Yufei Zhang

CONTACT INFORMATION

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RESEARCH INTERESTS

Stochastic Control and Games, Mathematical and Computational Finance, Theory and Applications of Machine Learning, particularly Deep Learning and Reinforcement Learning.

ACADEMIC APPOINTMENTS

Imperial College London, United Kingdom
Department of Mathematics

Associate Professor in Mathematical Finance and Machine Learning — Sep. 2023-present

Co-director of the MSc in Mathematics and Finance

London School of Economics, United Kingdom

Assistant Professor at Department of Statistics — Sep. 2021-Aug. 2023

EDUCATION

University of Oxford, United Kingdom

D.Phil., Mathematics — Oct. 2017-June 2021

The Chinese University of Hong Kong, Hong Kong

M.Phil., Mathematics — Aug. 2015-July 2017

M.Sc., Mathematics — Aug. 2013-June 2015

B.B.A., Insurance, Financial and Actuarial Analysis — Aug. 2008-June 2013

JOURNAL PUBLICATIONS

[1] Bekzhan Kerimkulov, David Šiška, Łukasz Szpruch, and Yufei Zhang, *Mirror descent for stochastic control problems with measure-valued controls*, Stochastic Processes and Their Applications, forthcoming. [Preprint version.]

[2] Deven Sethi, David Šiška, and Yufei Zhang, *Entropy annealing for policy mirror descent in continuous time and space*, SIAM Journal on Control and Optimization, 63 (2025), pp. 3006-3041.

[3] Bekzhan Kerimkulov, James-Michael Leahy, David Šiška, Łukasz Szpruch, and Yufei Zhang, *A Fisher-Rao gradient flow for entropy-regularised Markov decision processes in Polish spaces*, Foundations of Computational Mathematics, Online first. [Preprint version.]

[4] Xin Guo, Xinyu Li, and Yufei Zhang, *An α-potential game framework for N-player games*, SIAM Journal on Control and Optimization, 63 (2025), pp. 2964-3005.

[5] Eyal Neuman and Yufei Zhang, *Statistical learning with sublinear regret of propagator models*, The Annals of Applied Probability, forthcoming. [Preprint version.]

[6] Xin Guo and Yufei Zhang, *Towards an analytical framework for dynamic potential games*, SIAM Journal on Control and Optimization, 63 (2025), pp. 1213-1242.

[7] Christoph Reisinger, Wolfgang Stockinger, and Yufei Zhang, *A fast iterative PDE-based algorithm for feedback controls of nonsmooth mean-field control problems*, SIAM Journal on Scientific Computing, 46 (2024), pp. A2737-A2773.

[8] Lukasz Szpruch, Tanut Treetanthiploet, and Yufei Zhang, *Exploration-exploitation trade-off for continuous-time episodic reinforcement learning with linear-convex models*, The Annals of Applied Probability, forthcoming. [Preprint version.]

[9] Michael Giegrich, Christoph Reisinger, and Yufei Zhang, *Convergence of policy gradient methods for finite-horizon exploratory linear-quadratic control problems*, SIAM Journal on Control and Optimization, 62 (2024), pp. 1060-1092.

[10] Lukasz Szpruch, Tanut Treetanthiploet, and Yufei Zhang, *Optimal scheduling of entropy regulariser for continuous-time linear-quadratic reinforcement learning*, SIAM Journal on Control and Optimization, 62 (2024), pp. 135-166.

[11] Christoph Reisinger, Wolfgang Stockinger, and Yufei Zhang, *Linear convergence of a policy gradient method for some finite horizon continuous time control problems*, SIAM Journal on Control and Optimization, 61 (2023), pp. 3526-3558.

[12] Christoph Reisinger, Wolfgang Stockinger, and Yufei Zhang, *A posteriori error estimates for fully coupled McKean-Vlasov forward-backward SDEs*, IMA Journal of Numerical Analysis, 44 (2024), pp. 2323-2369.

[13] Xin Guo, Anran Hu and Yufei Zhang, *Reinforcement learning for linear-convex models with jumps via stability analysis of feedback controls*, SIAM Journal on Control and Optimization, 61 (2023), pp. 755-787.

[14] Matteo Basei, Xin Guo, Anran Hu and Yufei Zhang, *Logarithmic regret for episodic continuous-time linear-quadratic reinforcement learning over a finite-time horizon*, Journal of Machine Learning Research, 23 (2022), pp. 1–34.

