

Abstract Submitted
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Fast Ground State Manipulation of Neutral Atoms in Microscopic Dipole Traps DENIZ YAVUZ, University of Wisconsin Madison, ERICH URBAN, TODD JOHNSON, PASAD KULATUNGA, MARIE DELANEY, THOMAS HENAGE, NICK PROITE, THAD WALKER, MARK SAFFMAN — We demonstrate Rabi flopping at MHz rates between ground hyperfine states of neutral ^{87}Rb atoms that are trapped in two micron sized optical traps. Using tightly focused laser beams we demonstrate high fidelity, site specific Rabi rotations with crosstalk on neighboring sites separated by $8\ \mu\text{m}$ at the level of 10^{-3} . Ramsey spectroscopy is used to measure a dephasing time of $870\ \mu\text{s}$ which is ≈ 5000 times longer than the time for a $\pi/2$ pulse. We also demonstrate the suppression of Rydberg excitation in a dipole trap which is the first step towards demonstrating a two-qubit gate between neutral atoms.

Deniz Yavuz
University of Wisconsin Madison

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