ZHI-PING LIU

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Google Scholar ◇

EDUCATION

Nanjing University (NJU) *Sep. 2020 – Present*
Ph.D. in Quantum Information

Nanjing University (NJU) *Sep. 2016 – May 2020*
B.E. in Physics

RESEARCH INTERESTS

Quantum Physics, Quantum Information, Quantum Resource Theory, Machine Learning, Large Language Model

RESEARCH EXPERIENCE

Research Student Sep 2019 – Jun 2020
Supervisors: Prof. Sun Jian Laboratory of Solid State Microstructure, NJU

Developed algorithms and software that utilize graph theory to accelerate crystal structure search.

Ph.D. Candidate Sep 2020 – Present
Supervisors: Prof. Zeng-Bing Chen and Prof. Hua-Lei Yin NJU

- Working on quantum machine learning, including quantum neural networks and quantum federated learning.
- Applying deep learning, Bayesian optimization techniques to discrete-modulated continuous-variable quantum key distribution.

Research Intern Feb 2023 – July 2023
Supervisors: Dr. Xin Wang and Dr. Kun Fang Institute for Quantum Computing, Baidu Research.

- Working on quantum algorithm for thermal-state preparation, noisy simulation of protein folding quantum algorithms on NISQ devices mentored by Dr. Xin Wang.
- Participate in the development of the Python-based quantum machine learning platform Paddle Quantum 2.4.0. mentored by Dr. Xin Wang.
- Working on improving quantum cloud cumputing platform mentored by Dr. Xin Wang, finish 2 Patents.
- Participate in surveying applications of LLMs in quantum field mentored by Dr. Kun Fang.

Research Assistant July 2023 – Dec 2024
Supervisors: Prof. Xin Wang HKUST-GZ, AI thrust

- Working on quantum resource theory including magic, entanglement, thermodynamic and coherence.

PUBLICATIONS

- **Liu, Z.**†, Wang, K.†, Wang, X.. Quantum Fidelity Estimation in the Resource Theory of Nonstabilizerness (Under Review)
- **Liu, Z.**†, Zhu, C.†, Yin, H. L., and Wang, X. (2024). Quantum Coherence and Distinguishability: A Resource-Theoretic Perspective on Wave-Particle Duality. arXiv:2404.14323. (PRA accepted)
- **Liu, Z. P.**†, Cao, X. Y.†, Liu, H. W.†, Sun, X. R., Bao, Y., Lu, Y. S. and Chen, Z. B. (2025). Practical quantum federated learning and its experimental demonstration, arXiv:2501.12709.

- Zhu, C.†, **Liu, Z.**†, Zhu, C., and Wang, X. (2024). Limitations of classically simulable measurements for quantum state discrimination. Physical Review Letters, 133(1), 010202.
- **Liu, Z. P.**, Zhou, M. G., Liu, W. B., Li, C. L., Gu, J., Yin, H. L., and Chen, Z. B. (2022). Automated machine learning for secure key rate in discrete-modulated continuous-variable quantum key distribution. Optics Express, 30(9), 15024-15036.
- Zhu, C., Zhu, C., **Liu, Z.**, and Wang, X. (2025). Entanglement cost of discriminating quantum states under locality constraints. IEEE Transactions on Information Theory. (ISIT 2024)
- Zhu, C., Chen, Y. A., Shen, Z., **Liu, Z.**, Yu, Z., and Wang, X. (2024). Amortized Stabilizer Rényi Entropy of Quantum Dynamics. arXiv:2409.06659.
- Mo, Y., Zhu, C., **Liu, Z.**, Jing, M., and Wang, X. (2024). Enhancement of nonstabilizerness within indefinite causal order. Physical Review A, 109(6), 062428.
- Zhou, M. G.†, **Liu, Z. P.**†, Yin, H. L.†, Li, C. L., Xu, T. K., and Chen, Z. B. (2023). Quantum neural network for quantum neural computing. Research, 6, 0134.

TALKS

In the following list, (∗) indicates delivery by my co-author.

- **AQIS 2024** Quantum Coherence and Distinguishability: A Resource-Theoretic Perspective on Wave-Particle Duality. *Hokkaido University, Sapporo, Japan Summer 2024*
- **ISIT 2024*** Entanglement cost of discriminating quantum states under locality constraints. IEEE Transactions on Information Theory. *Athens, Greece July 2024*

PATENTS

- H. Yin, M. Zhou, **Z. Liu**, Y. Fu, T. Xu, Z. Chen, A Soft Quantum Neural Network System and Pattern Recognition Method, CN114519430, under review, 2022.
- L. Li, **Z. Liu**, X. Liu, L. Zhang, Z. Wang, X, Wang, Quantum Cloud Computing: Processing Methods, Devices, Systems, and Media Storage, CN116974758A, under review, 2023.
- L. Li, **Z. Liu**, X. Liu, L. Zhang, Z. Wang, X, Wang, Quantum Cloud Computing: Processing Methods, Devices, Systems, and Media Storage, CN117009075A, under review, 2023.

HONOR

- Third-class People's Scholarship 2018, NJU
- First-class People's Scholarship 2019, NJU
- Outstanding Graduate 2020, NJU
- Outstanding Postgraduate Student 2021, NJU
- First-class Doctoral Talent Scholarship 2022, NJU
- Two Mountains Excellence Scholarship 2024, NJU