Almantas Galvanauskas$^2$, and Franz X. Kärtner$^3$; $^1$Department of Electrical Engineering and Computer Science and Research Laboratory of Electronics, Massachusetts Institute of Technology, 77 Massachusetts Ave, Cambridge MA 02139, $^2$Department of Electrical Engineering and Computer Science, University of Michigan, Ann Arbor, Michigan 48109-2099, $^3$Center for Free-Electron Laser Science, DESY, and Dept. of Physics, University of Hamburg, Notkestrasse 85, D-22607 Hamburg, Germany.

We demonstrate high-power (>10 W), 300-fs mode-locked oscillators at 83-MHz repetition rate using air-clad chirally-coupled-core Yb-fiber with 37-µm central-core diameter, corresponding to a 30-µm mode-field diameter.

16:15 Poster area THU.PII.2

Shaper-Based Approach to Real-time Monitoring and Correction of Ultrashort Pulse Phase Drifts. Dmitry Pestov$^1$, Igor Pastirk$^2$, Shreya Nad$^3$, Nathan Butcher$^4$, and Marcos Dantas$^{1,2}$; $^1$Biophotonic Solutions, Inc., 1401 East Lansing Dr., Suite 112, East Lansing, Michigan 48823, USA, $^2$Department of Chemistry, Michigan State University, East Lansing, Michigan 48824, USA.

We demonstrate an active phase-and-amplitude monitoring and correction routine that retrieves phase distortion of femtosecond pulses from changes in the SHG spectrum shape. We implement this scheme experimentally for the second- and third-order dispersion compensation.

16:15 Poster area THU.PII.3

Pulse Compression of Phase-matched High Harmonic Pulses from a Time-delay Compensated Monochromator. •Hironori Igarashi, Ayumu Makida, Motohiko Ito, and Taro Sekikawa; Hokkaido University, Sapporo, Japan. Pulse compression of single 32.6-eV high harmonic pulses from a time-delay compensated monochromator was demonstrated down to 11 fs by compensating the pulse front tilt. The photon flux was intensified to $5.7 \times 10^9$ photons/s on target.

16:15 Poster area THU.PII.4

Dual Wavelength, Cryogenically-Cooled Yb:YLF Chirped-Pulse Regenerative Amplifier. •Eduardo Granados$^{1,2}$, Kyung-Han Hong$^1$, Xing Fu$^3$, Luis E. Zapata$^1$, Hung-Wen Chen$^1$, Guoqing Chang$^2$, and Franz X. Kärtner$^3$; $^1$Massachusetts Institute of Technology (MIT), Cambridge, Massachusetts 02139, USA, $^2$IKERBASQUE, Basque Foundation for Science, Bilbao, Spain, $^3$Center for Photonics and Electronics, Department of Precision Instruments and mechnology, Tsinghua University, Beijing 100084, China, $^4$Center for Free-Electron Laser Science, DESY and Department of Physics, University of Hamburg, Hamburg, Germany.

We report on a dual wavelength cryogenic Yb:YLF chirped-pulse regenerative amplifier which is designed...
Microjoule energies are sufficient for stable continua with smooth, plateau-like spectra from the deep ultraviolet to the infrared. We visualize the processes of the generation.

16:15 Poster area THU.PIII.8
High repetition rate two-color pumped OPCPA system with a spectral bandwidth of 1.5 octaves from VIS to NIR, •Anne Harth1,2, Marcel Schultz1, Tino Lang1,2, Stefan Rausch2,3, Thomas Binhammer4, and Uwe Morgner1,2,4; 1Institut für Quantenoptik, Leibniz Universität Hannover, Hannover, Germany, 2Centre for Quantum Engineering and Space-Time Research (QUEST), Hannover, Germany, 3VENTEON Laser Technologies GmbH, Garbsen, Germany, 4Laser Zentrum Hannover e.V., Hannover, Germany. We present a 200 kHz double-stage OPCPA system, pumped with two different wavelengths. The µJ output spectrum supports pulse durations of sub-3 fs, a SPIDER measurement of the inner spectral part confirms sub-5 fs.

16:15 Poster area THU.PIII.9
A Direct Diode-Pumped 15 fs Ti:Sapphire Laser and its Application to Multi-Photon Microscopy, •Sterling Backus1,2, Michael Young2, Tristan Storz2, Jonathan Garlick1,2, Steven Hilf3, Matt Kirchner3, Greg Taft3, Kevin Shea3, Henry Kaptay1,4, Margaret Murnane1,4, Charles Durfee3, and Jeff Squier2; 1KMLabs Inc., Research and Development Department, 1855 S 57th Ct, Boulder, CO 80301, USA, 2Colorado School of Mines, Department of Physics, Golden, CO, 80401, USA, 3Colorado State University, Department of Electrical and Computer Engineering, Ft. Collins, CO, 80523, USA, 4JILA, and Department of Physics, University of Colorado, Boulder, CO 80309. We have demonstrated the first direct-diode-pumped Kerr-lens-modelocked Ti:sapphire laser, pumped directly by two 445nm laser diodes, and generating 30 mW output in 15fs pulses. This laser has been successfully used for multi-photon microscopy.

16:15 Poster area THU.PIII.10
Generating Few-cycle Energetic Mid-IR Pulses with Soliton Compression by Cascaded Quadratic Nonlinearities, •Morten Bacher1, Binbin Zhou1, and Frank W. Wise2; 1Technical University of Denmark, DTU Fotonik, Department of Photonics Engineering, DK-2800 Kgs. Lyngby, Denmark, and 2Cornell University, Dep. Applied and Engineering Physics, Ithaca (NY) 14853, USA.

We study nonlinear mid-IR crystals and assess their potential for ultrafast cascaded nonlinearities in the type 0 phase-matching interaction. Few-cycle, broadband energetic mid-IR pulses can be generated from compressing multi-cycle mid-IR pulses with self-defocusing solitons.

16:15 Poster area THU.PIII.11
Asynchronous mid-infrared broadband optical parametric oscillator for dual-comb spectroscopy, Zhao wei Zhang1, Chenglin Gu1,*, Jinhua Sun1,2, Chingyue Wang2, Tom Gardiner1, and Derryn Reid2; 1Scottish Universities Physics Alliance (SUPA), Institute of Photonics and Quantum Sciences, School of Engineering and Physical Sciences, Heriot-Watt University, Riccarton, Edinburgh EH14 4AS, UK, 2School of Precision Instruments and Optoelectronics Engineering, Tianjin University, Tianjin 300072, China, 3National Physical Laboratory, Hampton Road, Teddington, London TW11 0LW, UK, 4School of Physics, Huazhong University of Science and Technology, 1037, Luoyu Road, Wuhan, 430074, China.

Two asynchronous, broadband 3.3-um pulse trains with a stabilized repetition-rate difference of up to 5-kHz were generated from a single optical parametric oscillator. With additional carrier-envelope-offset stabilization, it could be applied to coherent dual-frequency-comb spectroscopy.

16:15 Poster area THU.PIII.12
Direct Imaging of Morphology Dependent Charge Dynamics in Organic Photovoltaics by Transient Absorption Microscopy, Chris Wang, Hongyan Shi, and Libai Huang; Notre Dame Radiation Laboratory, University of Notre Dame, Notre Dame, IN, USA.

Charge generation and recombination was directly imaged in photovoltaic polymer blends with simultaneously high spatial and temporal resolution by a femtosecond transient absorption microscope. Morphology dependent charge dynamics were revealed on the microscopic level.

16:15 Poster area THU.PIII.13
Femtosecond laser ablation dynamics of platinum, •Takuro Tomita1, Masaharu Nishikino2, Masahiko Ishino2, Takeshi Kaitoh3, Yoshihiro Ochi3, Tetsuya Kawauchi2, Mitsuru Yamagiwa2,•
 Ryota Takei\textsuperscript{1}, Yasuo Minami\textsuperscript{1}, Kota Terakawa\textsuperscript{2}, and Tohru Suemoto\textsuperscript{3};
\textsuperscript{1}Department of Ecosystem System, The University of Tokushima, Tokushima 770-8506, Japan, \textsuperscript{2}Quantum Beam Science Directorate, Japan Atomic Energy Agency, 8-1-7 Umemi-dai, Kizugawa, Kyoto 619-0215, Japan, \textsuperscript{3}The Institute for Solid State Physics, The University of Tokyo, 5-1-5 Kashiwanoha, Kashiwa, Chiba 277-8581, Japan.

Time-resolved soft x-ray reflective imaging was applied to the observation of laser ablation process. Despite the continuous intensity profile of the pump beam, a discontinuity is found, reflecting a crossover of the ablation scheme.

**16:15** Poster area THU.PIII.14

**Stimulated Raman Scattering via integrated optical waveguides in microfluidic structures.** \textsuperscript{●}Claudia Hoffmann\textsuperscript{1}, Matthias Posspiech\textsuperscript{1}, Moritz Emons\textsuperscript{1}, Günther Rinke\textsuperscript{2}, and Uwe Morgner\textsuperscript{1,3,4}; \textsuperscript{1}Institut für Quanten Optik, Leibniz Universität Hannover, Welfengarten 1, D-30167 Hannover, Germany, \textsuperscript{2}Karlruher Institut für Technologie, Institut für Mikroverfahrenstechnik, Hermann-von-Helmholtz-Platz 1, D-76344 Eggenstein-Leopoldshafen, Germany, \textsuperscript{3}Center for Quantum Engineering and Space-Time Research, Welfengarten 1, D-30167 Hannover, Germany, \textsuperscript{4}Laser Zentrum Hannover, Hollerithallee 8, D-30419 Hannover, Germany.

We report on Stimulated Raman Scattering (SRS) to distinguish fluids in a microfluidic channel with integrated waveguides. The excitation pulses are delivered by a non-collinear optical parametric amplifier driven by an amplified Yb:KYW oscillator.

**16:15** Poster area THU.PIII.15

The contribution has been moved to Monday.

**16:15** Poster area THU.PIII.16

**Pump-Probe Intracavity Phase Spectroscopy.** \textsuperscript{●}R. Jason Jones and David R. Carlson; College of Optical Sciences, University of Arizona, Tucson, AZ, USA.

Pump-probe intracavity phase spectroscopy utilizes a femtosecond enhancement cavity to enable precision measurements of high-field ultrafast nonlinearities. We demonstrate this new approach measuring the pump-induced plasma evolution of a xenon target with a time-delayed probe.

**16:15** Poster area THU.PIII.17

**HF12/SiF2 chirped multilayer mirrors for broadband dispersion management in the ultraviolet spectral range.** \textsuperscript{●}Olga Rzaszkovszky\textsuperscript{1}, Mohammed T. Hassan\textsuperscript{1}, Eleftherios Goulielmakis\textsuperscript{1}, Ferenc Krausz\textsuperscript{1,2}, and Vladimir Pervak\textsuperscript{2}; \textsuperscript{1}Max-Planck-Institute of Quantum Optics, Hans-Köpfmann-Strasse 1, D-85748, Garching, Germany, \textsuperscript{2}Ludwig-Maximilians-Universität Muenchen, Am Coulombwall 1, D-85748, Garching, Germany.

Newly developed dispersive dielectric multilayer mirror covering near ultraviolet wavelength range competes to be one of the most advanced and user-friendly technology for pulse compression and generation of sub-6 fs pulses in UV spectral region.

**16:15** Poster area THU.PIII.18

**Exploring the Polarisation Degrees of freedom in Collinear Two Dimensional Infrared Spectroscopy.** \textsuperscript{●}Julien Rèhault and Jan Helbing; Physikalisch-Chemisches Institut, Universität Zürich, Winterrhuterstrasse 190, 8057 Zürich, Switzerland.

