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Dynamically corrected gates for singlet-triplet spin qubits with control-dependent errors[1] N. TOBIAS JACOBSON, WAYNE M. WITZEL, ERIK NIELSEN, MALCOLM S. CARROLL, Sandia National Laboratories — Magnetic field inhomogeneity due to random polarization of quasi-static local magnetic impurities is a major source of environmentally induced error for singlet-triplet double quantum dot (DQD) spin qubits. Moreover, for singlet-triplet qubits this error may depend on the applied controls. This effect is significant when a static magnetic field gradient is applied to enable full qubit control. Through a configuration interaction analysis, we observe that the dependence of the field inhomogeneity-induced error on the DQD bias voltage can vary systematically as a function of the controls for certain experimentally relevant operating regimes. To account for this effect, we have developed a straightforward prescription for adapting dynamically corrected gate sequences that assume control-independent errors into sequences that compensate for systematic control-dependent errors. We show that accounting for such errors may lead to a substantial increase in gate fidelities.

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N. Tobias Jacobson
Sandia National Laboratories

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