



Zhuan Li

Ph.D. Candidate in Physics

EDUCATION

University of Pittsburgh
Ph.D. in Physics, Advisor: Prof. Roger Mong

PA, United State
Sep 2019 –Apr 2024

University of Bristol
Visiting student

Bristol, United Kingdom
Jan 2018 –Jun 2018

University of Chinese Academy of Sciences
B.Sc. in Physics, Advisor: Prof. Pan Zhang

Beijing, China
Sep 2015 –Jul 2019

RESEARCH EXPERIENCE

- **Topological phase of matter.**
 - Determining and classifying the topological order by analytically calculating the overlaps of ground states wave functions.
 - Analyzing the behavior of current quantum correcting codes (toric code, color code) in an open system by using tensor networks algorithm (PEPS).
- **Quantum information**
 - Applying the entanglement measure on many body system at the critical point by using tensor networks algorithm (MPS).
 - Analytically calculating the entanglement properties of random matrices ensembles.
- **Quantum transport.**
 - Using python library *kwant* to simulate and analyze the Josephson junction under different conditions (with/without external magnetic field, spin-orbital coupling, and orbital effect).
 - Optimizing the efficiency of the Josephson parametric amplifier based on input-output theory.

SKILLS

- **Coding:** Python, MATLAB, Mathematica, L^AT_EX, C++.
- **Simulation skill:**
 - Monte Carlo for random sampling
 - Tensor networks (MPS, PEPS) for many body system
 - *Kwant* for quantum transport problem
 - Different solvers for ODE/PDE (including direct time integration, harmonic balanced method)
- **Theoretical Knowledge Background:** Computational Physics, Advanced Statistical Mechanics, Quantum information, Quantum field theory

PUBLICATIONS

- [Z. Li](#) and R. S. K. Mong, Detecting topological order from modular transformations of ground states on the torus, *Phys. Rev. B* 106, 235115 (2022).
- B. Zhang, [Z. Li](#), V. Aguilar, P. Zhang, M. Pendharkar, C. Dempsey, J. Lee, S. Harrington, S. Tan, J. Meyer, et al., Evidence of ϕ_0 -Josephson junction from skewed diffraction patterns in Sn-InSb nanowires, arXiv preprint [arXiv:2212.00199](https://arxiv.org/abs/2212.00199) (2022).
- [Z. Li](#) and R. S. K. Mong, Estimating the entanglement of purification, (in preparation).
- B. Zhang, [Z. Li](#), V. Aguilar, P. Zhang, M. Pendharkar, C. Dempsey, J. Lee, S. Harrington, S. Tan, J. Meyer, et al., Supercurrent through single electron transverse mode in 1D Josephson junctions QPC, (in preparation).

CONFERENCE TALKS

- [Zhuan Li](#), and Roger SK Mong. “Detecting topological order from modular transformations of ground states on the torus.” APS March meeting (2022).
- [Zhuan Li](#), and Roger SK Mong. “Estimating the reflected entropy from random matrices.” APS March meeting (2023).