TITLE Quantum speed limits, fidelity estimation, and lower bounds on adiabatic quantum computing times

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Abstract:

Quantum fidelity is a crucial metric for assessing the performance of quantum algorithms and the accuracy of quantum state preparation. In the context of adiabatic quantum computing (AQC), fidelity quantifies the deviation of the final state from the ideal ground state, directly influencing computational success. In this talk, I will present methods for estimating quantum fidelity in AQC and deriving lower bounds on the evolution time required to achieve a given fidelity threshold. Our approach leverages quantum speed limits to establish explicit scaling relations between fidelity, control parameters, and timing schedules. Notably, our method provides lower bounds on the runtime of certain adiabatic quantum algorithms with undetermined quantum speedups, where the traditional spectral gap-based approach is ineffective.

References:

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[3] J.-H. Chen, Phys. Rev. Research 5, 033175 (2023).