Joint CQSE & NCTS Special Seminar

2022
June. 29, Friday

TIME June. 29, 2022, 2:30~3:30pm
TITLE Finite-Temperature Topological Classification and How Quantum Computers Can Help
SPEAKER Associate Professor and Physics Graduate Chair, Chih-Chun Chien (Department of Physics, University of California, Merced)
PLACE NCTS Physics, Lecture Hall, 4F, Chee-Chun Leung Cosmology Hall, NTU
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Abstract:

The discovery of topological properties of quantum systems has revolutionized our classification of materials. While the classification of zero-temperature topological systems is near completion, classification of finite-temperature topological systems is still lacking. I will first summarize the challenges from direct generalizations of zero-temperature topological indicators and then present a promising candidate of finite-temperature topological indicators known as the Uhlmann phase. Due to the incompatibility between the Uhlmann process and Hamiltonian dynamics, simulation and measurement of the Uhlmann phase is challenging. By using quantum computers to simulate composite systems of a system plus its ancilla, however, measurements of the Uhlmann phase have become feasible. If time permits, I will discuss other candidates of finite-temperature topological indicators or other pure-state representations on quantum computers.

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