Abstract Submitted
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Improving the state selectivity of field ionization with quantum control[1] VINCENT C. GREGORIC, ANKITHA KANNAD, ZHIMIN CHERYL LIU, Bryn Mawr College, THOMAS J. CARROLL, Ursinus College, MICHAEL W. NOEL, Bryn Mawr College — The state distribution of a collection of Rydberg atoms can be determined by ionizing the atoms with a slowly increasing electric field, a process known as selective field ionization. Generally, atoms in higher energy states are ionized at lower fields, so ionized electrons which are detected earlier in time can be correlated with higher energy Rydberg states. The resolution of this technique is limited by the Stark effect; as the electric field is increased, the electron encounters many avoided Stark level crossings which split the amplitude among many states, thus broadening the time-resolved ionization signal. Previously, we have demonstrated "directed field ionization," a modification of selective field ionization in which we use a genetic algorithm to exert quantum control over the time-resolved ionization signal shape of a single Rydberg state[2]. Here, we present an extension of this work to separate the signals from two states which are originally overlapped in our selective field ionization signal.

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[2]V. Gregoric, *et al.*, Phys. Rev. A **96**, 023403 (2017)

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