Abstract Submitted
for the MAR17 Meeting of
The American Physical Society

Two-axis control of a coupled quantum dot - donor qubit in Si-MOS MARTIN RUDOLPH, PATRICK HARVEY-COLLARD[1], TOBIAS JACOBSON, JOEL WENDT, TAMMY PLUYM, JASON DOMINGUEZ, GREG TENEYCK, MIKE LILLY[2], MALCOLM CARROLL, Sandia National Labs — Si-MOS based QD qubits are attractive due to their similarity to the current semiconductor industry. We introduce a highly tunable MOS foundry compatible qubit design that couples an electrostatic quantum dot (QD) with an implanted donor. We show for the first time coherent two-axis control of a two-electron spin logical qubit that evolves under the QD-donor exchange interaction and the hyperfine interaction with the donor nucleus. The two interactions are tuned electrically with surface gate voltages to provide control of both qubit axes. Qubit decoherence is influenced by charge noise, which is of similar strength as epitaxial systems like GaAs and Si/SiGe. This work was performed, in part, at the Center for Integrated Nanotechnologies, a U.S. DOE, Office of Basic Energy Sciences user facility. The work was supported by the Sandia National Laboratories Directed Research and Development Program. Sandia National Laboratories is a multi-program laboratory operated by Sandia Corporation, a Lockheed-Martin Company, for the U. S. Department of Energy under Contract No. DE-AC04-94AL85000.

[1]Universite de Sherbrooke
[2]Center for Integrated Nanotechnologies, Sandia National Labs

Martin Rudolph
Sandia National Labs

Date submitted: 11 Nov 2016 Electronic form version 1.4