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Transport through a double quantum dot in the Pauli spin blockade regime

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Quantum dots are 0D few-electron (or hole) systems that allow for the study and manipulation of individual electrons (or holes) at low temperatures. Due to the possibility of employing the spin degree of freedom of an electron (or hole) as the building block of a qubit, they constitute one of the most promising candidates for spin-based quantum computing in semiconductor devices (1). Inspired by recent experiments in germanium-silicon core-shell nanowires hole double quantum dots (DQD) (2), we simulate the dc (current) and ac (parametric capacitance) transport signatures of Pauli spin blockade (PSB), a phenomenon in which, due to the Pauli exclusion principle, current is suppressed when the bias voltage is negative (3). Our preliminary results are consistent with (unpublished) data involving transport through a DQD in the PSB regime. The present work is currently been developed in collaboration with Simon Svab, Rafael Eggli, Miguel Carballido, Pierre Chevalier Kwon, Taras Patlatiuk and Dominik Zumbühl (University of Basel), Ang Li and Erik Bakkers (TU Eindhoven), Stefano Bosco (QuTech and Kavli Institute of Nanoscience) and William Coish (McGill University).

Palavras-chave: double quantum dot; Pauli spin blockade; parametric capacitance

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