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On the stability of gapped ground state phases of frustration-free quantum spin systems

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Gapped quantum spin systems with topologically ordered ground states have been of interest due to their potential for developing fault-tolerant quantum codes. A key feature of such models is that the spectral gap remains open in the presence of small, local perturbations. Several stability results have been proved in recent years for frustration-free quantum spin models with periodic boundary conditions with ground states that satisfy a condition known as Local Topological Quantum Order. We will discuss how to generalize these results in several directions: including to quantum spin systems with more general boundary conditions, quantum spin systems with discrete symmetry breaking, and lattice fermion models.

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