We fully exploit polarisation in a 2D-IR set-up in the pump-probe geometry to amplify signals, eliminate scattering and measure absorptive and dispersive spectra.

**16:15** Poster area THU.PIII.19

**Sub-1.5-cycle pulses from a single filament.** \textsuperscript{●}Martin Kretschmar\textsuperscript{1}, Daniel Steinrueber\textsuperscript{1,2}, Emilja Schulz\textsuperscript{1,2}, Thomas Binhammer\textsuperscript{1}, Dominik Hoff\textsuperscript{3}, Peter Hansinger\textsuperscript{4}, Gerhard G. Paulus\textsuperscript{1}, Uwe Morgner\textsuperscript{1,2}, and Milutin Kovacev\textsuperscript{1,2}; \textsuperscript{1}Leibniz Universität Hannover, Institut für Quantenoptik, Welfengarten 1, D-30167 Hannover, Germany, \textsuperscript{2}Quest, Centre for Quantum Engineering and Space-Time Research, Welfengarten 1, D-30167 Hannover, Germany, \textsuperscript{3}VENTEON Laser Technologies GmbH, D-30827 Garbsen, Germany, \textsuperscript{4}Friedrich-Schiller-Universität Jena, Institut für Optik und Quantenteleknik, Max-Wien-Platz 1, D-07743 Jena, Germany.

We report on the measurement of sub-1.5-cycle laser pulses directly from a single femtosecond filament. A stereo-ATI setup is used to determine the pulse duration as well as CEO phase contributions along the filament.

**16:15** Poster area THU.PIII.20

**Optimal Control of High-Order Harmonic Generation.** Arnau Pou and \textsuperscript{●}Carles Serrat; UPC-Universitat Politècnica de Catalunya, Colom 11, 08222-Terrassa, Spain.

A static electric field added at each spot of the interaction region controls high-order harmonic generation. The method is all-optical and susceptible to feedback-loop control schemes.

**16:15** Poster area THU.PIII.21

**Vectorial Phase Retrieval for Linear Characterization of Attosecond Pulses.** \textsuperscript{●}Oren Raz\textsuperscript{1,4}, Nirut Dudovich\textsuperscript{1,2}, and Ian Walmsley\textsuperscript{1}; \textsuperscript{1}Weizmann Inst. of Science, \textsuperscript{2}Department of Physics, University of Oxford, Clarendon Laboratory, Oxford, UK.

We propose a new linear and all-optical method for attosecond pulses characterization. Our scheme is based only on spectral and polarization measurements. We demonstrate this method numerically on attosecond pulses generated from aligned CO\textsubscript{2} molecules.

**16:15** Poster area THU.PIII.22

**Time-resolved Four-body Coulomb Explosion Imaging of Correlated Dynamics of Hydrogen Atoms in Acetylene Dication.** \textsuperscript{●}Akiuaka Mainsuda\textsuperscript{1,2}, Mizuho Fushitani\textsuperscript{1}, Eiji Takahashi\textsuperscript{2}, and Akiyoshi Hishikawa\textsuperscript{1,2}; \textsuperscript{1}Nagoya University, Nagoya, Japan, \textsuperscript{2}Institute for Molecular Science, Okazaki, Japan, \textsuperscript{3}RIKEN, Wako, Japan.

The correlated motion of the two deuterium atoms associated with the hydrogen migration and structural deformation to non-planar geometry are identified in acetylene dication by the time-resolved four-body Coulomb explosion imaging.

**16:15** Poster area THU.PIII.23

**High Order Harmonic Generation in Three Pulse Scattering Geometry.** Caterina Vozzi\textsuperscript{1}, Matteo Negro\textsuperscript{2}, Luca Poletto\textsuperscript{1}, Sandro De Silvestri\textsuperscript{2}, and \textsuperscript{●}Salvatore Stagira\textsuperscript{1}; \textsuperscript{1}Istituto di Fotonica e Nanotecnologie - CNR, piazza L. da Vinci 32, 20133 Milano, Italy, \textsuperscript{2}Dipartimento di Fisica - Politecnico di Milano, piazza L. da Vinci 32, 20133 Milano, Italy.

We study the generation of high order harmonics produced by the interaction of three intense and ultrafast noncollinear laser pulses. Scattered harmonic radiation, not overlapped to the direction of the incident pulses, is observed.

**16:15** Poster area THU.PIII.24

**Hydrogen scrambling in H3+ generation from ethane molecules induced by ultrashort intense laser
two-electron wavefunctions, and observe a new continuum coupling mechanism.

16:15 Poster area THU.PIII.27

Quasi-phase-matching of high harmonic generation using polarization beating in optical waveguides. • Lewis Z. Liu, Kevin O’Keeffe, and Simon M. Hooker; University of Oxford, Oxford, UK.

A new scheme for quasi-phase matching high-harmonic generation is proposed in which polarization beating within a hollow-core birefringent waveguide modulates harmonic generation. The performance of this scheme as a function of experimental parameters is investigated.

16:15 Poster area THU.PIII.28

Fragmentation Control of a Polyatomic Molecule by fully determined Laser-Fields. • Xinhua Xie1, Stefan Roither1, Markus Schöffler1, Daniił Kartashov1, Hualiang Xu1,6, Li Zhang1, Tim Rathje2, Gerhard G. Paulus2, Katharina Dobhoff-Dier2, Stefanie Grieß1, Sergiy Bubin1, Mackenzie Atkinson3, Kálmán Varga4, Kaoru Yamanouchi1, Andrius Baltuška1, and Markus Kirtzer1; 1Photonics Institute, Vienna University of Technology, A-1040 Vienna, Austria, 2Institute of Optics and Quantum Electronics, D-07743 Jena, Germany, 3Institute of Theoretical Physics, Vienna University of Technology, A-1040 Vienna, Austria, 4Department of Physics and Astronomy, Vanderbilt University, Nashville, Tennessee 37235, USA, 5Department of Chemistry, School of Science, The University of Tokyo, Tokyo 113-0033, Japan, 6State Key Laboratory on Integrated Optoelectronics, Changchun 130012, China.

Strong-field control of acetylene photoionization is demonstrated using fully determined femtosecond laser pulses induced by an ultrashort-pulsed intense laser field, nearly statistically randomized of H and D atoms called hydrogen atom scrambling was identified.

16:15 Poster area THU.PIII.29

Attosecond X-ray Free electron Laser. • Dong Eon Kim1,2, Sandeep Kumar1,2, and Heung Sik Kang1,3; 1Department of Physics, Pohang University of Science and Technology (POSTECH), Pohang, 790-784, South Korea, 2Center for Attosecond Science and Technology (CASTECH), Pohang University of Science and Technology (POSTECH), Pohang, 790-784, South Korea, 3Pohang Accelerator Laboratory, San 31, Hyoja-dong, Pohang, Kyungbuk, 790-784, South Korea.

The interaction of 10 GeV electron beam with a few-cycle laser and its radiation through undulator was simulated. An isolated 146 as, 58 GW pulse at 0.1 nm is expected for 1200 nm and 0.2 ml laser.

16:15 Poster area THU.PIII.30

Resonant Formation of a Single Attosecond Pulse in Hydrogenlike Medium. • Vladimir Polovinkin1, Yevgeny Radeonychev2, and Olga Kocharovsky3; 1Institute of Applied Physics of the Russian Academy of Science, 46, Ulyanov str., Nizhny Novgorod, 603950 Russia, 2Department of Physics of Texas A&M University, College Station, 77843-4224 TX, USA.

We show the possibility to produce single nearly bandwidth-limited few-cycle attosecond pulses without external synchronization of spectral components based on time-dependent resonant interaction of an incident radiation with the bound states of hydrogenlike atoms.

16:15 Poster area THU.PIII.31

Femtosecond Electron Diffraction Study of the Cyclization Reaction in Crystalline Diarylethene. • Hubert Jean-Ruel1, Meng Gao2, Ryan R. Cooney1, Cheng Lu1, Michael A. Kochman3, Carole A. Morrison3, and R. J. Dwayne Miller1,3; 1Departments of Chemistry and Physics, 80 St. George Street, University of Toronto, Toronto, Ontario, M5S 3H6, Canada, 2School of Chemistry and EarthChem Research School, University of Edinburgh, West Mains Road, Edinburgh, UK, EH9 3JL, 3Max Planck Department for Structural Dynamics, Department of Physics, University of Hamburg, Centre for Free Electron Laser Science, DESY, Notkestrasse 85, Hamburg 22607.

Femtosecond electron diffraction is used to directly resolve the atomic motions involved in the ring closing reaction induced in a photochromic single crystal.
Out of equilibrium multi-phonon dynamics of the photoinduced transformation in the 1D molecular material (EDO-TTF)2SbF6. 

**16:15 Poster area THU.PIII.33**


**16:15 Poster area THU.PIII.34**

Temperature and fluence dependence of electron-phonon energy coupling in bismuth.

**16:15 Poster area THU.PIII.37**

Ultrafast quasiparticle dynamics of FeTe0.75Se0.25 superconductor.

**16:15 Poster area THU.PIII.38**

Surface Enhanced 2D-IR spectroscopy of gold nanoparticle capping layers.

**16:15 Poster area THU.PIII.40**

Substrate Effects on the Ultrafast Dynamics of the Vanadium Dioxide Insulator-to-Metal Transition Observed by Nondegenerate Pump-Probe Spectroscopy.

**16:15 Poster area THU.PIII.41**

Ultrafast Surface-Plasmon Enhancement of Exciton and Defect
Luminescence in ZnO Thin Films.
• Richard Haghland1, Benjamin Lawrie1, and Richard Mur2, 1Vanderbilt University, Nashville TN, USA, 2Fisk University, Nashville TN, USA.

Femtosecond pump-probe and photoluminescence measurements in transmission and reflection show that ultraviolet band-edge and visible defect luminescence in ZnO films can be selectively enhanced by coupling to Ag surface-plasmon polaritons or localized surface plasmon resonances.

16:15 Poster area THU.PII.43
Charge Dynamics and Spin Polarization in the Double-perovskite Multiferroic Bi2FeMnO6.
• Guohong Ma, Department of Physics, Shanghai University.

The electron charge dynamics and ultrafast spin relaxation in a double-perovskite multiferroic Bi2FeMnO6 film are investigated using time-resolved spectroscopy. Temperature dependence of couplings among the photon, phonon and spin degrees of freedom is clarified.

16:15 Poster area THU.PII.44
Electronic phase control in oxide heterostructures via ultrafast strain engineering.
• Andrea Caviglìa1, Raoul Scherwitzl2, Paul Popovich3, Wanzheng Hu4, Hubertus Bromberger4, Rashmi Singla4, Matteo Mitrano4, Matthias Hoffmann4, Stefan Kaiser4, Pavlo Zubko5, Stefano Gariglio6, Jean-Marc Triscone6, Micheal Först7, and Andrea Cavalleri1, 2, 1Max-Planck Department for Structural Dynamics, Center for Free Electron Laser Science, University of Hamburg, Germany, 2Department of Physics, Clarendon Laboratory, University of Oxford, United Kingdom, 3Département de Physique de la Matière Condensée, University of Geneva, 24 Quai Ernest-Ansermet, 1211 Genève 4, Switzerland.

Using femtosecond mid-infrared pulses, a NdNiO3 epitaxial thin film is switched between its insulating and metallic states by selectively exciting the lattice of a LaAlO3 or NdGaO3 substrate.

