

Abstract Submitted
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Detection of the mechanical motion of a carbon nanotube resonator by an adjacent nanotube single-electron-transistor ASSAF HAMO, AVISHAI BINYAMINI, SHAHAL ILANI, Weizmann Institute of Science, FELIX VON OPPEN, Freie Universitat Berlin — In recent years the detection of nano-mechanical motion of carbon nanotubes has made substantial progress. This enabled the measurement of mechanical coupling to single electrons, improved mass detection to the level of an individual proton, and improved force detection to extremely tiny forces. In all these experiments the nanotube was used both as the mechanical resonator and the detector of its own motion, requiring the nanotube to be in a conducting state and reducing the detection sensitivity due to back-action and mechanical nonlinearities. Here, we demonstrate a detection scheme using a separate detector based on a second nanotube single-electron-transistor, eliminating these limitations. The separation of the detector and the mechanical resonator in our system opens the way to investigation of new nano-mechanical phenomena, inaccessible to date.

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