Quantum beats in the field ionization of Rydberg atoms in the presence of magnetic fields

VINCENT C. GREGORIC, HANNAH HASTINGS, Bryn Mawr College, THOMAS J. CARROLL, Ursinus College, MICHAEL W. NOEL, Bryn Mawr College — By exciting a coherent superposition and varying its phase evolution, quantum beats in the selective field ionization of Rydberg atoms have been observed [R. Feynman, et al., PRA, 92, 043412 (2015)]. Here, we present a study exploring the effect of electric and magnetic fields on quantum beats. Beginning with a single excited state, a coherent superposition is created by a short electric field pulse in the presence of a static magnetic field. The resulting quantum beats are then observed in the field ionization spectrum. Additionally, millimeter-wave spectroscopy is used to probe the state populations in this superposition.

This work is supported by the National Science Foundation under Grants No. 1205895 and No. 1205897.