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QUTIF

Quantum Dynamics in Tailored Intense Fields (QUTIF)

Meeting II
18th May – 19th May, 2016
Venue: „Altes Schloss Dornburg“
Max-Krehan-Straße 3, 07774 Dornburg

Conference rooms:
Rittersaal
Großer Kaisersaal

Friedrich-Schiller-Universität Jena
seit 1558

Leibniz Universität Hannover

Wednesday, 18th May 2016

08:10	Bus departure: Jena - Dornburg
08:55 – 09:00	Welcome
09:00 – 09:50	Dieter Bauer (Rostock) *Strong-field few-body dynamics*
09:50 – 10:10	Max Sayler (Jena) *Probing attosecond dynamics and atomic structure using the absolute carrier-envelope phase*
10:10 – 10:30	Walter Pfeiffer (Bielefeld) *Modelling and physical interpretation of time-delay differences observed in attosecond streaking from WSe_2 and BiTeCl surfaces*
10:30 – 11:00	Coffee Break
11:00 – 11:50	Markus Kitzler (Wien) *Control of electron dynamics by two- and multi-color fields*
11:50 – 12:10	Ulf Saalmann (Dresden) *Pulse optimization with Gaussian processes*
12:10 – 13:10	Lunch Break
13:10 – 15:00	Poster + Coffee
15:00 – 15:50	Fernando Martin (Madrid) *Attosecond molecular dynamics: from simple diatomics to biomolecules*
15:50 – 16:10	Sebastian Eckart (Frankfurt) *Strong-Field Ionisation with Tailored Two-Color Laser Fields*
16:10 – 16:30	Nicolas Eicke (Hannover) *Electron Trajectories with Two-Color Strong-Field Ionization*
16:30 – 17:10	Coffee break
17:10 – 17:30	Jamal Berakdar (Halle) *Ultrafast optomagnetism driven by tailored optical vortices*
17:30 – 17:50	Danilo Zille (Jena) *Strong-field Photoionization of Alkali Atoms*
17:50 – 18:10	Alexander Kastner (Kassel) *Wavelength dependence of Photoelectron Circular Dichroism in Femtosecond Multiphoton Ionization*
18:30	Bus departure: Dornburg - Jena
19:45	Dinner (Hotel Schwarzer Bär)

Thursday, 19th May 2016

08:10	Bus departure: Jena - Dornburg
08:55 – 09:45	Andre Staudte (Ottawa) *Molecular imaging with intense laser pulses and coincidence photoelectron-photoion momentum spectroscopy*
09:45 – 10:35	Tobias Brixner (Würzburg) *Ultrafast Light Control and Spectroscopy on the Nanoscale*
10:35 – 11:35	Poster + Coffee
11:35 – 12:00	Young Scientists‘ Meeting
12:00 – 13:00	Lunch Break
13:00 – 13:20	Timo Paschen (Erlangen) *Coherent control of multiphoton photoemission from single nanotips in a two-color scheme*
13:20 – 13:40	Petra Groß (Oldenburg) *Coherent interactions of strong optical near-fields with free and weakly bound electrons*
13:40 – 14:00	Mackillo Kira (Marburg) *Ultrafast harmonic sideband generation in solids*
14:00 – 14:20	Peter Elliott (Halle) *Highly system dependent physics of laser induced demagnetization*
14:20 – 14:40	Katharina Echternkamp (Göttingen) *Quantum coherent manipulation of free electron wavefunctions*
14:40	Conclusion
15:00	Bus departure: Dornburg - Jena

Abstracts

Strong-field few-body dynamics

Dieter Bauer

Institute of Physics, University of Rostock

The talk will focus on the methodological aspects of strong-field few-body theory, adressing questions any newcomer in the field is concerned with: how to describe, model, and numerically simulate atoms or molecules in intense laser fields. Here, "few" means n= 1, 2, 3. Hence, we start with n=1 and the basics, i.e., "simple man's theory," strong-field approximation, quantum orbits, and how to obtain time-dependent Schrödinger equation benchmark results. Some of the typical strong-field textbook phenomena and their assessment by these methods will be reviewed, still open questions will be pointed out. With n = 2, 3 fascinating strong-field correlation phenomena come into play that turn out to be real floorers for conventional "ab initio" many-body approaches. Exemplarily, nonsequential ionization, autoionization, anti-screening, and dissociative ionization will be discussed.

