CFEL SCIENCE

SEMINAR

Seminar: 25th October 2018, 14:00–15:30h

CFEL – Building 99, seminar room II and III (ground floor)

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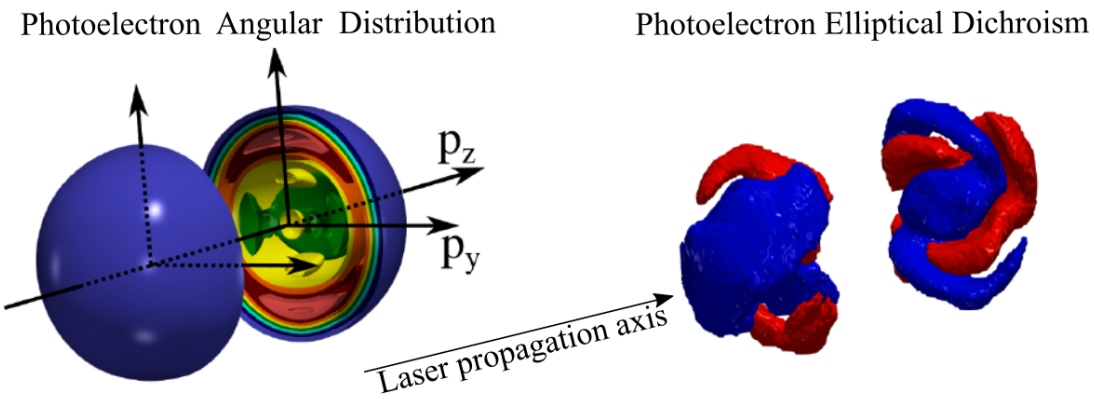
Ultrafast measurements of ultrafast dynamics of chiral molecules

We have recently built a new lab dedicated to measurements of ultrafast chiral dynamics in the gas phase, based on a high repetition rate Yb fiber laser system. I will give an overview of the developments and first results obtained:

Real-time monitoring of enantiomeric excesses through photoelectron elliptical dichroism:
We photoionized chiral molecules using elliptically-polarized femtosecond pulses at 2MHz repetition rate. We measured the 3D photoelectron angular distribution produced and demonstrate that it is highly sensitive to the structure of the ionized molecules. Continuously scanning the laser ellipticity allows us to track real-time changes in the chemical and chiral content of samples with unprecedented speed and accuracy.

Influence of the instantaneous optical chirality in the photoionization of chiral molecules:
After varying the degree of ellipticity of the ionizing radiation, we wondered if we could sculpt the instantaneous electric field to create a non-constant polarization state. We produced light beams with zero net chirality but non-zero instantaneous optical chirality. We used them to photoionize chiral molecules and found out that photoelectron circular dichroism could emerge from transiently chiral fields.

High-order harmonic generation beamline:
Our ultimate goal is to use circularly polarized XUV pulses to probe molecular chirality. We have thus developed a new beamline based on high-order harmonic generation and optimized both the macroscopic conditions, using an absolute density profiling of the gas jet, and the single atom response. This enables us to produce 4e14 photons per seconds at 19 eV (1.3 mW), with a 166 kHz repetition rate.



Host: Francesca Calegari/ CFEL Molecular Physics Seminar