Ge Bai

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About

My main research focus is quantum information theory, with topics including quantum causal inference, quantum data compression, hypothesis testing and benchmarks. I also have interest in quantum machine learning and circuit design.

Google scholar link: https://scholar.google.com/citations?user=usrPjHoAAAAJ

Expertise

- Quantum information theory
- Quantum causal inference
- Higher-order quantum operations
- Tensor networks
- Quantum benchmarks
- Classical machine learning and algorithms

Awards

Dec. 2021 Winner of 2021 Hong Kong Institution of Science Young Scientist Award

Positions

Feb. 2023 to now Post-doctoral fellow, Centre for Quantum Technologies, National University of Singapore.

Mar. 2022 to Jan. 2023 Post-doctoral fellow, Department of Computer Science, the University of Hong Kong.

Apr. 2021 to Feb. 2022 Research assistant, Department of Computer Science, the University of Hong Kong.

Education

Sep. 2016 to Mar. 2021 PhD, Department of Computer Science, the University of Hong Kong. Supervised by Prof. Giulio Chiribella.

Aug. 2012 to Jul. 2016 BEng in Yao Class, Institute for Interdisciplinary Information Sciences (IIIS), Tsinghua University. Yao Class is a pilot class on computer science directed by the respected Turing Award winner, Andrew Yao.

Publications

Ge Bai, Iman Marvian, "Synthesis of Energy-Conserving Quantum Circuits with XY interaction." *Quantum Science and Technology* 9, 045049 (2024).

Ya-Dong Wu, Yan Zhu, **Ge Bai**, Yuexuan Wang, Giulio Chiribella, "Quantum Similarity Testing with Convolutional Neural Networks." *Physical Review Letters* 130, 210601 (2023).

Fei Shi, **Ge Bai**, Xiande Zhang, Qi Zhao, Giulio Chiribella, "Graph-theoretic characterization of unextendible product bases." *Physical Review Research* 5, 033144 (2023).

Yan Zhu, **Ge Bai**, Yuexuan Wang, Tongyang Li, Giulio Chiribella. "Quantum autoencoders for communication-efficient quantum cloud computing." Quantum Machine Intelligence, 5(2):27, (2023).

Ge Bai, Ya-Dong Wu, Yan Zhu, Masahito Hayashi, Giulio Chiribella. "Quantum causal unravelling." *npj Quantum Information* 8.69 (2022).

Yan Zhu, Ya-Dong Wu, **Ge Bai**, Yuexuan Wang, Giulio Chiribella. "Flexible learning of quantum states with generative query neural networks." *Nature Communications* 13, 6222 (2022).

Ya-Dong Wu, **Ge Bai**, Giulio Chiribella, Nana Liu. "Efficient verification of continuous-variable quantum states and devices without assuming identical and independent preparation." *Physical Review Letters* 126.24 (2021): 240503

Ge Bai, Yuxiang Yang, Giulio Chiribella. "Quantum compression of tensor network states." *New Journal of Physics* (2020): 043015.

Ge Bai, Giulio Chiribella. "Test one to test many: a unified approach to quantum benchmarks." *Physical Review Letters* 120.15 (2018): 150502. **Editors' Suggestion.**

Yuxiang Yang, **Ge Bai**, Giulio Chiribella, Masahito Hayashi, "Compression for quantum population coding." *IEEE Transactions on Information Theory* (2018).

Xiao Yuan, **Ge Bai**, Tianyi Peng, Xiongfeng Ma. "Quantum uncertainty relation using coherence." *Physical Review A* 96.3 (2017): 032313.

Ge Bai, Ivan Damgård, Claudio Orlandi, Yu Xia, "Non-interactive verifiable secret sharing for monotone circuits", *International Conference on Cryptology in Africa.* Springer International Publishing, 2016.

Ge Bai, Hansi Mou, Yinhong Hou, Yongqiang Lyu, Weikang Yang, "Android power management and analyses of power consumption in an Android smartphone", *2013 IEEE International Conference on High Performance Computing and Communications & 2013 IEEE International Conference on Embedded and Ubiquitous Computing*. IEEE, 2013.

Preprints

Ge Bai, Francesco Buscemi, Valerio Scarani, "Quantum Bayes' rule and Petz transpose map from the minimal change principle." arXiv:2410.00319 (2024).

Ge Bai, "Bayesian retrodiction of quantum supermaps." arXiv:2408.07885 (2024).

Ge Bai, Dominik Šafránek, Joseph Schindler, Francesco Buscemi, Valerio Scarani, "Observational Entropy with General Quantum Priors." arXiv:2308.08763 (2023).

Teaching Experience

Sep. 2016 to Mar. 2021 I have been working as a teaching assistant for four courses in computer science, including programming basics (C++ and Python), programming technology and tools, and discrete mathematics.