Abstract Submitted
for the MAR16 Meeting of
The American Physical Society

Fidelity of a quantum state protected by the surface code in the presence of a finite-temperature bosonic bath[1] E. NOVAIS, Federal University of ABC (SP-BRAZIL), A. J. STANFORTH, EDUARDO R. MUCCIOLO, University of Central Florida — We evaluate the fidelity of a multi-qubit quantum state protected by the surface code during a single quantum error correction cycle when qubits couple to a gapless bosonic environment. We discuss the protection of the state for different spectral functions and bath temperatures. Analytical results are supported by finite-size scaling analyses based on Monte Carlo and exact numerical calculations. Our results demonstrate a finite threshold that explicitly depends on the bath-mediated qubit-qubit interaction range and bath spectral function and temperature.

[1]This work was supported by the NSF grant CCF 1117241 and by Fapesp(Brazil) grant 2014/26356-9.

Eduardo Novais
Univ Federal do ABC

Date submitted: 06 Nov 2015 Electronic form version 1.4