Abstract Submitted
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Towards ultrasensitive scanning probe force detection with silicon nanowire mechanical resonators[1] JOHN NICHOL, University of Illinois at Urbana-Champaign, ERIC HEMESATH, LINCOLN LAUHON, Northwestern University, RAFFI BUDAKIAN, University of Illinois at Urbana-Champaign — Silicon nanowires have emerged as promising force sensors due to their low intrinsic mechanical dissipation. At room temperature, the nanowires we study possess a mechanical dissipation in the range of 2×10^{-15}- 2×10^{-14} kg/s, corresponding to a force sensitivity of 6-18 $\times10^{-18}$N/$\sqrt{\text{Hz}}$. Force sensitivities below 10^{-18}N/$\sqrt{\text{Hz}}$ should be possible by cooling the nanowires to low temperatures. This is an encouraging prospect for applications such as magnetic resonance force microscopy. To this end, we describe our progress toward the use of silicon nanowires as scanning probe force sensors at 4K. We also discuss a novel form of active feedback to cancel the native cubic nonlinearity of silicon nanowire resonators.

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