Spin Liquid and Deconfined Criticality in a Kagome Lattice Bose-Hubbard Model

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Abstract

We present quantum Monte Carlo simulations on a sign-problem free Bose-Hubbard model on the kagome lattice. This model supports a quantum Z2 spin liquid phase with fractional excitations and topological order, which can be characterized definitively through calculation of the topological entanglement entropy. I will outline how the entanglement entropy can be measured in general using a direct implementation of the "replica trick" which allows for the study of entanglement scaling in a variety of other models amenable to study by QMC. Finally, I will examine the kagome model's superfluid/spin-liquid transition, which is an example of an exotic deconfined quantum critical point called XY*, mediated by the fractional charges.