Abstract Submitted
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Noise and correlations in a microwave-mechanical-optical transducer[1] ANDREW P. HIGGINBOTHAM, PETER S. BURNS, ROBERT W. PETERSON, MAXWELL D. URMEY, NIR S. KAMPEL, TIMOTHY MENKE, JILA, NIST and CU Boulder, KATARINA CICAK, RAYMOND W. SIMMONDS, NIST, Boulder, CINDY A. REGAL, KONRAD W. LEHNERT, JILA, NIST and CU Boulder — Viewed as resources for quantum information processing, microwave and optical fields offer complementary strengths. We simultaneously couple one mode of a micromechanical oscillator to a resonant microwave circuit and a high-finesse optical cavity. In previous work, this system was operated as a classical converter between microwave and optical signals at 4 K, operating with 10% efficiency and 1500 photons of added noise (1). To improve noise performance, we now operate the converter at 0.1 K. We have observed order-of-magnitude improvement in noise performance, and quantified effects from undesired interactions between the laser and superconducting circuit. Correlations between the microwave and optical fields have also been investigated, serving as a precursor to upcoming quantum operation.

(1) Andrews, R. W., et. al. Bidirectional and efficient conversion between microwave and optical light. Nature Physics, **10**, 321326 (2014).

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