Modelling and physical interpretation of time-delay differences observed in attosecond streaking from WSe_2 and BiTeCl surfaces

Walter Pfeiffer[1], Sergej Neb[1], Fabian Siek[1], Norbert Müller[1], J. Hugo Dil[2,3], Evgueni V. Chulkov[4,5], Pedro M. Echenique[4], Miquel Torrent-Sucarrat[4,6], Vyacheslav M. Silkin[4,6], Eugene E. Krasovskii[4,6], Andrey K. Kazansky[4,6], Ulrich Heinzmann[1]

[1]Universität Bielefeld, Germany - [2]Paul-Scherrer-Institut, Villigen, Switzerland - [3]Institute of Condensed Matter Physics, École Polytechnique Fédérale de Lausanne, Switzerland - [4]Donostia International Physics Center (DIPC) and Unidad de Fisica de Materiales CSIC-UPV/EHU, Basque Country, Spain - [5]Tomsk State University, Russian Federation - [6]University Basque Country, Spain

The availability of single attosecond (as) XUV pulses allows investigating ultrafast electron dynamics on the as time scale by recording slight temporal shifts of the photoelectron streaking in a simultaneously present strong IR field. The physical origin of the observed small delays is not yet understood and controversial theoretical models coexist demonstrating our still limited understanding of the fundamentals of the photoemission process. Here we report our progress to model and interpret photoemission delays measured using as-time-resolved photoemission from the layered crystals WSe_2 and the non-centrosymmetric BiTeCl. Quantum mechanical modelling on the single particle level and classical trajectory calculations yield no satisfactory explanation of the observed relative delays between photoemission events from different initial states. Local atomic effects and many body corrections occurring inside the atom from which the electron is emitted yield significant corrections to the total photoemission delay and improve the match between experimental observation and theoretical prediction. This sheds new light on the fundamental mechanism involved in the photoemission process and shows that a refined model of photoemission that accounts for these local effets is needed.

Control of electron dynamics by two- and multi-color fields

Markus Kitzler

Photonics Institute, Vienna University of Technology

Ultrashort intense laser pulses allow to create coherent electron wavepackets with sub-cycle duration via the strongly nonlinear process of field-ionization of atoms or molecules. Tailored fields open up the possibility to determine the motion of these electrons on attosecond times and on Angström spatial scales. In my talk I will present several examples where this possibility has been exploited for performing measurement and control of atomic and molecular dynamics, and for the generation of attosecond XUV or THz pulses. One example will be the measurement of the laser-sub-cycle phase-evolution of atomic bound states during the removal of an electron with sub-10 attosecond resolution. These experiments exploit interferences of wavepacket pairs released during one laser-cycle. A two-color laser field with parallel polarization directions is used to control these interferences.

Two-color fields with orthogonal polarization directions (OTC pulses) allow to control the motion of electron wavepackets not only in time but additionally in space, thereby establishing an attosecond time scale in the polarization plane. I will outline how this can be exploited for the generation of isolated attosecond pulses and for bound state probing of atoms. Furthermore, I will present experiments that use OTC pulses for controlling the double ionization dynamics of atoms on sub-cycle times, and to switch between a correlated and a strongly anti-correlated two electron emission dynamics.

Finally, I would like to discuss recent trends in the tailoring of intense fields that go beyond the superposition of merely two colors. As an example I will present an experiment on high-harmonic generation with pulses generated by multi-color waveform synthesis based on optical parametric amplification.

