Abstract Submitted
for the MAR14 Meeting of
The American Physical Society

Mechanisms of $S - T_+$ coupling in singlet-triplet qubits JOHN NICHOL, MICHAEL SHULMAN, SHANNON HARVEY, Harvard University, VLADIMIR UMANSKY, Weizmann Institute of Science, AMIR YACOBY, Harvard University — Semiconductor quantum dots provide a unique environment for studying a variety of problems, from few-particle systems to the central spin problem. Investigating these systems furthers our understanding of fundamental physics and advances efforts to achieve semiconductor spin-based quantum information processing. We study two electron spins in a semiconducting double quantum dot and measure the spin singlet to $m_s = 1$ triplet ($S - T_+$) avoided crossing. Our results suggest that several processes, including the hyperfine interaction between the electrons and the host nuclei and spin-orbit coupling in the quantum dots, compete to drive the $S - T_+$ transition. This work gives insight into the poorly understood nuclear dynamics in these systems and provides a path forward for improving nuclear pumping efficiency and therefore coherence times in semiconducting spin qubits.

John Nichol
Harvard University

Date submitted: 15 Nov 2013 Electronic form version 1.4