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Dispersively Detected Pauli Spin-Blockade in a Silicon Nanowire Field-Effect Transistor ANDREAS BETZ, Hitachi Cambridge Laboratory, Cambridge, UK, R WACQUEZ, M. VINET, X. JEHL, CEA-LETI, Grenoble, France, A.L. SARAIVA, Universidade Federal do Rio de Janeiro, Brasil, M. SANQUER, CEA-LETI, Grenoble, France, A.J. FERGUSON, Cavendish Laboratory, Cambridge, UK, M.F. GONZALEZ-ZALBA, Hitachi Cambridge Laboratory, Cambridge, UK — We report the dispersive readout of the spin state of a double quantum dot (DQD) formed at the corner states of a silicon nanowire FET. Two face-to-face top-gate electrodes allow us to independently tune the charge occupation of the quantum dot system down to the few-electron limit. We measure the charge stability of the DQD in DC transport as well as dispersively via in situ gate-based radio frequency (rf) reflectometry, where one top-gate electrode is connected to a resonator. The latter removes the need for external charge sensors in quantum computing architectures and provides a compact way to readout the dispersive shift caused by changes in the quantum capacitance during inter-dot charge transitions. Here, we observe Pauli spin-blockade in the rf response of the circuit at finite magnetic fields between singlet and triplet states. The blockade is lifted at higher magnetic fields when intra-dot triplet states become the ground state configuration. A line shape analysis of the dispersive signal reveals furthermore an intra-dot valley-orbit splitting $\Delta_{vo} \simeq 145\mu$eV. Our results open up the possibility to operate compact CMOS technology as a singlet-triplet qubit and make split-gate silicon nanowire architectures an ideal candidate for the study of spin dynamics.

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