

Laser Seminar / NCCR MUST Seminar

Friday, May 20, 2016

Time 16.45

Location ETH Zurich, Hönggerberg, HCI J6

Speaker **Anthony F. Starace, Department of Physics and Astronomy, University of Nebraska-Lincoln, USA**

Title **Applications of Elliptically Polarized, Few-Cycle Attosecond Pulses***

Abstract Use of elliptically-polarized light opens the possibility of investigating effects that are not accessible with linearly-polarized pulses. This talk presents two new physical effects that are predicted for ionization of the helium atom by few-cycle, elliptically polarized attosecond pulses. For double ionization of He by an intense elliptically polarized attosecond pulse, we predict a nonlinear dichroic effect (i.e., the difference of the two-electron angular distributions in the polarization plane for opposite helicities of the ionizing pulse) that is sensitive to the carrier-envelope phase, ellipticity, peak intensity I , and temporal duration of the pulse [1]. For single ionization of He by two oppositely circularly polarized, time-delayed attosecond pulses we predict that the photoelectron momentum distributions in the polarization plane have helical vortex structures that are exquisitely sensitive to the time-delay between the pulses, their relative phase, and their handedness [2]. Both of these effects [1, 2] manifest the ability to control the angular distributions of the ionized electrons by means of the attosecond pulse parameters. Our predictions are obtained numerically by solving the two-electron time-dependent Schrödinger equation for the case of elliptically polarized attosecond pulses. They are interpreted analytically by means of perturbation theory analyses of the two ionization processes [1, 2].

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[1] J.M. Ngoko Djiokap, N.L. Manakov, A.V. Meremianin, S.X. Hu, L.B. Madsen, and A.F. Starace, "Nonlinear dichroism in back-to-back double ionization of He by an intense elliptically-polarized few-cycle XUV pulse," Phys. Rev. Lett. 113, 223002 (2014).

[2] J.M. Ngoko Djiokap, S.X. Hu, L.B. Madsen, N.L. Manakov, A.V. Meremianin, and A.F. Starace, "Electron Vortices in Photoionization by Circularly Polarized Attosecond Pulses," Phys. Rev. Lett. 115, 113004 (2015).

Host Hans Jakob Wörner, Laboratory of Physical Chemistry, LPC

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