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Fast charge sensing in InAs nanowire double quantum dot devices¹ MINKYUNG JUNG, MICHAEL SCHROER, KARL PETERSSON, JIRI STEHLIK, JASON PETTA, Princeton University, PRINCETON UNIVERSITY TEAM — Fast and sensitive charge and spin state readout is one of the most important requirements for quantum computing. Radio frequency (rf) reflectometry [1] provides a simple and fast charge detection scheme for charge and spin state readout in double quantum dot (DQD) devices without a separate charge detector [2]. Here, we demonstrate charge sensing measurements in InAs nanowire DQD devices using rf-reflectometry. The source electrode of the nanowire DQD is directly coupled to the tank circuit. We correlate standard dc transport measurements with the tank circuit response. We drive the resonator at its resonant frequency and detect the reflected signal via a cryogenic and room temperature amplifier. Using rf-reflectometry, we can observe charging transitions even when the device is tuned to a regime where current through the device is below the noise floor of the setup. The sensor enables the occupancy of the quantum dot to be probed down to a few electron regime. We present preliminary results of spin state readout using rf-reflectometry.
[1] R. J. Schoelkopf *et al.*, *Science* **280**, 1238 (1998)
[2] K. D. Petersson *et al.*, *Nano Lett.* **10**, 2789 (2010)

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