

Abstract Submitted
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Double Quantum Dot Molecule Coupled with Single-Electron Transistors for Quantum Computation Applications¹ LIMIN CAO, PHILLIP WU, FABIO ALTOMARE, A. M. CHANG, Department of Physics, Duke University, Durham, NC 27708, M. R. MELLOCH, School of Electrical Engineering, Purdue University, West Lafayette, IN 47907 — We describe the fabrication of a series-coupled double quantum dot (DQD) with side-coupled single-electron transistors (SETs). The DQD are intended to work as qubits, and the SETs perform the quantum spin measurements. The device was fabricated on a GaAs/AlGaAs heterostructure using a one-step, two-angle, evaporation of aluminum. Our design is compatible with modern semiconductor techniques, and if proven successful, can readily be scaled into larger integrated qubit systems with spin manipulation and measurement circuitry. Our preliminary experimental results indicate that both the QDs and SETs have single-electron tunneling behaviors with good reproducibility. We will report on progress towards the in-situ detection of the spin and charge of a single electron trapped in the semiconductor quantum dots.

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