[15] Christoph Reisinger and Yufei Zhang, *Regularity and stability of feedback relaxed controls*, SIAM Journal on Control and Optimization, 59 (2021), pp. 3118–3151.

[16] Kazufumi Ito, Christoph Reisinger, and Yufei Zhang, *A neural network based policy iteration algorithm with global H^2-superlinear convergence for stochastic games on domains*, Foundations of Computational Mathematics, 21 (2021), pp. 331–374.

[17] Christoph Reisinger and Yufei Zhang, *A penalty scheme and policy iteration for nonlocal HJB variational inequalities with monotone drivers*, Computers and Mathematics with Applications, 93 (2021), pp. 199-213.

[18] Roxana Dumitrescu, Christoph Reisinger, and Yufei Zhang, *Approximation schemes for mixed optimal stopping and control problems with nonlinear expectations and jumps*, Applied Mathematics & Optimization, 83 (2021), pp. 1387-1429.

[19] Christoph Reisinger and Yufei Zhang, *Rectified deep neural networks overcome the curse of dimensionality for nonsmooth value functions in zero-sum games of nonlinear stiff systems*, Analysis and Applications, 18 (2020), pp. 951-999.

[20] Christoph Reisinger and Yufei Zhang, *Error estimates of penalty schemes for quasi-variational inequalities arising from impulse control problems*, SIAM Journal on Control and Optimization, 58 (2020), pp. 243–276.

[21] Christoph Reisinger and Yufei Zhang, *A penalty scheme for monotone systems with interconnected obstacles: convergence and error estimates*, SIAM Journal of Numerical Analysis, 57 (2019), pp. 1625–1648.

CONFERENCE PUBLICATIONS

[1] Xinshi Chen, Yufei Zhang, Christoph Reisinger, and Le Song, *Understanding deep architectures with reasoning layer*, Advances in Neural Information Processing Systems (NeurIPS 2020), 33 (2020), pp. 1240–1252.

PREPRINTS

[1] Xin Guo, Xinyu Li, and Yufei Zhang, *Distributed games with jumps: An α-potential game approach*, arXiv: 2508.0192, 2025.

[2] Philipp Plank, Yufei Zhang, *Policy optimization for continuous-time linear-quadratic graphon mean field games*, arXiv: 2506.05894, 2025.

[3] Matthieu Meunier, Christoph Reisinger, abd Yufei Zhang, *Efficient learning for entropy-regularized Markov Decision Processes via Multilevel Monte Carlo*, arXiv: 2503.21224, 2025.

[4] Yanwei Jia, Du Ouyang, and Yufei Zhang, *Accuracy of discretely sampled stochastic policies in continuous-time reinforcement learning*, Revision at SIAM Journal on Control and Optimization, arXiv:2503.09981, 2025.

[5] Xin Guo, Anran Hu, Jiacheng Zhang, Yufei Zhang, *Continuous-time mean field games: a primal-dual characterization*, arXiv:2503.01042, 2025.

[6] Lukasz Szpruch, Marc Sabaté Vidales, Tanut Treetanthiploet, Yufei Zhang, *Pricing and hedging of decentralised lending contracts*, Submitted, arXiv:2409.04233,2024.

[7] Christoph Knochenhauer, Alexander Merkel, and Yufei Zhang, *Continuous-time dynamic decision making with costly information*, Revision at Mathematics of Operations Research, arXiv:2408.09693, 2024.

[8] Tanut Treetanthiploet, Łukasz Szpruch, and Yufei Zhang, *ϵ-policy gradient for online pricing* , Revision at Applied Mathematics and Optimization, arXiv:2405.03624, 2024.

[9] Eyal Neuman, Wolfgang Stockinger, and Yufei Zhang, *An offline learning approach to propagator models*, Revision at Mathematical Finance, arXiv:2309.02994, 2023.

[10] Christoph Reisinger, Wolfgang Stockinger, and Yufei Zhang, *Optimal regularity of extended mean field controls and their piecewise constant approximation*, preprint, arXiv:2009.08175v2, 2020.

