Zhuan Li

Ph.D. Candidate in Physics

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Education

University of Pittsburgh — PA, United States
Ph.D. in Physics, Advisor: Prof. Roger Mong — 08/05/2019 – 05/01/2025 (expected)

University of Bristol — Bristol, United Kingdom
Visiting student — 01/01/2018 – 06/01/2018

University of Chinese Academy of Sciences — Beijing, China
B.Sc. in Physics, Advisor: Prof. Pan Zhang — 09/01/2015 – 06/30/2019

Experience

- **Los Alamos National Lab (05/2024 - Present)**
  - **Advanced Statistical Modeling Learning**
    - Employed statistical learning techniques to enhance the performance and accuracy of complex modeling systems, applying these methods in optimizing simulation processes.
    - Developed and implemented computational algorithms such as importance sampling and rejection sampling, significantly improving the efficiency of large-scale sampling operations.
- **University of Pittsburgh (08/2019 - Present)**
  - **Scientific Computing and Data Analysis**
    - Conducted complex numerical simulations to study supercurrent behaviors in electronic systems using Python and specialized computational libraries.
    - Improved algorithms for solving partial differential equations, optimizing simulation accuracy and computational speed.
    - Utilized advanced software tools for detailed electromagnetic and thermal property analysis in various materials and device designs.
    - Applied Monte Carlo simulation techniques to explore statistical properties of complex systems, contributing to foundational research in statistical mechanics.
  - **Theoretical Physics and Mathematical Modeling**
    - Designed and executed novel computational strategies to analyze system behaviors under various conditions, leveraging ground state overlap techniques and tensor network analyses.
    - Enhanced data integrity and system reliability through the development of robust computational models to study the impact of environmental noise on system performance.
    - Developed quantum noise mitigation protocols using advanced statistical methods, improving system resilience and reliability.

Skills

- **Coding**: Python, Julia, SQL, Mathematica, Qiskit, LaTeX.
- **Machine Learning Tools**: PyTorch, Scikit-Learn, TensorFlow.
- **Knowledge Background**: Linear Algebra, Probability and Statistics, Machine Learning, Computational Physics, Quantum Information and Quantum Computation.

Selected 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 phi0-josephson junction from skewed diffraction patterns in sn-insb nanowires, arXiv preprint arXiv:2212.00199 (2022).
- N. M. Hougland, **Z. Li**, R. Kaufman, B. Mesits, R. S. K. Mong, M. Hatridge, and D. Pekker, Pump-efficient Josephson parametric amplifiers with high dynamic range, arXiv preprint arXiv:2402.12586 (2024).
- **Z. Li** and R. S. K. Mong, Replica Topological Order and Error Correction, arXiv preprint arXiv:2402.09516 (2024).

Awards

2022, Thomas-Lain Essay Competition Winner.

2023, Pittsburgh Quantum Institute Fellowship.