

Weiyuan Gong

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Education

- Aug 2019 **Bachelor of engineering**, *Institute for Interdisciplinary Information Sciences (Yao Class)*,
–June 2023 Tsinghua University, Beijing, CHN.
- Thesis: *Pauli Channel Estimation with Bounded Quantum Memory*, Outstanding diploma thesis.
 - Thesis advisor: Dong-Ling Deng and Sitan Chen.
- Sept 2023 **Graduate student**, *John A. Paulson School of Engineering and Applied Sciences*, Harvard
–Present University, Cambridge, MA.
- Advisor: Sitan Chen.

Working Experiences

- June 2023 **Visiting student**, Quantum Laboratory, DAMO Academy, Alibaba, Host: Dr. Jianxin
–Aug 2023 Chen.
- Jan 2020 **Member**, Center for Quantum Information, Institute for Interdisciplinary Information
–June 2023 Sciences, Tsinghua University, PI: Prof. Dong-Ling Deng.
- May 2022 **Research Internship**, Center on Frontiers of Computing Studies, Peking University, PI:
–Dec 2022 Prof. Tongyang Li.
- Dec 2021 **Research Internship (Remote)**, Department of Computer Science, University of Texas
–Sept 2022 at Austin, PI: Prof. Scott Aaronson.
- Apr 2021 **Research Internship (Remote)**, QuICS, NIST/ University of Maryland, College Park,
–Aug 2023 PI: Prof. Alexey V. Gorshkov.

Preprints & Manuscripts (alphabetic †, contribution *)

- Zhanhuan Liu*, Weiyuan Gong*, Zhenyu Du*, Zhenyu Cai, “Exponential Separations between Quantum Learning with and without Purification”, [arxiv:2410.17718](#), 2024.
- Weiyuan Gong†, Jonas Haferkamp, Qi Ye, and Zhihan Zhang, “On the sample complexity of purity and inner product estimation”, [arxiv:2410.12712](#), 2024.
- Sitan Chen, Weiyuan Gong†, Qi Ye, and Zhihan Zhang, “Stabilizer bootstrapping: A recipe for efficient agnostic tomography and magic estimation”, [arxiv:2408.06967](#), 2024.
- Sitan Chen, Weiyuan Gong†, “Efficient Pauli channel estimation with logarithmic quantum memory”, [arxiv:2309.14326](#).
- Weiyuan Gong*, Yaroslav Kharkov, Minh C. Tran, Przemyslaw Bienias, and Alexey V. Gorshkov, “Improved Digital Quantum Simulation by Non-Unitary Channels”, [arxiv:2307.13028](#), 2023.
- Weiyuan Gong*, Chenyi Zhang* and Tongyang Li, “Robustness of Quantum Algorithms for Nonconvex Optimization”, [arxiv:2212.02548](#), 2022.

Publications (alphabetic †, contribution *)

- Sitan Chen, Weiyuan Gong†, and Qi Ye, “Optimal tradeoffs for estimating Pauli observables”, in Proceedings of 65th IEEE Symposium on Foundations of Computer Science (FOCS 2024), [arxiv:2404.19105](#), 2024.
- Zhihan Zhang*, Weiyuan Gong*, Weikang Li, and Dong-Ling Deng, “Quantum-classical separations in shallow-circuit-based learning with and without noise”, *Commun. Phys.* **7**, [290](#), 2024.

- Weiyuan Gong*, Shuo Zhou*, Tongyang Li, “Complexity of Digital Quantum Simulation in the Low-Energy Subspace: Applications and a Lower Bound”, *Quantum* **8**, 1409, 2024.
- Jianxin Chen, Dawei Ding, Weiyuan Gong[†], Cupjin Huang, Qi Ye, “One Gate Scheme to Rule Them All: Introducing a Complex Yet Reduced Instruction Set for Quantum Computing”, in *Proceedings of the 29th ACM International Conference on Architectural Support for Programming Languages and Operating Systems (ASPLOS 2024)*, 2024.
- Weiyuan Gong*, Dong Yuan, Weikang Li, and Dong-Ling Deng, “Enhancing Quantum Adversarial Robustness by Randomized Encodings”, *Phys. Rev. Res.* **6**, 023020, 2024. See also: *APS March Meeting 2023*.
- Weiyuan Gong* and Scott Aaronson, “Learning Distributions over Quantum Measurement Outcomes”, *Proceedings of the 40th International Conference on Machine Learning (ICML 2023)*, *PMLR 202: 11598-11613*, 2023.
- Weiyuan Gong*, Si Jiang* and Dong-Ling Deng, “No-go theorem and a universal decomposition strategy for quantum channel compilation”, *Phys. Rev. Res.* **5**, 013060, 2023.
- Weiyuan Gong* and Dong-Ling Deng, “Universal Adversarial Examples and Perturbations for Quantum Classifiers” *National Science Review, Volume 9, Issue 6, nwab130*, 2022.

Talks

- *Optimal tradeoffs for estimating Pauli observables*, 65th IEEE Symposium on Foundations of Computer Science (FOCS 2024), Chicago IL, Oct 2024
- *Toward optimal bounds for estimating Pauli observables and purity*, QSE retreat, Harvard Quantum Initiative, Harvard University, Boston MA, Sept 2024
- *Smooth and sharp complexity transitions in learning with bounded quantum memory*, QuICS special seminar, QuICS, University of Maryland at College Park, College Park MD, Mar 2024.
- *Smooth and sharp complexity transitions in learning with bounded quantum memory*, Department of Computer Science, University of Texas at Austin, Austin TX, Feb 2024.
- *Efficient Pauli Channel Estimation with Logarithmic Quantum Memory*, IIIS, Tsinghua University, Beijing, Dec 2023.
- *On the Quantum-classical Separation in Shallow-circuit-based Machine Learning*, Quantum Laboratory, DAMO Academy, Alibaba, Hangzhou, June 2023.
- *Enhancing Quantum Adversarial Robustness via Randomized Encodings*, APS March Meeting, March 2023.
- *On the Universal Decomposition Strategy for Quantum Channel Compilation*, invited talk at Quantum Seminar, Peking University, Beijing, March 2023.
- *Learning Distributions over Quantum Measurement Outcomes*, (virtual) invited talk at Quantum Research Seminars Toronto (QRST), the Matter Lab at the University of Toronto & Zapata Computing, October 2022.
- *Learning Distributions over Quantum Measurement Outcomes*, invited talk at Yao Seminar, IIIS at Tsinghua University, October 2022.

Academic Service & Teaching

- Referee for conferences: STOC (2024), QIP (2024, 2025), ITCS (2025), QSim (2024)
- Referee for journals: PRX Quantum, Quantum, Physical Review A, Communications in Mathematical Physics, npj Quantum Information, ACM Transactions on Quantum Computing, TheoretiCS
- Teaching fellow, CS 2243: Algorithms for Data Science, SEAS, Harvard University, 2024 Fall.
- Teaching assistant, Abstract Algebra, IIIS, Tsinghua University, 2023 Spring.

Honor & Awards

June 2023 **Outstanding Diploma Thesis**, Tsinghua University.

Nov 2022 **Academic Excellence Scholarship**, Tsinghua University.

Nov 2022 **Outstanding Scholarship for Scientific and Technological Innovation**, Tsinghua University.

Nov 2020 **Outstanding Scholarship for Social Works**, Tsinghua University.

Nov 2019 **Freshman Scholarship**, *Second Prize*, Tsinghua University.

Nov 2017 **First Prize (Gold Medal) in 34-th CPhO. Candidate for China representative of 49-th IPhO.**, Chinese Physical Society.