AWARDS

- The Mathematical Institute DPhil Thesis Prize 2021, *University of Oxford*.
- G-Research PhD Prize in Maths and Data Science, *G-Research*, 2020.
- Academic Support Grant, *The Queen's College, University of Oxford*, 2017.
- Departmental Studentship, *Mathematical Institute, University of Oxford*, 2017–2021.

GRANTS

- Principal Investigator, "Reinforcement Learning for Insurance Pricing" in partnership with The Alan Turing Institute, £95,000, November 1, 2022 to April 28, 2023.
- Corresponding Proposer, Isaac Newton Institute Satellite Programme "Bridging Stochastic Control And Reinforcement Learning", £119,840, November 3-28, 2025.

PH.D SUPERVISION

- Philipp Plank (2024-now, Imperial College London).

CONFERENCES ORGANISATION

- Senior Program Committee, 6th ACM International Conference on AI in Finance (ICAIF 2025), Singapore (Nov. 15-18 2025).
- Corresponding Organiser, Isaac Newton Institute Satellite Program "Bridging Stochastic Control and Reinforcement Learning", Cambridge (Nov. 3-28, 2025)
- Organizing Committee, BIRS workshop "Advances in Stochastic Control and Reinforcement Learning: Theory and Application", Banff, Canada (April 27-May 2, 2025)

- Scientific Committee, "London–Oxford–Warwick Mathematical Finance Workshop", Oxford (Jan. 9-10, 2025).
- Organizing Committee, 8th-London-Paris Bachelier Workshop, Paris (September 2024).
- Organizing Committee, ETH–Hong Kong–Imperial Mathematical Finance Workshop, London (June 2024).
- Organizing Committee, 7th-London-Paris Bachelier Workshop, London (September 2023).

ADMINISTRATIVE DUTIES

- Member of the Research Committee of the Department of Mathematics, Imperial College (2024-2025).
- Organiser of the Finance and Stochastics seminar at Imperial College (2023-2025).

REVIEWER

- Journals (in alphabetical order)
  - in **mathematical finance**: Applied Mathematical Finance, Finance and Stochastics, Journal of Computational Finance, Market Microstructure and Liquidity, Mathematical Finance, SIAM Journal on Financial Mathematics, and others.
  - in **machine learning**: Journal of Machine Learning Research, Journal of Machine Learning, and others.
  - in **control and optimization**: Applied Mathematics and Optimization, Automatica, IEEE Transactions on Automatic Control, Operations Research, SIAM Journal on Control and Optimization, and others.
  - in **probability and statistics**: Annals of Applied Probability, Annals of Statistics, Stochastic Processes and Their Applications, and others.
  - in **computational mathematics**: Advances in Computational Mathematics, SIAM Journal on Scientific Computing, and others.
  - in **other areas of applied mathematics**: Discrete and Continuous Dynamical Systems Series B, Journal of Mathematical Analysis and Applications, and others.
- Conferences
  - in **machine learning**: Advances in Neural Information Processing Systems (NeurIPS 2021), Conference on Mathematical and Scientific Machine Learning (MSML 2020).

INVITED TALKS

- *CRiSM 2.0 Conference*, University of Warwick, May 21-23, 2025.
- *2nd ETH-HKG-ICL Mathematical Finance Workshop*, Hong Kong, April 22-25, 2025.
- *ISOR Colloquium*, University of Vienna, Vienna, Austria, Mar. 31, 2025.
- *Statistics Seminar Series*, Collegio Carlo Alberto, Torino, Italy, Feb. 12-14, 2025.
- *Modeling, Learning and Understanding: Modern Challenges between Financial Mathematics, Financial Technology and Financial Economics*, Banff, Nov. 10-15, 2024.
- *12th Bachelier World Congress of the Bachelier Finance Society*, Rio de Janeiro, July 8-12, 2024.
- *New Trends and Challenges in Stochastic Differential Games*, Banff, June 23-28, 2024.
- *ETH-Hong Kong-Imperial Mathematical Finance Workshop*, London, June 17-20, 2024.
- *Probability for Machine Learning seminar*, Oxford, June 12, 2024.
- *Mathematical Finance seminar*, Bielefeld, June 5, 2024.
- *Bachelier Seminar*, Paris, April 17, 2024.
- *Fields-CFI Bootcamp on Machine Learning in Quantitative Finance*, Toronto, April 25-26, 2024.
- *Recent Advances in Stochastic Control, Machine Learning and Quantitative Finance*, Shanghai, April 15-19, 2024.
- *IMSI Workshop on Decision Making and Uncertainty*, Chicago, Feb. 2-9, 2024.
- *CityU-NUS MFG/MFC seminar*, Jan. 30, 2024.
- *16th International Conference of the ERCIM WG on Computational and Methodological Statistics*, Berlin, Dec. 16-18, 2023.

