Abstract Submitted
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Dynamically correcting a CNOT gate for any systematic logical error FERNANDO CALDERON-VARGAS, JASON KESTNER, University of Maryland Baltimore County — The reliability of quantum information processing depends on the ability to deal with noise and error in an efficient way, and a significant source of error in many settings is coherent, systematic gate error. We address this problem by deriving a set of composite pulse sequences that generate CNOT gates and correct all systematic errors within the logical subspace to arbitrary order [1]. These sequences are applicable for any two-qubit interaction Hamiltonian, and make no assumptions about the underlying noise mechanism except that it is constant on the timescale of the operation. We do assume access to error-free single-qubit gates, so single-qubit gate imperfections eventually limit the achievable fidelity. However, since single-qubit gates generally have much higher fidelities than two-qubit gates in practice, these pulse sequences offer useful dynamical correction for a wide range of coupled qubit systems. [1] F.A. Calderon-Vargas, J.P. Kestner, "Dynamically correcting a CNOT gate for any systematic logical error", arXiv:1607.04638 (2016).

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