Abstract Submitted
for the MAR15 Meeting of
The American Physical Society

Ground state entanglement constrains low-energy excitations ISAAC KIM, Perimeter Inst for Theo Phys, BENJAMIN BROWN, Imperial College London — For a general quantum many-body system, we show that its ground state entanglement imposes a fundamental constraint on the low-energy excitations. For two-dimensional systems, our result implies that any system that supports anyons must have a nonvanishing topological entanglement entropy. We demonstrate the generality of this argument by applying it to three-dimensional quantum many-body systems, and showing that there is a pair of ground state topological invariants that are associated to their physical boundaries. From the pair, one can determine whether the given boundary can or cannot absorb point-like or line-like excitations.

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Date submitted: 13 Nov 2014 Electronic form version 1.4