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Microresonator based Optomechanical Cavity: Calibration of Quantum Noises for LIGO ROBINJEET SINGH, Louisiana State Univ - Baton Rouge, GARRETT COLE, University of Vienna and Vienna Center for Quantum Science and Technology, THOMAS CORBITT, Louisiana State Univ - Baton Rouge, LIGO COLLABORATION — Recent improvements in the properties of micro-mechanical oscillators provide promising avenues towards -more sensitive interferometry measurements and hence observation of weaker forces. In an optomechanical system, radiation pressure noise is a quantum back-action effect on the mechanical oscillator, due to the intensity fluctuations of the driving laser field. We study the radiation pressure noise in a centimeter scale Fabry-Perot Cavity using a microresonator as the end mirror of the cavity. The micro-resonator is fabricated from a multilayer stack of $Al_{0.92}Ga_{0.08}As/GaAs$ forming a dielectric mirror pad with a mass of about 250 nanograms. This work is in effort towards developing a new quantum noise evading scheme for the Laser Interferometer Gravitational Observatory (LIGO). Radiation pressure noise is expected to be one of the limiting noise sources in Advanced LIGO. Further, the microresonators that we have developed are promising candidates for testing other noise reduction schemes including quantum non-demolition schemes, speed meters, squeezing of radiation pressure noise, and variational-readout.

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