Abstract Submitted
for the DAMOP18 Meeting of
The American Physical Society

Microwave-optical two photon excitation of Rydberg states[1] DUNCAN TATE, Colby College, THOMAS GALLAGHER, University of Virginia — We report efficient microwave-optical two photon excitation of Rb Rydberg atoms in a magneto optical trap. This approach allows the excitation of normally inaccessible states and provides a path toward excitation of high angular momentum states. The efficiency stems from the elimination of the Doppler width, the use of a narrow band pulsed laser, and the enormous electric dipole matrix element connecting the intermediate and final states of the transition. The excitation is efficient in spite of the low optical and microwave powers, of order 1 kW and 1 mW, respectively. To our knowledge, this is the first application of the large dipole coupling strengths between Rydberg states to achieve two photon excitation of Rydberg atoms.

[1]Supported by Air Force Office of Scientific Research and Colby College

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Date submitted: 22 Jan 2018 Electronic form version 1.4