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Controlling the directionality of photoemission from M- vs. N-photon ionization with CEP stable polarization-tailored bichromatic fields

Wednesday 14 February 2018 17:00 (2 hours)

Polarization-tailored bichromatic laser fields with commensurable center frequencies have emerged as a new twist to steer ultrafast electron dynamics. Recently, we introduced a novel approach to the generation of polarization-tailored bichromatic fields, based on ultrafast pulse shaping of an octave-spanning Carrier Envelope Phase (CEP)-stable white light supercontinuum [1-2]. The shaper-based approach allows us to combine control strategies based on bichromatic multipath interference with CEP-sensitive excitation and, in addition, to utilize the full repertoire of femtosecond pulse shaping.
In this contribution, bichromatic pulse shaping is applied to study CEP-sensitive lateral asymmetries in the photoelectron angular distribution from 7- vs. 8-photon ionization of Xenon atoms. The physical mechanism is discussed in terms of the interference of states with opposite parity, addressed by the corresponding quantum pathways. In addition to the CEP studies, we vary the polarization state of both colors from linear to circular, generating a CEP-sensitive 3D-photoelectron wave packets with 1-arm-vortex shape. The 3D photoelectron wave packets is detected using a velocity map imaging spectrometer in combination with tomographic reconstruction techniques.

[1] S. Kerbstadt, L. Englert, T. Bayer and M. Wollenhaupt, J. Mod. Opt. 64 (2017) 1010.
[2] S. Kerbstadt, D. Timmer, L. Englert, T. Bayer and M. Wollenhaupt, Opt. Expr. 25 (2017) 12518.

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