THE UNIVERSITY OF CHICAGO | THE COMMITTEE ON COMPUTATIONAL AND APPLIED MATHEMATICS

COLLOQUIUM

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When Numerical Analysis Meets Quantum Algorithms for Hamiltonian Simulation

THURSDAY, January 12th, at 4:00 PM
Jones 303, 5747 S. Ellis Ave. Chicago, IL 60637

ABSTRACT

Recent years have witnessed tremendous progress in developing and analyzing quantum algorithms for quantum dynamics simulation (Hamiltonian simulation). The accuracy of quantum dynamics simulation is usually measured by the error of the unitary evolution operator in the operator norm, which in turn depends on the operator norm of the Hamiltonian and introduces large cost overhead for problems with unbounded operators and scale separation. However, the operator norm measures the worst-case scenario, while practical simulation concerns the error with respect to a given initial vector or given observables at hand. In this talk, we will introduce some recent advances in weakening the strong operator norm dependence in quantum simulation tasks, by taking into account the initial condition and observables or considering the interaction picture. In the end, I will discuss briefly how Hamiltonian simulation techniques can be applied to a quantum learning task achieving optimal scaling. (The talk does not assume a priori knowledge on quantum computing.)

Organizers:
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