Pulse optimization with Gaussian processes

Ulf Saalmann, Mehrdad Baghery, Jan Michael Rost

Max-Planck-Institute for the Physics of Complex Systems, Dresden

Optimization for expensive-to-evaluate penalty functions is a notoriously difficult problem. We will discuss a method based on Gaussian processes (GP). Hereby the multi-parameter function to be optimized is described by means of a GP, which approaches the function as more and more calculations are made. This GP is easy to evaluate and most importantly its derivatives are analytically expressible, which allows to use standard gradient-based minimization algorithms. As a proof of principle we will use the algorithm to find the shape of a high-frequency laser pulse maximizing/minimizing the ionization yield of single-electron atom.

Attosecond molecular dynamics: from simple diatomics to biomolecules

Fernando Martin

Departamento de Química, Universidad Autónoma de Madrid

Sudden ionization of a molecule by an attosecond pulse is followed by charge redistribution on a time scale from a few-femtoseconds down to hundreds attoseconds, which is usually followed by fragmentation of the remaining molecular cation. This dynamics is the consequence of the coherent superposition of electronic continua associated with the ionization thresholds reached by the broadband attosecond pulse. Thus, a correct theoretical description of the time evolution of the ensuing wave packet requires the knowledge of the actual ionization amplitudes associated with all open ionization channels, as well as of the ensuing nuclear dynamics, a real challenge for large and medium-size molecules. In this talk, I will present the results of the first calculations of this kind, which have allowed us to interprete ultrafast electron dynamics observed in attosecond pump-probe experiments performed on N2 and the amino acid phenylalanine [Trabattoni et al., Phys. Rev. X 2015, 5, 041053; Calegari et al., Science 2014, 346, 336].

Strong-Field Ionisation with Tailored Two-Color Laser Fields

Sebastian Eckart, Reinhard Dörner

Institut für Kernphysik, Goethe University Frankfurt

We plan to report on our results on studying single ionization in tailored two-colour (780 nm & 390 nm) laser fields with overall intensities of up to 1.6×10^{14} W/cm^2. Ellipticites, intensities and the relative phase are tuned to tailor the combined electric field. The 3D-momenta of the fragments will be recorded with selected combinations of this huge parameter space using Cold Target Recoil Ion Momentum Spectroscopy (COLTRIMS) as experimental technique. We present technical aspects of the experimental setup including active stabilization of the relative phase and hope to be able to show new results regarding recollision dynamics, nonsequential double ionization and the control of interference patterns.

Electron Trajectories with Two-Color Strong-Field Ionization

Nicolas Eicke, Jost Henkel, Manfred Lein

Institute for Theoretical Physics, Leibniz Universität Hannover

We present first results from our QUTIF research project on the theory of momentum distributions from bichromatic ionization of atoms and molecules. Observation of the photoelectron momentum distribution in strong field ionization with a linearly polarized field and a weak orthogonal field of double frequency allows for reconstruction of the relative strength of direct and indirect ATI trajectories through intracycle interference and gives access to the ionization times of the long trajectories, as we have previously demonstrated with 2D TDSE calculations. We extend the calculation to 3D, where Coulomb focusing is expected to enhance the signal of the long (revisiting) trajectories even further.

Ultrafast optomagnetism driven by tailored optical vortices

Jonas Wätzel, Alexander Schäffer, Y. Pavlyukh, J. Berakdar

Martin Luther University Halle-Wittenberg

Orbital and spin parts of the angular momentum of electromagnetic waves were discussed theoretically long ago (cf. e.g. [1,2,3,4]). With the first realization and recent immense advances in producing and tailoring light waves carrying orbital angular momentum (OAM) [5], i.e. electromagnetic fields with optical vortices, interest is now focused on studying and exploiting the OAM-light-matter interactions with demonstrated applications ranging from optical tweezers for microscale objects to quantum information [5].

