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Si platform for fault tolerant spin-based quantum computation with quantum dots

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To date basic techniques of implementing spin-based quantum computing have been developed using quantum dots, including single and two-qubit gates, initialization and readout. But improving the operation fidelity as well as increasing the qubit number is still a challenge in realizing fault-tolerant quantum computing. We have developed a fast gating technique for Si quantum dots to operate the qubits with high fidelity. I will first talk about our approach to improve the gate fidelity for single and two qubit gates and discuss the limiting factor of the fidelity. I will then review the current research and development to scale up the qubit system.

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