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Dynamics of two-photon double ionization of helium in short intense XUV laser pulses[1] XIAOXU GUAN, KLAUS BARTSCHAT, Drake University, BARRY SCHNEIDER, National Science Foundation — We present an *ab-initio* non-perturbative time-dependent approach to the problem of a helium atom driven by an intense XUV laser pulse. Based on the finite-element discrete-variable-representation, a novel space discretization is proposed for the radial grid in spherical coordinates. Absolute angle-integrated and triple-differential cross sections for double ionization by absorption of two photons are obtained over a range of photon energies between 39.5 eV (31.4 nm) to 54 eV (23 nm), where the process is dominated by nonsequential ionization mechanisms. We show that the agreement with several other sets of previous predictions is good, as long as the effective interaction time is defined properly. Two-photon double ionization at the photon energy of 57.0 eV (22 nm), for which both sequential and nonsequential channels are open, is also discussed. For double photoionization in the near-threshold regime, our results do not indicate a preferential mode of energy sharing between the two escaping electrons, while asymmetric energy sharing becomes the dominant mode with increasing excess energy. Overall, the two ionized electrons strongly prefer to escape along the polarization axis of linearly polarized laser fields.

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