Yang Liu

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EDUCATION

East China Normal University, School of Physics and Electronic Science Shanghai, China

M. Sc. in Condensed matter physics *Sep. 2022 - Expected Jun 2025*

Supervisor: Haiyuan Zou, researcher

Research Field: Strongly correlated many body systems, Tensor Networks(TNs), Quantum Phase Transition

Core Courses:: Advanced Quantum Mechanics, Theory of Solids, Computational Physics, Physics of Semiconductor Devices, Modern Physics Experiments, Advanced statistical physics, Introduction to condensed matter physics

North China University of Science and Technology, School of Science Tangshan, China

B. Sc. in Applied Physics *Sep. 2017 - Jun. 2021*

Core Courses: Advanced Mathematics, Linear Algebra, Probability and Statistics, General Physics, Solid State Physics, Fundamentals of Analog Circuits, Fundamentals of Electronic Technology, Electrical and Electronics, Digital Image Processing

PUBLICATIONS

Preprint

1. **Yang Liu**, Songtai Lv, Yuchen Meng, Zefan Tan, Erhai Zhao, Haiyuan Zou, "Exact Fisher zeros and thermofield dynamics across a quantum critical point", arXiv:2406.18981.

Published

2. **Yang Liu**, Erhai Zhao, Haiyuan Zou,"From Complexification to Self-Similarity: New Aspects of Quantum Criticality", *Chinese Phys. Lett.* 41, 100501(2024).

3. **Yang Liu**, Songtai Lv, Yang Yang, Haiyuan Zou, "Signatures of quantum criticality in the complex inverse temperature plane", *Chinese Phys. Lett.* 40, 050502 (2023).

ACADEMIC EXPERIENCE

- **Fisher Zeros and QPTs**: We analyze Fisher zeros in the 1DTFIM, revealing smooth curves in the complex β plane that offer insights into quantum criticality. Our results provide new analytical predictions about quantum dynamics, refine Suzuki's solution, and extend this approach to other spin models, opening avenues for studying quantum critical systems in higher dimensions. From this experience, I gained these skills:
  - Developed and implemented a 2D tensor network representation for 1D quantum models by using MPOs.
  - Applied Higher Order Tensor Renormalization Group (HOTRG) method to efficiently contract the tensor network for calculating thermodynamic quantities.
  - Acquired proficiency in MATLAB and Python for conducting complex numerical experiments.
  - Gained experience in using Linux servers to manage and submit large-scale computational tasks.
- **Teaching Assistant**: Atomic Physics
  - Graded assignments and exams, ensuring timely and accurate feedback for over 50 students.
  - Provided one-on-one assistance, helping students overcome difficulties and enhancing their understanding of atomic physics.

ACADEMIC CONFERENCES

The 11th Workshop on Quantum Many-Body Computation Fuzhou, China

Display a poster: Signatures of quantum criticality in the complex inverse temperature plane *Mar.13 2023 - Mar.17 2023*

Quantum Simulation of Fundamental Physics Shanghai, China

Display a poster: same as above *Nov.16 2023 - Nov.18 2023*

The 12th Workshop on Quantum Many-Body Computation Xi'an, China

Display a poster: Structure of Fisher zeros for 1D Transverse Ising Model in the disorder side *Apr.12 2024 - Apr.14 2024*

Quantum Many-Body Summer School Chongqing, China

courses: Fermi Liquid Theory, Landau Phase Transition Theory, Scaling and Renormalization, KT Phase Transition, Quantum Phase Transition *Jul.15 2024 - Jul.21 2024*

EXTRACURRICULAR ACTIVITIES

- **Hardware Club**: Joined the hardware laboratory of the school's "Maker Space"
  - Gained hands-on experience with single-chip microcomputers and C programming and applied to create practical models.
- **Music Club**: Joined the School Folk Music Orchestra
  - Studied the bamboo flute and participated in school instrument performance competitions, performing with the orchestra.