Quantum dimer model
on the kagome lattice

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Abstract

We introduce quantum dimer models on lattices made of corner-sharing triangles. These lattices include the kagome lattice and can be defined in arbitrary geometry. They realize fully disordered and gapped dimer-liquid phase with topological degeneracy and deconfined fractional excitations, as well as solid phases. Using geometrical properties of the lattice, several results are obtained exactly, including the full spectrum of a dimer-liquid. These models offer a very natural - and maybe the simplest possible - framework to illustrate general concepts such as fractionalization, topological order and relation to $\mathbb{Z}_2$ gauge theories. We also attempt to explain the observed entropy of the Kagome Heisenberg model using a simple dimer model.