Haotian WEI

weihaotian776@gmail.com ◦ (281) 236-4913 ◦ Houston, TX ◦ www.linkedin.com/in/htwei17

EDUCATION

Ph. D. in Theoretical Physics, Rice University, *Houston, TX* — Expected May 2026
Research in Quantum Science and Engineering

M. Sc. in Theoretical Physics, Rice University, *Houston, TX* — Dec 2024

B.Sc. in Physics, Fudan University, *Shanghai, China* — Jun 2020
GPA: 3.72/4.00 (9^{th}/111), Major GPA: 3.94/4.00
Outstanding Graduate of Class 2020 (top 10%)

Visiting Student, University of California, *Berkeley, CA* — Aug - Dec 2017
GPA: 4.00/4.00, sponsorship by Fudan University

RESEARCH EXPERIENCE

Doctoral Researcher, *Rice University, Houston, TX* — Jun 2021 - Present
Advisor: Dr. Kaden Hazzard

- Proposed a universal and efficient variational quantum circuit framework on fermionic quantum simulators and showed its exponential advantage over classical algorithms
- Developed Riemannian-manifold-optimization-based dynamical simulation package to explain the world's first fermion 2d optical tweezer array experiment data and precisely engineer its effective model parameters of arbitrary geometry, related works featured *Editors' Suggestion* in professional research journals *Physical Review Letters* and *Physical Review A* and in public science news magazine *Physics Magazine*
- Unveiled a universal thermodynamical law in the above quantum system, research featured *Editors' Suggestion* in *Physical Review A*

Visiting Undergraduate Researcher, *Rice University, Houston, TX* — Jul – Oct 2019
Advisor: Dr. Kaden Hazzard

- Developed state-of-the-art Exact Diagonalization Matlab code of SU(N) Fermi-Hubbard Model (FHM) in arbitrary optical lattices
- Performed large-scale computations and derived the world's first-ever theoretical thermometry on the coldest quantum fermion system in the universe - ultracold SU(6) Fermi gas in an optical lattice
- Helped con calculations to discover the universal thermodynamical law behind SU(N) FHM
- Related work reported on international media, including *physics.org*, *SRF* (German), *BBC News Mundo* (Spanish), *Principia* (Chinese)

Research Assistant, *Fudan University, Shanghai, China* — Sep 2018 – Jun 2020
Advisor: Dr. Yang Qi

- Developed stochastic-gradient-descent-based algorithms in C++ code to learn effective potential of statistical physics model sampled by Hybrid Monte Carlo
- Predicted the phase diagram of triangular lattice quantum Ising model by field theory analysis
- Performed Monte-Carlo-based dynamical simulation in C++ for a Berezinskii-Kosterlitz-Thouless transition model
- Completed Bachelor's thesis and published relevant research work with broad reception

PUBLICATIONS

6 articles, 200+ citations and 5 h-index from Google Scholar profile: scholar.google.com/citations?user=mu--7-UAAAAJ

- **Hao-Tian Wei**, Eduardo Ibarra-García-Padilla, Michael L. Wall, and Kaden R. A. Hazzard. "Hubbard Parameters for Programmable Tweezer Arrays" *Physical Review A [Editors' Suggestion] [Featured in news]* **109**, 013318 (2024).
- Dasom Kim, Sohail Dasgupta, Xiaoxuan Ma, Joong-Mok Park, **Hao-Tian Wei**, Liang Luo, Jacques Doumani, Xinwei Li, Wanting Yang, Di Cheng, Richard HJ Kim, Henry O Everitt, Shojiro Kimura, Hiroyuki Nojiri, Jigang

Wang, Shixun Cao, Motoaki Bamba, Kaden RA Hazzard and Junichiro Kono. “Observation of the magnonic Dicke superradiant phase transition” *Science Advances* **11**, adt1691 (2025).

