清华大学高等研究院

Institute for Advanced Study, Tsinghua University

学术报告

Title: Entanglement Berry Phases: from the Berry Phase to Holography to Measurement-Based Quantum Computing

Speaker: Bartek Czech *(IAS, Tsinghua University)*

Time: 3:30pm, Thursday, November 5, 2020

Venue: Conference Hall 322, Science Building, Tsinghua University

Abstract

The traditional Berry phase, which characterizes trajectories swept by pure states, can be generalized to mixed states in two inequivalent ways. In one of them the "generalized Berry phase" accrues on a fictitious purifier system; in another it transforms the algebra of observables, with which the mixed state may be probed. My collaborators and I independently discovered that second generalization last year in the context of holographic duality. In this talk, I will explain the journey from the usual Berry phase to its two generalizations, and illustrate it using Matrix Product States. We will see how the two generalized Berry phases can be used together to describe Measurement-Based Quantum Computation---a protocol for conducting quantum computations by measurements alone. The formalism shares many commonalities with how Symmetry-Protected Topological order (SPT) is described in Matrix Product States.