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Improving the gate fidelity of capacitively coupled spin qubits[1]
XIN WANG, Condensed Matter Theory Center, University of Maryland, College Park, EDWIN BARNES, Condensed Matter Theory Center and Joint Quantum Institute, University of Maryland, College Park — Precise execution of quantum gates acting on two or multiple qubits is essential to quantum computation. For semiconductor spin qubits coupled via capacitive interaction, the best fidelity for a two-qubit gate demonstrated so far is around 70%, insufficient for fault-tolerant quantum computation. In this talk we present control protocols that may substantially improve the robustness of two-qubit gates against both nuclear noise and charge noise. Our pulse sequences incorporate simultaneous dynamical decoupling protocols and are simple enough for immediate experimental realization. Together with existing control protocols for single-qubit gates, our results constitute an important step toward scalable quantum computation using spin qubits.

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