

CP-05-01

Technical update: Annealing quantum computing's rapid progress

Emile Hoskinson*D-Wave*

Abstract

Annealing quantum computing is undergoing rapid technological progress in the scientific domain, with magnetic materials simulation [Computational supremacy in quantum simulation (arXiv:2403.00910)], and in the large-scale commercial optimization domain, with powerful new hybrid quantum-classical solvers. Here we describe the use of D-Wave annealing quantum computers to simulate magnetic materials with a variety of lattice topologies. We first reproduce expected coherent quantum dynamics in small-scale problems that can be simulated classically, then scale to problems beyond the reach of classical computing. We describe the powerful new coherent quantum annealing capability of D-Wave annealing quantum computers now available to customers that makes this possible. We give a preview of newer advanced features on the horizon, which we expect will enable excited state control within quantum annealing processors, potentially opening up powerful new approaches to quantum computation.