OAM beams are also interesting for electronic applications, as they, under certain conditions, can transfer OAM to charge degrees of freedom triggering in this way a spatio-temporal orbital magnetism [6]. In the presence of a spin orbital coupling OAM beams can also be utilized to swiftly manipulate spins [7] which is a key element for spintronics. These

theory predictions were qualitatively confirmed by a recent experiment [8]. Also for intrinsically magnetic systems, OAM beams may act as effective, femtosecond magnetic field bursts [9]. For atomic systems, the vast difference between the beam waist and the atomic orbital extension is adverse [10] for transferring OAM (even though one may first excite to high-lying Rydberg states, as in [10]). In our recent studies we envisaged therefore magnetizing orbitally stable, virtual states in fullerenes containing magnetically active agents, such as $DySc_2N@C_{80}$ or $N@C_{60}$, both were experimentally investigated and are of relevance for a number of applications including quantum information processing. We find that an ultraviolet vortex femtosecond pulse with an intensity of ~10^{13} W/cm^2 generates in C_{60} a non-invasive nA unidirectional surface current with an associated magnetic field of hundreds mT at the centre of the fullerene [11]. Results and further prospects for applications will be detailed in the talk.

[1] L. Rosenfeld, On the Energy-Momentum Tensor, Mem. Acad. Roy. Belg. 8, 6, 1 (1940)

[2] F.J. Belinfante, On the Current and the Density of the Electric Charge, the Energy, the Linear Momentum and the Angular Momentum of Arbitrary Fields, Physica, 7, 449 (1940).

[3] C. Cohen-Tannoudji, J. Dupont-Roc and G. Grynberg, Photons and Atoms. Introduction to Quantum Electrodynamics (Wiley, New York, 1989) (Ch.1)

[4] D.E. Soper, Classical Field Theory (Dover, New York, 2008) (Ch.10).

[5] L. Allen et. al. Orbital angular momentum of light and the transformation of Laguerre-Gaussian laser modes, Phys. Rev. A 45, 8185 (1992); D.L. Andrews, Structured Light and its Applications: an Introduction to Phase structured Beams and Nanoscale Optical Forces, (Academic Press, 2011).

[6] G.F. Quinteiro, J. Berakdar, Electric currents induced by twisted light in Quantum Rings Opt. Expr. 17, 20465 (2009); Wätzel J., and Berakdar J. Centrifugal photovoltaic and photogalvanic effects driven by structured light Sci.Rep. 6, pp 21475 (2016)

[7] G.F. Quinteiro, P.I. Tamborenea, J. Berakdar, Orbital and spin dynamics of intraband electrons in quantum rings driven by twisted light Opt. Expr. 19, 26733 (2011).

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[10] K. Koeksal, J. Berakdar, Charge-current generation in atomic systems induced by optical vortices, Phys. Rev. A 86, 063812 (2012).

[11] J. Wätzel, Y. Pavlyukh, A. Schäffer, and J. Berakdar Optical vortex driven charge current loop and optomagnetism in fullerenes Carbon 99, 439 (2016)

Strong-field Photoionization of Alkali Atoms

Danilo Zille, Daniel Adolph, Daniel Würzler, A. Max Sayler, Max Möller, Gerhard G. Paulus

Institute of Optics and Quantum, Friedrich Schiller University Jena

The ionization of atoms by strong laser fields reveals a number of characteristic features in the resulting photoelectron spectra. Examples are the above-threshold ionization peaks, the high-energy plateau or most recently, the low-energy structures which have been investigated over the last 25 years. An outcome of the experimental and theoretical efforts is an apparatus which is called carrier-envelope (CE) Phasemeter. It is capable of measuring the CE-phase and pulse duration of every single laser pulse within a kHz pulse train of few-cycle laser pulses at wavelengths around 0.8 μm. Its working principle is based on CE-phase dependence of the high-energy plateau in the photoelectron spectra. The goal of our project is the realization of a similar CE-Phasemeter which operates at short-wave infrared (sw-IR) wavelengths in the range between 1 μm and 3 μm. Using alkali atoms instead of noble gases, as the target for a sw-IR CE-Phasemeter, has the potential to circumvent several difficulties. In this talk, photoelectron spectra from strong-field photoionization of sodium at a center wavelength of 1.8 μm are presented and discussed in terms of the viability as a target gas for the sw-IR CE-Phasemeter.