16:15 Poster area THU.PII.45
• Kotaro Makino1, Junji Tominaga2, Alexander Kolobov3, Paul Fons4, and Muneaki Hase1, 1Institute of Applied Physics, University of Tsukuba, Tsukuba, Japan, 2Nanoelectronics Research Institute, National Institute of Advanced Industrial Science and Technology, Tsukuba, Japan.

We demonstrate ultrafast phase change in a multilayered Ge-Se-Te structure with linearly-polarized pulse. Selective excitation along the superlattice direction results in reversible and irreversible phonon softening, corresponding to the phase change, depending on pump fluence.

16:15 Poster area THU.PII.46
Transition from Ballistic to Drift Motion in High-Field Transport in GaAs.
• Pamela Bowlan1, Wilhelm Kuehn1, Klaus Reimann2, Michael Woerner1, Thomas Elsaesser1, Rudolf Hey2, and Christos Fytianis3, 1Max-Born-Institut, 12489 Berlin, Germany, 2Paul-Drude-Institut, 10117 Berlin, Germany, 3École Normale Supérieure, 75231 Paris, France.

With strong THz pulses, we measure ultrafast transport of electrons, holes, and an electron-hole plasma in GaAs. The transition from ballistic to drift-like transport is strongly influenced by electron-hole scattering.

16:15 Poster area THU.PII.47
Nonlinear lattice control in La0.7Sr0.3MnO3 probed by femtosecond hard X-ray diffraction.
• Michael Först1, Roman Mankowsky2, Hubertus Bromberger3, Stefan Kaiser4, Cristian Manzonì4, David M. Fritz3, Henrik Lemke5, Diling Zhu6, Matthieu Chollert7, Andrin Caviezel7, Yashhide Tomioka7, Yoshinori Tokura7, Roberto Merlin8, John P. Hill8, Steven L. Johnson8, and Andrea Cavalleri1, 2, 1Max-Planck Department for Structural Dynamics, Center for Free Electron Laser Science, University of Hamburg, 2Department of Physics, Clarendon Laboratory, University of Oxford, United Kingdom, 3Max-Born-Institut, 12489 Berlin, Germany, 4Physikalisches Institut, Eberhard Karls Universität, Tübingen, Germany, 5Institute for Quantum Electronics, Swiss Federal Institute of Technology, Zürich, Switzerland, 6Correlated Electron Engineering Group, AIST, Tsukuba, Ibaraki, 305-8562 Japan, 7Department of Applied Physics, University of Tokyo, Tokyo, 113-8656 Japan, 8Department of Physics, University of Michigan, Ann Arbor, MI-48109, USA, 9Condensed Matter Physics and Materials Science Department, Brookhaven National Laboratory, Upton, NY11973, USA.

We use femtosecond x-ray diffraction to capture time-resolved distortions of a perovskite lattice resonantly excited in the mid-infrared. Ionic Raman scattering rectifies the oscillating vibrational field via lattice anharmonicities, observed through instantaneous displacive atomic motion.

16:15 Poster area THU.PII.48
Time and momentum resolved magnetic x-ray scattering on EuTe.
• Christoph Trabant1, 2, Nikolaus Pontius1, Enrico Schierle1, Eugen Weschke1, Torsten Kachel1, Christian Schüller-Langeheine1, Günter Springholz2, and Karsten Holldack1, 1G-I2 / M-II, Helmholtz-Zentrum Berlin, Germany, 2II. Physikalisches Institut, Universität zu Köln, Germany.

EuTe is an AF semiconductor in which AFM order is detectable by tr-RMXS. We measured fs- and ps time-resolved q-scans with surprising information about the magnetic profile at different pump-probe delays and pump fluences.

16:15 Poster area THU.PII.49
The contribution has been withdrawn.

16:15 Poster area THU.PII.50
Measurement of Decoherence Lifetimes in a High Mobility Two-Dimensional Electron Gas.
• Jeremy Curtis, Bagvanth Sangala, and David Hilton; The University of Alabama at Birmingham, Birmingham, Alabama, USA.

We have studied the dynamics of a high mobility two-dimensional electron gas as a function of temperature. The presence of satellite reflections in the sample and magnet can be modeled in the time-domain.

16:15 Poster area THU.PII.51
Absolute Femtosecond Measurements of Auger Recombination Dynamics in Lead Sulfide Quantum Dots.
• Byungmoon Cho, William Peters, Vivek Tiwari, Rob Hill, Austin Spencer, and David Jonas; Department of Chemistry and Biochemistry, University of Colorado at Boulder, Colorado, USA.

Multiphoton excitation of hot carriers generates multiexcitons that are probed as a function of the absolute number of photons absorbed. Standard assumptions of Auger recombination analyses fail for an average of 2 excitations.
16:15 Poster area THU.PI.52
CdTe Nanowires studied by Transient Absorption Microscopy. •Shun S. Lo1, Todd Major1, Nattasamon Peichang1, Libai Huang2, Masaru Kuno3, and Gregory V. Hartland1; 1Dept. of Chemistry and Biochemistry, University of Notre Dame, Notre Dame, Indiana 46556-5670, USA, 2Notre Dame Radiation Laboratory, University of Notre Dame, Notre Dame, Indiana 46556-5670, USA. Single CdTe nanowires were studied. The results suggest a trap-filling mechanism for charge carrier relaxation. Acoustic phonon modes were observed and the measured dephasing times gave vibrational quality factors similar to those for metal nanostructures.

16:15 Poster area THU.PI.53
Excitons, Biexcitons, and Trions in an InAs Quantum Dot Ensemble Studied with Optical Two-Dimensional Fourier-Transform Spectroscopy. •Galan Moody1,2, Rohan Singh1,2, Hebin Li1, Ilya Akimov3,2, Manfred Bayer3, Dirk Reuter2, Andreas Wiek3, and Steven Cundiff2; 1JILA, National Institute of Standards and Technology and the University of Colorado, 2Department of Physics, University of Colorado, 3Experimentelle Physik 2, Technische Universität Dortmund, 4A. F. Ioffe Physical-Technical Institute, Russian Academy of Sciences, 5Lehrstuhl fuer Angewandte Festkoerperfysik, Ruhr-Universitaet Bochum. Multi-particle correlations are investigated in an InAs quantum dot ensemble using two-dimensional Fourier-transform spectroscopy. This technique enables us to measure excitation polarization and density dependence of excitons, biexcitons, and trions within the ensemble.

16:15 Poster area THU.PI.54
Long-lived Image Potential Electrons on Alkanethiol Self-assembled Monolayer Studied by Two-photon Photoemission Spectroscopy. •Masahiro Shibuta1,2, Naoyuki Hirata1,2, Ryo Matsuzawa1, Masato Nakajima1,2, Toyoaki Eguchi1,2, and Atsushi Nakajima1,2; 1JST-ERATO, Nakajima Designer Nanocluster Assembly Project, Kawasaki, Japan, 2Department of Chemistry Faculty of Science and Technology, Keio University, Yokohama, Japan. The image potential state on alkanethiol self-assembled monolayer has been investigated by two-photon photoemission spectroscopy. The electron lifetime ranging from 10 to 100 ps can be controlled by changing the length of alkythiol chain.

16:15 Poster area THU.PI.55
Time resolved diffuse reflectance spectroscopy study of the dynamics of carriers in doped silver nanowires. •Elihu Ghadiri and Jacques-E. Moser; Institute of chemical sciences & engineering, Ecole polytechnique federale de Lausanne, Lausanne, Switzerland. Femtosecond time resolved diffuse reflectance spectroscopy is developed to study the charge carrier dynamics, namely electron injection rate on the photoanode of a dye sensitized solar cell in the situation close to the operational condition.

16:15 Poster area THU.PI.56
Resonant Enhancement of Coherent Phonons in Carbon Nanotubes Observed with Sub-10fs Time Resolution. •Kazumi Katayama1, Keisuke Tahara1, Jun Takeda2, Kazuhiro Yanagi2, Jie Tang1, and Masahiro Kitajima1; 1Yokohama National University, Yokohama, Japan, 2Tokyo Metropolitan University, Hachioji, Japan, 3National Institute of Materials Science, Tsukuba, Japan, 4National Defense Academy, Yokosuka, Japan. Using wavelength-resolved pump-probe spectroscopy with a sub-10-fs laser, we investigated resonant enhancement of radial breathing mode and G-mode coherent phonons in carbon nanotubes (CNTs), and successfully distinguished the electronic states of CNTs with different chiralities.

16:15 Poster area THU.PI.57
Exciton and Hole-Transfer Dynamics in Polymer: Fullerene Blends. •Almis Serbenta, Vlad G. Pavelyev, Jan C. Hummelen, Paul H. M. Loosdrecht, and Maxim S. Pshenichnikov; Zernike Institute for Advanced Materials, University of Groningen, The Netherlands. We study ultrafast hole transfer dynamics from fullerene derivative to polymer in bulk heterojunction blends implementing visible-pump for selective fullerene excitation, and IR-probe to detect charge appearance on polymer.

16:15 Poster area THU.PI.58
Ultrafast Charge Separation Dynamics of Twisted Intramolecular Charge Transfer State (TICT) in Coumarin Dye Sensitized TiO2 Film: A New Route to Achieve Higher Efficient Dye-Sensitized Solar Cell. Hirenrad Ghosh and •Sandeep Verma; Radiation & Photochemistry Division, Bhabha Atomic Research Centre, Trombay, Mumbai 400 085, INDIA. Ultrafast transient spectroscopy of 7-diethyl amino coumarin 3-carboxylic acid (D-1421) sensitized TiO2 film reveals that TICT states facilitate higher charge separation and slow recombination and proved to be new route to design higher efficient solar cell.

16:15 Poster area THU.PI.59
Quantum-dynamical Modeling of the Rydberg to Valence Excited State Internal Conversion in Cyclobutanone and Cyclopentanone. •Thomas S. Kuhlman1, Stephan P. A. Sauer2, Theis I. Sølling2, and Klaus B. Møller1; 1Department of Chemistry, Technical University of Denmark, Kgs. Lyngby, Denmark, 2Department of Chemistry, University of Copenhagen, Copenhagen, Denmark. The excited state internal conversion in cycloketones is governed by coherent ring-puckering motion affecting the timescale of this process. Using a vibronic coupling Hamiltonian we model this internal conversion using wave packet dynamics.

16:15 Poster area THU.PI.60
Intramolecular Charge Transfer Dynamics of a Planarized Analogue of 4-(dimethylamino)benzonitrile (DMABN) by Time-Resolved Fluorescence. •Myeongkong Park1, So Young Kim1, Donghong Im2, Young Ho Rhee2, and Taiha Joo1; 1Ultrafast Dynamics Laboratory, Department of Chemistry, Pohang University of Science and Technology (POSTECH), Pohangsi, Kyungbuk, Korea, 2Synthetic Organic Chemistry Laboratory, Department of Chemistry, Pohang University of Science and Technology (POSTECH), Pohangsi, Kyungbuk, Korea. Intramolecular charge transfer (ICT) of confined 1-tert-butyl-6-cyano-1, 2, 3, 4-tetrahydroquinoline (NTC6) is determined with a single time constant of ~1 ps regardless of solvents, although ICT of 4-(dimethylamino)benzonitrile (DMABN) shows dispersive dynamics in solvents.

16:15 Poster area THU.PI.61
Monitoring molecular chirality exchange by photon echo. •Frantisek Sanda1 and Shaul Mukamel2; 1Charles University, Faculty of Mathematics and
Towards Controlling Photochemical Reactivity in Small Polyatomic Molecules in Solution: Difluorodiiodomethane. Patrick El-Khoury, Suman Pal, Andrey Mershenchenko, and Alexander Tarnovsky; 1Department of Chemistry, University of California, Irvine, California 92697, USA, 2School of Basic Sciences, Indian Institute of Technology, Mandi, Himachal Pradesh 175 001, India, 3Department of Chemistry, Center for Photochemical Sciences, Bowling Green State University, Bowling Green, Ohio 43403, USA.

