

Institutsseminar

Attosecond Light Pulses: Generation, Metrology, and Time-Resolved Photoionization Dynamics

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Observing electron motion in real time is a central ambition of today's physics. Because electronic dynamics occur on the attosecond timescale ($1 \text{ as} = 10^{-18} \text{ s}$), their direct investigation became possible with the advent of attosecond light pulses in the early 2000s. This breakthrough, recognized by the 2023 Nobel Prize in Physics, established the field of attosecond science and opened unprecedented opportunities for probing and controlling ultrafast electron dynamics in matter.

In this seminar, I will discuss the generation of attosecond pulses via high-order harmonic generation, produced by focusing intense femtosecond laser pulses into a rare-gas medium. I will in particular present Attohallen, the new attosecond science facility developed within the Feifel group at the University of Gothenburg, designed for the production and application of high-intensity attosecond radiation.

In this seminar I will recapitulate the RABBITT (Reconstruction of Attosecond Beating By Interference of Two-photon Transitions) technique, a key interferometric method for characterizing attosecond pulse trains and accessing ultrafast photoionization dynamics. I will focus on how RABBITT measurements enable the extraction of Wigner time delays associated with electron emission in photoionization. As an example, I will present spin-orbit-resolved measurements of Wigner time delays in Ar 3p photoionization performed at the Attohallen facility, demonstrating its possibly uniquely combined high temporal and high spectral resolution for ultrafast photoionization studies.