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Leakage-current lineshapes from inelastic cotunneling in the Pauli spin blockade regime[1] FARZAD QASSEMI, Inst for Quantum Computing, University of Waterloo, Waterloo, Canada, BILL COISH, Department of Physics, McGill University, Montreal, Canada — We find the leakage current through a double quantum dot in the Pauli spin blockade regime accounting for inelastic (spin-flip) cotunneling processes. Taking the energy-dependence of this spin-flip mechanism into account allows for an accurate description of the current as a function of applied magnetic fields, gate voltages, and an inter-dot tunnel coupling. In the presence of an additional local dephasing process or nonuniform magnetic field, we obtain a simple closed-form analytical expression for the leakage current giving the full dependence on an applied magnetic field and energy detuning. This work is important for understanding the nature of leakage, especially in systems where other spin-flip mechanisms (due, e.g., to hyperfine coupling to nuclear spins or spin-orbit coupling) are weak, including silicon and carbon-nanotube or graphene quantum dots.
W. A. Coish and F. Qassemi, Phys. Rev. B 84, 245407 (2011), http://arxiv.org/abs/1109.4445,

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