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Transport and charge sensing in Si/SiGe double-quantum dots CHRISTIE SIMMONS, MADHU THALAKULAM, E. K. SACKMANN, B. J. VAN BAEL, D. E. SAVAGE, M. G. LAGALLY, R. JOYNT, M. FRIESEN, S. N. COPPERSMITH, M. A. ERIKSSON, University of Wisconsin - Madison — Gated quantum dots in Si/SiGe are of interest because spins in silicon are weakly coupled to the host material. We demonstrate that Coulomb blockade measurements through a single quantum dot are well correlated with charge sensing in a nearby quantum point contact. Charge sensing enables the determination of the absolute number of electrons in the system, and we present data demonstrating a one-electron single quantum dot. Incorporated with a double quantum dot, charge sensing can be used to probe the inter-dot motion of a single electron at fixed total charge in the double dot. The tunnel coupling between the two dots directly effects the charge localization and thus the sharpness of this inter-dot transition. Here we demonstrate gated electrical control of the exchange coupling – an important step towards qubit implementation – showing a smooth transition between two well-isolated dots, two dots so strongly coupled that they act as a single large quantum dot, and the intermediate regime.

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