- *7th London-Paris Bachelier Workshop on Mathematical Finance*, London, Sept. 18-19, 2023.
- *The Second HKSIAM Biennial Meeting*, Hong Kong, Aug. 28-Sept. 1, 2023.
- *Recent Advances on Quantitative Finance*, Hong Kong, Aug. 27-30, 2023
- *10th International Congress on Industrial and Applied Mathematics*, Tokyo, Aug. 20-25, 2023.
- *11th Advanced Mathematical Methods for Finance Conference*, Bielefeld, June 26-30, 2023.
- *Stochastic Analysis and Math Finance Seminar*, Berlin, June 22, 2023.
- *Berlin Probability Colloquium*, Berlin, June 21, 2023.
- *North British Probability Seminar*, The University of Edinburgh, June 14, 2023.
- *Data Science Seminar*, The University of Essex, May 11, 2023.
- *2nd Workshop on Machine Learning for PDEs*, Imperial College London, Apr. 3-4, 2023.
- *Probability Seminar*, The University of Bath, Jan. 9, 2023.
- *World Online Seminars on Machine Learning in Finance*, Virtual, Nov. 22, 2022.
- *Machine Learning and Optimal Control*, Royal Statistical Society, Virtual, Oct. 19, 2022.
- *Finance and Stochastic Seminar*, The University of Sydney, Oct. 11, 2022.
- *London-Paris Bachelier Workshop on Mathematical Finance*, Paris, France, Sept. 15-16, 2022.
- *Machine Learning for PDEs*, London, UK, Sept. 6-8, 2022.
- *The 9th International Colloquium on BSDEs and Mean Field Systems*, Annecy, France, June 26–July 1, 2022.
- *IMSI Workshop on Machine Learning and Mean-Field Games*, Chicago, May 23–27, 2022.
- *Maxwell Institute Probability Seminar*, Heriot-Watt University and University of Edinburgh, Mar. 24, 2022.
- *Finance and Stochastic Seminar*, Imperial College London, Mar. 23, 2022.
- *Financial/Actuarial Mathematics Seminar*, University of Michigan, Virtual, Mar. 16, 2022.
- *SIAG/FME virtual seminar*, Virtual, Mar. 10, 2022.
- *15th German Probability and Statistics Days*, Virtual, Sept. 27-Oct. 1, 2021.
- *2nd Fudan-Warwick Workshop on Financial Mathematics and Stochastic Analysis*, University of Warwick, UK, July 30–31, 2019.
- *3rd International Conference on Computational Finance*, A Coruña, Spain, July 8–12, 2019.
- *International Workshop on PDE-Constrained Optimization, Optimal Controls and Applications*, Sanya, China, Dec. 10–14, 2018.
- *10th Oxford-Berlin Young Researchers Meeting on Applied Stochastic Analysis*, Oxford, United Kingdom, Nov. 29–Dec. 1, 2018.
- *14th Viennese Conference on Optimal Control and Dynamic Games*, Vienna, Austria, July 3–6, 2018.

TEACHING EXPERIENCE

- Lecturer at Imperial College London:
  - Simulation Methods for Finance — Spring 2024, 2025
  - Advances in Machine Learning — Spring 2025
  - Interest Rate Models — Spring 2025
- Lecturer at London School of Economics:
  - Stochastic Process — Fall 2021, 2022
  - Stochastic Simulation — Spring 2023
  - Computational Methods in Finance and Insurance — Spring 2022, 2023
- Tutor at University of Oxford:
  - Analysis II — Spring 2021
  - Fixed Income — Spring 2021
  - Financial Derivatives — Fall 2020
  - Introduction to Probability — Fall 2020

– Advanced Numerical Methods — Spring 2020
– Numerical Methods — Fall 2019

PROFESSIONAL MEMBERSHIPS
- Member, Bachelier Finance Society
- Member, Society for Industrial and Applied Mathematics

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