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Impact of non-Abelian anyons on criticality MARC SCHULZ, FIONA BURNELL, Univ of Minn - Minneapolis — Topological order provides an interesting playground to investigate criticality in phase transitions with no local order parameter where the condensing excitations interact statistically. We investigate the impact of these exchange statistics on critical properties by comparing two closely related models, which differ only by the presence or absence of such long-ranged statistical interactions for the condensed excitations:

1. The Ising string-net Hamiltonian, in which the transition is between a topologically ordered phase (with doubled Ising topological order) and a trivial phase. The excitations that condense across this transition are achiral non-Abelian anyons.

2. The Ashkin-Teller model on a triangular lattice, in which the transition is from a paramagnetic to a ferromagnetic phase.

We show that the non-Abelian excitations in the first model can be mapped onto the spin degrees of freedom of the second, and that the mapping captures all relevant features except the non-Abelian statistics. We derive the low-energy spectra of these models by means of high-order perturbation theory and exact diagonalization to study the resulting differences in their critical behavior.

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