K 5: Attosekunden Experimente

Zeit: Dienstag 15:30–15:45 Raum: 2D

K 5.1 Di 15:30 2D

Attosecond Ionization Gating of High-Harmonic Generation — •Thomas Pfeifer[1,2], Aurélie Jullien[1,2], Mark J. Abel[1,2], Phillip M. Nagel[1,2], Daniel M. Neumark[1,2], and Stephen R. Leone[1,2] — [1]Departments of Chemistry and Physics, University of California, Berkeley, CA 94720, USA — [2]Chemical Sciences Division, Lawrence Berkeley National Laboratory, Berkeley, CA 94720, USA

When an intense ($\sim 10^{14}$-10^{15} W/cm^2) laser pulse interacts with an atomic system, ionization occurs and high-order harmonics are produced. We present experimental evidence that the ultrafast ionization at a quickly-rising leading edge of a laser pulse can be used to turn off the harmonic production process on a sub-optical-cycle timescale. The last, most intense cycle to produce harmonics before the turn-off then produces the highest photon energies, therefore leading to an isolated attosecond pulse after high-pass filtering. Instead of requiring a cosine-pulse for isolated attosecond pulse generation as in the conventional scheme, the carrier-envelope phase now becomes a free parameter to tune the center photon energy of the attosecond pulse. The same method also allows the production of isolated attosecond pulses with multi-cycle driver pulses. We also describe an interferometric way of extracting the multiplicity of attosecond pulses (number of pulses in the pulse train) in different parts of the high-harmonic spectrum.

Ref.: T. Pfeifer et al., Opt. Express, accepted (2007).