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Optimising simulated quantum annealing, simulated annealing and a mean-field algorithm to find ground states of Ising spin glasses
DAMIAN S. STEIGER, ETH - Zurich, TROELS F. RØNNOW, ETH - Zurich and Nokia Technologies, Cambridge (UK), MATTHIAS TROYER, ETH - Zurich — We report on benchmarks of finding the ground states of Ising spin glasses on chimera graphs using simulated annealing, simulated quantum annealing and a mean-field quantum annealing algorithm. We analyze the performance of these algorithms by calculating the empirical time-to-solution distribution function and extrapolating their tails, which describe the hard instances. All algorithms show an increasing fat-tail with larger system size, and therefore the average time-to-solution is dominated by the run-times of the hard instances. These tails can be significantly reduced by optimizing the annealing time and temperature. Especially the hard instances of simulated quantum annealing are solved much faster by using a shorter annealing time or higher temperature.

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