Ultrafast transient absorption and tools of computational photochemistry monitor the efficient formation of molecular iodine from difluorodiiodomethane promoted to the lowest excited state in inert solvents: this requires significantly larger photon energies in the gas-phase.

Local Control Theory in Trajectory-based Nonadiabatic Dynamics. Basile F. E. Curchod, Thomas J. Penfold, Ursula Rothlisberger, and Ivanò Tavernelli; 1Laboratory of Computational Chemistry and Biochemistry, Ecole Polytechnique Fédérale de Lausanne, CH-1015 Lausanne, Switzerland, 2Laboratoire de Spectroscopie Ultrarapide, Ecole Polytechnique Fédérale de Lausanne, CH-1015 Lausanne, Switzerland, 3SwissFEL, Paul Scherrer Inst., CH-5232 Villigen, Switzerland.

We present a pulse shaping method coupled with ab initio nonadiabatic molecular dynamics based on linear-response time-dependent density functional theory. We apply this to study state specific photoexcitations and consequent photochemical reactions of molecular systems.
Karlsruhe, Germany, 1Institut für Angewandte Physik, KIT, Wolfgang-Gaede-Strasse 1, D-76131 Karlsruhe, Germany, 2Institut für Nanotechnologie, KIT, D-76021 Karlsruhe, Germany, 3Preparative Macromolecular Chemistry, Institut für Technische Chemie und Polymerchemie KIT, Engesserstr. 18, 76128 Karlsruhe, Germany.

Different photoinitiators are investigated by femtosecond transient absorption spectroscopy and DFT calculations.

Their initiation properties are critically governed by competition between intersystem crossing, fluorescence and internal conversion partly taking place on comparable time scales.

16:15 Poster area THU.PIII.72
Multi-scale exciton relaxation dynamics in photosynthetic pigment-protein complexes. Darius Abramavicius1,2, Olga Rancova1, Andrius Gelzinis1,2, Vytautas Butkus1,3, and Leonas Valkunas1,3, 1Department of Theoretical Physics, Vilnius University, Sauletekio al. 9-III, LT-10222, Vilnius Lithuania, 2State Key Laboratory of Supramolecular Structure and Materials, Jilin University, 2699 Qianjin Street, Changchun 130012, PR China, 3Center for Physical Sciences and Technology, Gostauto 9, LT-01108 Vilnius, Lithuania.

Dynamics of molecular excitions in excitonic pigment-protein aggregates show coherent quantum beats as well as incoherent energy decay during the molecular exciton lifetime. Using simulations we show how excitons reach polaronically entangled system-bath configurations.

16:15 Poster area THU.PIII.73
Coherent Exciton Dynamics in Light-Harvesting Complexes with Two-Colour Spectroscopy. Gethin Richards1, Krystyna Wilk2, Paul Carmi3, Harry Quiney4, and Jeffrey Davis1, 1Swinburne University of Technology, Melbourne, Australia, 2University of New South Wales, Sydney, Australia, 3University of Melbourne, Melbourne, Australia.

We investigate coherent superpositions of excitons in the light-harvesting complex PC645 using two-colour spectroscopy. We measured a decoherence time of 500fs for the superposition and evidence for strong coupling to phonon modes.

16:15 Poster area THU.PIII.74
Ultrafast IR Pump-Probe and 2D-IR Photon Echo Spectroscopy of Adenosine-Thymidine Base Pairs.

16:15 Poster area THU.PIII.75

We investigate the ultrafast dynamics of light-harvesting proteins sourced from cryptophyte algae using two-dimensional electronic spectroscopy. A comparison of coherence effects between two similar light-harvesting proteins is presented.

16:15 Poster area THU.PIII.78
Two-dimensional electronic femtosecond stimulated Raman spectroscopy. Daniel Wilcox and Jennifer Ogilvie; Department of Physics and Biophysics, University of Michigan, 450 Church Street, Ann Arbor, MI, USA 48101.

We report two-dimensional electronic spectroscopy with a femtosecond stimulated Raman scattering probe. The method reveals correlations between excitation energy and excited state vibrational structure following photoexcitation. We demonstrate the method in rhodamine 6G.

16:15 Poster area THU.PIII.79
pH Jump induced alpha-helix folding. Mateusz Donen and Peter Hamm; University of Zurich, Institute of Physical Chemistry, Winterthurerstrasse 190, CH-8057 Zurich, Switzerland.

With pH jump experiments a wide group of peptides and proteins can be studied in terms of their folding dynamics and biological function. Poly-l-glutamic acid alpha-helix formation was investigated with time resolved infrared spectroscopy.

16:15 Poster area THU.PIII.80
Initial Processes of Proton Transfer in Salicylideneaniline Studied by Time-resolved Photoelectron Spectroscopy. Taro Sekikawa1,2, Oliver Schalk2, Guorong Wu2, Andrey E. Boguslavskiy2, and Albert Stolov2, 1Hokkaido University, Sapporo, Japan, 2National Research Council Canada, Ottawa, Canada.

The initial processes of excited state intramolecular proton transfer (ESIPT) in salicylideneaniline were investigated by time-resolved photoelectron spectroscopy. The planarity of the

16:15 Poster area THU.PIII.76
Ultrafast Absorption Kinetics of NADH in Folded and Unfolded Conformations. Zuzsanna Heiner1, Thomas Roland2, Stefan Haacke2, and Geza I. Groma3, 1Institute of Biophysics, Biological Research Centre, Hungarian Academy of Sciences, P.O.Box 521, 6701 Szeged, Hungary, 2Institut de Physique et Chimie des Matériaux de Strasbourg, Université de Strasbourg - CNRS, 23 rue du Loess, F-67034 Strasbourg, France.

The two conformation states of reduced nicotinamide adenine dinucleotide, exhibiting different fluorescence properties are characterized by markedly different femtosecond time-resolved absorption kinetics.
molecule was found to be a key parameter to describe ESIPT.

**16:15 Poster area THU.PIII.81 Ultrafast dynamics and Raman imaging of metal complexes of tetrasulphonated phthalocyanines in human cancerous and noncancerous breast tissues.** Halina Abramczyk, Arkadiusz Jarota, Beata Brozek-Pluska, Eric Freysz, Marc Tondusson, Jacek Musiał, and Radzislaw Kordek; 1Technical University of Lodz, Institute of Applied Radiation Chemistry, Laboratory of Laser Molecular Spectroscopy, Wroblewskiego 15, 93-590 Lodz, Poland, 2Université Bordeaux 1, Laboratoire Ondes et Matière d’Aquitaine (LOMA), UMR-CNRS 5798, 351 cours de la libération 33405 Talence Cedex, France, 3cMedical University of Lodz, Department of Pathology, Chair of Oncology, Paderewskiego 4, 93-509 Lodz, Poland. E-mail: abramczy@mitr.p.lodz.pl.

We will discuss the medical applications of femtosecond spectroscopy and Raman imaging techniques (SERS, TERS, SERRS, non-linear femtosecond stimulated Raman imaging FSRS, CARS). The role of nanoparticles and bioconjugates as Raman reporters will be reviewed.

**Postdeadline session**

20:00–21:30
FRI.1A: Ultrafast Dynamics in Materials and Systems

Chair: Koichiro Tanaka, Kyoto University, Kyoto, Japan

8:30–10:15 Auditorium A FRI.1A

8:30 Auditorium A FRI.1A.1

Real-time observation of ultrafast Rabi oscillations between excitons and plasmons in metal-molecular aggregate hybrid nanostructures, •Parinda Vasa1,2, Wei Wang1, Robert Pomraenke1, Melanie Lammers2, Margherita Mauiri2, Cristian Manzoni3, Giulio Caccuri1, and Christoph Lienau2; 1Department of Physics, Indian Institute of Technology Bombay, 400076 Mumbai, India, 2IFN-CNR, Dipartimento di Fisica, Politecnico di Milano, Milano, Italy.

We demonstrate ultrafast coherent manipulation of the normal mode splitting in metal/molecular-aggregate nanostructures by real-time observation of Rabi oscillations between excitons and surface-plasmon-polaritons. Oscillations in exciton density on a 10-fs timescale control the Rabi splitting.

8:45 Auditorium A FRI.1A.2

Plasmon Enhanced Photo-Induced Ultrafast Demagnetization in Ag-Co Hybrid Nanoparticles, •Kantiaki Konishi1,2, Katsuara Iemiyama3,4, Eiko Fujii3, Toshihiro Koyagase5; Tetsuya Hasegawa3,4, and Makoto Kawai-Gonokami1,2,6; 1Photon Science Center, The University of Tokyo, Tokyo, Japan, 2CREST (JST), The University of Tokyo, Tokyo, Japan, 3Department of Chemistry, The University of Tokyo, Tokyo, Japan, 4Kanagawa Academy of Science and Technology, Kanagawa, Japan, 5Department of Earth and Planetary Science, The University of Tokyo, Tokyo, Japan, 6Department of Physics, The University of Tokyo, Tokyo, Japan.

We investigated ultrafast photo-induced magnetization dynamics of Ag-Co hybrid nanoparticles in epitaxial TiO2 films. Ag nanoparticles with localized surface plasmon resonance enhance light-matter coupling and carrier relaxation resulting in strong demagnetization and few-picoseconds fast recovery.

9:00 Auditorium A FRI.1A.3

Calibrated detection of nonlinearly propagating strain waves, •Andre Bohjoo1, Daniel Schick1, Marc Herzog1, and Matthias Bargheer2; 1Institut f"{u}r Physik, Carl von Ossietzky Universit"{a}t, 26111 Oldenburg, Germany, 2Institut f"{u}r Physik, Carl von Ossietzky Universit"{a}t, 26111 Oldenburg, Germany.

Physik und Astronomie, Universitaet Potsdam, Karl-Liebknecht-Str. 24-25, 14476 Potsdam, Germany, 2Helmholtz-Zentrum Berlin fuer Materialien und Energie GmbH, Wilhelm-Conrad-Roentgen Campus, BESSY II, Albert-Einstein-Str. 15, 12489 Berlin, Germany. We show ultrafast all-optical reflectivity measurements on nonlinear propagating strain pulses for different fluences calibrated by ultrafast X-ray diffraction (UXRD) to the corresponding induced strain amplitudes.

9:15 Auditorium A FRI.1A.4

Ultrafast pump-probe spectroscopy of high-frequency mechanical modes in a singlemicrodisk resonator, Timo Kritzer, Oliver Ristow, Mike Hettich, Elaine Barretto, Martin Schubert, Elke Scheer, and Thomas Dekorsy; Department of Physics and Center for Applied Photonics, University of Konstanz, Konstanz, Germany.

Single microdisk resonators with a diameter of one micron are characterized using an ultrafast pump-probe spectroscopy method. Frequencies on the order of tens of GHz are detected.

9:30 Auditorium A FRI.1A.5

Superatom molecular orbitals of gas-phase fullerences, •Olof Johansson1, Gordon G. Henderson1, Françoise Remacle2, and Eleanor E.B. Campbell1; 1The Edinburgh and St Andrews Research School of Chemistry, University of Edinburgh, West Mains Road, EH9 3JJ, Scotland, 2Département de Chimie, B6c, Université de Liège, B4000 Liège, Belgium.

Angular-resolved photoelectron spectroscopy is used to characterise and study the fs/ps dynamics of the superatom molecular orbitals of gas-phase fullerences, which are hydrogen-like orbitals centred on the hollow core of the carbon cage.

