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Attosecond Pulse Carrier-Envelope Phase Effects: Roles of Frequency, Intensity and an Additional IR Pulse EVGENY A. PRONIN, The University of Nebraska-Lincoln, LIANG-YOU PENG, Peking University-Beijing, ANTHONY F. STARACE, The University of Nebraska-Lincoln — The effects of the carrier-envelope phase (CEP) of a few-cycle attosecond pulse on ionized electron momentum and energy spectra are analyzed, both with and without an additional few-cycle IR pulse [1, 2]. In the absence of an IR pulse, the CEP-induced asymmetries in the ionized electron momentum distributions are shown to vary as the 3/2 power of the attosecond pulse intensity. These asymmetries are also found to satisfy an approximate scaling law involving the frequency and intensity of the attosecond pulse. In the presence of even a very weak IR pulse, the attosecond pulse CEP-induced asymmetries are found to be significantly augmented. In addition, for higher IR laser intensities, we observe for low electron energies peaks separated by the IR photon energy in one electron momentum direction along the laser polarization axis; in the opposite direction, we find structured peaks that are spaced by twice the IR photon energy. Possible physical mechanisms for such asymmetric, low-energy structures in the ionized electron momentum distribution are proposed. Our results are based on single-active-electron solutions of the 3D TDSE for H and He. [1] Peng LY, Pronin EA, and Starace AF, New J. Phys. **10**, xxx (2008); [2] Peng LY, Starace AF, Phys. Rev. A **76**, 043401 (2007)

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