

Abstract Submitted
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A correlation criterion for non-sequential or sequential two-photon double ionization of helium in ultrashort XUV pulses¹ AIHUA LIU, UWE THUMM, Physics Department, Kansas State University — For sufficiently long XUV pulses, sequential and non-sequential two-photon double ionization (DI) of helium atoms are distinguishable by the central XUV photon energy. If this energy is above the second ionization potential (54.4 eV), emission proceeds sequentially, otherwise non-sequential correlated DI occurs [1]. For ultrashort XUV pulses, this distinction breaks down if their spectrum overlaps the sequential and non-sequential regimes [2]. We investigated joint photoelectron angular distributions for two-photon DI of helium atoms in the sequential and non-sequential regimes. We found that strong correlation results in similar angular distributions at different energy sharing of the photoelectrons. Based on the emission asymmetry in joint angular distributions (ranging from -1 for emission in opposite to 1 for emission into the same hemisphere) we distinguish “sequential” and “non-sequential” contributions to DI. E.g., for 50 eV XUV pulses, the sequential DI contribution reaches a maximum value at 650 as pulse duration, which we explain as being due to the competition between increasing temporal and decreasing spectral pulse widths.

[1] A. Liu and U. Thumm, Phys. Rev. A **89**, 063423 (2014).

[2] J. Feist et al., Phys. Rev. Lett. **103**, 063002 (2009).

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