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A Nanoscale Quantum Interface for Single Atoms JEFF THOMPSON, Harvard, DARRICK CHANG, Caltech, ALEXANDER ZIBROV, MIKHAIL LUKIN, Harvard — Single atoms are ideal quantum systems, but a scalable, efficient method to exchange information between single atoms and photonic modes is an outstanding challenge. Recently [1], it was proposed that surface plasmon modes in metallic nanowires can couple efficiently to an atom if the atom lies within the plasmon evanescent mode volume. In this poster, we extend this work and show that a nanowire can also be used to generate a dipole trap for the atom within the efficient coupling region. The confinement is extremely tight ($\sim$ 100 MHz), very close to the nanowire surface and stable against attractive atom-surface interactions. We also present experimental progress toward constructing a MOT-loaded nanowire trap. [1] Chang, D.E. et al., PRB **76**, 035420 (2007).

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