



清华大学高等研究院

Institute for Advanced Study, Tsinghua University

物理学术报告

Physics Seminars (biweekly)

- Title:** Gauge-Invariant Tensor Network Simulations for Abelian Lattice Gauge Theory in (2+1)D (and maybe more)
- Speaker:** Yantao Wu (Institute of Physics CAS)
- Time:** 4:00 pm, Tuesday, October 28, 2025
- Venue:** Conference Hall 322, Science Building, Tsinghua University

Abstract

We propose a novel tensor network method to achieve accurate and efficient simulations of Abelian lattice gauge theories (LGTs) in (2+1)D for both ground state and real-time dynamics. We demonstrate the versatile capability of this approach for accurate ground state simulation of pure Z2, Z3 and Z4 gauge theory, odd-Z2 gauge theories, and Z2 gauge theory coupled to hard-core bosons, on square lattices up to 32×32 . Furthermore, we demonstrate that it allows for accurate simulations of real-time dynamics up to long-time, exemplified by the dynamics of elementary excitations of the deconfined Z2 gauge field on a 10×10 lattice. This is also the first example of using VMC to simulate the real-time dynamics of PEPS, whose impact may extend beyond gauge theory.

If time permits, I can also talk about some recent advances in various numerical methods of mine.

Bio

武琰涛，中国科学院物理研究所特聘研究员。他在哈佛马德学院获得了物理学士学位，在普林斯顿大学获得了物理博士学位，在加州大学伯克利分校和日本理化所做过博士后研究。他的主要研究兴趣是计算物理方法。