

Abstract Submitted
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The intrinsic error thresholds of the surface code with correlated errors¹ PEJMAN JOUZDANI, EDUARDO MUCCILO, Physics Department, University of Central Florida, EDUARDO NOVAIS, Universidade Federal do ABC (Brazil) — We study how the resilience of the surface code to decoherence is affected by the presence of a bosonic bath. The surface code experiences an effective dynamics due to the coupling to a bosonic bath that correlates the qubits of the code. The range of the effective induced qubit-qubit interaction depends on parameters related to the bath correlation functions. We show that different ranges set different intrinsic bounds on the fidelity of the code. These bounds appear to be independent of the stochastic error probabilities frequently studied in the literature and to be merely a consequence of the induced dynamics by the bath. We introduce a new definition of stabilizers based on logical operators that allows us to efficiently implement a Metropolis algorithm to determine the intrinsic upper bounds to the error threshold.

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