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A study of QAOA using the Jülich Universal Quantum Computer Simulator

We study the quantum approximate optimization algorithm (QAOA) by simulating QAOA circuits using the Jülich Universal Quantum Computer Simulator (JUQCS).

JUQCS is a massively parallel, GPU-accelerated quantum state-vector simulator which allows us to obtain, for a given QAOA circuit, the exact energy expectation value and success probability.

We discuss the relation between QAOA and quantum annealing. In particular, we investigate how a coarsely discretized quantum annealing schedule can be used to obtain reasonable initializations for QAOA, and in which cases we may circumvent the costly optimization procedure.