Max-Planck-Institut für Struktur und Dynamik der Materie



Max Planck Institute for the Structure and Dynamics of Matter

March 4th 2014 – 15:00 CFEL Seminar room IV, 01.111 (Bldg. 99)

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Measurement of attosecond electron tunnel ionization times

Tunneling of a particle through a barrier is one of the most fundamental and ubiquitous quantum processes. When induced by an intense laser field, electron tunneling from atoms and molecules initiates a broad range of processes that evolve on the attosecond time-scale. As the liberated electron is driven by the laser field, it can return to the parent ion and recombine to the initial (ground) state, releasing its energy in an attosecond burst of light. This process, known as High Harmonic Generation (HHG) provides an excellent spatio-temporal filter for the electron motion.

In the talk I will describe how adding a weak perturbation allows us to probe both the ionization times and the recollision times of the electron in simple atomic systems. Our results which deviate from the simple classical model are in good agreement with the quantum path analysis. The next step is the probing of molecular systems where more than one ionization channel participates in the process. As an example I will show how multiplechannel ionization is observed in aligned CO2 molecules and how the high sensitivity of the measurement allows us to probe subtle differences between two ionization channels.

[1] D. Shafir et al., Nature 485, (2012)[2] H. Soifer et al., Chem. Phys. 414, 176 (2013)





Host: Andrea Cavalleri

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