| Personal<br>Information | Date of Birth: 1992.05.02Yinan.Li@whu.edu.cnSchool of Mathematics and Statisticsliyinan9252@gmail.comWuhan Universitywww.yinanli.com  |                          |  |  |
|-------------------------|---|--------------------------|--|--|
| Research<br>Interests   | The mathematical foundation of quantum computation. In particular, quantum (and classical) algorithms and quantum information theory.   |                          |  |  |
| Positions               | <b>School of Mathematics and Statistics, Wuhan University</b><br>Tenure-track assistant professor<br>Department of Information and Computational Sciences   | 2022.9 –                 |  |  |
|                         | <b>Graduate School of Mathematics, Nagoya university</b><br>Designated Assistant Professor<br>Part of the QLEAP theory group lead by Prof. Francois Le  | 2020.11 – 2022.8<br>Gall |  |  |
|                         | <b>Centrum Wiskunde &amp; Informatica (CWI)</b><br>Postdoctoral Researcher<br>Hosted by: Prof. Ronald de Wolf & Prof. Michael Walter  | 2018.6 - 2020.8          |  |  |
| Education               | <b>University of Technology Sydney</b><br>Ph.D. in Ouantum Information, August, 2018  | 2014.9 – 2018.6          |  |  |
|                         | <ul> <li>Thesis: Applications of Matrix Spaces in Quantum Information and Computational Complexity.</li> <li>Advisors: Prof. Runyao Duan (Principal), Prof. Youming Qiao (Joint), Prof. Andreas Winter (External)</li> </ul>                    |                          |  |  |
|                         | Wuhan University  | 2010.9 - 2014.6          |  |  |
|                         | B.Sc. in Mathematics, June, 2014  |                          |  |  |
|                         | <ul> <li>Honor Graduate Award of Hongyi School</li> <li>Exchange Student at Utrecht University, 2013.9 – 2014</li> </ul>  | 4.1.                     |  |  |
| Research<br>Fundings    | National Key Research and Development Program of China, PI, 2024-2027   |                          |  |  |
|                         | Hubei Science Fund for Distinguished Young Scholars, Hubei Provincial Natural Sci-<br>ence Foundation of China, PI, 2024-2027   |                          |  |  |
|                         | The Young Scientists Fund of the National Natural Science Foundation of China, PI, 2024-2026  |                          |  |  |
| BOOK CHAPTERS           | (B1) Shusen Liu, Xin Wang, Li Zhou, Ji Guan, Yinan Li, Yang He, Runyao Duan<br>Mingsheng Ying. Q SI>: A Quantum Programming Environment. In Symposiun<br>on Real-Time and Hybrid Systems. Lecture Notes in Computer Science, vol 11180<br>2018. |                          |  |  |

