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Perturbation Theory Analysis of Attosecond Photoionization[1]
EVGENY A. PRONIN, ANTHONY F. STARACE, University of Nebraska-Lincoln, USA, MIKHAIL V. FROLOV, NIKOLAI L. MANAKOV, Voronezh State University, Russia — Ionization of an atom by a few-cycle attosecond XUV pulse is analyzed using perturbation theory (PT), keeping terms in the transition amplitude up to second order in the pulse electric field [*Phys. Rev. A* **80**, 063403 (2009)]. Within the PT approach, we present an *ab initio* parametrization of the ionized electron angular distribution (AD) (using rotational invariance and symmetry arguments) that gives analytically the dependence of the AD on the carrier envelope phase (CEP), the pulse polarization, and the ionized electron direction, $\hat{\mathbf{p}}$. For an elliptically-polarized pulse, interference of the first and second order amplitudes causes a CEP-dependent asymmetry (with respect to $\hat{\mathbf{p}} \to -\hat{\mathbf{p}}$) and both elliptic and circular dichroism effects. For ionization of the H atom by linearly-polarized pulses, our PT results are in excellent agreement with results of numerical solutions of the time-dependent Schrödinger equation of Peng *et al.* [*New J. Phys.* **10**, 025030 (2008)].

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