Abstract Submitted
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A Microwave Atomic Point Contact Displacement Detector N. E. FLOWERS-JACOBS, D. R. SCHMIDT, K. W. LEHNERT, JILA, National Institute of Standards and Technology and the University of Colorado, Boulder, Colorado 80309-0440, USA — A fundamental goal of nanomechanics is position detection at the Heisenberg limit. Recent experiments have employed single-electron transistor based position readout [1,2]. In contrast we use an atomic point contact (APC) as a displacement detector. In our measurements we probe the conductance of an APC formed between a nanomechanical beam and a fixed metal point to measure the harmonic motion of the beam. We measure the APC conductance at microwave frequencies and achieve an electrical bandwidth which contains the 18 Mhz mechanical resonance. We anticipate that this technique will approach the quantum limit of position measurement. Future applications include sensitive force detection and the ability to squeeze the thermal and quantum noise of the mechanical oscillator.

[1] R. G. Knobel, A. N. Cleland, *Nature* **424**, 291 (2003)
[2] M. D. LaHaye, O. Buu, B. Camarota, K. C. Schwab, *Science* **304**, 74 (2004)

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