

Abstract Submitted
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Exploration of laser-driven electron-multirescattering dynamics in high-order harmonic generation.¹ PENG-CHENG LI, Department of Physics, College of Science, Shantou University, SHIH-I CHU, Department of Chemistry, University of Kansas — We investigate the dynamical origin of multiple rescattering processes in high-order harmonic generation (HHG) associated with the odd and even number of returning times of the electron to the parent ion. We perform fully ab initio quantum calculations and extend the empirical mode decomposition method to extract the individual multiple scattering contributions in HHG. We find that the tunneling ionization regime is responsible for the odd number times of rescattering and the corresponding short trajectories are dominant. On the other hand, the multiphoton ionization regime is responsible for the even number times of rescattering and the corresponding long trajectories are dominant. Moreover, we discover that the multiphoton- and tunneling-ionization regimes in multiple rescattering processes occur alternatively. Our results uncover the dynamical origin of multiple rescattering processes in HHG for the first time. It also provides new insight regarding the control of the multiple rescattering processes for the optimal generation of ultrabroad band supercontinuum spectra and the production of single ultrashort attosecond laser pulse. This work was partially supported by DOE. P.C. Li was partially supported by NSFC (Grants No.11674268).

¹Exploration of laser-driven electron-multirescattering dynamics in high-order harmonic generation

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