

Abstract Submitted  
for the MAR13 Meeting of  
The American Physical Society

**Dynamically Corrected Pulse Sequences for the Exchange Only Qubit** GARRETT HICKMAN, JASON KESTNER, University of Maryland, Baltimore County — In the exchange-only qubit, hyperfine interactions of qubit electrons with neighboring atoms introduce decoherence into the basis states and mix them with a third leaked state. We theoretically derive a scheme for performing arbitrary single-qubit rotations on the exchange-only qubit while canceling all hyperfine-induced errors to first order. We compare numerically the performance of the resulting pulse sequences with that of the simplest naïve implementations for a range of hyperfine interaction strengths. While for typical operations these sequences are roughly 50 times longer than a simple uncorrected pulse, error is significantly reduced. We show that for hyperfine field inhomogeneities less than one thirtieth of the maximum exchange strength, typical hyperfine-induced errors are reduced by at least an order of magnitude.

Garrett Hickman  
University of Maryland, Baltimore County

Date submitted: 03 Dec 2012

Electronic form version 1.4