

Abstract Submitted  
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**Backaction-limited measurement, cavity feedback, and ponderomotive squeezing in ultracold atom optomechanics** THIERRY BOTTER, DANIEL W.C. BROOKS, NATHAN BRAHMS, University of California, Berkeley, THOMAS P. PURDY, JILA, SYDNEY SCHREPPLER, DAN M. STAMPER-KURN, University of California, Berkeley — A large variety of optomechanical systems have been constructed with the goal of making quantum-limited measurements of mechanical motion. Here we present a cavity optomechanics system where the resonator is composed of a gas of ultracold atoms. The resonator is prepared in its ground state, and can operated in the single-photon strong-coupling regime. Using this system, we obtain measurement sensitivity that is limited by measurement backaction. We additionally observe gain and attenuation of radiation-pressure fluctuations due to cavity-optomechanical feedback, including signatures of ponderomotive squeezing.

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