Abstract Submitted
for the MAR10 Meeting of
The American Physical Society

Comparison of Dynamical Decoupling Schemes in Double Quantum Dot Spin Qubits[1] CHRISTIAN BARTHEL, JAMES MEDFORD, HENDRIK BLUHM, CHARLES MARCUS, Department of Physics, Harvard University, MICAH HANSON, ARTHUR GOSSARD, Materials Department, University of California, Santa Barbara — The decoherence and decoupling of a Singlet-Triplet spin qubit in a GaAs double quantum dot are studied, employing high-fidelity repeated single-shot readout of the charge arrangement with less than 1 μs repetition period. Coherence times of greater than 100 μs are obtained for both Carr Purcell and Concatenated Dynamical Decoupling, opening the way for future fault tolerant error correction algorithms. In addition, long operation sequences combining single qubit gates and decoupling schemes are studied. Nuclear polarization build-up and feedback mechanisms are investigated and combined with single-shot measurement and control.

[1]Support from ARO/iARPA, Department of Defense, IBM, and the NSF-NNIN through Harvard's Center for Nanoscale Systems.

Christian Barthel
Harvard

Date submitted: 18 Dec 2009 Electronic form version 1.4