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Double Ionization of He by an Intense Elliptically-Polarized, Few-Cycle Attosecond Pulse[1] JEAN MARCEL NGOKO DJIOKAP, University of Nebraska-Lincoln, NIKOLAI M. MANAKOV, ALEXEI V. MEREMIANIN, Voronezh State University, SUXING HU, University of Rochester, LARS B. MADSEN, Aarhus University, ANTHONY F. STARACE, University of Nebraska-Lincoln
— By solving the six-dimensional two-electron, time-dependent Schrödinger equation for He interacting with an arbitrarily-polarized intense attosecond XUV pulse, we demonstrate numerically the control of He double ionization by means of the pulse polarization and its carrier-envelope phase (CEP).[2] Using perturbation theory (PT), we predict a new type of CEP-sensitive polarization asymmetry that is normally absent in single photon double ionization of He, but does occur for an elliptically-polarized, few-cycle attosecond XUV pulse. We call this new effect *nonlinear dichroism*,[3] which is sensitive not only to the ellipticity, peak intensity I, and temporal duration of the pulse, but also to the energy-sharing. This dichroic effect (i.e., the difference of the two-electron angular distributions for opposite helicities of the ionizing XUV pulse) originates from interference of first- and second-order PT amplitudes, allowing one to investigate and control S- and D-wave channels of the two-electron continuum. Nonlinear dichroism probes electron correlation on its natural timescale since it vanishes for long pulses.

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[2]J.M. Ngoko Djiokap *et al.*, Phys. Rev. Lett. **113**, 223002 (2014).
[3]Djiokap *et al.*

Jean Marcel Ngoko Djiokap
University of Nebraska-Lincoln

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