

# Thermal shot noise in top-gated single carbon nanotube field effect transistors

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## Abstract

The high-frequency transconductance and current noise of top-gated single carbon nanotube transistors have been measured and used to investigate hot electron effects in one-dimensional transistors. Results are in good agreement with a theory of 1-dimensional nano-transistor. In particular the prediction of a large transconductance correction to the Johnson-Nyquist thermal noise formula is confirmed experimentally. Experiment shows that nanotube transistors can be used as fast charge detectors for quantum coherent electronics with a resolution of  $13\mu e/\sqrt{\text{Hz}}$  in the 0.2–0.8 GHz band.

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