

Ji Guan

PERSONAL INFORMATION	<p>Date of Birth: February 1, 1992 Skype: scott-ji State Key Laboratory of Computer Science, Institute of Software, Chinese Academy of Sciences 4# South Fourth Street, Zhong Guan Cun, Beijing 100190 P.R. China</p>	<p>Nationality: Chinese guanji1992@gmail.com</p>
RESEARCH INTERESTS	<p>Interplay between Quantum Computing and Formal Method: model checking quantum systems, trustworthy quantum machine learning, quantum algorithm and quantum differential privacy.</p>	
EDUCATION	<p>Centre for Quantum Software and Information, University of Technology Sydney(UTS), Sydney, Australia</p> <p>Ph.D., Quantum Computing, August 2018</p> <ul style="list-style-type: none">• Thesis Topic: <i>Decomposition of Quantum Markov Chains and Its Applications</i>• Supervisors: Professor Mingsheng Ying and Professor Yuan Feng <p>Sichuan University, Sichuan, China</p> <p>B.S., Computational Mathematics, June 2014</p>	
WORKING EXPERIENCE	<ul style="list-style-type: none">• October 2022 to now: Research Associate Professor, State Key Laboratory of Computer Science, Institute of Software, Chinese Academy of Sciences• September 2018 to September 2022: Postdoctoral Fellow, Assistant Researcher, supervised by Professor Mingsheng Ying, State Key Laboratory of Computer Science, Institute of Software, Chinese Academy of Sciences	
REFEREED CONFERENCE PUBLICATIONS	<ol style="list-style-type: none">1. Lin, Y., Guan, J.*, Fang, W., Ying, M. and Su, Z., 2024, September. A Robustness Verification Tool for Quantum Machine Learning Models. In International Symposium on Formal Methods (FM 2024) (pp. 403-421). Cham: Springer Nature Switzerland.2. Guan, J., Feng, Y., Turrini, A. and Ying, M., 2024, July. Measurement-based verification of quantum markov chains. In International Conference on Computer Aided Verification (CAV 2024) (pp. 533-554). Cham: Springer Nature Switzerland.3. Huang, M., Guan, J.*, Fang, W. and Ying, M., 2024, March. Approximation Algorithm for Noisy Quantum Circuit Simulation. In 2024 Design, Automation & Test in Europe Conference & Exhibition (DATE 2024) (pp. 1-6). IEEE.4. Guan, J., Fang, W., Huang, M. and Ying, M., 2023, November. Detecting violations of differential privacy for quantum algorithms. In Proceedings of the 2023 ACM SIGSAC Conference on Computer and Communications Security (CCS 2023) (pp. 2277-2291).5. Guan J., Fang, W. and Ying, M., 2022. Verifying Fairness in Quantum Machine Learning. In International Conference on Computer Aided Verification (CAV 2022) (pp. 408-429). Springer, Cham. (The only quantum paper in CAV 2022) [Talk Video]	

6. **Guan, J.**, Yu, N. (2022). A Probabilistic Logic for Verifying Continuous-time Markov Chains. In: Fisman, D., Rosu, G. (eds) Tools and Algorithms for the Construction and Analysis of Systems (**TACAS 2022**). Lecture Notes in Computer Science, vol 13244. Springer, Cham.
7. **Guan J.**, Fang W., Ying M. (2021) Robustness Verification of Quantum Classifiers. In: Silva A., Leino K.R.M. (eds) Computer Aided Verification (**CAV 2021**) Lecture Notes in Computer Science, vol 12759. Springer, Cham. (**The only quantum paper in CAV 2021**) [[Talk Video](#)]
8. Xu M., Mei J., **Guan J.**, and Yu N. “Model Checking Quantum Continuous-Time Markov Chains,” in 32nd International Conference on Concurrency Theory (**CONCUR 2021**), ser. Leibniz International Proceedings in Informatics (LIPIcs), S. Haddad and D. Varacca, Eds., vol. 203. Dagstuhl, Germany: Schloss Dagstuhl – Leibniz-Zentrum für Informatik, 2021, pp. 13:1-13:17. (**The only quantum paper in CONCUR 2021**)
9. Bei, X., Chen, S., **Guan, J.**, Qiao, Y. and Sun, X., 2020. From Independent Sets and Vertex Colorings to Isotropic Spaces and Isotropic Decompositions: Another Bridge Between Graphs and Alternating Matrix Spaces. In 11th Innovations in Theoretical Computer Science Conference (**ITCS 2020**). Schloss Dagstuhl-Leibniz-Zentrum für Informatik. (**Contributed equally**) [[Talk Video](#)]