9:45 Auditorium A FRI.1A.6

Tunable ultrafast nonlinear optofluidic coupler, •Marius Vieweg1, Sebastian Pricking1, Timo Gissibl2, Jaroslav Kartashov2, Lluis Torner2, and Harald Giessen1; 14th Physics Institute and Research Center Scope, University of Stuttgart, Stuttgart, Germany, 2ICFO - Institut de Ciencies Fotoniques, and Universitat Politecnica de Catalunya, Castelldefels, Spain.

We present an ultrafast nonlinear coupler fabricated by selective filling of two strands of a PCF with the liquid CC14 which exhibits a large Kerr nonlinearity.

We demonstrate power dependent switching in this optofluidic device.

10:00 Auditorium A FRI.1A.7

Heterodyne Detection of Electronic Optical Activity in Time-Domain: Single-Shot Chiroptical Spectroscopy, •Intae Eom1, Sung-Hyun Ahn1, Hanju Rhee1,2, and Minhaeng Cho3,3; 1Korea Basic Science Institute, Seoul 136-713, Korea, 2Graduated School of Analytical Science and Technology, Chungnam National University, Daejeon 305-764, Korea, 3Department of Chemistry, Korea University, Seoul 136-701, Korea.

We demonstrate that an ultimately sensitive chiroptical measurement at single femtosecond pulse level can be achieved using heterodyne-detection techniques. These methods will be of use to observe molecular chirality changes in ultrafast time domain.

FRI.1B: Extreme Light Generation

Chair: Louis Franklin DiMauro, The Ohio State University, Columbus, USA

8:30–10:15 Auditorium B FRI.1B

8:30 Auditorium B FRI.1B.1

Synthesis and Applications of Subcycle Light Transients, Mohammed Hassan1, Adrian Wirth1, Ivanka Grugurus1, Antoine Moulet1, Tran Trung Luu1, Justin Gagnon1, Olga Razskazovskaya2, Stefan Pabst3,4, Robin Santra3,4, Zeyad Alahmed2, Abdallah Azzeer5, Vladislav Yakovlev6, Vladimir Pervak2, Ferenc Krausz1,2, and Eleftherios Goulielmakis1,2; 1Max-Planck-Institut für Quantenoptik, Hans-Kopfermann-Str. 1, D-85748 Garching, Germany, 2Department für Physik, Ludwig-Maximilians-Universität, Am Coulombwall 1, D-85748 Garching, Germany, 3Center for Free-Electron Laser Science, DESY, Notkestraße 85, 22607 Hamburg, Germany, 4Department of Physics, University of Hamburg, Jungiusstraße 9, 20355 Hamburg, Germany, 5Physics and Astronomy Department, King Saud University, Riyadh, 11451, Kingdom of Saudi Arabia.

We demonstrate synthesis of superoctave, intense, subcycle transients of light and their application to attosecond control of matter.

8:45 Auditorium B FRI.1B.2

Multi-octave high-energy supercontinuum from mid-IR filamentation in YAG, Francisco Silva1,2,
Matthias Baudisch1, Dane R. Austin1, Alexandre Thai1, Michael Hemmer2, Daniele Faccio2, Arnaud Couairon2, and •Jens Biegert1, 2, 1ICFO-Institut de Ciencies Fotòniques, Av. Carl Friedrich Gauss, 3, 08860 Castelldefels, Barcelona, Spain, 2School of Engineering and Physical Sciences, Heriot-Watt University, Edinburgh, UK, 3Centre de Physique Theorique, Ecole Polytechnique, CNRS, F-91128 Palaiseau, France, 4Institució Catalana de Recerca i Estudis Avançats, 08010 Barcelona, Spain.

A coherent, carrier-envelope phase stable supercontinuum over more than three octaves extending from the ultraviolet into the mid-infrared is demonstrated, driven by mid-infrared femtosecond pulses. Tenfold self-compression is predicted numerically.

9:30 Auditorium B FRI.1B.5

Pulse Shaping of On-Chip Microresonator Frequency Combs: Investigation of Temporal Coherence, Fahmida Ferdous1, Houxun Miao2,3, Daniel Leaind, Kartik Srivinasan2, Lei Chen2, Vladimir Aksyuk2, and •Andrew Weiner1, 2, 1School of Electrical and Computer Engineering, Purdue University, 465 Northwestern Avenue, West Lafayette, IN 47907-2035, USA, 2Center for Nanoscale Science and Technology, National Institute of Standards and Technology, 100 Bureau Dr, Gaithersburg, MD 20899, USA, 3Nanocenter, University of Maryland, College Park, MD 20742, USA, 4Birck Nanotechnology Center, Purdue University, 1205 West State Street, West Lafayette, Indiana 47907, USA.

We use pulse shaping to investigate the temporal coherence of frequency combs generated in microresonators pumped by a strong CW laser. We observe that different groups of comb lines have different mutual coherence.

9:45 Auditorium B FRI.1B.6

Spatial and Spectral Coherent Control over Direct Frequency Comb Excitation, Itan Barmes, •Stefan Witte, and Kjeld S. E. Eikema; LaserLab Amsterdam, VU University, De Boelelaan 1081, 1081 HV Amsterdam, The Netherlands.

We demonstrate a principle for coherent control in both space and frequency, using counter-propagating frequency comb pulse trains. Precise control over two-photon excitation is observed, enabling significant improvements to direct frequency comb spectroscopy.

10:00 Auditorium B FRI.1B.7

Generation and detection of ultrabroadband infrared wave exceeding 200 THz. •Eiichi Matsubara, Masaya Nagai, and Masaaki Ashida; Osaka university, Osaka, Japan.  

Focusing an intense sub-10-fs pulse together with its second harmonics in air, we generate ultrabroadband coherent infrared wave with 200 THz bandwidth. Electric field profile is observed up to 100 THz by electro-optic sampling.

Coffee Break 10:15–10:45

FRI.2: Electron Diffraction

Chair: Majed Cherghoi, École Polytechnique Fédérale de Lausanne (EPFL), Lausanne, Switzerland

10:45–12:30 Room 350/351 FRI.2

Spatial-temporal characterization and control of ultrashort pulses through a multiply scattering medium. •Ayhan Tajduli1, 2, David Mccabe1, Dane R. Austin1, 2, Sylvain Gigan3, Ian Walmsley4, and Béatrice Chatel1; Laboratoire Collisions, Agrégats Réactivité, Université de Toulouse, Centre national de la recherche scientifique, F-31062 Toulouse, France, 2Clarendon Laboratory, Department of Physics, University of Oxford, OX1 3PU, Oxford, United Kingdom, 3Institut de Ciencies Fotòniques, Mediterranean Technology Park, 08860 Castelldefels (Barcelona), Spain, 4Institut Langevin, Universités Paris 6 & 7, ParisTech, Centre national de la recherche scientifique, 10 rue Vauquelin, Paris 75005, France.  

Propagation of ultrashort broadband pulses through a multiply scattering media result in complex spatio-temporal speckle pattern. Using spectral pulse shaping, we demonstrate the spatially localized temporal recompression of the output speckle to the Fourier-limit duration.

11:00 Room 350/351 FRI.2.2

Ultrafast Charge Relocation in an Ionic Crystal Probed by Femtosecond X-Ray Powder Diffraction. •Michael Woerner1, Flavio Zamponi1, Philip Rothhardt2, Johannes Stingl1, and Thomas Elsaesser1; 1Max-Born-Institut für Nichtlineare Optik und Kurzzeitspektroskopie, 12489 Berlin, Germany, 2Fraunhofer-Institut für Solare Energiesysteme Heidenhofstr. 2 79110 Freiburg Germany.  

Femtosecond x-ray diffraction from a powder of potassium dihydrogen phosphate demonstrates a relocation of electronic charge over the length of a chemical bond, much larger than the amplitude of the driving lattice soft mode.

11:15 Room 350/351 FRI.2.3

Photoinduced Dynamics in the Charge Density Wave Compound TaSe2, Nicolas Erasmus1, Maximilian Eichberger2, Kerstin Haupt1, Ilana Boshoff3, Günther Kassier1, Reinhard Binnske2, Helmuth Berger3, Jure Demšar2, and •Heinrich Schwoerer1;
Ultrafast charge density wave and periodic lattice distortion dynamics in TaSe2 are studied with ultrafast electron diffraction. Fluence dependence of the lattice superstructure suppression indicates a phase transition from the commensurate and incommensurate phase.

11:30 Room 350/351 FRI.2.4

High Density, Phase Stable RF Compressed Femtosecond Electron Diffraction System Characterized by Grating Enhanced Ponderomotive Scattering. •Meng Gao1,2, Hubert Jean-Ruel1,2, Ryan R Cooney1,2, Jonathan Stampe3, Mark De Jong2, German Sciaini1,2, and RJ Dwayne Miller1,2; Departments of Chemistry and Physics, 80 St. George Street, University of Toronto, Toronto, Ontario, M5S 3H6, Canada.

We present progress and outlook of rf photoinjector based electron diffraction. The use of this technique to study martensitic phase transition in Cobalt and laser driven shock waves in thick Al targets is discussed.

12:00 Room 350/351 FRI.2.6

4D Electron Microscopy: Development and Applications. •Ahmed H. Zewail; California Institute of Technology (Caltech), Pasadena, CA, USA.

