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Si double quantum dot spin qubit in a MOSFET structure[1] QIUZI LI, DIMITIRIE CULCER, LUKASZ CYWINSKI, SANKAR DAS SARMA, University of Maryland, College Park — Motivated by recent experimental developments, we theoretically consider the prospects for creating spin qubits in a lateral double-dot structure fabricated in a Si MOSFET by lithographic patterning. We calculate tunnel coupling, exchange splitting, and other relevant qubit properties as functions of the double-dot structural parameters, i.e. dot separation, central barrier, detuning, etc. Our motivation is to obtain a detailed qualitative comparison between GaAs and Si double-dot systems to see whether a Si MOSFET double-dot structure is feasible as a spin qubit in real quantum computer architectures. We will discuss both regular single electron spin qubit and the successful (in GaAs quantum dots) singlet-triplet spin qubits.

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