

Ruichen Luo

Education

2023–2027	Ph.D. (Ongoing), COMPUTER SCIENCE, Institute of Science and Technology Austria <i>Advisor:</i> Prof. Krishnendu Chatterjee <i>Research Areas:</i> Optimization, Reinforcement Learning, Game Theory, Machine Learning
2018–2022	B.Eng. , COMPUTER SCIENCE, Zhejiang University <i>GPA:</i> 3.92/4.00, <i>Rank:</i> Top 10%

Research Statement

My research focuses on the intersection of optimization, games, and machine learning. Specifically, I have been working on the following topics:

- [3, 2]: Communication-efficient algorithms for distributed consensus optimization.
- [5, 6]: Communication- and computation-efficient algorithms for multiplayer games.
- [4, 7, 8]: Complexity and algorithms for sequential decision makings and their generalizations.

Employments

Jun 2023–Sep 2023	Research Assistant @ MBZUAI — Abu Dhabi, UAE <i>Advisor:</i> Prof. Samuel Horvath and Prof. Martin Takac <i>Contributions:</i> <ul style="list-style-type: none"> • Developed the first non-convex speedup results of Local SGD and SCAFFOLD (two important algorithms in federated learning) • Written a first author paper [3] at AISTATS'2025
Jan 2022–May 2022	Research Intern @ Tencent ARC Lab — Shenzhen, China <i>Project:</i> Pretrained Model Selection for Downstream Tasks <i>Contributions:</i> <ul style="list-style-type: none"> • Developed a practical tool for the selection of pretrained model checkpoints for various downstream tasks

Research Visits

Oct 2025–Nov 2025	CISPA Helmholtz Center — St. Ingbert, Germany <i>Host:</i> Dr. Sebastian U Stich <i>Collaboration Project:</i> Minimax Optimization with General Conditioning [6]
Oct 2024–Dec 2024	CISPA Helmholtz Center — St. Ingbert, Germany <i>Host:</i> Dr. Sebastian U Stich <i>Collaboration Project:</i> Monotone Near-Zero-Sum Games [5]

Publications

Also see my Google Scholar page. ‘*’ stands for equal contribution.

[8] Ali Asadi*, Krishnendu Chatterjee*, **Ruichen Luo***, Raimundo Saona*, and Elahe Tohidi*. **2026a**. “Faster Algorithms for Discounted-Sum Games with Few Stochastic Nodes”. In: *Preparation*.

[7] Krishnendu Chatterjee*, **Ruichen Luo***, Raimundo Saona*, and Jakub Svoboda*. **2026b**. “Algorithms for Linear Equations with Min and Max Operators under (Absolutely) Halting Condition”. In: *Submission to LICS'2026*. [\[Slides\]](#).

- [6] **Ruichen Luo**, Anton Rodomanov, and Sebastian Stich. **2026c**. “Efficient Gradient Methods for Distributed Saddle Problems”. In: *Submission to COLT’2026*.
- [5] **Ruichen Luo**, Sebastian U Stich, and Krishnendu Chatterjee. **2026d**. “Monotone Near-Zero-Sum Games”. In: *ICLR’2026*. [\[Slides\]](#).
- [4] Krishnendu Chatterjee*, **Ruichen Luo***, Raimundo Saona*, and Jakub Svoboda*. **2025a**. “Linear Equations with Min and Max Operators: Computational Complexity”. In: *AAAI’2025 (Oral)*. [\[Slides\]](#).
- [3] **Ruichen Luo**, Sebastian U Stich, Samuel Horvath, and Martin Takac. **2025b**. “Revisiting LocalSGD and SCAFFOLD: Improved Rates and Missing Analysis”. In: *AISTATS’2025*. [\[Poster\]](#) [\[Slides\]](#).
- [2] Ali Zindari, **Ruichen Luo**, and Sebastian U Stich. **2023**. “On the Convergence of Local SGD under Third-Order Smoothness and Hessian Similarity”. In: *OPT’2023 NIPS Workshop*.
- [1] Longqian Huang, **Ruichen Luo**, Xu Liu, and Xiang Hao. **2022**. “Spectral Imaging with Deep Learning”. In: *Light: Science & Applications* 11.61. [\[Top Downloaded Paper 2022, 2023, 2024\]](#).

Working Papers

1. An Algorithm in Smoothed Polynomial Time for Discounted-Sum Games
2. The Complexity of Matrix Games with Regularization

Student Mentorships

Elahe Tohidi	Feb 2025–Jun 2025	Scientific Intern @ ISTA (from Sharif University of Technology)
Yizhou Mao	Aug 2024–Dec 2024	Scientific Intern @ ISTA (from Shanghai Jiaotong University)

Talks and Presentations

Nov 1, 2025	From Simple Stochastic Games to Linear Equations with Min and Max Operators: Complexities and Algorithms Control Software Systems Group Seminar, Kaiserslautern, Germany
Oct 10, 2025	Monotone Near-Zero-Sum Games: A Generalization of Convex-Concave Minimax Machine Learning and Optimization Group Meeting, St. Ingbert, Germany
Jun 30, 2025	New Nonconvex Analysis of LocalSGD and SCAFFOLD Monday Session D, EUROPT’2025, Southampton, England
Jun 23, 2025	The Complexity of A Class of Linear Equations with Min and Max Operators Monday Session D, EURO’2025, Leeds, England
Oct 23, 2024	New Nonconvex Analysis of LocalSGD and SCAFFOLD Machine Learning and Optimization Group Meeting, St. Ingbert, Germany

Academic Services

Reviewer for NeurIPS’2023, NeurIPS’2025, ICLR’2026