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Few Electron Quantum Dots in Si/SiGe NAKUL SHAJI, CHRISTIE SIMMONS, LEVENTE KLEIN, DON SAVAGE, SUSAN COPPERSMITH, MARK FRIESEN, HUA QIN, ROBERT BLICK, MARK ERIKSSON, University of Wisconsin-Madison — Quantum information processing in silicon-based materials offers potential advantages like low spin orbit coupling and long spin coherence times. We report the fabrication and measurement of few electron quantum dots in strained Si/SiGe heterostructures. The quantum dots are formed by depleting the underlying two-dimensional electron gas using Schottky top gates. The design incorporates a capacitively coupled quantum point contact charge sensor to enable the read out of the number of electrons in the quantum dot. Low-noise measurement through the quantum dot reveals stable coulomb diamonds in the few electron regime. Interesting effects such as Kondo coupling of electron spins with the leads and Fano lineshapes for the coulomb peaks are observed in our measurements. We have investigated in detail the ground state and excited state transport spectroscopy through the quantum dots in the few electron limit at a base temperature of 20mK. In the presence of an external magnetic field (up to 4 Tesla) applied normal to the plane of electron transport we observe shifts in peak height and position enabling a discussion of the nature of these transport channels in our quantum dot.

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