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Signature of hyperfine interaction through current properties in quantum dots. ERNESTO COTA, FERNANDO ROJAS, Centro de Ciencias de la Materia Condensada, Universidad Nacional Autonoma de Mexico, SERGIO E. ULLOA, Ohio University — Several experiments have been carried out to observe and control spin properties of electrons in quantum dots subject to the hyperfine interaction due to nuclear spins. In this work, we study the manifestation of the hyperfine interaction through current calculations in one and two quantum dots. We use the density matrix master equation approach in the stationary regime taking into account an external magnetic field and the nuclear magnetic field in the quasistatic approximation characterized by the statistical fluctuations of the components of the nuclear field. As a first step, we study the case of a single quantum dot with one orbital. We study in detail the effects on the current of the hyperfine interaction, temperature and external magnetic field and we find that it is possible to obtain information on the hyperfine interaction directly from the differential conductance. We extend the model to study a double quantum dot with one and two electrons, including tunneling and exchange interactions, where the signature of the hyperfine interaction is more involved.

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