JOURNAL PUBLICATIONS

- (J1) Yinan Li, Youming Qiao, Avi Wigderson, Yuval Wigderson, Chuanqi Zhang. On linear-algebraic notions of expansion. Accepted at Theory of Computing, ArXiv: 2212.13154, 2022.
- (J2) Yinan Li, Youming Qiao, Avi Wigderson, Yuval Wigderson, Chuanqi Zhang. Connections between graphs and matrix spaces. In Israel Journal of Mathematics, 2023.
- (J3) Li Gao, Sander Gribling, Yinan Li. *On a tracial version of Haemers bound*. In *IEEE Transactions on Information Theory*, 2022.
- (J4) Yinan Li, Jeroen Zuiddam. *Quantum asymptotic spectra of graphs and non-commutative graphs, and quantum Shannon capacities*. In IEEE Transactions on Information Theory, 2021.
- (J5) Sander Gribling, Yinan Li. *The Haemers bound of noncommutative graphs*. In *IEEE Journal on Selected Areas in Information Theory*, 2020.
- (J6) Yinan Li, Youming Qiao. *Group-theoretic generalisations of vertex and edge connectivities.* In Proceedings of the American Mathematical Society, 2019.
- (J7) Shusen Liu, Yinan Li, Runyao Duan. *Distinguishing unitary gates on the IBM quantum processor*. In *Science China Information Sciences*, 2019.
- (J8) Yinan Li, Youming Qiao, Xin Wang, Runyao Duan. *Tripartite-to-bipartite entan*glement transformation by stochastic local operations and classical communication and the structure of matrix spaces. In Communications in Mathematical Physics, 2018.
- (J9) Yinan Li, Youming Qiao. *On rank-critical matrix spaces*. In *Differential Geometry and its Applications* (Special issue: Geometry and complexity theory), 2017.
- (J10) Yinan Li, Xin Wang, Runyao Duan. *Indistinguishability of bipartite states by positivepartial-transpose operations in the many-copy scenario.* In *Physical Review A*, 2017.
- (C1) Zhan Yu, Qiuhao Chen, Yuling Jiao, Yinan Li, Xiliang Lu, Xin Wang, Jerry Zhijian Yang. Non-asymptotic Approximation Error Bounds of Parameterized Quantum Circuits, In Advances in Neural Information Processing Systems 37 (Spotlight), 2024; also presented at QTML 2024 (short-oral).
  - (C2) Joran van Apeldoorn, Sander Gribling, Yinan Li, Harold Nieuwboer, Michael Walter, Ronald de Wolf. *Quantum algorithms for matrix scaling and matrix balancing*. Extended abstract: 48th International Colloquium on Automata, Languages, and Programming (ICALP), 2021.
  - (C3) Peter A. Brooksbank, Yinan Li, Youming Qiao, James B. Wilson. *Improved Algorithms for Alternating Matrix Space Isometry: from Theory to Practice*. In proceedings of the European Symposium on Algorithms, 2020.
  - (C4) Zhihuai Chen, Yinan Li, Xiaoming Sun, Pei Yuan, Jialin Zhang. A Quantuminspired classical algorithm for separable non-negative matrix factorization. In proceedings of the 28th International Joint Conference on Artificial Intelligence, 2019.
  - (C5) Yuxuan Du, Tongliang Liu, Yinan Li, Runyao Duan, Dacheng Tao. *Quantum divide-and-conquer anchoring for separable non-negative matrix factorization*. In proceedings of the 27th International Joint Conference on Artificial Intelligence, 2018.
  - (C6) Yinan Li, Youming Qiao. *Linear algebraic analogues of the graph isomorphism problem and the Erdős-Rényi model.* In proceedings of the 58th Annual IEEE Symposium on Foundations of Computer Science, 2017.
  - (C7) Runyao Duan, Cheng Guo, Chi-Kwong Li, Yinan Li. Parallel distinguishability of quantum operations. In proceedings of 2016 IEEE International Symposium on Information Theory, 2016.

CONFERENCE PROCEEDINGS (REFEREED)

| Preprints              | (P1) Markus Bl<br><i>ders of aut</i><br>2025.  | (P1) Markus Bläser, Yinan Li, Youming Qiao, Alexander Rogovskyy. On average or-<br>ders of automorphism groups of bilinear maps over finite fields, arXiv: 2503.07299,<br>2025.  |  |  |  |
|------------------------|--|--|--|--|--|
|                        | (P2) Qiuhao Ch<br>Excess Risk  | (P2) Qiuhao Chen, Yuling Jiao, Yinan Li, Xiliang Lu, Jerry Zhijian Yang. Near-optimal<br>Excess Risk Estimation for Quantum Supervised Learning, submitted, 2024.  |  |  |  |
|                        | (P3) Z. T. Wang<br>Jingning Z<br>Xiliang Lu<br><i>tum Compi</i><br>2406.12195  | '3) Z. T. Wang, Qiuhao Chen, Yuxuan Du, Z. H. Yang, Xiaoxia Cai, Kaixuan Huang,<br>Jingning Zhang, Kai Xu, Jun Du, Yinan Li, Yuling Jiao, Xingyao Wu, Wu Liu,<br>Xiliang Lu, Huikai Xu, Yirong Jin, Ruixia Wang, Haifeng Yu, S. P. Zhao. <i>Quan-</i><br><i>tum Compiling with Reinforcement Learning on a Superconducting Processor</i> , ArXiv:<br>2406.12195, 2024. |  |  |  |
|                        | (P4) Markus Bl<br>QROM Sec<br>Actions, in  | <sup>(4)</sup> Markus Bläser, Yinan Li, Youming Qiao, Alexander Rogovskyy. <i>Towards Rigorous</i><br><i>QROM Security Proofs for Some Post-Quantum Signature Schemes Based on Group</i><br><i>Actions</i> , in submission, 2024.  |  |  |  |
|                        | (P5) Kun Fang, Munan Zhang, Ruqi Shi, and Yinan Li. <i>Dynamic quantum circuit com-</i><br><i>pilation</i> , ArXiv: 2310.11021, 2023.  |  |  |  |  |
|                        | (P6) Joran van Apeldoorn, Sander Gribling, Yinan Li, Harold Nieuwboer, Michael<br>Walter, Ronald de Wolf. <i>Quantum algorithms and limitations for matrix scaling and<br/>matrix balancing</i> , in preparation. Part of this paper has been accepted to ICALP<br>2021. |  |  |  |  |
|                        | (P7) Peter Bürgisser, Yinan Li, Harold Nieuwboer, Michael Walter. <i>Interior-point methods for unconstrained geometric programming and scaling problems</i> . ArXiv: 2008.12110, 2020.  |  |  |  |  |
|                        | (P8) Peter A. Brooksbank, Joshua A. Grochow, Yinan Li, Youming Qiao, James B. Wilson. <i>Incorporating Weisfeiler-Leman into algorithms for group isomorphism</i> . ARXIV: 1905.02518, 2019. Part of this paper has been accepted to ESA 2020.                           |  |  |  |  |
| Patents                | (1) Kun Fang<br>Electronic I   | (1) Kun Fang, Yinan Li, Ruqi Shi. <i>Quantum Circuit Processing Method, Device and Electronic Equipment</i> . CN116629370A, 2024.  |  |  |  |
| TEACHING<br>EXPERIENCE | Courses at Wuhan University  |  |  |  |  |
|                        | Autumn 2024  | Linear Algebra<br>Exercise Class for Advanced Algebra<br>Scientific English Writing  |  |  |  |
|                        | Spring 2024  | Graph Theory   |  |  |  |
|                        | Autumn 2023  | Quantum Information and Quantum Computation  |  |  |  |
|                        | Spring 2023  | Linear algebra   |  |  |  |
| Invited Talks          | The 7th Joint Conference of A3 Foresight Program on Computational and Applied Mathematics, Wuhan, 2024   |  |  |  |  |
|                        | CQCC, Quantum Algorithm Session, Changsha, 2024  |  |  |  |  |
|                        | Analytical and combinatorial methods of quantum information theory, International Centre for Mathematical Sciences, Edinburgh, 2023.   |  |  |  |  |
|                        |  |  |  |  |  |

