Abstract Submitted
for the MAR14 Meeting of
The American Physical Society

Long-Range Entanglement Is Necessary for a Topological Storage of Quantum Information ISAAC KIM, Perimeter Inst for Theo Phys — A general inequality between entanglement entropy and a number of topologically ordered states is derived, even without using the properties of the parent Hamiltonian or the formalism of topological quantum field theory. Given a quantum state, we obtain an upper bound on the number of distinct states that are locally indistinguishable from it. The upper bound is determined only by the entanglement entropy of some local subsystems. As an example, we show that $\log N \leq 2\gamma$ for a large class of topologically ordered systems on a torus, where N is the number of topologically protected states and γ is the constant subcorrection term of the entanglement entropy. We discuss applications to quantum many-body systems that do not have any low-energy topological quantum field theory description, as well as tradeoff bounds for general quantum error correcting codes.

Isaac Kim
Perimeter Inst for Theo Phys

Date submitted: 12 Nov 2013

Electronic form version 1.4