

Quantum Material Simulation with D-Wave Processors

Friday, 31 May 2019 09:30 (30 minutes)

One of the most natural and also probably most important applications of quantum computation is simulation of other quantum systems. Qubits are particularly suitable for simulating spin-1/2 particles in magnetic materials. In this presentation, after a brief introduction to D-Wave quantum processors, I provide examples in which D-Wave qubits were used for simulation of quantum magnetic systems with different lattice structures. I show experimental evidence of spin glass phase transition in 3D lattices [Science 361, 162 (2018)] and Kosterlitz-Thouless (KT) phase transition in 2D lattices [Nature 560, 7719 (2018)]. The latter is specially interesting because the rotational symmetry, essential for KT physics, appears due to an interplay between frustration and quantum mechanics in a transverse field Ising Hamiltonian.

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