Abstract Submitted
for the MAR15 Meeting of
The American Physical Society

Single-electron regime and Pauli spin blockade in a silicon metal-oxide-semiconductor double quantum dot[1] SOPHIE ROCHETTE, Université de Sherbrooke, GREGORY A. TEN EYCK, TAMMY PLUYM, MICHAEL P. LILLY, MALCOLM S. CARROLL, Sandia National Laboratories, MICHEL PIORO-LADRIÈRE, Université de Sherbrooke — Silicon quantum dots are promising candidates for quantum information processing as spin qubits with long coherence time. We present electrical transport measurements on a silicon metal-oxide-semiconductor (MOS) double quantum dot (DQD). First, Coulomb diamonds measurements demonstrate the one-electron regime at a relatively high temperature of 1.5 K. Then, the 8 mK stability diagram shows Pauli spin blockade with a large singlet-triplet separation of approximatively 0.40 meV, pointing towards a strong lifting of the valley degeneracy. Finally, numerical simulations indicate that by integrating a micro-magnet to those devices, we could achieve fast spin rotations of the order of 30 ns. Those results are part of the recent body of work demonstrating the potential of Si MOS DQD as reliable and long-lived spin qubits that could be ultimately integrated into modern electronic facilities.

[1]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. DOE's National Nuclear Security Administration under contract DE-AC04-94AL85000.

Sophie Rochette
Université de Sherbrooke

Date submitted: 14 Nov 2014 Electronic form version 1.4