Quantum Software Forum, 2023.

Institute of Quantum Computing, Baidu Inc., 2023.

Satellite Conference on Computational Mathematics, 2023.

AMSS-UTS Joint Workshop on Quantum Computing, online, 2020.

Applied Math Youth Forum, Peking University, Beijing, 2019.

Analytical and combinatorial aspects of quantum information theory, International Centre for Mathematical Sciences, Edinburgh, 2019.

Tensors: Algebra-Computation-Applications (TACA), University of Colorado Boulder, Boulder, 2019.

China Theory Week, Tsinghua University, Beijing, 2018.

SEMINAR TALKS Department of Applied Mathematics and Theoretical Physics, University of Cambridge, 2023.

Youth Academic Forum, State Key Laboratory for Novel Software Technology, Nanjing University, 2023.

Reading group Seminar, Research group Networks and Optimization at CWI, online, 2021.

Q-LEAP Quantum AI theory Seminar, online, 2021.

Q-LEAP Quantum AI Seminar, online, 2020.

Centre for the Mathematics of Quantum Theory (QMATH), University of Copenhagen, 2020.

School of Mathematics, Statistics & Applied Mathematics, National University Ireland Galway, 2019.

Department of Applied Mathematics and Theoretical Physics, University of Cambridge, 2019.

Korteweg-de Vries Institute for Mathematics, University of Amsterdam, 2019.

Institute of Computing Technology, Chinese Academy of Sciences, 2019.

Research Center for Quantum Software, CWI, 2019.

Department of Physics, Southern University of Science and Technology, 2018.

School of Mathematics and Statistics, Wuhan University, 2018.

Institute for Quantum Information and Matter, California Institute of Technology, 2017.

Joint Center for Quantum Information and Computer Science, University of Maryland, College Park, 2017.

