

Xinzhao Wang

Education

- 2022–present **Ph.D. Candidate in Computer Science**, *School of Computer Science, Peking University*, Beijing, China
Advisor: Tongyang Li
- 2018–2022 **B.S. in Computer Science and Technology, Summa Cum Laude**, *School of Electronics Engineering and Computer Science, Peking University*, Beijing, China

Research Interests

Quantum algorithms, Hamiltonian and Lindbladian simulation, quantum information, and computational complexity.

Research Visits

- Jul. 2024–
Feb. 2025 **Visiting Scholar**, *University of California, Berkeley*, Berkeley, CA, USA
Host: Lin Lin

Publications

* Equal contribution; † Authors listed alphabetically by surname.

- † Ji, Z., Li, T., Shao, C., **Wang, X.**, & Zhang, Y. (2026). DQC1-completeness of normalized trace estimation for functions of log-local Hamiltonians. *67th IEEE Symposium on Foundations of Computer Science (FOCS 2026)*, to appear. arXiv:2604.01519
- † Chen, K., Gao, M., Li, T., Wang, Q., & **Wang, X.** (2026). Quantum Multi-Level Estimation of Functionals of Discrete Distributions. *Proceedings of the 53rd International Colloquium on Automata, Languages, and Programming (ICALP 2026)*, LIPIcs 374, 58:1–58:23. doi:10.4230/LIPIcs.ICALP.2026.58
- † Li, T., **Wang, X.**, & Zhang, Y. (2025). Near-Optimal Quantum Algorithms for Computing (Coarse) Correlated Equilibria of General-Sum Games. *39th Conference on Neural Information Processing Systems (NeurIPS 2025)*. arXiv:2510.16782
- Zhang, Y.*, Zhou, S.*, **Wang, X.***, Wang, Z., Yang, Z., Yang, R., Xue, Y., & Li, T. (2025). Efficient classical sampling from Gaussian boson sampling distributions on unweighted graphs. *Nature Communications*, 16, 9335. doi:10.1038/s41467-025-64442-7
- † Chen, X., Hazan, E., Li, T., Lu, Z., **Wang, X.**, & Yang, R. (2024). Adaptive online learning of quantum states. *Quantum*, 8, 1471. doi:10.22331/q-2024-09-12-1471
- **Wang, X.**, Zhang, S., & Li, T. (2024). A quantum algorithm framework for discrete probability distributions with applications to Rényi entropy estimation. *IEEE Transactions on Information Theory*, 70(5), 3399–3426. doi:10.1109/TIT.2024.3382037

- [†] Hu, J., Li, T., **Wang, X.**, Xue, Y., Zhang, C., & Zhong, H. (2024). Quantum non-identical mean estimation: Efficient algorithms and fundamental limits. *Proceedings of the 19th Conference on the Theory of Quantum Computation, Communication and Cryptography (TQC 2024)*, 9:1–9:21. doi:10.4230/LIPIcs.TQC.2024.9

