Abstract Submitted
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**Development of a Si/$SiO_2$based double quantum dot charge qubit with dispersive microwave readout**[1] M.G. HOUSE, University of California, Los Angeles, E. HENRY, A. SCHMIDT, University of California, Berkeley, O. NAAMAN, University of Calfornia, Berkeley, I. SIDDIQI, University of California, Berkeley, H. PAN, M. XIAO, H.W. JIANG, University of California, Los Angeles — Coupling of a high-Q microwave resonator to superconducting qubits has been successfully used to prepare, manipulate, and read out the state of a single qubit, and to mediate interactions between qubits. Our work is geared toward implementing this architecture in a semiconductor qubit. We present the design and development of a lateral quantum dot in which a superconducting microwave resonator is capacitively coupled to a double dot charge qubit. The device is a silicon MOSFET structure with a global gate which is used to accumulate electrons at a $Si/SiO_2$ interface. A set of smaller gates are used to deplete these electrons to define a double quantum dot and adjacent conduction channels. Two of these depletion gates connect directly to the conductors of a 6 GHz co-planar stripline resonator. We present measurements of transport and conventional charge sensing used to characterize the double quantum dot, and demonstrate that it is possible to reach the few-electron regime in this system.

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