Abstract Submitted
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Development of a hybrid quantum system employing a tunable high-Q superconducting microwave resonator and trapped laser-cooled atoms[1] JARED HERTZBERG, K. VOIGT, Z. KIM, J. HOFFMAN, J. GROVER, J. LEE, S. RAVETS, JQI/UMD, M. HAFEZI, J. TAYLOR, JQI/NIST/UMD, A. CHOUDHARY, UMD, J. ANDERSON, JQI/UMD, C. LOBB, JQI/NIST/UMD, L. OROZCO, S. ROLSTON, F. WELLSTOOD, JQI/UMD — We present progress toward a hybrid quantum system in which microwave quanta stored in a superconducting flux qubit are coupled through a magnetic dipole interaction to laser-trapped atoms. In initial experiments, our goal will be to couple a microfabricated superconducting LC resonator to the 6.835 GHz hyperfine splitting in an ensemble of ^{87}Rb atoms. By trapping the atoms in the evanescent field of a 500-nm-wide optical fiber, we will seek to place them within 10 micrometers of the chip surface, where they will interact with the near-field of the microwave mode. In previous work we have demonstrated a frequency-tunable superconducting resonator having Q >100,000. [1] Here we will describe improvements in the resonator's design to reduce its sensitivity to absorbed photons, as well as the design of components to position the resonator relative to the optical fiber within a dilution refrigerator.

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