REFEREED
JOURNAL
PUBLICATIONS

1. Wang, Q., **Guan, J.**, Liu, J., Zhang, Z. and Ying, M., 2022. New quantum algorithms for computing quantum entropies and distances. *IEEE Transactions on Information Theory*, 70(8), pp.5653 - 5680.
2. Wang, Q., Zhang, Z., Chen, K., **Guan, J.***, Fang, W., Liu, J. and Ying, M., 2022. Quantum algorithm for fidelity estimation. *IEEE Transactions on Information Theory*, 69(1), pp.273-282.
3. Bei, X., Chen, S., **Guan, J.**, Qiao, Y. and Sun, X., 2021. From independent sets and vertex colorings to isotropic spaces and isotropic decompositions: Another bridge between graphs and alternating matrix spaces. *SIAM Journal on Computing*, 50(3), pp.924-971. (**Contributed equally**)
4. **Guan, J.**, Wang, Q. and Ying, M., 2021. An HHL-Based Algorithm for Computing Hitting Probabilities of Quantum Random Walks. *Quantum Information & Computation* 21(5&6): 0395-0408 (2021).
5. **Guan, J.**, Feng, Y. and Ying, M., 2018. Decomposition of quantum Markov chains and its applications. *Journal of Computer and System Sciences*, 95, pp.55-68.
6. **Guan, J.**, Feng, Y. and Ying, M., 2018. Super-activating Quantum Memory with Entanglement. *Quantum Information & Computation* 18(13&14): 1115-1124 (2018).
7. Su, Z., **Guan, J.** and Li, L., 2018. Efficient quantum repeater with respect to both entanglement-concentration rate and complexity of local operations and classical communication. *Physical Review A*, 97(1), p.012325.
8. Liu, S., Wang, X., Zhou, L., **Guan, J.**, Li, Y., He, Y., Duan, R. and Ying, M., 2018. *Q|SI*: A Quantum Programming Environment. In Symposium on Real-Time and Hybrid Systems (pp. 133-164). Springer, Cham.
9. Liu S S, Zhou L, **Guan J**, et al. *Q|SI*: a Quantum Programming Environment (in Chinese). *Sci Sin Inform*, 2017, 47: 1300–1315, doi: 10.1360/N112017-00095

ACCEPTED TALKS	1. Guan, J. , Feng, Y., Turrini, A. and Ying, M., 2019. Model Checking Applied to Quantum Physics. In <i>Quantum Physics and Logic (QPL 2019)</i> .
INVITED TALKS	1. Robustness Verification of Quantum Classifiers. 2021.11.25 Nagoya University, Japan 2. Robustness Verification of Quantum Classifiers. 2021.12.8 University of Science and Technology of China, China
SUBMITTED PUBLICATIONS	1. Guan, J. , 2024. Optimal Mechanisms for Quantum Local Differential Privacy. arXiv preprint arXiv:2407.13516. 2. Chen, K., Fang, W., Guan, J.* , Hong, X., Huang, M., Liu, J., Wang, Q. and Ying, M., 2022. VeriQBench: A benchmark for multiple types of quantum circuits. arXiv preprint arXiv:2206.10880. 3. Guan, J. , Feng, Y. and Ying, M., 2018. The structure of decoherence-free subsystems. arXiv preprint arXiv:1802.04904, 2018.
PROGRAMMING SKILLS	Python, C/C++ Programming Language, Matlab.
QUANTUM TOOLCHAIN:	Leading a project for developing a tool chain for trustworthy quantum computing, called <i>VeriQ</i> , which includes (i) QDA (Design Automation for Quantum Computing), (ii) Quantum Programs Verification and Analysis and (iii) Trustworthy Quantum Machine Learning. Nine tools have been released at the website of VeriQ .

Particularly, I with my collaborators developed the following five tools in *VeriQ*.

- VeriQRobust: a software for the robustness verification of quantum classifiers (Python, implemented on [TensorFlow Quantum](#)); Authors: **Ji Guan** and Wang Fang. (Available at <https://github.com/Veri-Q/Robustness> and passed artifact evaluation of CAV 2021)
- VeriQFair: a software for the fairness verification of quantum decision models (Python, implemented on [TensorFlow Quantum](#)); Authors: **Ji Guan**, Wang Fang and Mingsheng Ying. (Available at <https://github.com/Veri-Q/Fairness> and passed artifact evaluation of CAV 2022).
- VeriQBench: a benchmark for multiple types of quantum circuits. (OpenQASM). Authors: Kean Chen, Wang Fang, **Ji Guan**, Xin Hong, Mingyu Huang, Junyi Liu, Qisheng Wang, and Mingsheng Ying. (Available at <https://github.com/Veri-Q/Benchmark>). (**Contributed equally**)
- QMC: a toolbox for the automatic verification of quantum programs and algorithms (Python); Authors: **Ji Guan**. (Not available online, sending by request)
- A model checker for the automatic verification of quantum statistical systems and quantum many-body systems (Matlab and Java); Authors: **Ji Guan** and Andrea Turrini. (Not available online, sending by request)

SERVICE

1. PC Member: CAV 2025, QCNC 2025
2. Editorial Board Member of Theoretical Computer Science Section, Frontiers in Computer Science.
3. Member of Q|SI Developing Team; Q|SI is a quantum programming environment.
4. Reviewer: ASPLOS 2025, CDC 2024, QIP2024, CSL 2024, AQIS 2023, CAV 2021, IEEE QCE 2022, 2023 and 2024, PQC 2021, QPL 2020, COCOON 2018 and 2019, ICFEM 2019, SIAM Journal on Control and Optimization, the Science Bulletin, Journal of Computer Science and Technology, Information Processing Letters, IEEE Transactions on Emerging Topics in Computational Intelligence

RESEARCH STAY 21/08/2019-16/10/2019 hosted by Prof. Joost-Pieter Katoen at RWTH Aachen University, Germany.

AWARDS	the Beijing High-Level Overseas Talent Program (about 30 people per year)	2023
	ISCAS Outstanding Youth Award	2023
	the Youth Innovation Promotion Association of the Chinese Academy of Sciences	2022
	UTS ARC Discovery Scholarship.	2014.08 - 2018.02
	UTS International Research Scholarship.	2014.08 - 2018.02
	UTS FEIT PhD Post-Thesis Publication Scholarship	2018.03 - 2018.06

REFERENCES

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