In recent years it has become possible to unite the time domain with the spatial one, thereby creating four-dimensional (4D) electron microscopy. In this talk, we will present an overview of the development and advances made in this field, including recent extensions to 4D tomography, nanoscale plasmonics and near-field biological imaging.
<table>
<thead>
<tr>
<th>Author</th>
<th>Pages/Sections</th>
</tr>
</thead>
<tbody>
<tr>
<td>Birchfield, Luke</td>
<td>TUE.2A.4, TUE.4A.6</td>
</tr>
<tr>
<td>Biskup, Christian</td>
<td>THU.3B.6</td>
</tr>
<tr>
<td>Biskup, Dmitry</td>
<td>MON.PI.41</td>
</tr>
<tr>
<td>Burgdörfer, Joachim</td>
<td>TUE.PI.27, THU.PI.25</td>
</tr>
<tr>
<td>Butaeva, Evgenia</td>
<td>MON:2B.4, TUE.PI.72</td>
</tr>
<tr>
<td>Butcher, Nathan</td>
<td>THU.PI.2</td>
</tr>
<tr>
<td>Butkus, Vytautas</td>
<td>TUE.PI.16, THU.PI.72</td>
</tr>
<tr>
<td>Cabasse, Amélie</td>
<td>MON:25</td>
</tr>
<tr>
<td>Cacho, Cepheus</td>
<td>THU:2B.4, THU:3B.4</td>
</tr>
<tr>
<td>Cai, Dawen</td>
<td>MON:77</td>
</tr>
<tr>
<td>Caillat, Jérémie</td>
<td></td>
</tr>
<tr>
<td>Caillou, Hervé</td>
<td>MON:PI.48, THU.PI.33</td>
</tr>
<tr>
<td>Calegari, Francesca</td>
<td>MON:2A.2</td>
</tr>
<tr>
<td>Calendron, Anne-Laure</td>
<td>TUE:PI.2</td>
</tr>
<tr>
<td>Camaratta, Marco</td>
<td>MON:PI.32</td>
</tr>
<tr>
<td>Campbell, Eleanor B.</td>
<td>FRI:1A.5</td>
</tr>
<tr>
<td>Camper, Antoine</td>
<td></td>
</tr>
<tr>
<td>Canfield, Paul</td>
<td>MON:PI.41</td>
</tr>
<tr>
<td>Cannizzo, Andrea</td>
<td></td>
</tr>
<tr>
<td>Canton, Sophie</td>
<td>MON:PI.32</td>
</tr>
<tr>
<td>Carbone, Fabrizio</td>
<td>THU:2B.7, THU:3B.2</td>
</tr>
<tr>
<td>Carrell, Thomas</td>
<td>TUE:4A.4</td>
</tr>
<tr>
<td>Carlson, David R.</td>
<td>TUE.PI.16</td>
</tr>
<tr>
<td>Carpene, Ettore</td>
<td>TUE:PI.47</td>
</tr>
<tr>
<td>Carr, Adra</td>
<td>THU:2B.5</td>
</tr>
<tr>
<td>Carré, Bertrand</td>
<td></td>
</tr>
<tr>
<td>Cataldo, Franco</td>
<td>MON:PI.56</td>
</tr>
<tr>
<td>Caudell, Adrian</td>
<td>WED:2B.5, THU:2B.2</td>
</tr>
<tr>
<td>Cavalleria, Andrea</td>
<td>THU:2B.4, THU:PI.44, THU:PI.47</td>
</tr>
<tr>
<td>Caviezel, Andrin</td>
<td>EMON:PI.33, THU:PI.3.1, THU:PI.47</td>
</tr>
<tr>
<td>Caviglia, Andrea</td>
<td>TUE:PI.44</td>
</tr>
<tr>
<td>Cederbaum, Lorenz S.</td>
<td>MON:PI.55</td>
</tr>
<tr>
<td>Chen, Hou-Tong</td>
<td></td>
</tr>
<tr>
<td>Chen, Hung-Wen</td>
<td>TUE:2A.1, THU:PI.1, THU:PI.4</td>
</tr>
<tr>
<td>Cheng, F. G.</td>
<td>WED:3.2</td>
</tr>
<tr>
<td>Chang, Guoqing</td>
<td>TUE:PI.2, THU:PI.1, THU:PI.4</td>
</tr>
<tr>
<td>Chapman, Richard T.</td>
<td>MON:PI.14</td>
</tr>
<tr>
<td>Chatzipapadopoulos, Susana</td>
<td>TUE:PI.17</td>
</tr>
<tr>
<td>Chekalina, Sergey</td>
<td>TUE:PI.46, THU:PI.65</td>
</tr>
<tr>
<td>Chom, H.</td>
<td></td>
</tr>
<tr>
<td>Cheng, Hung-Wen</td>
<td>TUE:2A.1, THU:PI.1, THU:PI.4</td>
</tr>
<tr>
<td>Chen, Jinan</td>
<td></td>
</tr>
<tr>
<td>Chen, Wei</td>
<td>FRI:1B.5</td>
</tr>
<tr>
<td>Chen, Ming-Chang</td>
<td>WED:3.1</td>
</tr>
<tr>
<td>Cheng, Chi-Wen</td>
<td>TUE:PI.77</td>
</tr>
<tr>
<td>Cheong, S.-W.</td>
<td>TUE:PI.43</td>
</tr>
<tr>
<td>Cheong, Sang-Wook</td>
<td>MON:PI.33</td>
</tr>
<tr>
<td>Chergui, Majed</td>
<td>MON:2B.2, MON:2B.5, MON:2B.6, THU:2B.7, THU:3A.1, THU:3B.2</td>
</tr>
<tr>
<td>Chevalier, Katharina</td>
<td>THU:PI.70</td>
</tr>
<tr>
<td>Chiche, Ronic</td>
<td>MON:PI.10</td>
</tr>
<tr>
<td>Cho, Byungmoon</td>
<td>TUE:PI.51</td>
</tr>
<tr>
<td>Cho, Hana</td>
<td>MON:2B.9</td>
</tr>
<tr>
<td>Chatel, Bénédicte</td>
<td>FRI:1.2</td>
</tr>
<tr>
<td>Chellat, Matthias</td>
<td>THU:PI.47</td>
</tr>
<tr>
<td>Christen, Nikolas</td>
<td>TUE:2A.2</td>
</tr>
<tr>
<td>Christoffers, Jens</td>
<td>TUE:PI.76</td>
</tr>
<tr>
<td>Christoffer, Jens</td>
<td>TUE:PI.76</td>
</tr>
<tr>
<td>Christofilos, Dimitris</td>
<td>WED:4B.3</td>
</tr>
<tr>
<td>Chu, J.-H.</td>
<td>THU:2B.6</td>
</tr>
<tr>
<td>Chuang, Y.-D.</td>
<td>WED:3.2</td>
</tr>
<tr>
<td>Chuang, Yi-De</td>
<td>THU:2B.3, THU:3B.1</td>
</tr>
<tr>
<td>Chu, Yi-De</td>
<td>THU:2B.2, THU:3B.1</td>
</tr>
<tr>
<td>Ciu, Edna</td>
<td></td>
</tr>
<tr>
<td>Ciu, Edna</td>
<td>TUE:3A.3, TUE:THU.3.73</td>
</tr>
<tr>
<td>Dayeh, Shadi A.</td>
<td>TUE:3A.3, TUE:THU.3.73</td>
</tr>
<tr>
<td>De Froissart, Thomas</td>
<td>EMON:PI.33, THU:PI.34, de Heij, Janeke</td>
</tr>
<tr>
<td>de Jong, Mark</td>
<td>FRI:2.4</td>
</tr>
<tr>
<td>de Jong, Mark</td>
<td>FRI:2.4</td>
</tr>
<tr>
<td>de Lind, Regen</td>
<td>TUE:PI.27</td>
</tr>
<tr>
<td>de Re, Elenora</td>
<td>TUE:2A.3</td>
</tr>
<tr>
<td>de Rijis, Novin</td>
<td></td>
</tr>
<tr>
<td>de Souza, Raquel</td>
<td>THU:3B.1</td>
</tr>
<tr>
<td>de Sestri, Sandro</td>
<td>THU:PI.23, FRI:1B.4</td>
</tr>
<tr>
<td>de Vries-Rieke, Regina</td>
<td>TUE:3A.7, MON:2B.4, TUE:3A.4, TUE:4A.4, WED:4A.1, THU:PI.42</td>
</tr>
<tr>
<td>Doi, Kohshiro</td>
<td>MON:PI.43</td>
</tr>
<tr>
<td>Dombi, Péter</td>
<td>TUE:PI.6, TUE:PI.1</td>
</tr>
<tr>
<td>Dominik, Scharlakin</td>
<td>MON:PI.63</td>
</tr>
<tr>
<td>Donaldson, Paul M.</td>
<td>THU:PI.40</td>
</tr>
<tr>
<td>Donsen, Mateusz</td>
<td>THU:PI.79</td>
</tr>
<tr>
<td>Dostal, Jakub</td>
<td>TUE:4A.1</td>
</tr>
<tr>
<td>Doumy, Gilles</td>
<td>MON:PI.32, WED:2B.5, WED:4B.3</td>
</tr>
<tr>
<td>Dresden, Markus</td>
<td>THU:2B.4, THU:2B.4</td>
</tr>
<tr>
<td>Dreyer, Jens</td>
<td>WED:4A.7</td>
</tr>
<tr>
<td>Drozdov, Arkady</td>
<td>TUE:PI.29</td>
</tr>
<tr>
<td>Du, Juan</td>
<td>ETE:3A.5</td>
</tr>
<tr>
<td>Dubroil, Antoine</td>
<td>MON:PI.25, TUE:PI.30</td>
</tr>
<tr>
<td>Ducouso, Mathieu</td>
<td>WED:3.4</td>
</tr>
<tr>
<td>Dubovic, Martin</td>
<td>MON:1.2, MON:1.3, THU:PI.21</td>
</tr>
<tr>
<td>Duester, Stefan</td>
<td>WED:2B.5</td>
</tr>
<tr>
<td>Duggdale, Stephen B.</td>
<td>THU:2B.7</td>
</tr>
<tr>
<td>Dunck, Klaus</td>
<td>WED:4B.6</td>
</tr>
<tr>
<td>Dunford, Robert</td>
<td>MON:PI.32</td>
</tr>
<tr>
<td>Durfee, Charles</td>
<td>THU:PI.9</td>
</tr>
<tr>
<td>Dür, H. A.</td>
<td>WED:3.2</td>
</tr>
<tr>
<td>Durr, Hermann</td>
<td>TUE:1.5</td>
</tr>
<tr>
<td>Düsterer, Stefan</td>
<td>MON:1.2, THU:2B.4</td>
</tr>
<tr>
<td>Duwe, Matthias</td>
<td>THU:1.4</td>
</tr>
<tr>
<td>Dworak, Lars</td>
<td>MON:PI.52</td>
</tr>
<tr>
<td>Edlund, Petra</td>
<td>WED:1.3</td>
</tr>
<tr>
<td>Efimov, Anatoly</td>
<td>WED:4B.5</td>
</tr>
<tr>
<td>Elleehagh, Hans-J.</td>
<td>MON:PI.61</td>
</tr>
<tr>
<td>Eguchi, Toyoaki</td>
<td>THU:PI.54</td>
</tr>
<tr>
<td>Eich, Steffen</td>
<td>WED:3.6</td>
</tr>
<tr>
<td>Eichberger, Maximilian</td>
<td>FRI:2.3</td>
</tr>
<tr>
<td>Eikema, Kjeld S. E.</td>
<td>WED:2B.6, FRI:1B.6</td>
</tr>
<tr>
<td>El Nahhas, Amal</td>
<td>THU:2B.4, THU:2B.5</td>
</tr>
<tr>
<td>Elbashir, Toin</td>
<td>THU:2B.4</td>
</tr>
<tr>
<td>Ein-Khoury, Patrick</td>
<td>THU:2B.4, THU:PI.66</td>
</tr>
<tr>
<td>Emons, Mortiz</td>
<td>EMON:PI.15, THU:PI.4, THU:PI.14</td>
</tr>
</tbody>
</table>
AUTHORS' INDEX

