Xinkai Shu

Contact Information

Office	Room 316, Max Planck Institute for Informatics Campus E 1 4, Saarland Informatics Campus 66123 Saarbrücken, Germany
Email	xshu@mpi-inf.mpg.de
Homepage	shuxk.github.io

Research Interest

Online Algorithms
Algorithmic Game Theory
Fundamental Graph Algorithms

Academic Positions

2025 – now **Postdoctoral researcher**
Department 1: Algorithm & Complexity
Max Planck Institute for Informatics

Education

2019 – 2024 **Doctor of Philosophy**
Computer Science
The University of Hong Kong Supervisor: Prof. Zhiyi Huang

2015 – 2019 **Bachelor of Engineering**
Computer Science and Technology (Yao Class)
Tsinghua University Instructor: Prof. Ran Duan

Conference Publications

Authors are listed in alphabetical order following the traditions of theoretical computer science, unless stated otherwise.

The Long Arm of Nashian Allocation in Online p-Mean Welfare Maximization [arXiv]
Zhiyi Huang, Chui Shan Lee, Xinkai Shu, and Zhaozi Wang
52nd EATCS International Colloquium on Automata, Languages, and Programming (**ICALP 2025**)

Breaking the Sorting Barrier for Directed Single-Source Shortest Paths [arXiv]

Ran Duan, Jiayi Mao, Xiao Mao, Xinkai Shu, and Longhui Yin
57th Annual ACM SIGACT Symposium on Theory of Computing (**STOC 2025**)
Best paper award

Online Matching Meets Sampling Without Replacement [arXiv]
Zhiyi Huang, Chui Shan Lee, Jianqiao Lu, and Xinkai Shu
20th Conference on Web and Internet Economics (**WINE 2024**)

Online Nash Welfare Maximization Without Predictions [arXiv] [link]
Zhiyi Huang, Minming Li, Xinkai Shu, and Tianze Wei
19th Conference on Web and Internet Economics (**WINE 2023**)

A Randomized Algorithm for Single-Source Shortest Path on Undirected Real-Weighted Graphs [arXiv] [link]
Ran Duan, Jiayi Mao, Xinkai Shu, and Longhui Yin
64th IEEE Annual Symposium on Foundations of Computer Science (**FOCS 2023**)

The Power of Multiple Choices in Online Stochastic Matching [arXiv] [link]
Zhiyi Huang, Xinkai Shu, and Shuyi Yan
54th Annual ACM SIGACT Symposium on Theory of Computing (**STOC 2022**)

Online Stochastic Matching, Poisson Arrivals, and the Natural Linear Program [arXiv] [link]
Zhiyi Huang and Xinkai Shu
53rd Annual ACM SIGACT Symposium on Theory of Computing (**STOC 2021**)

Theses

Online Matching and Resource Allocation under Stochasticity
Doctoral thesis, supervised by Prof. Zhiyi Huang, 2024

Quick Algorithms for Dynamic Edge Coloring (in Chinese)
Bachelor thesis, instructed by Prof. Ran Duan, 2019

Invited Talks

A Randomized Algorithm for Single-Source Shortest Path on Undirected Real-Weighted Graphs

- CCF Forum for distinguished Ph.D. Candidates in Theoretical Computer Science 2023
  The Hong Kong Polytechnic University, July 20-21, 2023
- Institute for Theoretical Computer Science (ITCS) Seminar
  Shanghai University of Finance and Economics, July 11, 2023

Online Nash Welfare Maximization Without Predictions

- Complexity & Algorithms Workshop 2023
  Shandong University, April 1-2, 2023

The Power of Multiple Choices in Online Stochastic Matching

- International Joint Conference on Theoretical Computer Science – Frontier of Algorithmic Wisdom (IJTCS-FAW) 2022
  City University of Hong Kong, August 15-19, 2022 (virtually)

Research Visits

Mar 1 – Aug 31	Institute for Theoretical Computer Science
2023	Shanghai University of Finance and Economics

Honors and Awards

2025	**Best Paper Award** 57th Annual ACM SIGACT Symposium on Theory of Computing
2016	**Tsinghua-Baidu Scholarship** Baidu Inc. & Tsinghua University
2015	**Freshman Scholarship** Tsinghua University
2014	**Gold Medal** China National Olympiad of Informatics
2013	**Gold Medal** China National Olympiad of Informatics

Services

External reviewer of conferences:
ICML 2025, STOC 2025, SODA 2025, ICALP 2024, SODA 2024, ICALP 2023, ISSAC 2023, SODA 2023, STOC 2022

Teaching Experience

Teaching assistant at *The University of Hong Kong*:

2022 Spring	COMP 3250B	Design and analysis of algorithms
2021 Fall	COMP 3250A	Design and analysis of algorithms (Advanced)
2021 Fall	COMP 3351	Advanced algorithm analysis
2020 Spring	COMP 3250A	Design and analysis of algorithms

Additional Information

Language	Native Chinese, Fluent English, Intermediate Japanese
Programming	Proficient in C++, Python, PASCAL, used to be competitive programmer
Puzzle	I love solving puzzles, especially mathematical puzzles (e.g. sudoku, kakuro, slitherlink and masyu), as well as chess problems, go problems and tsume-shogi