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Noise filtering of composite pulses for singlet-triplet qubits[1] XIN WANG, XU-CHEN YANG, City University of Hong Kong — Dynamically corrected gates are useful measures to combat decoherence in spin qubit systems. They are, however, mostly designed assuming the static-noise model and may thus be considered low-frequency noise filters. In this talk we carefully examine the applicability of a particular type of dynamically corrected gates, namely the SUPCODE designed for singlet-triplet qubits, under realistic $1/f^{\alpha}$ noises. Through randomized benchmarking, we have found that SUPCODE offers improvement of the gate fidelity for $\alpha > 1$ and the improvement becomes exponentially more pronounced with the increase of the noise exponent α up to 3. On the other hand, for small α SUPCODE will not offer any improvement. We also present the computed filter transfer functions for the SUPCODE gates for nuclear and charge noise respectively and have found that they are consistent with the finding from the benchmarking.

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