Contribution ID: **28** Type: **Talk**

Realization and Characterization of Topological States on Quantum Processors

Wednesday, 8 May 2024 09:00 (1 hour)

The interplay of quantum fluctuations and interactions can yield novel quantum phases of matter with fascinating properties. Understanding the physics of such systems is a very challenging problem as it requires to solve quantum many body problems—which are generically exponentially hard to solve on classical computers. In this context, universal quantum computers are potentially an ideal setting for simulating the emergent quantum many-body physics. In this talk, I will discuss two different classes of quantum phases: First, we consider symmetry protected topological (SPT) phases and show that a topological phase transition can be simulated using shallow circuits. We then utilize quantum convolutional neural networks (QCNNs) as classifiers and introduce an efficient framework to train them. Second, we focus on the realization of topological ordered phases and simulate the braiding of anyons. Taking into account additional symmetries, we then investigate phase transitions between different symmetry enriched topological (SET) phases.

Abstract category

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Session Classification: Invited contributions