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**Quantum squeezing of a mechanical resonator** CHAN U LEI, AARON WEINSTEIN, California Institute of Technology, JUNHO SUH, Korea Research Institute of Standards and Science, EMMA WOLLMAN, KEITH SCHWAB, California Institute of Technology — Generating nonclassical states of a macroscopic object has been a subject of considerable interest. It offers a route toward fundamental test of quantum mechanics in an unexplored regime. However, a macroscopic quantum state is very susceptible to decoherence due to the environment. One way to generate robust quantum states is quantum reservoir engineering. In this work, we utilize the reservoir engineering scheme developed by Kronwald et al. [1] to generate a steady quantum squeezed state of a micron-scale mechanical oscillator in an electromechanical system. Together with the backaction evading measurement technique [2], we demonstrate a quantum nondemolition measurement of the mechanical quadratures to characterize the quantum squeezed state. By measuring the quadrature variances of the mechanical motion, more than 3dB squeezing below the zero-point level has been achieved. [1] A. Kronwald, F. Marquardt, and A. A. Clerk, Phys. Rev. A 88, 063833 (2013). [2]J. Suh, A. J. Weinstein, C. U. Lei, E. E. Wollman, S. K. Steinke, P. Meystre, A. A. Clerk, and K. C. Schwab, Science 344, 1262 (2014).

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