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Fast readout of carbon nanotube mechanical resonators HAROLD MEERWALDT, VIBHOR SINGH, BEN SCHNEIDER, RAYMOND SCHOUTEN, HERRE VAN DER ZANT, GARY STEELE, Delft University of Technology —
We perform fast readout measurements of carbon nanotube mechanical resonators. Using an electronic mixing scheme, we can detect the amplitude of the mechanical motion with an intermediate frequency (IF) of 46 MHz and a timeconstant of 1 us, up to 5 orders of magnitude faster than before. Previous measurements suffered from a low bandwidth due to the combination of the high resistance of the carbon nanotube and a large stray capacitance. We have increased the bandwidth significantly by using a high-impedance, close-proximity HEMT amplifier. The increased bandwidth should allow us to observe the nanotube's thermal motion and its transient response, approaching the regime of real-time detection of the carbon nanotube's mechanical motion.

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