Wavelength dependence of Photoelectron Circular Dichroism in Femtosecond Multiphoton Ionization

Alexander Kastner, Stefanie Züllighoven, Tom Ring, Cristian Sarpe, Christian Lux, Arne Senftleben, Thomas Baumert

Institute of Physics, University of Kassel

The asymmetry of photoelectron angular distributions (PADs) from randomly oriented enantiomers of chiral molecules in the ionization with circularly polarized light arises in forward/backward direction with respect to the light propagation. This effect was termed Photoelectron Circular Dichroism (PECD) and so far investigated using synchrotron radiation [1] and recently also by using high harmonic generation [2]. We observed highly structured asymmetries in the range of ± 10% on bicyclic Ketones [3, 4]. Due to the multiphoton ionization (MPI), high order Legendre polynomials appear in the measured PADs in the threshold as well as the above threshold ionization [5]. We recently tested the sensitivity of femtosecond PECD on enantiomeric excess [6]. In the case of Resonance Enhanced MPI (REMPI) using femtosecond laser pulses, the observed Legendre polynomial distribution is determined through the intermediate

resonance and can be influenced by the laser wavelength. In this contribution we show our recent findings on wavelength dependence of the PECD effect of bicyclic Ketones. Between the ionization threshold for 3 photons to the region slightly below our previous measurement point at 398 nm, a single intermediate resonance dominates the PAD images while for even shorter wavelengths the contribution from a second intermediate resonance arises.

Financial support by the State Initiative for the Development of Scientific and Economic Excellence (LOEWE) in the LOEWE-Focus ELCH is gratefully acknowledged.

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[3] C. Lux et al.: Circular Dichroism in the Photoelectron Angular Distributions of Camphor and Fenchone from Multiphoton Ionization with Femtosecond Laser Pulses, Angew. Chem. Int. Ed. 51, 5001-5005 (2012)

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Molecular imaging with intense laser pulses and coincidence photoelectron-photoion momentum spectroscopy

Andre Staudte

Joint Attosecond Science Lab, National Research Council, University of Ottawa

In the last 15 or so years, the imaging of orbitals from molecules has drawn significant interest. Advances in scanning tunneling microscopy (STM) have enabled the direct imaging of the electron density of complex molecules adsorbed on a surface [1]. On the other hand, the promise to time-resolve transient molecular orbitals, e.g., in chemical reactions, has stimulated vigorous efforts to reconstruct the orbital amplitude and phase from the high harmonic radiation emitted from molecules, irradiated by intense, infrared laser pulses [2]. However, the conceptual simplicity of STM can be combined with the time-resolution of femtosecond laser pulses, when the photoelectrons are imaged. For example, the angular dependence of the ionization current in the molecular frame has been shown to map out the electron density of the outer orbitals (e.g., [3]). Subsequently, using this technique, time-dependent charge oscillations in Ne+ were imaged in a pump-probe experiment [4].

Whereas the above yields a 1-dimensional observable of the charge density, it was demonstrated, that a 2-dimensional projection of the molecular orbital for a fixed molecular alignment can be obtained by imaging the momentum distribution of the photo-electron [5]. This opens the route to a tomographic reconstruction of the 3-dimensional shape of a molecular orbital. Furthermore, molecular imaging with strong laser fields can also provide access to the position of the nuclei through laser induced electron diffraction [5].

In my talk I will review the experimental efforts in molecular imaging at JASLab using Cold Target Recoil Ion Momentum Spectroscopy (COLTRIMS). I will cover the direct imaging of the orbital electron density, discuss laser induced electron diffraction, and strong field photoelectron holography. In order to provide a comprehensive overview of the state-of-the-art, I will place these results in the context of activities by other groups.

[1] J. Repp et al., Phys. Rev. Lett. 94, 026803 (2005).

