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Spin qubit transport in a double quantum dot[1] XINYU ZHAO, XUEDONG HU, University at Buffalo, SUNY — Long distance spin communication is a crucial ingredient to scalable quantum computer architectures based on electron spin qubits. One way to transfer spin information over a long distance on chip is via electron transport. Here we study the transport of an electron spin qubit in a double quantum dot by tuning the interdot detuning voltage. We identify a parameter regime where spin relaxation hot-spots can be avoided and high-fidelity spin transport is possible. Within this parameter space, the spin transfer fidelity is determined by the operation speed and the applied magnetic field. In particular, near zero detuning, a proper choice of operation speed is essential to high fidelity. In addition, we also investigate the modification of the effective g-factor by the interdot detuning, which could lead to a phase error between spin up and down states. The results presented in this work could be a useful guidance for experimentally achieving high-fidelity spin qubit transport.

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