Abstract Submitted
for the MAR14 Meeting of
The American Physical Society

Robust Two-Qubit Gates for Exchange-Coupled Exchange-Only Qubits[1] FNU SETIAWAN, HOI-YIN HUI, Condensed Matter Theory Center and Joint Quantum Institute, University of Maryland, College Park, JASON KESTNER, Department of Physics, University of Maryland, Baltimore County and Condensed Matter Theory Center, University of Maryland, College Park, XIN WANG, Condensed Matter Theory Center, University of Maryland, College Park — We show how to perform dynamically corrected two-qubit gates, with the leading hyperfine error term cancelled, for various geometries of an exchange-only qubit network. These sequences are designed to obey the realistic experimental constraint of strictly non-negative couplings. Moreover, we show that these corrected sequences lead to substantial improvement in the gate fidelity. Together with single-qubit dynamically corrected gates, our results facilitate universal and robust multi-qubit quantum operations and pave the way towards scalable fault-tolerant quantum computation on the exchange-only qubit platform.

[1]Work done in collaboration with Sankar Das Sarma, and supported by NSF-JQI-PFC, IARPA and LPS.

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Date submitted: 14 Nov 2013 Electronic form version 1.4