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Charge sensing in a silicon MOS double quantum dot[1] M. LILLY, K. NGUYEN, R. YOUNG, E. NIELSEN, N. BISHOP, J. WENDT, R. GRUBBS, T. PLUYM, J. STEVENS, J. DOMINGUEZ, R. MULLER, M. CARROLL, Sandia National Laboratories — We report charge sensing measurements on a double quantum dot fabricated in a silicon / silicon dioxide double top gated structure. Depletion gates are used to laterally define a double quantum dot, and each dot has an adjacent quantum point contact (QPC) electrometer for remote detection of the dot occupation. For charge sensing, two techniques have been employed. In one, the direct conductance of the QPC measured with a low frequency ac voltage bias, and in the other the differential change in QPC conductance is measured as an ac voltage is applied to a dot plunger gate. Simultaneous direct and differential charge sense measurements are performed using an amplitude modulation technique. We characterize the double dot using honeycomb stability diagrams and non-linear transport. Results are compared to detailed modeling of our device structure.

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