Abstract Submitted
for the MAR07 Meeting of
The American Physical Society

Time Resolved Characterization of Tunneling in a Quantum Dot
KENNETH MACLEAN, SAMI AMASHA, IULIANA RADU, MIT, DOMINIK ZUMBUHL, University of Basel, MARC KASTNER, MIT, MICAH HANSON, ARTHUR GOSSARD, UCSB — Measurements are presented of the rates for tunneling on and off a laterally defined GaAs quantum dot as a function of drain source bias, plunger gate voltage, and magnetic field. The measurements are obtained using a quantum point contact as a real-time charge sensor, and utilizing pulsed gate techniques. In zero magnetic field, we find evidence that the tunneling is elastic, and that the observed exponential dependences of the tunneling rates on drain-source bias and plunger gate voltage agree quantitatively with a model that takes into account changes in the electron energy relative to the top of the tunnel barrier. In a magnetic field applied parallel to the two dimensional electron gas, we resolve contributions to the tunneling from the two Zeeman sublevels, and discuss how the magnetic field modifies the tunneling rates. This work has been supported by the ARO (W911NF-05-1-0062), the NSF (DMR-0353209), and in part by the NSEC Program of the NSF (PHY-0117795).

Kenneth MacLean
MIT

Date submitted: 19 Nov 2006 Electronic form version 1.4