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Current Biased Real Time Charge Detection in a Single Electron Transistor KENNETH MACLEAN, SAMI AMASHA, DOMINIK ZUMBUHL, IULIANA RADU, MARC KASTNER, Massachusetts Institute of Technology, MICAH HANSON, ARTHUR GOSSARD, University of California, Santa Barbara — Measurements of charge fluctuations in an AlGaAs/GaAs single electron transistor (SET) are presented. The SET consists of a lateral quantum dot created by confining a two-dimensional electron gas using nanometer-size surface electrodes. The charge on the quantum dot is detected by changes in conductance of a nearby quantum point contact. We discuss noise and bandwidth characteristics of our charge detection method, which uses commercially available voltage amplifiers. Our real time charge detection capabilities are used to investigate charge dynamics on the SET in a magnetic field parallel to the two-dimensional electron gas. This work is supported by the U.S. Army Research Office under Contract No. W911NF-05-1-0062, by the National Science Foundation under Grant No. DMR-0353209, and in part by the NSEC Program of the National Science Foundation under Award No. PHY-0117795.

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