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Theory of spin blockade in a triple quantum dots[1] CHANG-YU HSIEH, Department of Physics, University of Ottawa, Ottawa, Ontario, Canada K1N 6N5, YUN-PIL SHIM, Department of Physics, University of Wisconsin-Madison, Madison WI 53706, PAWEL HAWRYLAK, Quantum Theory Group, Institute for Microstructural Sciences, National Research Council, Ottawa, Canada, K1A 0R6 — We present a theory of electronic properties and spin blockade in a linear triple quantum dots. We use micoroscopic LCHO-CI and double-band Hubbard model to analyze the electronic and spin properties of a triple quantum dots near a symmetrical quadruple point involving the (1,1,1) configuration which is essential for implementing quantum information processing with electron spin. We calculate spectral functions and relate them via the rate equation, including coupling with a phonon bath, to current as a function of applied bias. We show that the spin blockade in a triple quantum dots can serve as a spectroscopic tool to distinguish spin polarized states from spin depolarized states. We also show that a spin blockade is developed only at high bias when an onsite triplet state on the edge quantum dot connected to the source lead becomes accessible in the transport window. In contradiction to the case of double quantum dot molecule, the onsite triplet is not only essential for lifting spin blockade but also important for building up spin polarisation and spin blockade in the system.

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