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Cavity optomechanics with micromirrors: Progress towards the measurement of quantum radiation pressure noise and ponderomotive squeezing JONATHAN CRIPE, ROBINJEET SINGH, THOMAS CORBITT, Louisiana State Univ - Baton Rouge, LIGO COLLABORATION — Advanced LIGO is predicted to be limited by quantum noise at intermediate and high frequencies when it reaches design sensitivity. The quantum noise, including radiation pressure noise at intermediate frequencies, will need to be reduced in order to increase the sensitivity of future gravitational wave interferometers. We report recent progress towards measuring quantum radiation pressure noise in a cryogenic optomechanical cavity. The low noise microfabricated mechanical oscillator and cryogenic apparatus allow direct broadband thermal noise measurements which test thermal noise models and damping mechanisms. We also progress toward the measurement of the ponderomotive squeezing produced by the optomechanical cavity and the reduction of radiation pressure noise using squeezed light. These techniques may be applicable to an upgrade of Advanced LIGO or the next generation of gravitational wave detectors.

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