| CONFERENCE     | Some of the below talks were delivered by coauthors.   |  |  |
|----------------|--|--|--|
| TALKS          | Beyond IID in Information Theory 9, online, 2021.  |  |  |
|                | The 21th Asian Quantum Information Science Conference, online, 2021.   |  |  |
|                | SIAM Conference on Optimization (OP), online, 2021.  |  |  |
|                | Theory of Quantum Computation, Communication and Cryptography (TQC), online, 2021.   |  |  |
|                | International Colloquium on Automata, Languages, and Programming (ICALP), on-<br>line, 2021.   |  |  |
|                | The 28th Annual European Symposium on Algorithms (ESA 2020), online, 2020.   |  |  |
|                | The 23rd Annual Conference on Quantum Information Processing (QIP), Shenzhen, 2020.  |  |  |
|                | The 22nd Conference of the International Linear Algebra Society (ILAS), Fundação Getulio Vargas, Rio de Janeiro 2019.                            |  |  |
|                | 1st Australian Algebra Conference (AAC), University of Technology Sydney, Sydney, 2017.  |  |  |
|                | The 58th Annual IEEE Symposium on Foundations of Computer Science (FOCS), Berkeley, 2017   |  |  |
|                | The 16th Asian Quantum Information Science Conference (AQIS), Academia Sinica, Taipei, 2016  |  |  |
|                | The IEEE International Symposium on Information Theory (ISIT), Universitat Pom-<br>peu Fabra, Barcelona, 2016.                                   |  |  |
| PUBLIC TALKS   | "The future of AI: Quantum Computing", University of Chinese Academy of Sciences, 2019. (A general talk for general audiences given in Chinese.) |  |  |
| ACADEMIC VISIT | 7.16–7.22, 2023, Department of Applied Mathematics and Theoretical Physics, University of Cambridge.   |  |  |
|                | Hosted by: Dr. Sergii Strelchuk  |  |  |
|                | 2.2–2.4, 2020, Centre for the Mathematics of Quantum Theory (QMATH), University of Copenhagen.   |  |  |
|                | Hosted by: Prof. Laura Mančinska   |  |  |
|                | 1.14, 2020, School of Mathematics, University of Bristol.  |  |  |
|                | Hosted by: Prof. Ashley Montanaro and Prof. Noah Linden  |  |  |
|                | 12.23–27, 2019, Institute of Quantum Computing, Baidu Inc  |  |  |

Hosted by: Prof. Runyao Duan

11.20–22, 2019. School of Mathematics, Statistics & Applied Mathematics, National University Ireland, Galway.

Hosted by: Dr. Tobias Rossmann

11.18–20, 2019. School of Mathematics and Physics, Queen's University Belfast.

Hosted by: Prof. Ivan Todorov

10.30–11.1, 2019. Department of Applied Mathematics and Theoretical Physics, University of Cambridge.

Hosted by: Prof. Richard Jozsa

5.20-25, 2019, Institute of Quantum Computing, Baidu Inc..

Hosted by: Prof. Runyao Duan

9.21–28, 2018, Institute of Quantum Computing, Baidu Inc..

Hosted by: Prof. Runyao Duan

3.4–9, 2018, Department of Physics, Southern University of Science and Technology.

Hosted by: Prof. Man-Hong Yung

10.18–26, 2017, Institute for Quantum Information and Matter, California Institute of Technology.

Hosted by: Prof. Xie Chen

10.9–13, 2017, Joint Center for Quantum Information and Computer Science, University of Maryland, College Park.

Hosted by: Prof. Andrew Childs

| HONORS AND | 2018.3-2018.5 | FEIT PhD Post Thesis Publication Scholarship |
|------------|---------------|--|
| AWARDS     | 2014.9-2018.2 | UTS President's Scholarship                  |
|            | 2014.9-2018.2 | UTS International Research Scholarship       |

PROFESSIONAL Minisymposium organizer at CSIAM Annual Conference, 2023, 2024

Organizer of the QLEAP theory seminar 2021, 2022

Reviewer for Mathscinet

ACTIVITIES

Co-organizer of the reading group: From Euclidean to Geodesic Convex Optimization

Journals Review

□ Nature Physics

□ SIAM Journal on Computing

- □ IEEE Transactions on Information Theory
- □ Illinois Journal of Mathematics
- □ Nature Communications
- □ ACM Transactions on Quantum Computing
- Quantum
- □ Frontiers of Computer Science
- □ Mathematical Programming
- □ IEEE Transactions on Neural Networks and Learning Systems
- Quantum Information and Computation
- □ Science China Information Sciences
- □ Journal of Combinatorial Theory, Series A
- □ The Electronic Journal of Linear Algebra

- Conferences/Workshops Review
- 🗅 AAAI 2018
- □ AQIS 2019, 2021
- COCOON 2017, 2018, 2019
- CSR 2021
- □ FOCS 2020
- □ ICALP 2020, 2023
- □ MFCS 2020, 2021
- QCE 2022, 2023
- □ QIP 2020,2021,2022,2025
- SODA 2023, 2024
- □ STACS 2021
- **TQC 2022**