Contribution ID: **193** Type: **talk**

Projected Entangled Pair States for Lattice Gauge Theories with Dynamical Fermions

Thursday 23 January 2025 10:15 (15 minutes)

Lattice gauge theory is an important framework for studying gauge theories that arise in the Standard Model and condensed matter physics.
Yet many systems (or regimes of those systems) are difficult to study using conventional techniques, such as action-based Monte Carlo sampling. In this paper, we demonstrate the use of gauged Gaussian projected entangled pair states as an ansatz for a lattice gauge theory involving dynamical physical matter. We study a $\mathbb{Z}_2$ gauge theory on a two dimensional lattice with a single flavor of fermionic matter on each lattice site. Our results show agreement with results computed by exactly diagonalizing the Hamiltonian, and demonstrate that the approach is computationally feasible for larger system sizes where exact results are unavailable. This is a further step on the road to studying higher dimensions and other gauge groups with manageable computational costs while avoiding the sign problem.

For further information, we refer to the extended abstract attached to this submission.

Email Address of submitter

emonts@lorentz.leidenuniv.nl

Short summary

Authors: Mr KELMAN, Ariel; Dr BORLA, Umberto; EMONTS, Patrick; Prof. ZOHAR, Erez

Presenter: EMONTS, Patrick

Session Classification: Quantum Computing