
About

I am a postdoctoral researcher at Centre for Quantum Information and Communication (QuIC) at the Université libre de Bruxelles. I received my PhD degree at the University of Hong Kong, supervised by Giulio Chiribella. My research interests lie in the intersection of quantum information and quantum foundations.

Professional Experience

- 2024–now **Postdoc**, *Université libre de Bruxelles*, Brussels
Supervised by Ognian Oreshkov
- 2023–2024 **Postdoc**, *The University of Hong Kong*, Hong Kong
Supervised by Giulio Chiribella
- 2023–2023 **Research assistant**, *The University of Hong Kong*, Hong Kong
Supervised by Giulio Chiribella

Education

- 2019–2023 **PhD**, *The University of Hong Kong*, Hong Kong
Supervised by Giulio Chiribella
- 2015–2019 **BEng in Computer Science**, *Zhejiang University*, Hangzhou
Chu Kochen Honors degree (400 out of 7000 students)

Publications

- [1] Giulio Chiribella and Zixuan Liu. Quantum operations with indefinite time direction. *Communications Physics*, 5(1):1–8, 2022.
- [2] Yu Guo, Zixuan Liu, Hao Tang, Xiao-Min Hu, Bi-Heng Liu, Yun-Feng Huang, Chuan-Feng Li, Guang-Can Guo, and Giulio Chiribella. Experimental demonstration of input-output indefiniteness in a single quantum device. *Physical Review Letters*, 132(16):160201, 2024.
- [3] Zixuan Liu and Giulio Chiribella. Tsirelson bounds for quantum correlations with indefinite causal order. *Nature Communications*, 16(1):3314, 2025.
- [4] Zixuan Liu and Ognian Oreshkov. Parity erasure: a foundational principle for indefinite causal order. *arXiv preprint arXiv:2512.08635*, 2025.
- [5] Zixuan Liu, Ming Yang, and Giulio Chiribella. Quantum communication through devices with indefinite input-output direction. *New Journal of Physics*, 25(4):043017, 2023.

Expertise

- Quantum information theory
- Operational probabilistic theories
- Quantum resource theories
- Semidefinite programming

Teaching

- 2025-26 Teaching assistant for the course INFO-H514 Quantum Information and Computation (Exercise Sessions), at Ecole polytechnique de Bruxelles, Université libre de Bruxelles (ULB), Brussels.
- 2024-25 Teaching assistant for the course INFO-H422 Theory of Information coding computing and complexity (Exercise Sessions, Information theory), at Ecole polytechnique de Bruxelles, Université libre de Bruxelles (ULB), Brussels.
- 2021-23 Teaching assistant for the course COMP3316 Quantum information, at Department of Computer Science, the University of Hong Kong, Hong Kong.
- 2019-21 Teaching assistant for the course COMP2121 Discrete mathematics, at Department of Computer Science, the University of Hong Kong, Hong Kong.

Presentations

- 2025 25th Asian Quantum Information Science Conference, Hong Kong, China
Poster presentation on "Information causality for indefinite causal order".
- 2025 The 22nd International Conference on Quantum Physics and Logic (QPL 2025), Varna, Bulgaria
Poster presentation on "Information causality for indefinite causal order".
- 2024 Causalworlds, Perimeter Institute for Theoretical Physics
Contributed talk on "Tsirelson bounds for quantum correlations with indefinite causal order".
- 2024 24th Asian Quantum Information Science Conference, Sapporo, Japan
Contributed talk on "Tsirelson bounds for quantum correlations with indefinite causal order".
- 2024 The sixteenth Biennial IQSA conference quantum structures 2024, Brussels, Belgium
Contributed talk on "Tsirelson bounds for quantum correlations with indefinite causal order".
- 2024 The 21st International Conference on Quantum Physics and Logic (QPL 2024), Buenos Aires, Argentina
Contributed talk on "Tsirelson bounds for quantum correlations with indefinite causal order".
- 2023 26th Annual Conference on Quantum Information Processing, Ghent, Belgium
Poster presentation on "Quantum operations with indefinite time direction".