

Seminar über Ultrafast Science and Technology

Referent: Dr. Laura Cattaneo, Institute for Quantum Electronics, Ultrafast Laser Physics, ETH Zürich

Titel: Investigation of photoionization time delays in atomic and molecular targets

The recent progress in the generation of ultra-short light pulses has enabled the determination of photoionization time delays with attosecond precision. The two dominating techniques used to investigate these electron dynamics are the attosecond streak camera or Streaking, and the reconstruction of attosecond beating by interference of two photon transitions or RABBITT. Both techniques are based on a pump-probe scheme, employing an extreme ultraviolet (XUV) single attosecond pulse (Streaking) or attosecond pulse train (RABBITT) as pump, and an infrared (IR) pulse as probe. Here it may arise the question whether the two methods give the same answer. I will first present a complete study, supported by both experiments and simulations, about the comparison of these two techniques when the photoemission time delay between valence electrons emitted from Ne2p and Ar3p ground states is investigated. To continue, I will show how to extend this type of investigation to more complex targets, such as molecules, identifying the key parameters involved in molecular photoionization reactions. In particular I will present the dissociative ionization of oriented H₂ molecule, a fundamental case of study where the dynamics of the escaping electron wavepacket is influenced not only by electron correlation due to the presence of autoionizing states, but also by nuclear dynamics which takes place at comparable time scales as the electron dynamics. These experimental results are confirmed and complemented by a complete ab initio theoretical study incorporating not only the electronic, but also the nuclear coordinates in the description of the molecular wave function.

Zeit: Donnerstag, 22.03.2018, 11:15 Uhr

Ort: Hörsaal B116, Gebäude exakte Wissenschaften, Sidlerstrasse 5, Bern, Schweiz