

## Research Interests

- Quantum information theory, Quantum computation, Quantum machine learning

## Education

- 09/2023 - **The Hong Kong University of Science and Technology (Guangzhou)**,  
present *Ph.D in Artificial Intelligence*,  
Supervisor: Xin Wang.
- 09/2020 - **University of Chinese Academy of Sciences**,  
06/2023 *M.S in Cyber security*,  
Supervisor: Zhenyu Huang.
- 01/2019 - **Oklahoma State University**,  
06/2019 *Visiting student*.
- 09/2016 - **China Agricultural University**,  
06/2020 *B.S in Applied Mathematics*.

## Research Experience

- 07/2021 – **Research Intern**, *Institute for Quantum Computing, Baidu Research*.
- 04/2023 ◦ Working on quantum information and quantum machine learning supervised by Xin Wang.
- Research developer for Paddle Quantum. Developing quantum information tools, and classical shadows tools.
- Writing six patents in areas of parameter estimation of quantum channels, Hamiltonian simulation.
- 06/2021 – **Research Student**, *Institute of Information Engineering, Chinese Academy of Sciences*.
- 06/2023 ◦ Working on quantum circuits optimization supervised by Zhenyu Huang.
- Focusing on the quantum implementation of symmetric ciphers.

## Honors

- 12/2017 **Arawana Scholarship**, CAU.  
◦ Ranked TOP 1% in College of Science, China Agricultural University.
- 12/2017 **The Second-class Scholarship**, CAU.
- 12/2017 **Merit Student**, CAU.
- 09/2017 **The Second Prize Award**, *Undergraduate Mathematical Contest in Modeling at CAU*.
- 08/2017 **The Third Prize Award**, *China Undergraduate Physics Tournament (CUPT) at HIT*.
- 03/2017 **The First Prize Award**, *The 8th English Debating Championship at CAU*.

## Publications

(\*) indicates a co-first author.

- C. Zhu\*, Y. Mo\*, Y. A. Chen, X. Wang, *Reversing Unknown Quantum Processes via Virtual*

Combs: for Channels with Limited Information, Physical Review Letters 133.3 (2024): 030801.

- C. Zhu<sup>\*</sup>, Z. Liu<sup>\*</sup>, C. Zhu, X. Wang, *Limitations of classically-simulable measurements for quantum state discrimination*, Physical Review Letters 133.1 (2024): 010202.
- C. Zhu<sup>\*</sup>, C. Zhu<sup>\*</sup>, and X. Wang, *Estimate distillable entanglement and quantum capacity by squeezing useless entanglement*, IEEE Journal on Selected Areas in Communications (2024).
- C. Zhu<sup>\*</sup>, C. Zhu<sup>\*</sup>, Z. Liu, X. Wang, *Entanglement cost of discriminating quantum states under locality constraints*, 2024 IEEE International Symposium on Information Theory (ISIT).
- H. K. Zhang<sup>\*</sup>, C. Zhu<sup>\*</sup>, G. Liu, and X. Wang. *Exponential Hardness of Optimization from the Locality in Quantum Neural Networks*, Thirty-Eighth AAAI Conference on Artificial Intelligence (AAAI 2024).
- Y. Mo, C. Zhu, Z. Liu, M. Jing, X. Wang, *Enhancement of non-Stabilizerness within Indefinite Causal Order*, Physical Review A 109.6 (2024): 062428.
- H. Yao, X. Liu, C. Zhu, X. Wang, *Optimal unilocal virtual quantum broadcasting*, Physical Review A 110.1 (2024): 012458.
- C. Zhu and Z. Huang. *Optimizing the depth of quantum implementations of linear layers*, International Conference on Information Security and Cryptology. Springer, Cham, 2023.

## Preprints

(\*) indicates a co-first author.

- C. Zhu, X. Zhao, X. Wang, *Bidirectional classical communication cost of a bipartite quantum channel assisted by non-signalling correlations*, arXiv:2408.02506 (2024).
- Z. Liu<sup>\*</sup>, C. Zhu<sup>\*</sup>, H. Yin, X. Wang, *Quantum Coherence and Distinguishability: A Resource-Theoretic Perspective on Wave-Particle Duality*, arXiv:2404.14323 (2024).
- M. Jing, C. Zhu, and Xin Wang. *Circuit Knitting Faces Exponential Sampling Overhead Scaling Bounded by Entanglement Cost*, arXiv:2404.03619 (2024).
- Y. A. Chen<sup>\*</sup>, C. Zhu<sup>\*</sup>, K. He, M. Jing, X. Wang, *Virtual Quantum Markov Chains*, arXiv:2312.02031 (2023).
- X. Wang, M. Jing, and C. Zhu, *Computable and Faithful Lower Bound for Entanglement Cost*, arXiv:2311.10649 (2023).

## Refereed conference talks

(†) indicates a talk delivered by my co-author.

- 09/2024 **TQC 2024**<sup>†</sup>, *Reversing Unknown Quantum Processes via Virtual Combs*, Okinawa, Japan.
- 08/2024 **AQIS 2024**<sup>†</sup>, *Quantum Coherence and Distinguishability: A Resource-Theoretic Perspective on Wave-Particle Duality*, Sapporo, Japan.
- 07/2024 **ISIT 2024**<sup>†</sup>, *Entanglement cost of discriminating quantum states under locality constraints*, Athens, Greece.
- 04/2024 **QCTiP 2024**, *Reversing Unknown Quantum Processes via Virtual Combs*, University of Edinburgh, Scotland.

- 09/2023 **AQIS 2023<sup>†</sup>**, *Estimate distillable entanglement and quantum capacity by squeezing useless entanglement*, Korea.
- 07/2023 **BIID 2023**, *Estimate distillable entanglement and quantum capacity by squeezing useless entanglement*, University of Tübingen, Germany.
- 12/2022 **Inscrypt 2022**, *Optimizing the depth of quantum implementations of linear layers*, Beijing, China.

## Patents

- 07/2023 ○ X. Wang, G. Fan, R. Chen, C. Zhu, Quantum data measurement method, system, electronic equipment and media, CN114021728, Granted, 2023.
- 03/2023 ○ X. Wang, C. Zhu, R. Chen, G. Fan, Quantum channel noise parameter estimation method and device, electronic equipment and media, CN114239840, under review, 2023.
- 01/2023 ○ X. Wang, C. Zhu, Information processing method and device based on quantum system, CN115577791, under review, 2023.
- 01/2023 ○ C. Zhu, X. Wang, Information processing method and device based on quantum system, CN115577792, under review, 2023.

## Professional service

- Journal Referee Quantum, npj Quantum Information, Nature Communication (subreviewer)
- Conference Referee 24th Asian Quantum Information Science Conference (AQIS2024), 23rd Asian Quantum Information Science Conference (AQIS2023), 19th Theory of Quantum Computation, Communication and Cryptography (TQC2024), Quantum Computing Theory in Practice 2024, Quantum Techniques in Machine Learning 2023, IEEE International Conference on Quantum Computing and Engineering (QCE)

## Extracurricular Activities

- 07/2019 – Being a volunteer teacher in Qinghai Province, China.
- 08/2019 ○ Teaching left-behind children in primary school fundamental science in Haidong City, Qinghai Province.
- 07/2018 – Being a volunteer teacher in Ningxia Province, China.
- 08/2018 ○ Teaching left-behind children in primary school fundamental science in Guyuan City, Ningxia Province.
- Interests ○ Basketball, Soccer, Swimming, Piano, Guitar

## References

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