Abstract Submitted
for the DAMOP13 Meeting of
The American Physical Society

Trapping Cold Neutral Atoms with a Nanofiber for a Hybrid Quantum System[1] J. LEE, J.A. GROVER, J.E. HOFFMAN, JQI/UMD, S. RAVETS, JQI/UMD/Institut d'Optique, J. HERTZBERG, K.D. VOIGT, A. CHOUDHARY, U. CHUKWU, P. KORDELL, JQI/UMD, M. HAFEZI, J.M. TAYLOR, JQI/NIST/UMD, J.R. ANDERSON, C.J. LOBB, L.A. OROZCO, S.L. ROLSTON, F.C. WELLSTOOD, JQI/UMD — We explore uses of atoms trapped in the evanescent optical field near a 500-nm diameter nanofiber for the creation of a hybrid quantum system by magnetically coupling to a superconducting(SC) circuit. Optically-trapped Rb atoms loaded from a grating MOT (GMOT) in a dilution refrigerator can be transported and coupled to the magnetic field of a high-Q SC resonator operating at the Rb ground state hyperfine frequency (6.8 GHz). The resonator can be coupled to a SC qubit to form a hybrid quantum system. We will present our current research progress, including fabrication of ultra-low loss nanofibers, a sub-Doppler cooled GMOT, progress toward atom trapping, design for atom/SC integration, and effects of optical power on the SC circuit.

[1]Work is supported by the ARO Atomtronics MURI, the Fulbright, Foundation, and the NSF (PFC at JQI).

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Date submitted: 24 Jan 2013 Electronic form version 1.4