

A lower bound method for Hamiltonian simulation based on quantum marginals and its relation to quantum information

Thursday, September 13, 2018 1:45 PM (40 minutes)

In this talk we introduce a lower bound simulation method based on variational determination of the quantum marginal distribution, and how the geometric constraints associated with enforcing feasibility in the variational procedure can be employed to certify physicality in a marginal tomography routine. The feasibility constraints we employ are derived from ‘outer’ approximations to the n -representability problem which provide a hierarchy of semidefinite programs that are relaxations of the ground state energy problem. We demonstrate that with modern semidefinite program solvers i) the lower bound method can provide tight approximations to the ground state energies for chemical and condensed matter model systems that are challenging for traditional methods and ii) provide a computationally efficient method for fermionic marginal tomography that will be paramount for finding utility with near-term quantum resources.

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