Abstract Submitted
for the MAR07 Meeting of
The American Physical Society

Non-destructive Kerr rotation measurements of a single spin in a quantum dot[1] J. BEREZOVSKY, M.H. MIKKELSEN, O. GYWAT, N. STOLTZ, L. COLDREN, D.D. AWSCHALOM, Center for Spintronics and Quantum Computation, University of California, Santa Barbara, CA 93106 — A single electron spin in a quantum dot forms a natural two state system for use in quantum information processing. The ability to measure this spin without destroying the system is an important step towards observing various quantum measurement-related phenomena. In contrast to previous experiments, we have performed non-destructive Kerr rotation measurements on a single electron spin confined in a charge-tunable semiconductor quantum dot[2]. This measurement technique provides a means to directly probe the spin off-resonance, thus minimally disturbing the system. Energy-resolved Kerr rotation spectra demonstrate that we are probing a single electron, and also yield information about the optically-pumped spin polarization as a function of quantum dot charging. These results point the way towards quantum non-demolition measurements and optically-mediated entanglement of spins in the solid state.

[1]Work supported by NSF and AFOSR.
[2]J. Berezovsky *et al., Science Express*, 9 November 2006, (10.1126/science.1133862).

Jesse Berezovsky
Center for Spintronics and Quantum Computation
University of California, Santa Barbara, CA 93106

Date submitted: 14 Nov 2006 Electronic form version 1.4