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Decoherence of two electron spin qubit in Si double quantum dot with g-factor modulations PEIHAO HUANG, GARNETT BRYANT, Joint Quantum Institute, National Institute of Standards and Technology and University of Maryland — The rapid progress in the manipulation and detection of semiconductor spin qubits enables the experimental demonstration of high fidelity two qubit gates that are necessary for universal quantum computing. Here, we consider the decoherence of two electron spin due to phonon emission in a Si double quantum dot (DQD). In the large detuning regime, where the two qubit gate is operated, we find that the decoherence depends strongly on the g-factor modulation and the asymmetry of the two dots. The estimated two qubit decoherence rate is comparable to the experimental measured results. We discuss the impact of the decoherence on the single/two qubit operations and ways to reduce the gate errors for the addressable semiconductor spin qubit.

Peihao Huang
Joint Quantum Institute, National Institute of Standards and Technology and University of Maryland

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