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Encoded Dynamical Recoupling with Shaped Pulses YUNFAN LI, University of California,Riverside, DANIEL A. LIDAR, University of Southern California, LEONID P. PRYADKO, University of California,Riverside — Encoded Dynamical Recoupling is a passive error correction techique which can be used to enhance the performance of a quantum error correction code (QECC) against low-frequency component of the thermal bath. The elements of the stabilizer group are used in the decoupling cycle which makes the encoded logic operations fault-tolerant. We studied the effectiveness of this techique both analytically and numerically for several three- and five-qubit codes, with decoupling sequences utilizing either Gaussian or self-refocusing pulse shapes. When logic pulses are intercalated between the decoupling cycles, the technique may be very effective in cancelling constant perturbation terms, but its performance is much weaker against a time-dependent perturbation simulated as a classical correlated noise. The decoupling accuracy can be substantially improved if logic is applied slowly and concurrently with the decoupling, so that a certain adiabaticity condition is satisfied.

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