

Spin dynamics in a double quantum dot with hyperfine interaction.

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We analyze the electronic transport through a semiconductor double quantum dot, in particular, we analyze the spin blockade mechanism and how it is affected by the hyperfine interaction. Experiments of current rectification by Pauli exclusion in double quantum dots [1] are reproduced with our model based in the density matrix formalism.

Our calculations indicate that the finite value of the current that experiments show in the spin-blockade region of the current-voltage characteristic curve occurs due to spin-flip processes induced by hyperfine interaction between the electrons and nuclei spins.

We analyze as well the self-consistent dynamical behaviour of the electrons and nuclei spins and we show as well how a magnetic field applied to the sample allows excited states to participate in the electronic current and to remove spin blockade at certain dc voltages.

References:

[1] K. Ono, D.G. Austing, Y. Tokura, S. Tarucha, *Science* 297, 131 (2002).