Abstract Submitted
for the MAR14 Meeting of
The American Physical Society

Extremal Optimization for estimation of the error threshold in topological subsystem codes at T = 0 JORGE E. MILLÁN-OTOYA, STEFAN BOETTCHER, Emory Univ — Quantum decoherence is a problem that arises in implementations of quantum computing proposals. Topological subsystem codes (*TSC*) have been suggested as a way to overcome decoherence. These offer a higher optimal error tolerance when compared to typical error-correcting algorithms. A TSC has been translated into a planar Ising spin-glass with constrained bimodal three-spin couplings. This spin-glass has been considered at finite temperature to determine the phase boundary between the unstable phase and the stable phase, where error recovery is possible.[1] We approach the study of the error threshold problem by exploring ground states of this spin-glass with the Extremal Optimization algorithm (*EO*).[2] EO has proven to be a effective heuristic to explore ground state configurations of glassy spin-systems.[3]

[1]R. S. Andrist et al., *Optimal error correction in topological subsystem codes*, Phys. Rev. A., **85**, 050302(R) (2012)
[2]S. Boettcher et al., *Optimization with extremal dynamics*, Phys. Rev. Lett., **86**, 5211 (2001)
[3]S. Boettcher, *Stiffness of the Edwards-Anderson model in all dimensions*, Phys. Rev. Lett., **95**, 197205 (2005)

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Date submitted: 15 Nov 2013 Electronic form version 1.4