Abstract Submitted
for the MAR14 Meeting of
The American Physical Society

Enhancing the performance of exchange-only qubits in triple-quantum-dots[1] JIANJIA FEI, University of Wisconsin - Madison, JO-TZU HUNG, University at Buffalo, SUNY, TECK SENG KOH, YUN-PIL SHIM, SUSAN COPPERSMITH, University of Wisconsin - Madison, XUEDONG HU, University at Buffalo, SUNY, MARK FRIESEN, University of Wisconsin - Madison — The exchange-only qubit has several potential advantages for quantum computation: all-electrical control, fast gate operations, and robustness against global magnetic noise. Such a device has recently been implemented in a GaAs triple-quantum-dot. In this talk, we discuss theoretical simulations of the fidelity of pulsed gate operations of the exchange-only qubit, based on a master equation approach. Our model accounts for several different dephasing mechanisms, including hyperfine interactions and charge noise arising from double-occupation errors and fluctuations of the detuning parameter. Our investigations indicate the optimal working regimes and maximum gate fidelities for these devices, in terms of experimentally tunable parameters. This work was supported by the Army Research Office, the National Science Foundation, and the United States Department of Defense. The views and conclusions contained in this document are those of the authors and should not be interpreted as representing the official policies, either expressly or implied, of the US Government.

[1]This work was supported by the Army Research Office, the National Science Foundation, and the United States Department of Defense.

Jianjia Fei
University of Wisconsin - Madison

Date submitted: 15 Nov 2013 Electronic form version 1.4