Abstract Submitted
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Attosecond coherence control of Helium ions ensemble[1] SAAD MEHMOOD, Phys. Dept., University of Central Florida, Orlando, FL, EVA LINDROTH, Phys. Dept., Stockholm University, Sweden (EU), LUCA ARGENTI, Phys. Dept., University of Central Florida, Orlando, FL — Attosecond extreme ultraviolet (XUV) pulses trigger the release of a photoelectron from an atom or molecule in a coherent ionization process. As soon as the electron is emitted, however, part of the coherence in the residual parent-ion is lost, and so is the chance of guiding any subsequent transformations of the target in a reproducible way. To influence the parent-ion coherence, the system must be perturbed with additional light pulses before the ionization process is over. Here we present a theoretical study of the attosecond XUV-pump IR-probe ionization of the Helium atom to the 2s and 2p He^+ states. In electrostatic approximation, these states are degenerate, and hence their coherent superposition gives rise to a parent ion with a permanent dipole moment. We show that the magnitude of the polarization can be controlled by altering the time delay between the XUV and IR pulses on a timescale of few femtoseconds, which is comparable to the beating between the autoionizing states populated by the XUV pulse. Furthermore, on a timescale of few picosecond, the dipole moment fluctuates even in absence of external fields, due to spin orbit interaction. Our results show how the slow dynamics of such polarized-ion ensemble can be controlled with attosecond precision.

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