

RUNZHOU TAO

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CONTACT INFORMATION

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EMPLOYMENT

2024.8 - now **Assistant Professor**,
University of Maryland, College Park, MD
Department of Computer Science and Institute of Advanced Computer Studies,
Fellow of the Joint Center for Quantum Information and Computer Science (QuICS).

EDUCATION

2024.8 **Ph.D. in Computer Science**,
Columbia University, New York, NY, U.S.A.
Thesis: *Formal Verification of Quantum Software*
Advisor: Ronghui Gu
2021.2 **M.S. in Computer Science**,
Columbia University, New York, NY, U.S.A.
2019.8 **B.Eng. in Computer Science**,
Yao Class, Institute for Interdisciplinary Information Sciences,
Tsinghua University, Beijing, China

RESEARCH INTERESTS

Programming language, formal verification and operating system support for quantum computing

JOURNAL PUBLICATIONS

Authors in the papers in theoretical computer science are listed in alphabetical order, while other papers are in contribution order.

- PNAS 120 (21)
e2218775120 *A Formally Certified end-to-end Implementation of Shor's Factorization Algorithm*
Yuxiang Peng, Kesha Hietala, **Runzhou Tao**, Liyi Li, Robert Rand, Michael Hicks, Xiaodi Wu.
- J. ACM 69 (6)
No. 45, 1-35 *Edge-Weighted Online Bipartite Matching*
Matthew Fahrbach, Zhiyi Huang, **Runzhou Tao**, Morteza Zadimoghaddam.

CONFERENCE PUBLICATIONS

Authors in the papers in theoretical computer science (FOCS, ITCS, APPROX, SODA) are listed in alphabetical order, while other papers are in contribution order. * denotes equal contribution

- POPL 2024 *A Case for Synthesis of Recursive Quantum Unitary Programs*
Haowei Deng*, **Runzhou Tao***, Yuxiang Peng, Xiaodi Wu.
- POPL 2024 *Mostly Automated Verification of Liveness Properties for Distributed Protocols with Ranking Functions*
Jianan Yao, **Runzhou Tao**, Ronghui Gu, Jason Nieh.
- FOCS 2022 *Solving SDP Faster: A Robust IPM Framework and Efficient Implementation*
Baihe Huang, Shunhua Jiang, Zhao Song, **Runzhou Tao**, Ruizhe Zhang.
- OSDI 2022 *Fast, Automated Inference of Inductive Invariants for Verifying Distributed Protocols*
Jianan Yao, **Runzhou Tao**, Ronghui Gu, Jason Nieh.
- PLDI 2022 *Giallar: Push-button Verification for the Qiskit Quantum Compiler*
Runzhou Tao, Yunong Shi, Jianan Yao, Xupeng Li, Ali Javadi-Abhari, Andrew W. Cross, Frederic T. Chong, Ronghui Gu.
- ITCS 2022 *Symmetric Boolean Factor Analysis with Applications to InstaHide*
Sitan Chen, Zhao Song, **Runzhou Tao**, Ruizhe Zhang.
- SOSP 2021 *Formal Verification of a Multiprocessor Hypervisor on Arm Relaxed Memory Hardware*
Runzhou Tao, Jianan Yao, Xupeng Li, Shih-Wei Li, Jason Nieh, Ronghui Gu.
- OSDI 2021 *DistAI: Data-Driven Automated Invariant Learning for Distributed Protocols*
Best paper award Jianan Yao, **Runzhou Tao**, Ronghui Gu, Jason Nieh, Suman Jana, Gabriel Ryan.
- PLDI 2021 *Gleipnir: Toward Practical Error Analysis for Quantum Programs*
Runzhou Tao, Yunong Shi, Jianan Yao, John Hui, Frederic T. Chong, Ronghui Gu.
- FOCS 2020 *Edge-Weighted Online Bipartite Matching*
Best paper award Matthew Fahrbach, Zhiyi Huang, **Runzhou Tao**, Morteza Zadimoghaddam.
- APPROX 2019 *Streaming Hardness of Unique Games*
Venkatesan Guruswami, **Runzhou Tao**.
- SODA 2019 *Tight Competitive Ratios of Classic Matching Algorithms in the Fully Online Model*
Zhiyi Huang, Binghui Peng, Zhihao Gavin Tang, **Runzhou Tao**, Xiaowei Wu, Yuhao Zhang.

AWARDS

- 2021 OSDI 2021 **Jay Lepreau Best Paper Award**
- 2020 FOCS 2020 **Best Paper Award**
- 2019 ACM/ICPC North America Championship, **Finalist**
Teammates: Hengjie Zhang, Zhengjia Xu
- 2019 ACM/ICPC Regional (Greater New York), **Champion**
Teammates: Hengjie Zhang, Zhengjia Xu
- 2019 Outstanding Graduate of Tsinghua University
- 2019 Outstanding Graduate of Beijing City
- 2019 **Yao Award** (For outstanding graduate from the Yao class)
- 2016 Baidu First-Class Scholarship
- 2015 ACM/ICPC Regional (Hefei), **Gold Medal**
Teammates: Yue Yu, Shuxin Chen
- 2014 Chinese Mathematical Olympiad, **Gold Medal**
- 2014 (China) National Olympiad in Informatics, **Silver Medal**

TEACHING EXPERIENCE

- 2024 Spring COMS4115: Programming Languages and Translators, Columbia University
Instructor: Prof. Ronghui Gu
 - 2020 Fall COMS4236: Introduction to Computational Complexity, Columbia University
Instructor: Prof. Xi Chen
 - 2020 Spring CSEE6180: Modeling and Performance Evaluation, Columbia University
Instructor: Prof. Vishal Misra
 - 2019 Spring Theory of Computation, Tsinghua University
Instructor: Prof. Ran Duan
- weekly office hours, grading homework assignments and exams.

SERVICE

- PC Member QCE 2021, 2022
- Reviewer STOC, ICALP, ITP, APLAS