Paul Friedrich

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Employment history

2020 – now **Ph.D. Candidate in Computer Science**, University of Zurich
Associated Researcher with the ETH AI Center
Planned graduation date: mid-2025. Available for internships year-round.
Research Areas: Machine Learning, Multi-Agent & Deep Reinforcement Learning, Mechanism Design, Game Theory, Planning
Co-advisors: Sven Seuken (Computation and Economics Research Group), Giorgia Ramponi (Autonomous Learning & Predictive Intelligence Lab)

2021 & 2022 **Head Teaching Assistant**, University of Zurich
Course: *Algorithmic Game Theory and Mechanism Design (CompSci MSc)*

2020 & 2023 **Teaching Assistant**, University of Zurich
Course: *Algorithmic Game Theory and Mechanism Design (CompSci MSc)*

2020 **Quant & Analytics Consultant**, Ernst & Young
Financial Services Risk Management (Zurich, Switzerland)
Worked on regulatory & financial audits of, and advisory projects for globally active Swiss financial institutions. Audited statistical and scenario-based risk models, critically verified documentation, designed and implemented independent challenger models in Python and R.

2018 – 2019 **Quant & Analytics Intern**, Ernst & Young
Financial Services Risk Management (Zurich, Switzerland)

2016 – 2018 **Teaching Assistant**, ETH Zurich
Courses: *Topology, Complex Analysis, Real Analysis I (Math BSc&MSc)*

Education

2017 – 2020 **M.Sc. in Mathematics**, ETH Zurich
Focus: Machine Learning, Computational Statistics, Mathematical Finance
Thesis: *A Machine Learning Perspective on the Kyle Model (graded 6.0/6.0)*
Supervisor: Josef Teichmann (ETH Zurich)

2017 **Exchange semester**, The Hong Kong University of Science and Technology

2014 – 2018 **B.Sc. in Mathematics**, ETH Zurich
Focus: Optimization, Probability Theory, Quantitative Risk Management
Thesis: *Risk Measures and their Applications: an Exposition (graded 6.0/6.0)*
Supervisor: Mete Soner (Princeton University)

Research Papers

Paul Friedrich, Yulun Zhang, Michael J. Curry, Ludwig Dierks, Stephen McAleer, Jiaoyang Li, Tuomas Sandholm, and Sven Seuken, "Scalable mechanism design for multi-agent path finding," *International Joint Conference on Artificial Intelligence, preprint at arXiv:2401.17044*, 2024.

Paul Friedrich, Ludwig Dierks, and Sven Seuken, "Machine learning-enhanced market design for drone traffic management," *working paper*, 2024.

Paul Friedrich, Barna Pasztor, and Giorgia Ramponi, "Collusion of RL-based pricing algorithms in episodic markets," *Agentic Markets Workshop at ICML '24*, 2024.

Sven Seuken, **Paul Friedrich**, and Ludwig Dierks, "Market design for drone traffic management," *AAAI Conference on Artificial Intelligence, won Blue Sky Best Paper Award (third place)*, 2022.

Paul Friedrich and Josef Teichmann, "Deep investing in kyle's single period model," *preprint at arXiv:2006.13889*, 2020.

Professional Experience

Supervision

2021 – 2022 **Master's project**, University of Zurich
Supervised a team of three Computer Science MSc students who developed a simulator for auction-based drone traffic management as part of my line of research.

Volunteering

2017 – 2018 **Organising committee**, MindPhair at ETH Zurich
Yearly job fair for mathematicians, physicists and computational scientists.

2015 – 2016 **Board member for university's policy**, The Association of Mathematics, Physics and Computational Science & Engineering Students at ETH Zurich
Handled all communication between the association and the Department of Mathematics at ETH, represented student interests in all department committees, incl. hiring committees. Organised events, coordinated with other student associations.

Competitions

2023 **2nd place**, Computational Social Choice Competition at IJCAI 2023

Summer Schools

2024 Multi-Agent Reinforcement Learning (MARL)
Organised by ETHZ & EPFL. Lausanne, Switzerland

Deep Learning + Reinforcement Learning (DLRL)
Organised by CIFAR & Vector Institute. Toronto, Canada

2021 Data Science, Optimization and Operations Research
Organised by Prof. Michel Bierlaire, EPFL. Zinal, Switzerland

Skills

Coding	**Python**, R, MATLAB, C++
Tools & Frameworks	**Numpy**/**Scipy**, **JAX**, Keras, Gurobi, CPLEX, SQL, Eikon
Languages	**German (mothertongue)**, **English (proficient)**, French (fluent), Spanish (intermediate). Basic Ukrainian, Russian, Mandarin Chinese
Interests	Sports (running, sailing, surfing, diving), volunteering, cooking, traveling & cultural exchange, violin, languages

References

Available on request.