Mechanical squeezing via parametric amplification and feedback control

ANDREW DOHERTY, Centre for Engineered Quantum Systems, University of Sydney, A. SZORKOVSZKY, G.I. HARRIS, W.P. BOWEN, Centre for Engineered Quantum Systems, The University of Queensland — We discuss the mechanical squeezing that can result from position measurement and feedback applied to a parametrically driven mechanical oscillator. If the parametric drive is optimally detuned from resonance, correlations between the quadratures of motion allow unlimited steady-state squeezing. This contrasts to a parametric drive alone, which is limited to 3dB of squeezing. Compared to back-action evasion, we demonstrate that the measurement strength, temperature and efficiency requirements for quantum squeezing are significantly relaxed.

1Supported by the Australian Research Council Centre of Excellence CE110001013 and Discovery Project DP0987146.