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Quantum Interference in Field Ionization of Rydberg Atoms¹ RACHEL FEYNMAN, Bryn Mawr College, JACOB HOLLINGSWORTH, MICHAEL VENNITTILLI, TAMAS BUDNER, RYAN ZMIEWSKI, Ursinus College, DONALD P. FAHEY, University of Maryland, THOMAS J. CARROLL, Ursinus College, MICHAEL W. NOEL, Bryn Mawr College — We excite ultracold rubidium atoms in a magneto-optical trap to a coherent superposition of three $|m_j|$ sublevels of a Rydberg state. After a delay in which the relative phase of the states evolve, we field ionize the atoms. The process of ionization is complicated by the details of the state structure for a weakly bound electron in Rydberg states. As these states ionize, their ionization pathways overlap, allowing them to interfere. We find that the result of this interference is dependent on the relative phase between the three states, and that the phase evolves in time inversely with the energy separation between the states.

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