Hong-Yi Wang



He/him/his
Ph.D. student in Quantum Science and Engineering
Princeton University
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RESEARCH INTEREST

- Quantum information and complexity perspectives of quantum matters
- Out-of-equilibrium quantum phenomena and non-Hermitian quantum systems
- Theoretical quantum error correction and fault-tolerant quantum information
- Scientific theory guiding deep learning

WORK EXPERIENCE

NTT Research—PHI Lab, Intern researcher Jun. 2025-Aug. 2025

Mentor: Liu Ziyin

- Research on physical theory of machine learning

EDUCATION

Princeton University, Ph.D. in Quantum Science and Engineering Sep. 2024-now
Advisors: Sarang Gopalakrishnan

- **GPA:** overall 4.00/4.00
- **Advanced Courses:** Implementations of quantum information, deep learning networks, stochastic calculus

MIT, Visiting Student Researcher Jun. 2025–Aug. 2025
Advisor: Isaac L. Chuang

Stanford University, Visiting Student Researcher Sep. 2023–May 2024
Advisor: Xiao-Liang Qi

Tsinghua University, Ph.D. in Physics (withdrawn) Sep. 2021–Jul. 2024
Advisor: Zhong Wang

- **GPA:** overall 3.84/4.00
- **Advanced Courses:** cold atom physics, topics in field theory and condensed matter, selected topics in computational physics, conformal field theory

Peking University, B.Sc. in Physics Sep. 2017–Jul. 2021

- **GPA:** overall 3.81/4.00; major 3.89/4.00
- **Advanced Courses:** solid state theory, general relativity, quantum gauge field theory, Lie group and Lie algebra, homology, characteristic classes, low-dimensional manifolds

The High School Affiliated to Renmin University of China Sep. 2011-Jul. 2017

- **Award:** Gold Medal in the Asian Physics Olympiad 2017

PUBLICATION LIST

- H.-Y. Wang, D. Luo, T. Poggio, I. L. Chuang and L. Ziyin. *International Conference on Learning Representations 2026, 115846-115871*
  "A universal compression theory for lottery ticket hypothesis and neural scaling laws"
- H. Tang, H.-Y. Wang, Z. Wang and X.-L. Qi. *SciPost Phys. 21, 054 (2026)*
  "Measurement induced scrambling and emergent symmetries in random circuits"
- H.-Y. Wang, M. Wang and L. Ziyin. *arXiv:2608.21752 (2026)*
  "Width-Independent Compressibility of Deep Neural Networks"
- H.-Y. Wang, H. Tang and X.-L. Qi. *arXiv:2601.12271 (2026)*
  "Measuring unconventional causal structures in monitored dynamics"
- H.-Y. Wang. *arXiv:2504.00108* (2025)
  "Relieving the post-selection problem by quantum singular value transformation"
- F. Song*, H.-Y. Wang* and Z. Wang. *arXiv:2410.23175* (2024)
  "Fragile non-Bloch spectrum and unconventional Green's function"
- H.-Y. Wang, F. Song and Z. Wang. *Phys. Rev. X 14, 021011* (2024)
  "Amoeba Formulation of Non-Bloch Band Theory in Arbitrary Dimensions"
- Y.-M. Hu, H.-Y. Wang, Z. Wang and F. Song. *Phys. Rev. Lett. 132, 050402* (2024)
  "Geometric Origin of Non-Bloch PT Symmetry Breaking"
- F. Song, H.-Y. Wang and Z. Wang. *A Festschrift in Honor of the C N Yang Centenary, pp. 299-311* (2022)
  "Non-Bloch PT Symmetry Breaking: Universal Threshold and Dimensional Surprise"

TALKS & PRESENTATIONS

- ICLR and GRaM workshop, 2026
  "A universal compression theory for lottery ticket hypothesis and neural scaling laws" (poster)
- APS March Meeting, 2025
  "Measuring unconventional causal influence in monitored dynamics"
- Quantum Information Processing, 2025
  "Relieving the post-selection problem by quantum singular value transformation"
- AI+Quantum at Aspen Center for Physics, 2025
  "Relieving the post-selection problem by quantum singular value transformation" (poster)
- APS March Meeting, 2024
  "Witness of non-Hermitian skin effect in arbitrary dimensions"
- Special seminar at Princeton Physics Department, 2023
  "Non-Bloch band theory in arbitrary dimensions: the stable and the fragile"
- Boulder Summer School on Non-Equilibrium Quantum Dynamics, 2023
  Amoeba formulation of non-Bloch band theory (poster)
- Gordon Research Conference 2023: "Topological and Correlated Matter".
  Amoeba formulation of non-Bloch band theory (poster)

PROFESSIONAL SKILLS

- **Theoretical Physics**

Contemporary quantum many-body models, quantum information and complexity, quantum algorithms, AdS/CFT correspondence, topological band theory and basics of topological order, etc.

- **Numerical Physics**

Tensor network algorithms, stabilizer formalism, etc.

- **Mathematics**

Algebraic topology, differential geometry, basic algebraic geometry, statistical models, etc.

- **Programming**

Python, Julia, MATLAB, Mathematica

- **Languages**

English (full professional), Chinese (native), Japanese (professional), German and Latin (intermediate)