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[822] Hole Spin Qubits in Silicon Fin Field-Effect Transistors

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By leveraging industrial CMOS manufacturing processes, spin qubits in silicon are a promising approach to achieving scalable quantum computing. While electron spin qubits have reached many milestones, hole spins in silicon present an exciting new platform, allowing for fast, all-electrical qubit control, absence of valleys and low susceptibility to hyperfine noise. Here, we present recent progress on hole spin qubits in fin field-effect transistors, which is an industry-standard transistor technology. We demonstrate single and two-qubit gate operations and explore hole-spin physics in the presence of strong spin-orbit interaction. Furthermore, we investigate the prospects for scalable readout and high temperature operation.

Theoretical Work

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