

Abstract Submitted
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Optical bottle beams for trapping neutral atoms¹ LARRY ISENHOWER, MARK SAFFMAN, University of Wisconsin — We describe a novel interferometric approach to implementing a bottle beam which can be used for trapping of atomic species in regions of low intensity. Using a Mach-Zehnder interferometer with unequal magnification in the two arms we demonstrate an optical field which has low intensity surrounded by bright regions in all directions. The bottle beam provides a quartic trapping potential transverse to the symmetry axis of the trap, and is a possible route to tight confinement of single atoms in three spatial dimensions using optical access from a single side of the experiment. We discuss the decoherence properties of this type of trap for holding neutral atom qubits, and show that it in principle can be used to create an attractive potential simultaneously for both ground state and Rydberg atoms.

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