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Control of single neutral atoms for quantum information MICHAEL GIBBONS, SOO KIM, KEVIN FORTIER, PEYMAN AHMADI, MICHAEL CHAPMAN, Georgia Institute of Technology — Experimentally, optical traps have suffered for many years from unexplained heating rates. These have limited the trap lifetime to an order of magnitude less than expected for the vacuum ranges attainable. Recently, we have achieved very long lifetimes of single rubidium atoms trapped in a 1-D optical lattice (λ=1064 nm) by optical molasses cooling. We have transported the laser cooled atoms, trapped in an optical lattice, to a high finesse cavity. Such long lived neutral atoms are of particular interest for quantum information storage and processing schemes.

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