

Abstract Submitted  
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**Excitation and interaction of Rydberg states in optical dipole traps**<sup>1</sup> ERICH URBAN, TODD JOHNSON, THOMAS HENAGE, LARRY ISENHOWER, MARIE DELANEY<sup>2</sup>, DENIZ YAVUZ, THAD WALKER, MARK SAFFMAN, University of Wisconsin Madison — We present recent progress in two-photon excitation of Rydberg levels with  $28 < n < 55$  in small samples of cold Rb atoms confined to a far off resonance optical dipole trap. Our data show narrow linewidth excitation spectra and the ability to transfer population into Rydberg levels on time scales of a few 100 ns. The dependence of excitation efficiency on atom number provides a strong signature of dipole blockade physics. The importance of these results for implementation of neutral atom quantum gates using dipole-dipole interactions of Rydberg states will be discussed.

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