

## Quantum Coherence in a Spin-FET with Magnetic Leads

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We study spin dependent transmission probability of electrons in a spin field effective transistor (spin-FET) with magnetic leads. We calculate numerically the transmission probability with the help of Green's function formalism using a tight-binding model, and examine its dependence on the length of semiconductor region, Rashba spin-orbit (RSO) coupling parameter, and the energy of electrons. When the quantum coherence and spin dependent injection/detection processes at magnetic leads are properly taken into account, the transmission probability pattern is considerably modified. While the pattern without taking into account above mentioned effects depends only on RSO coupling parameter, the properly calculated pattern depends also on the energy of electrons even in the case of small RSO coupling parameter. This energy dependence could be a serious pitfall for the operation of a spin-FET.