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Macroscopic Cavity Optomechanics[1] JACOB PATE, ALESSANDRO CASTELLI, LUIS MARTINEZ, JOHNATHON THOMPSON, RAYMOND CHIAO, JAY SHARPING, Univ of California - Merced — We propose and develop systems for demonstrating macroscopic cavity optomechanical phenomena, a field that is heavily focused on microscopic mechanical oscillators and resonant cavities. Our group seeks to observe the same optomechanical phenomena on the cm-scale in order to push the limits of observing quantum-mechanics. Specifically, our group has developed high-Q superconducting radio-frequency cavities with quality factors up to 1.7 x 10^9. The highest Q we achieved to date when integrated with a mechanical oscillator is 5 x 10^7. In addition, we are developing a capacitive electrode system to enhance the characterization and measurements of the optomechanical system. We aim to use this system to explore physics such as squeezing, parametric amplification, and the dynamical Casimir effect.

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