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Ultrafast Light Control and Spectroscopy on the Nanoscale

Tobias Brixner

Institute of Physical and Theoretical Chemistry, University of Würzburg

We investigate ultrafast coherent phenomena in nanomaterials via coherent two-dimensional (2D) nanoscopy [1]. It combines coherent 2D spectroscopy and time-resolved photoemission electron microscopy (TR-PEEM). Sequences of ultrashort laser pulses are irradiated on a sample, and emitted photoelectrons are measured with spatial resolution as a function of inter-pulse time delays and relative phases. Fourier transformation then provides 2D correlations of excitation versus detection frequency for each spatial position. As an application, we show that Anderson-localized photonic states are responsible for perfect absorption

in the long-wavelength region of nanostructured solar cells [2]. In another example, we present proof of long-distance coupling and coherent back-and-forth energy transfer between tailored plasmonic nanocavities over distances of >1 μm [to be published].

Another degree of freedom is added when exploiting the vectorial nature of near-fields. While we have demonstrated coherent control of near-fields previously [3], we now focus on their chirality. In free space the chiroptical far-field response of any given system is maximal for left versus right circularly polarized light. This is not necessarily the case in near-fields. We show theoretically that optimally shaped laser pulses can be used to enhance optical chirality beyond the values obtained in free space and beyond those from incident circular polarization. Applications are envisioned in chiral sensing [to be published].

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Coherent control of multiphoton photoemission from single nanotips in a two-color scheme

Timo Paschen

University of Erlangen-Nürnberg

We present laser-induced electron emission from a nanometric metal tip using a synthesized light field consisting of fundamental light and its second harmonic. We employ an Erbium-doped femtosecond fiber laser that emits ultrashort pulses at 1560 nm. By superimposing a strong fundamental and second harmonic perturbative admixture, it is possible to coherently control multi-photon photoemission including above-threshold orders. We show that the photo-induced electron emission as well as the respective emission sites on the nanotip are dependent on the phase of the two light fields and can be controlled by means of shifting the time delay between the laser pulses. By using a single solid state nanoemitter, contrast values of the phase-dependent electron signal of more than 90 per cent are reached, which lies among the highest reported values for two-color coherent control measurements. Our experiments also imply a switching behavior on the femtosecond time scale. The experimentally observed phase-dependent electron emission is explained via quantum interference between different emission pathways and is compared to time-dependent density functional theory (TDDFT) simulations and DFT calculations.

Ultrafast harmonic sideband generation in solids

M. Kira[(a)], S.W. Koch[(a)], O.D. Mücke[(b)], F.X. Kärtner[(b)]

(a) University Marburg, (b) DESY, University of Hamburg

Our project will develop solid-crystal-based sources excited with a combination of optical sub-cycle forms and teraherz (THz) fields, and aim to use sub-THz fields to enhance ponderomotive contributions. This unique combination of sources opens up intriguing new avenues for experimentally realizing a 0.3THz source with 0.3 GV/m field strength [1] and petahertz/terahertz electronics [2]. We also present theory development in describing time-resolved high-harmonic generation [3] as well as excitonic harmonic sideband generation [4]. The concept of a quasiparticle collider is demonstrated via a recent experiment performed in Prof. Rupert Huber's group [4].

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Highly system dependent physics of laser induced demagnetization

Peter Elliott, Sangeeta Sharma

Max-Planck-Institute of Microstructure Physics, Halle

In this work we study the electronic charge and spin dynamics induced by strong laser fields using time-dependent density functional theory (TDDFT). In order to make a direct comparison between theory and experiment, our recent work has focused on the response of thin films of Cobalt grown on Copper/Platinum substrates. In these simulations we see two mechanisms for ultrafast demagnetization of the Cobalt; spin-orbit mediated spin-flips and spin-transport into the substrate. Additionally, we also study the longer

time (100s of fs) behavior for these systems. This is a necessary step in achieving the goal of including phononic degrees of freedom in our calculations, as it is on such timescales that these processes are important.