- Zoe Z. Yan, Benjamin M. Spar, Max L. Prichard, Sungjae Chi, **Hao-Tian Wei**, Eduardo Ibarra-García-Padilla, Kaden R. A. Hazzard, and Waseem S. Bakr. “Two-Dimensional Programmable Tweezer Arrays of Fermions” *Physical Review Letters [Editors' Suggestion] [Featured in news]* **129**.123201 (2022).
- Shintaro Taie, Eduardo Ibarra-García-Padilla, Naoki Nishizawa, Yosuke Takasu, Yoshihito Kuno, **Hao-Tian Wei**, Richard T. Scalettar, Kaden R. A. Hazzard, and Yoshiro Takahashi. “Observation of Antiferromagnetic Correlations in an Ultracold SU(N) Hubbard Model” *Nature Physics [Featured in news]* **18**.1356–61 (2022).
- Ibarra-García-Padilla, Eduardo, Sohail Dasgupta, **Hao-Tian Wei**, Shintaro Taie, Yoshiro Takahashi, Richard T. Scalettar, and Kaden R. A. Hazzard. “Universal Thermodynamics of an SU(N) Fermi-Hubbard Model” *Physical Review A [Editors' Suggestion]* **104**.043316 (2021).
- Yuan Da Liao, Han Li, Zheng Yan, **Hao-Tian Wei**, Wei Li, Yang Qi, and Zi Yang Meng. “Phase Diagram of the Quantum Ising Model on a Triangular Lattice under External Field” *Physical Review B* **103**.104416 (2021).

CONFERENCE PRESENTATIONS & POSTERS

Presentations:

- “Fermionic programmable quantum simulators running variational algorithms”, *APS Division of AMO Physics Meeting* 2024.
- “Parameters and algorithms for programmable Fermi-Hubbard tweezer arrays for quantum simulations”, *Rice Quantum Group Meeting* 2023.
- “Effective Hubbard parameters for programmable tweezer arrays”, *APS March Meeting* 2023.
- “Hubbard parameters of optical tweezer arrays in arbitrary 1- and 2-D geometries”, *IUPAP Conference on Computational Physics* 2022.
- “Stroboscopic fermion tweezer arrays: heating and Hubbard parameters”, *APS Division of AMO Physics Meeting* 2022.

Posters:

- “A universal and efficient fermionic variational quantum simulator”, *ITAMP Winter School* 2025, *eQMA Spring School* 2025, *QuantIPS 2025*, and *APS Division of AMO Physics Meeting* 2025.
- “Programmable Hubbard model in tweezer arrays”, *RCQM Workshop* 2022 and *QuantIPS* 2023.

PROFESSIONAL SKILLS

Proficient Programming Languages: Python (NumPy/SciPy/PyTorch), C/C++, MATLAB, Mathematica & Julia
Algorithms: Variational Quantum Algorithms, Numerical Analysis, Optimization Algorithms, Monte Carlo Sampling, Large-scale Tensor Network Algorithms, matrix decomposition algorithms especially Arnoldi/Lanczos method, data correlation analysis
Expertise in Quantum Hardware: Neutral Atom, Ion Traps, Superconducting Qubits, Quantum Dots
Application Skills: High-performance scientific computing (HPC), cloud computing, code development workflow based on Git, LaTeX, Microsoft Office, data visualizations
GitHub Profile: github.com/htwei17

- Independently developed all-in-one Hubbard model parameter calculation package *HubbardTweezer*
- Contributed to 600+ starred Riemannian manifold optimization package *pymanopt*

Research Grants: Google Cloud research credits (maximum annual amount)
Languages: English (fluent), Mandarin (native)
Interests: Linguistics (phonetics and phonology), Saxophone

LEADERSHIP SERVICES

Physics & Astronomy Graduate student Association (PAGSA), Rice University, *Houston, TX* Jun 2022 – Jun 2024

Treasurer & Journal club coordinator

- Organized 10+ PAGSA journal clubs throughout one academic year with 150+ total attendance counts
- Proposed and managed spending of around $10,000 annual budget of PAGSA

- Organized around 20 faculty candidate meetings with PhD students and postgraduate researchers
- Assisted the departmental new PhD student recruitment open house & orientation events
- Initiated the American Physics Society (APS) Chapter at Rice University and served in its leadership board
- Mentored first-year PhD students on school life and advisor match

Academic Journal Referee Aug 2024 - Present

Physical Review Letters, PRX Quantum, Physical Review A & B, New Journal of Physics

Session Chair, APS March Meeting 2023 Mar 2023