Kelić, Thomas ................................ TUE.2A.1
Kelkensburg, Freek ................................ MON.2A.2
Keller, Ursula ................................ TUE.PII.28
Kelly, Thomas ................................ WED.2B.5
Kennedy, Brian ................................ MON.2B.1
Khallil, Munira ................................ THU.PII.22
Khanna, Vikaran ................................ THU.PII.22
Kida, Yuichiro ................................ TUE.PII.80, THU.3A.7
Kieffer, Jean-Claude ................................ MON.4B.2, TUE.PI.21
Kiel, Mario ................................ WED.4B.6
Kielinski, Dave ................................ WED.19
Kienberger, Reinhard ................................ MON.2A.1, MON.PI.49, WED.2B.5, THU.PI.51
Kilian, Gillian ................................ THU.PII.38
Kim, Dong Eon ................................ WED.2A.1
Kim, Dae-Gwi ................................ THU.PI.53
Kiliani, Gillian ................................ THU.3B.5
Kielpinski, Dave ................................ TUE.PI.19
Knop, Stephan ................................ THU.PI.22
Kleineberg, Ulf ................................ MON.PI.16
Kjaer, Kaspar Skov ................................ MON.PI.32
Kivshar, Yuri ................................ TUE.PII.29
Kitzler, Markus ................................ MON.4B.2, TUE.PI.22, THU.PI.28
Konishi, Kuniaki ................................ TUE.1B.2
Kireev, Victor ................................ WED.3.2
Kraack, Jan Philip ................................ TUE.2A.5, TUE.4A.6
Kramer, Christian ................................ TUE.2A.1
Kranz, Christian ................................ THU.1B.6
Kraus, Peter ................................ MON.1B.1, MON.PI.7
Krauss, Günther ................................ WED.19
Krauss, Ferenc ................................ MON.2A.1, MON.PI.7, MON.PI.16, MON.PI.49, THU.1B.2, THU.PI.15, THU.PI.17, FRI.1A.1
Krebs, Nils ................................ WED.4A.1
Krempasky, Juraj ................................ THU.PI.4
Kretschmar, Martin ................................ THU.PI.19
Krukunova, Maria ................................ THU.PI.4
Krüger, Hans-Jörg ................................ THU.PI.70
Krüger, Michael ................................ THU.PI.25
Krüger, Timo ................................ FRI.1A.4
Krupin, O. ................................ WED.3.2
Krupin, Oleg ................................ TUE.PII.31, THU.3B.2, THU.3B.1
Kubarych, Kevin ................................ MON.PI.3, THU.PI.82
Kubarych, Kevin J. ................................ TUE.PI.43
Kubon, Julia ................................ TUE.PI.75
Kudou, Tatsuya ................................ THU.PI.24
Kudriavcov, Viacheslav ................................ MON.4B.5
Kuehn, Wilhelm ................................ THU.PI.46
Kuhlman, Thomas S. ................................ THU.PI.59
Kukreja, R. ................................ WED.3.2
Kullmann, Martin ................................ THU.PI.29
Kumar, Sandeep ................................ THU.PI.29
Kumkar, Sören ................................ THU.PI.7
Kunusu, Kristian ................................ MON.PI.34
Kuno, Masaru ................................ THU.PI.52
Kuramochi, Hikaru ................................ MON.4A.2
Kurka, Moritz ................................ MON.PI.18
Kurz, Heiko G. ................................ TUE.PII.18
Kusaba, Miyuki ................................ TUE.PI.51
Kuwata-Gonokami, Makoto ......................... TUE.2B.2, TUE.4F, FRI.1A.2
Laegaard, Jesper ................................ MON.PI.3
Lai, Chien-Jen ................................ TUE.PI.68
Lammers, Melanie ................................ FRI.1A.1
Landsman, Alexander ................................ MON.PI.22
Landsman, Alexander S. ................................ THU.PI.28
Lang, Bernhard ................................ THU.PI.67
Lang, Peter ................................ WED.4A.4
Lang, Tino ................................ MON.PI.15, MON.PI.3, THU.PI.8
Lange, Christoph ................................ WED.2A.7
Langhals, Heinz ................................ THU.PI.5
Langner, Matthew ................................ TUE.PI.67
Lani, Sebastien ................................ THU.PI.6
Lanzani, Giugliano ................................ MON.PI.61, THU.3A.2
La-vorakiat, Chan ................................ WED.3.6
Laptenok, Sergey P. ................................ MON.PI.80
Larsson, Jorgen ................................ THU.PI.32
Lascoux, Noëlle ................................ THU.PI.53
Lassonde, Philippe ................................ MON.4B.2
Laux, Martin ................................ MON.2A.5, THU.1B.5, THU.PI.26
Lavoret, Bruno ................................ THU.PI.63
Lawrie, Benjamin ................................ THU.PI.42
Leard, Daniel ................................ FRI.1B.5
Leard, Daniel E. ................................ TUE.PI.21
Leburn, Christopher ................................ MON.PI.11
Leburn, Christopher G. ................................ TUE.PI.10
Leburn, Christopher Gilmour ................ TUE.PI.11
Lee, Chao-Kuei ................................ TUE.PI.36
Lee, Dong-Hai ................................ WED.3.5
Lee, J. ................................ FRI.1B.2
Lee, S. ................................ TUE.PI.42
Lee, Tae-Song ................................ TUE.PI.43
Lee, W.-S. ................................ WED.3.2
Lee, Wei-Sheng ................................ THU.3B.1, THU.3B.3
Lee, Yuan-Pern ................................ TUE.PI.77
Légaré, François ................................ MON.4B.2, TUE.PI.29, TUE.PI.21
Lehmann, C. Stefan ................................ MON.64
Lein, Manfred ................................ TUE.PI.18
Leitenstorfer, Alfred ................................ MON.PI.2, TUE.1.6, TUE.4B.6, TUE.PI.7, TUE.PI.26, TUE.PI.55, THU.3B.5
Leifner, Torsten ................................ MON.2B.1, THU.PI.69
Lemell, Christoph ................................ TUE.PI.27, THU.PI.25
Lemke, Henrik ................................ MON.PI.32, THU.PI.32, THU.PI.47
Lenngren, Nils ................................ THU.PI.53
Léonard, Jérémie ................................ MON.PI.79, WED.4A.5
Leschhorn, Günther ................................ MON.4B.4
Létard, Jean-François ................................ MON.PI.48
Leverenz, Ryan ................................ TUE.2A.3
Levinger, Nancy E. ................................ MON.PI.83
Li, Donghui ................................ THU.3B.1
Li, Hebin ................................ TUE.2A.6, THU.PI.53
Li, Renkai ................................ FRI.2B.5
Li, Tianqi ................................ THU.PI.21
Li, Yang ................................ WED.5A.1
Lidzey, David G. ................................ THU.PI.65
Liebl, Ursula ................................ MON.PI.80
Lienau, Christoph ................................ TUE.PI.34, TUE.PI.76, FRI.1A.1
Ligges, Manuel ................................ TUE.PI.33
Lilly, M.P. ................................ WED.2A.1
Lim, Jinkang ................................ TUE.PI.2
Lim, Manho ................................ THU.PI.81
Lima, Frederico ................................ WED.2B.2
Lim, Jeongmin ................................ MON.4B.5
Lim, Jeongmin ................................ MON.4B.5
Lim, Seong-Hoon ................................ THU.PI.7
Liu, Mengkun ................................ THU.PI.65
Liu, Xiaojun ................................ WED.3.2
Liu, Yuzhu ................................ MON.62
Lo, Shun S. ................................ TUE.PI.52
Lochner, Stefan ................................ TUE.PI.17, THU.2A.6
Locher, Regina ................................ MON.3A.3
Lograsso, Thomas ................................ THU.PII.21
Löhn, Madis ................................ FRI.1B.3
Lohrenz, Jan ................................ WED.2A.2
Lokman, Valery ................................ THU.PI.65
Lombardo, Antonio ................................ TUE.PI.68
Loosdrecht, Paul H. M. ......................... TUE.PI.57
Lopata, Kenneth ................................ TUE.PI.73
Lorenz, Maciej ................................ MON.PI.48, THU.PI.33
Lorenzana, José ................................ THU.PI.32
Loriot, Vincent ................................ MON.PI.23
Löstedt, Erik ................................ TUE.PI.22
Louise Groot, Marie ......................... TUE.PI.13, THU.3A.6
Lounis, Ibrahim ................................ THU.PI.58
Lozovsky, Vadim V ................................ TUE.PI.68
Lu, Cheng ................................ THU.PI.31
Lübeck, Andrea ................................ MON.3.3
Lucchini, Matteo ................................ MON.2A.2
Lücking, Fabian ................................ THU.PI.7
Lüder, Johannes ................................ MON.4B.4
