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**Multi-photon Single Ionization of Helium**[1] YIMENG WANG, CHRIS GREENE, Purdue University — This project explores the multiphoton single ionization of helium, for intermediate state energies that are either below or above the first ionization threshold. The approach is based on the eigenchannel R-matrix method and multichannel quantum-defect theory (MQDT), and is an application of methods introduced by Robicheaux and Gao to solve two-photon ionization problems. The electronic radial and angular correlations are elucidated by calculating multiphoton ionization cross sections and photoelectron angular distributions for an extended energy range. We consider different polarization configurations and bichromatic light sources to study the interference between different pathways. We also consider the ionization process triggered by a pair of entangled photons. Our results for two-photon ionization of helium for photon energies near the range of 25-32 eV are compared with some earlier theoretical treatments. The detailed behavior of the Rydberg series near the ionization threshold and the Fano lineshape properties in multiphoton ionization processes will also be discussed.

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