Preprints

- [†] Chen, B., Gao, M., **Wang, X.**, & Zhou, S. (2026). Optimal Query Complexity for Ground-State Preparation. arXiv:2609.35668
- [†] Chen, B., Gao, M., **Wang, X.**, & Zhou, S. (2026). Query-Optimal and Gate-Efficient Lindbladian Simulation. arXiv:2609.18757
- Zhou, S.^{*}, **Wang, X.**^{*}, Zhang, R.^{*}, Wang, X.-Y., Zheng, Y.-C., Li, T., & Zhang, S. (2026). Joint Mitigation of Algorithmic and Physical Errors in Noisy Hamiltonian Simulation. arXiv:2609.11508
- [†] Chen, B., Gao, M., Ji, Z., Li, T., **Wang, X.**, & Zhou, S. (2026). Gate-Efficient Implementation of the Query-Optimal Time-Dependent Hamiltonian Simulation. arXiv:2608.30629
- [†] Chen, B., Gao, M., **Wang, X.**, & Zhou, S. (2026). Time-Dependent Hamiltonian Simulation with Optimal Query Complexity. arXiv:2608.06094
- [†] Li, T., Ou, F., **Wang, X.**, Yao, P., Yuan, P., & Zhang, S. (2026). Optimal T Counts under Sparsity: from QROM to State Preparation and Block Encoding. arXiv:2607.28260
- **Wang, X.**, Zhou, S., Wang, Z., Zeng, P., Sun, J., Zhao, Q., Gur, T., & Li, T. (2026). Trotter error compensation with polylogarithmic precision and nested-commutator scaling without ancillas. arXiv:2607.11856
- **Wang, X.**^{*}, Zhou, S.^{*}, Wang, X.-Y., Zheng, Y.-C., Zhang, S., & Li, T. (2026). Lindbladian Simulation with Commutator Bounds. arXiv:2603.28602
- **Wang, X.**^{*}, Zhang, Y.^{*}, Hazra, S., Li, T., Shao, C., & Chakraborty, S. (2025). Randomized Quantum Singular Value Transformation. arXiv:2510.06851
- [†] Gong, W., Li, T., **Wang, X.**, & Zhang, Z. (2025). Instance-Optimal Matrix Multiplicative Weight Update and Its Quantum Applications. arXiv:2509.08911
- [†] Chakraborty, S., Hazra, S., Li, T., Shao, C., **Wang, X.**, & Zhang, Y. (2025). Quantum singular value transformation without block encodings: Near-optimal complexity with minimal ancilla. arXiv:2504.02385
- Sun, J.^{*}, Zhou, B.^{*}, Xu, J.^{*}, Yao, Y.^{*}, Du, Z.^{*}, Zhang, Z.^{*}, Gu, Y.^{*}, Huang, J., Zhou, S., Wang, Z., Yosifov, A., Dong, W., Huang, Y., Serrano, D., **Wang, X.**, Feng, T., Sadugol, S., Yu, W., You, Z., Qin, D., Zhang, X.-M., Wu, Y., Iyer, A., Zhou, Y., Li, T., Li, Y., Ma, X., Zhao, Q., Zeng, P., Zhang, P., & Yuan, X. (2026). Quantum-classical crossover in fault-tolerant quantum dynamics simulation. arXiv:2607.16116

Selected Talks

Jul. 9, 2026 **Quantum Multi-Level Estimation of Functionals of Discrete Distributions, ICALP 2026**, Royal Holloway, University of London
Contributed talk

- Apr. 29, 2026 **Quantum Singular Value Transformation without Block Encodings**, *Quantum Computing Seminar*, University of Cambridge, Cambridge, UK
Invited seminar
- Apr. 22, 2026 **Quantum Singular Value Transformation without Block Encodings**, *QCTiP 2026*, Mathematical Institute, University of Oxford
Contributed talk
- Nov. 7, 2025 **Randomized Quantum Singular Value Transformation**, *Quantum Research Center, Technology Innovation Institute*, Online
Invited research talk
- Oct. 29, 2025 **Quantum Singular Value Transformation without Block Encodings**, *CQT Computer Science Seminar*, Centre for Quantum Technologies, National University of Singapore, Online
Invited seminar

Selected Awards and Honors

- Ubiquant Scholarship, Peking University (2026)
- John Hopcroft Scholarship, Peking University (2020, 2021)
- Gold Medal, Chinese Physics Olympiad (2017)

Teaching

- Fall 2023 **Algorithm Analysis and Complexity Theory**, *Teaching Assistant*, Peking University
- Fall 2022 **Introduction to Quantum Computing**, *Teaching Assistant*, Peking University
- Fall 2020 **Introduction to Computer Systems**, *Teaching Assistant*, Peking University

Service

- Reviewer for journals including *Nature Physics*, *npj Quantum Information*, *Quantum*, *Physical Review A*, and *computational complexity*.
- Reviewer for conferences including STOC, SODA, QIP, TQC, and AQIS.