# High-fidelity and robust two-qubit gates for quantum-dot spin qubits in silicon

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## Abstract

A two-qubit controlled-NOT (CNOT) gate, realized by a controlled-phase (C-phase) gate together with some single-qubit gates, has been experimentally implemented recently for quantum-dot spin qubits in isotopically purified silicon, a promising solid-state system compatible with existing manufacturing technologies for practical quantum computation. The single-qubit gates have been demonstrated with fault-tolerant control-fidelity, but the infidelity of the two-qubit C-phase gate is, primarily due to electrical control noise, still higher than the required error threshold for fault-tolerant quantum computation (FTQC). Here we construct directly for high-fidelity CNOT gates with single smooth control pulses robust against the electrical noise for quantum-dot spin qubits in silicon, paving the way for large-scale FTQC.