

Abstract Submitted
for the MAR16 Meeting of
The American Physical Society

Full Controllability of a Singlet-Triplet Qubit Coupled to a Nuclear Spin Qubit ANDREW D. BACZEWSKI, JOHN KING GAMBLE, N. TOBIAS JACOBSON, RICHARD P. MULLER, ERIK NIELSEN, STEPHEN M. CARR, MALCOLM S. CARROLL, Sandia National Laboratories, MATTHEW CURRY, Sandia National Laboratories and University of New Mexico, PATRICK HARVEY-COLLARD, Sandia National Laboratories and Universit de Sherbrooke, RYAN M. JOCK, MARTIN RUDOLPH, Sandia National Laboratories — Recent experimental developments indicate that it is possible to drive coherent singlet-triplet rotations in a MOS quantum dot coupled to a single nearby phosphorus donor through the electron-nucleus hyperfine interaction. With the addition of NMR, we propose that it is possible to achieve universal 2-qubit control spanning i.) an electronic singlet-triplet subspace of the dot, ii.) the spin-1/2 donor nucleus, and iii.) entangling operations between them. We will assess the practicality of such an approach given realistic experimental conditions and constraints, including a comparison of pulsed and RF control of the detuning between the donor and dot. Sandia National Laboratories is a multi-program laboratory managed and operated by Sandia Corporation, a wholly owned subsidiary of Lockheed Martin Corporation, for the U.S. Department of Energy's National Security Administration under contract DE-AC04-94AL85000.

Andrew Baczewski
Sandia National Laboratories

Date submitted: 05 Nov 2015

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