

TUE3 • Coherent Molecular Dynamics

Auditorium

14:00–15:45

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Chair: Margaret Murnane, JILA, University of Colorado, Boulder, CO, USA

TUE3.1 • 14:00

•Invited•

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

TUE3.2 • 14:30

Polarization-Resolved Pump-Probe Spectroscopy with High Harmonics, •Eric Mével¹, Yann Mairesse¹, Stefan Haessler², Baptiste Fabre¹, Julien Higuet¹, Willem Boutu², Pierre Breger², Eric Constant¹, Dominique Descamps¹, Stéphane Petit¹, and Pascal Salières²; ¹CELIA, Université Bordeaux 1, UMR 5107 (CNRS, Bordeaux 1, CEA), 351 Cours de la Libération, 33405 Talence Cedex, France, ²CEA-Saclay, DSM, Service des Photons, Atomes et Molécules, 91191 Gif-sur-Yvette, France. High Harmonic generation can be used as a probe of the emitting medium with attosecond and Angström resolutions. We show that polarization-resolved pump-probe spectroscopy with high harmonics improves the detection sensitivity of rotationally excited molecules.

TUE3.3 • 14:45

Direct measurement of the angular-dependence of molecular ionization cross-sections by time-resolved extreme-ultraviolet spectroscopy, •Isabell Thomann, Robynne Lock, Chan La-O-Vorakiat, Etienne Gagnon, Arvinder Sandhu, Henry C. Kaptelyn, Margaret M. Murnane, and Wen Li; JILA, University of Colorado, 440 UCB, Boulder, CO 80309-0440, USA.

We present a novel method for determining molecular neutral-to-ionic transition dipoles, by measuring time-dependent ionization yields from transiently aligned molecules. Results for N₂ and CO₂ are presented.

TUE3.4 • 15:00

Field-Free Unidirectional Molecular Rotation, Sharly Fleischer, Ilya Sh. Averbukh, and •Yehiam Prior; Department of

Chemical Physics, Weizmann Institute of Science, Rehovot, Israel 76100.

By varying the polarization and delay between two ultrashort laser pulses, we control the plane, speed, and sense of molecular rotation. This control may be implemented to individual components within a molecular mixture.

TUE3.5 • 15:15

Attosecond Control of Quantum Interferences in Aligned Molecules, •Stefan Haessler¹, Willem Boutu¹, Hamed Merdji¹, Pierre Breger¹, Gavin Waters², Marek Stankiewicz³, Leszek Fransinski⁴, Richard Taieb⁵, Jeremie Caillat⁵, Alfred Maquet⁵, Patrick Monchicourt¹, Bertrand Carre¹, and Pascal Salières¹; ¹CEA-Saclay, DSM, Service des Photons, Atomes et Molécules, 91191 Gif sur Yvette, France, ²J.J. Thomson Physical Laboratory, University of Reading, Whiteknights, Reading RG6 6AF, UK, ³Institute of Physics, Jagellonian University, ul. Reymonta 4, 30-059 Kraków, Poland, ⁴The Blackett Laboratory, Imperial College London, Prince Consort Road, London SW7 2BW, UK, ⁵UPMC Univ Paris 06, Laboratoire de Chimie Physique-Matière et Rayonnement, 11 rue Pierre et Marie Curie, 75231 Paris, France.

We control the quantum interference occurring between a molecular orbital and an ultrafast laser-driven electron wavepacket. The phase jump measured in the resulting harmonic emission contains signatures of Coulombic wavepacket distortion and allows attosecond pulse-shaping.

TUE3.6 • 15:30

Attosecond coincidence spectroscopy of diatomic molecules, •M. Lezius¹, Z. Ansari², M. Böttcher², B. Manschwetus², W. Sandner², A. Verhoeft¹, G.G. Paulus³, A. Saenz⁴, D.B. Milosevic⁵, and H. Rottke²; ¹Max-Planck-Institut für Quantenoptik, Hans-Kopfermann-Str. 1, D-85748 Garching, Germany, ²Max-Born-Institute, Max-Born-Str. 2A, D-12489 Berlin, Germany, ³Dept of Physics, Texas A&M University, College Station, TX 77843, USA, ⁴Institut für Physik, Humboldt-Universität zu Berlin, Hausvogteiplatz 5-7, D-10117 Berlin, Germany, ⁵Faculty of Science, University of Sarajevo, Zmaja od Bosne 35, 71000 Sarajevo, Bosnia and Herzegovina. Sub-cycle ionization of Ar-dimer by few-cycle laser fields is investigated with COLTRIMS. Low energy photoelectrons show clear deviations from double slit interference. We suggest that breakdown of the single-active electron approximation could be responsible for such effect.