Abstract Submitted
for the MAR05 Meeting of
The American Physical Society

Spin Dynamics and Energy Levels in Quantum Shells[1] J. BEREZOVSKY, M. OUYANG, F. MEIER, D.D. AWSCHALOM, Center for Spintronics and Quantum Computation, University of California, Santa Barbara, California 93106, D. BATTAGLIA, X. PENG, Department of Chemistry and Biochemistry, University of Arkansas, Fayetteville, Arkansas 72701 — In a zero-dimensional analogue to planar quantum wells, nanoparticle heterostructures known as quantum-dot quantum wells (QDQWs) allow for the study of single quantum-confined electrons in an engineered potential energy landscape. We have characterized colloidal CdS/CdSe/CdS QDQWs using two-color time-resolved Faraday rotation (TRFR). The spin dynamics show that the electron g-factor is tunable with quantum well width and the transverse spin lifetime of several nanoseconds is robust up to room temperature. As a function of probe energy, the amplitude of the TRFR signal shows pronounced resonances, which allow one to identify individual exciton transitions. While the TRFR data are inconsistent with the conduction and valence band level scheme of spherical QDQWs, a model in which broken spherical symmetry is taken into account captures the essential features.

[1]This work was supported by DARPA, DMEA, and NSF.

Jesse Berezovsky
University of California, Santa Barbara

Date submitted: 22 Nov 2004 Electronic form version 1.4