Abstract Submitted
for the MAR14 Meeting of
The American Physical Society

Design considerations for multielectron double quantum dot qubits in silicon ERIK NIELSEN, Sandia National Laboratories, EDWIN BARNES, Condensed Matter Theory Center, 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 — Solid state double quantum dot (DQD) spin qubits can be created by confining two electrons to a DQD potential. We present results showing the viability and potential advantages of creating a DQD spin qubit with greater than two electrons, and which suggest that silicon devices which could realize these advantages are experimentally possible. Our analysis of a six-electron DQD uses full configuration interaction methods and shows an isolated qubit space in regimes which 3D quantum device simulations indicate are accessible experimentally. 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 Nuclear Security Administration under contract DE-AC04-94AL85000.

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Date submitted: 14 Nov 2013 Electronic form version 1.4