Luebcke, Andrea ................................ THU.PI.69
Lüer, Larry ................................ THU.PI.32
Lukacs, Andreas ................................ THU.4A.7
Lütkemmer, Florian ................................ THU.3A.7
Lukes, Vladimir ................................ THU.2A.2
Luning, Jan ................................ TUE.1.2, WED.3.4
Lütgens, Matthias ................................ TUE.PI.17
Luan, Tran Trung ................................ FRI.1B.1
<table>
<thead>
<tr>
<th>Name</th>
<th>Page Numbers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Weitzel, Karl-Michael</td>
<td>THU.PIII.24</td>
</tr>
<tr>
<td>Weber, Konradin</td>
<td>TUE.4B.4</td>
</tr>
<tr>
<td>Watanabe, Takahiro</td>
<td>WED.4B.5</td>
</tr>
<tr>
<td>Wang, Wei</td>
<td>TUE.1.5</td>
</tr>
<tr>
<td>Vöhringer, Peter</td>
<td>MON.2A.5, MON.66, TUE.PI.71</td>
</tr>
<tr>
<td>Voll, Dominik</td>
<td>THU.PI.71</td>
</tr>
<tr>
<td>Vomir, Mircea</td>
<td>MON.PI.42, TUE.PI.49</td>
</tr>
<tr>
<td>von den Hof, Philipp</td>
<td>MON.3.6</td>
</tr>
<tr>
<td>von der Linde, Dietrich</td>
<td>TUE.PI.33</td>
</tr>
<tr>
<td>von Haimberg, Theodore</td>
<td>THU.PI.75</td>
</tr>
<tr>
<td>Vonesh, Helene</td>
<td>TUE.PI.49</td>
</tr>
<tr>
<td>Voronin, Aleksandr</td>
<td>TUE.PI.23</td>
</tr>
<tr>
<td>Voronin, Alexander</td>
<td>MON.PI.12</td>
</tr>
<tr>
<td>Voronin, Alexander A.</td>
<td>MON.PI.9</td>
</tr>
<tr>
<td>Voronine, Dmitri V.</td>
<td>TUE.A.1</td>
</tr>
<tr>
<td>Vos, Marten H.</td>
<td>MON.PI.82</td>
</tr>
<tr>
<td>Yabashi, Makina</td>
<td>TUE.PI.78</td>
</tr>
<tr>
<td>Yacht, Georg</td>
<td>THU.PI.25</td>
</tr>
<tr>
<td>Wachtveitl, Josef</td>
<td>MON.PI.50, MON.PI.71, TUE.PI.78</td>
</tr>
<tr>
<td>Wachi, Wolf</td>
<td>WED.4B.6</td>
</tr>
<tr>
<td>Wieland, Marek</td>
<td>THU.PI.70</td>
</tr>
<tr>
<td>Wielopolski, Mateusz</td>
<td>MON.PI.60</td>
</tr>
<tr>
<td>Wilcox, Daniel</td>
<td>THU.PI.78</td>
</tr>
<tr>
<td>Wilk, Krystyna</td>
<td>THU.PI.73</td>
</tr>
<tr>
<td>Wilkins, Stuart</td>
<td>THU.PI.2B</td>
</tr>
<tr>
<td>Wirth, Adrian</td>
<td>FRI.1B.1</td>
</tr>
<tr>
<td>Wise, Frank W.</td>
<td>THU.PI.10</td>
</tr>
<tr>
<td>Witte, Stefan</td>
<td>WED.2B.6, FRI.1B.6</td>
</tr>
<tr>
<td>Woerner, Michael</td>
<td>TUE.PI.4.5, TUE.PI.5, THU.PI.46, FRI.2.2</td>
</tr>
<tr>
<td>Woeste, Ludger</td>
<td>TUE.4B.4</td>
</tr>
<tr>
<td>Wolf, Jean-Pierre</td>
<td>MON.PI.21, MON.PI.75, TUE.4B.4, TUE.PI.63, THU.PI.6</td>
</tr>
<tr>
<td>Wolf, M.</td>
<td>THU.PI.2B.6</td>
</tr>
<tr>
<td>Wolf, Martin</td>
<td>TUE.PI.31</td>
</tr>
<tr>
<td>Wolf, Matthias</td>
<td>THU.PI.70</td>
</tr>
<tr>
<td>Wolf, Thomas</td>
<td>THU.PI.6.1</td>
</tr>
<tr>
<td>Wollenspach, Matthias</td>
<td>MON.2A.7</td>
</tr>
<tr>
<td>Wolter, Stefen</td>
<td>THU.PI.2A.6</td>
</tr>
<tr>
<td>Wong, Chris</td>
<td>THU.PI.12</td>
</tr>
<tr>
<td>Woodward, Nathaniel</td>
<td>MON.PI.37</td>
</tr>
<tr>
<td>Wörner, Hans Jakob</td>
<td>MON.1.5, MON.1.6, MON.PI.4, TUE.PI.25, TUE.PI.60</td>
</tr>
<tr>
<td>Wörner, Hans-Jakob</td>
<td>THU.PI.1.6</td>
</tr>
<tr>
<td>Wraback, Michael</td>
<td>MON.PI.37</td>
</tr>
<tr>
<td>Wu, Guorong</td>
<td>WED.4A.4, THU.PI.80</td>
</tr>
<tr>
<td>Wu, Guorui</td>
<td>TUE.PI.14</td>
</tr>
<tr>
<td>Wu, Tom</td>
<td>MON.PI.51</td>
</tr>
<tr>
<td>Wurth, W.</td>
<td>WED.3.2</td>
</tr>
<tr>
<td>Wurth, Willfried</td>
<td>TUE.PI.31</td>
</tr>
<tr>
<td>Würthner, Frank</td>
<td>THU.PI.2A.6</td>
</tr>
<tr>
<td>Xiao, Dequan</td>
<td>MON.PI.65</td>
</tr>
<tr>
<td>Xie, Xinna</td>
<td>MON.1.5, TUE.PI.22, THU.PI.28</td>
</tr>
<tr>
<td>Xion, Guochuan</td>
<td>MON.PI.51</td>
</tr>
<tr>
<td>Xion, Guozhong</td>
<td>MON.PI.51</td>
</tr>
<tr>
<td>Xion, J</td>
<td>TUE.PI.42</td>
</tr>
<tr>
<td>Xu, Canhua</td>
<td>THU.PI.34</td>
</tr>
<tr>
<td>Xu, Haifang</td>
<td>MON.4B.1, TUE.PI.28</td>
</tr>
<tr>
<td>Xu, Xiaojie</td>
<td>WED.4B.4</td>
</tr>
<tr>
<td>Xu, Xiao-Gao</td>
<td>WED.4B.4</td>
</tr>
<tr>
<td>Yabashi, Makina</td>
<td>WED.2B.3</td>
</tr>
<tr>
<td>Yakovlev, Vladislav</td>
<td>MON.2A.1, MON.PI.49, FRI.1B.1</td>
</tr>
<tr>
<td>Yamada, Shigeki</td>
<td>THU.PI.2B.3</td>
</tr>
<tr>
<td>Yamagawa, Mitsuru</td>
<td>THU.PI.13</td>
</tr>
<tr>
<td>Yamaguchi, Shioichi</td>
<td>MON.3.2</td>
</tr>
<tr>
<td>Yamauchi, Koichi</td>
<td>WED.3.3</td>
</tr>
<tr>
<td>Yamamoto, Kenoru</td>
<td>THU.PI.74</td>
</tr>
<tr>
<td>Yamazaki, Koarou</td>
<td>MON.PI.24</td>
</tr>
<tr>
<td>Yamamoto, Koarou</td>
<td>MON.4B.1, MON.PI.24, TUE.PI.22, TUE.PI.24, WED.2B.3, THU.PI.24, THU.PI.28</td>
</tr>
<tr>
<td>Yamamoto, Koarou</td>
<td>MON.4B.1, MON.PI.24, TUE.PI.22, TUE.PI.24, WED.2B.3, THU.PI.24, THU.PI.28</td>
</tr>
<tr>
<td>Yamamoto, Koarou</td>
<td>MON.4B.1, MON.PI.24, TUE.PI.22, TUE.PI.24, WED.2B.3, THU.PI.24, THU.PI.28</td>
</tr>
<tr>
<td>Yamauchi, Koarou</td>
<td>MON.4B.1, MON.PI.24, TUE.PI.22, TUE.PI.24, WED.2B.3, THU.PI.24, THU.PI.28</td>
</tr>
<tr>
<td>Yan, Jianqi</td>
<td>THU.PI.2B.1</td>
</tr>
<tr>
<td>Yan, Li</td>
<td>MON.PI.43</td>
</tr>
<tr>
<td>Yanagi, Kazuhiro</td>
<td>THU.PI.56</td>
</tr>
<tr>
<td>Yang, Jye-Shane</td>
<td>TUE.PI.77</td>
</tr>
<tr>
<td>Yang, Zuyi</td>
<td>WED.2A.1</td>
</tr>
<tr>
<td>Yang, Ming</td>
<td>MON.3.5</td>
</tr>
<tr>
<td>Yang, Sunling</td>
<td>MON.PI.16</td>
</tr>
<tr>
<td>Yang, Yang</td>
<td>THU.PI.75</td>
</tr>
<tr>
<td>Yarotski, D. A.</td>
<td>TUE.PI.42</td>
</tr>
<tr>
<td>Yarotski, Dmitry</td>
<td>WED.4B.5</td>
</tr>
<tr>
<td>Yartsev, Arkady</td>
<td>TUE.PI.53</td>
</tr>
<tr>
<td>Ye, Jun</td>
<td>THU.PI.1.1</td>
</tr>
<tr>
<td>Yi, H. T.</td>
<td>TUE.PI.43</td>
</tr>
<tr>
<td>Yi, Ming</td>
<td>THU.PI.3B.1</td>
</tr>
<tr>
<td>Yoneyama, Naoki</td>
<td>TUE.PI.38</td>
</tr>
<tr>
<td>Yoo, Jinkyong</td>
<td>WED.4B.2</td>
</tr>
<tr>
<td>Yoshii, Kazumichi</td>
<td>TUE.PI.20</td>
</tr>
<tr>
<td>Yoshimatsu, Orihiro</td>
<td>MON.PI.78</td>
</tr>
<tr>
<td>Yoshikawa, Kosuke</td>
<td>TUE.PI.2B.6</td>
</tr>
<tr>
<td>Yoshizawa, Masayuki</td>
<td>MON.PI.76</td>
</tr>
<tr>
<td>Yoshizawa, Masayuki</td>
<td>MON.PI.81</td>
</tr>
<tr>
<td>Yost, Dylan</td>
<td>THU.PI.1.1</td>
</tr>
<tr>
<td>Young, Linda</td>
<td>MON.PI.32</td>
</tr>
<tr>
<td>Young, Michael</td>
<td>THU.PI.9</td>
</tr>
<tr>
<td>Yu, Fangting</td>
<td>TUE.PI.4.3</td>
</tr>
<tr>
<td>Yu, Hui</td>
<td>MON.PI.68</td>
</tr>
<tr>
<td>Yuma, Bertrand</td>
<td>TUE.PI.58</td>
</tr>
<tr>
<td>Zair, Amelie</td>
<td>MON.PI.31</td>
</tr>
<tr>
<td>Zakeeruddin, Shao M.</td>
<td>MON.PI.60</td>
</tr>
<tr>
<td>Zaks, Julia</td>
<td>TUE.PI.56</td>
</tr>
<tr>
<td>Zalis, Stanislav</td>
<td>MON.2B.2</td>
</tr>
<tr>
<td>Zamponi, Flavio</td>
<td>TUE.PI.5, FRI.2.2</td>
</tr>
<tr>
<td>Zanotto, Simone</td>
<td>TUE.PI.26</td>
</tr>
<tr>
<td>Zapata, Luis E.</td>
<td>THU.PI.4</td>
</tr>
<tr>
<td>Zeiloun, Philippe</td>
<td>WED.3.4</td>
</tr>
<tr>
<td>Zepf, Matthew</td>
<td>THU.1.2</td>
</tr>
<tr>
<td>Zerbe, Oliver</td>
<td>TUE.4A.2</td>
</tr>
<tr>
<td>Zewail, Ahmed H.</td>
<td>FRI.2.6</td>
</tr>
<tr>
<td>Zhang, Jingdi</td>
<td>TUE.PI.1.1</td>
</tr>
<tr>
<td>Zhang, Li</td>
<td>MON.4B.1, TUE.PI.22, THU.PI.28</td>
</tr>
<tr>
<td>Zhang, Wenkai</td>
<td>MON.2B.1</td>
</tr>
<tr>
<td>Zhang, Xiaoyan</td>
<td>MON.PI.58</td>
</tr>
<tr>
<td>Zhang, Xin</td>
<td>TUE.PI.1.1</td>
</tr>
<tr>
<td>Zhang, Yizhu</td>
<td>MON.2A.5, THU.PI.1.5, THU.PI.26</td>
</tr>
<tr>
<td>Zhang, Yu</td>
<td>MON.PI.5</td>
</tr>
<tr>
<td>Zhang, Zhao Wei</td>
<td>THU.PI.11</td>
</tr>
<tr>
<td>Zhang, Zhen</td>
<td>MON.3.1</td>
</tr>
<tr>
<td>Zhao, RuiKun</td>
<td>TUE.PI.4.7</td>
</tr>
<tr>
<td>Zheikavko, Igor</td>
<td>MON.2B.4</td>
</tr>
<tr>
<td>Zhechitkov, Aleksei</td>
<td>MON.4A.1, MON.PI.12, TUE.4B.3, TUE.PI.23</td>
</tr>
<tr>
<td>Zhechitkov, Aleksei M.</td>
<td>MON.PI.9</td>
</tr>
<tr>
<td>Zheng, Hong</td>
<td>THU.PI.2B.2</td>
</tr>
<tr>
<td>Zheng, kaibo</td>
<td>TUE.PI.53</td>
</tr>
<tr>
<td>Zhi, MiaoChen</td>
<td>MON.4B.5</td>
</tr>
<tr>
<td>Zhou, Binbin</td>
<td>THU.PI.10</td>
</tr>
<tr>
<td>Zhou, Ping</td>
<td>TUE.PI.33</td>
</tr>
<tr>
<td>Zhou, Shuyun</td>
<td>WED.3.5</td>
</tr>
<tr>
<td>Zhu, Cheng</td>
<td>THU.PI.1</td>
</tr>
<tr>
<td>Zhu, D.</td>
<td>WED.3.2</td>
</tr>
<tr>
<td>Zhu, Diling</td>
<td>THU.PI.32, THU.PI.47</td>
</tr>
<tr>
<td>Zhu, J. X.</td>
<td>TUE.PI.42</td>
</tr>
<tr>
<td>Zhu, Jian-Xin</td>
<td>MON.PI.43</td>
</tr>
<tr>
<td>Zhu, Jingyi</td>
<td>TUE.PI.13, TUE.PI.23, THU.PI.6.3</td>
</tr>
<tr>
<td>Zhu, Yi</td>
<td>WED.3.5, THU.PI.3B.3</td>
</tr>
<tr>
<td>Žildek, Karel</td>
<td>THU.PI.53</td>
</tr>
<tr>
<td>Zier, Tobias</td>
<td>TUE.PI.40</td>
</tr>
<tr>
<td>Zigmantas, Donatas</td>
<td>TUE.4A.1, TUE.PI.16, WED.1.3</td>
</tr>
<tr>
<td>Zijlstra, Eeuwe S.</td>
<td>TUE.PI.40, TUE.PI.5</td>
</tr>
<tr>
<td>Zinth, Wolfgang</td>
<td>TUE.4A.4, TUE.PI.75</td>
</tr>
<tr>
<td>Zomer, Fabian</td>
<td>MON.PI.10</td>
</tr>
<tr>
<td>Zubi, Pavlo</td>
<td>THU.PI.44</td>
</tr>
<tr>
<td>Zuck, Pavlo</td>
<td>THU.PI.44</td>
</tr>
<tr>
<td>Zuck, Zuck</td>
<td>THU.PI.44</td>
</tr>
</tbody>
</table>

AUTHORS' INDEX