Quantum coherent manipulation of free electron wavefunctions

Katharina E. Echternkamp, Armin Feist, Sascha Schäfer, Claus Ropers

IV. Physical Institute – Solids and Nanostructures, University of Göttingen

The localization of optical near-fields enables energy and momentum exchange between free electrons and light [1,2]. Very recently, we demonstrated the quantum coherent nature of this process by inducing multilevel Rabi-oscillations in the ladder of free electron momentum states [3]. This opens up new routes to coherent manipulation and control schemes with free electrons. Here, we present two implementations of coherent multi-field interactions with a free electron beam.

First, an electron-light interferometer based on sequential interactions with two spatially separated near-fields is realized [4], in which amplitude and phase of the subsequent interactions can be controlled via the incident laser polarization. Second, we demonstrate phase-dependent, coherent control over free electron sideband populations by exciting a single near-field with two phase-locked fields at 400 nm and 800 nm wavelength, achieving strongly asymmetric electron spectra.

Both experiments highlight the potential of coherent couplings in optical near-fields for free electron wavefunction control.

[1] B. Barwick et al., Nature 462, 902-906 (2009).

[2] F. J. García de Abajo et al., Nano Lett. 10 (5), 1859-1863 (2010).

[3] A. Feist et al., Nature 521, 200-203 (2015).

[4] K. E. Echternkamp et al. In preparation.

Posters (Kleiner Kaisersaal)

1. Kunlong Liu (MPI Halle)
   Tunnel ionization of NO in strong circularly polarized laser fields

2. Philipp Henning (Rostock)
   Nearfield driven electron emission from nanospheres

3. Petra Groß (Oldenburg)
   Coherent interactions of strong optical near-fields with free and weakly bound electrons

4. Katharina Echternkamp (Göttingen)
   Quantum coherent manipulation of free electron wavefunctions

5. Dominik Schomas (Freiburg)
   A new He droplet spectrometer for nanoplasma experiments

6. Ihar Babushkin (Hannover)
   Towards strong tailored fields and Brunel radiation in a doubly resonant cavity

7. Lennart Seiffert (Rostock)
   Controlling the photoemission from dielectric nanospheres with two-color laser fields

8. Christoph Leithold (Jena)
   Spatio-Temporal Tailoring of Light Fields for Sub-Cycle Resolved Measurements of Strong-Field Effects

9. Matthias Paul (Jena)
   Towards a fully ab-initio simulation of the strong field driven electronic dynamics in chiral systems – the prochiral case

10. Evangelos Karamatskos (CFEL Hamburg)
    Optimisation of strong field-free alignment using tailored light fields

11. Andrea Eschenlohr, Sangeeta Sharma (Duisburg / MPI Halle)
    Bridging the gap between ab-initio theory and experiments: Femtosecond spin dynamics at Co interfaces

12. Marcel Mudrich (Freiburg)
    EUV-ionization of helium nanodroplets

13. Daniel Seipt (Jena)
    Laser-assisted Photoionization in Intense Vortex Light Fields

14. Victor Despré (University of Heidelberg)
    Charge migration in propiolic acid and its control

15. Sajal Kumar Giri (MPIPKS Dresden)
    Non-perturbative single photon ionization

16. Nicola Mayer (MBI Berlin)
    Interference stabilization of autoionizing states in molecular N_2 studied by time- and angular-resolved photoelectron spectroscopy

17. Philipp Wustelt, Florian Oppermann (Jena / Hannover)
    The HeH^+ isotopologues in intense asymmetric waveforms

18. Stefanie Züllighoven (Kassel)
    Sub-One Per Cent Enantiomeric Excess Sensitivity using Femtosecond Photoelectron Circular Dichroism

19. Nickolai Zhavoronkov (MBI Berlin)
    Elliptically polarized high harmonics using multi-color tailored laser beams

20. Daniel Würzler, Nicolas Eicke (Jena / Hannover)
    Probing wave-packet scattering with strong-field photoionization in orthogonally polarized two-color laser fields

21. Christoph Jusko (Hannover)
    Theoretical and experimental investigation of Kramers-Henneberger states in alkaline and noble gas atoms

22. Lars Englert (Oldenburg)
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