<u>Toward silicon quantum dot quantum computing: valley splitting and quantum dots in Si/SiGe quantum wells</u>

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The low-lying energy spectrum of localized electronic states in semiconductors is of great importance to both charge-based and spin-based qubit proposals. In a strained silicon quantum well, the breaking of the degeneracy of the conduction band minima is vital to the isolation of the qubit. We present experimental measurements of the valley splitting in pure silicon 2DEGs with silicon-germanium barriers. Both theoretical fitting and direct tilted-magnetic field techniques are used to determine the energy splitting as a function of field strength from Shubnikov de Haas oscillations. We analyze our results in a theoretical framework and compare to atomistic simulations.

We also report results for low-dimensional electron quantum devices in these Si/SiGe heterostructures on the way to single electron quantum dot qubits. Transport measurements in quantum dots are presented, including observation of Coulomb blockade.

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