Paul Peter Hager

Curriculum Vitae

University of Vienna
Department of Statistics and Operations Research
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Professional Experience

since October 2024	Assistant Professor at the University of Vienna in "Foundations of Machine Learning for Mathematical Finance".
March 2024 - September 2024	Junior Research Group Leader at the Technische Universität Berlin, on "*Stochastic Analysis and Quantitative Finance*".
October 2021 - February 2024	Postdoctoral Researcher at the Humboldt University of Berlin, in the research group "*Applied Financial Mathematics & Applied Stochastic Analysis* ".
April 2019 - September 2021	Scientific Assistant at the Technische Universität Berlin, in the MATH+ project AA4-2 "*Optimal control in energy markets using rough analysis and deep networks*".

Education

April 2019 - September 2021	**Dr. rer. nat.**, Technische Universität Berlin / Berlin Mathematical School, graduated with "summa cum laude", Thesis: "*Rough Analysis with Application in Markets and Related Fields*", supervision by Prof. P. K. Friz and Dr. habil. C. Bayer.
April 2016 - March 2019	**Master of Science**, Technische Universität Berlin Mathematics with emphasis on stochastic analysis and mathematical finance, Thesis: "*The Multiplicative Chaos of Fractional Brownian Motions with Vanishing Hurst Parameters*", supervision by Prof. P. K. Friz.
September 2012 - March 2016	**Bachelor of Science**, Technische Universität Berlin, Mathematics with emphasis on probability theory, Thesis: "*Bayesian Change Point Detection with an Asymmetric Miss Criterion*", supervision by Prof. P. Bank.
September 2009 - August 2012	**Fachgebundene Hochschulreife**, Fachoberschule Bamberg (tech. branch), Seminar work: "*Logarithmus- und Exponentialrechnung im Komplexen*".

Prices

July 2022	MATH+ Dissertation Award
April 2024	Travel Award for the Bachelier World Congress 2024

Research Publications

Preprints

[9] P. K. Friz, P. P. Hager, and N. Tapia. "On expected signatures and signature cumulants in semimartingale models". In: *arXiv e-prints*, arXiv:2408.05085 (Aug. 2024)

[8] P. Bank, C. Bayer, P. P. Hager, S. Riedel, and T. Nauen. "Stochastic Control with Signatures". In: *arXiv e-prints*, arXiv:2406.01585 (June 2024)

[7] G. Fu, P. P. Hager, and U. Horst. "A Mean-Field Game of Market Entry: Portfolio Liquidation with Trading Constraints". In: *arXiv e-prints*, arXiv:2403.10441 (Mar. 2024)

Publications in Peer Reviewed Journals

[6] G. Fu, P. P. Hager, and U. Horst. "Mean-field liquidation games with market drop-out". In: *Mathematical Finance* n/a.n/a (2024)

[5] C. Bayer, P. P. Hager, S. Riedel, and J. Schoenmakers. "Optimal stopping with signatures". In: *Annals of Applied Probability* 33.1 (2023), pp. 238–273

[4] C. Bayer, D. Belomestny, P. Hager, P. Pigato, J. Schoenmakers, and V. Spokoiny. "Reinforced optimal control". In: *Communications in Mathematical Sciences* 20.7 (2022), pp. 1951–1978

[3] P. K. Friz, P. P. Hager, and N. Tapia. "Unified signature cumulants and generalized Magnus expansions". In: *Forum of Mathematics, Sigma* 10 (2022), e42

[2] P. Hager and E. Neuman. "The multiplicative chaos of $H = 0$ fractional Brownian fields". In: *Annals of Applied Probability* 32.3 (2022), pp. 2139–2179

[1] C. Bayer, D. Belomestny, P. Hager, P. Pigato, and J. Schoenmakers. "Randomized Optimal Stopping Algorithms and Their Convergence Analysis". In: *SIAM Journal on Financial Mathematics* 12.3 (2021), pp. 1201–1225

Teaching Experience

Fall 2024/25	Lecture and Exercise Class on Linear Algebra
Spring 2024	Lecture on Stochastic Processes in Continuous Time
Fall 2023/24	Lecture on Stochastic Differential Equations
Spring 2023	Lecture on Continuous Time Finance
Fall 2022/23	Lecture on Discrete Time Finance
Spring 2022	Lecture on Continuous Time Finance
Fall 2021/22	Exercise Class on Analysis III for Physicists

Selected Recent Talks

- *"Advancing Optimal Stochastic Control with Signatures"*:
  - October 17, 2024, Financial and Actuarial Mathematics research seminar, UCLA (online),
  - October 2, 2024, Norwegian Business School – BI, Oslo,
  - July 11, 2024, Bachelier World Congress, Rio de Janeiro,
  - June 13, 2024, Italian Meeting on Probability and Mathematical Statistics, Rome,
  - April 2, 2024, World Online Seminars on Machine Learning in Finance.
- *"A Mean-Field Game of Market Entry – Portfolio Liquidation with Trading Constraints –"*:
  - September 3, 2024, MAFE Workshop Risk Mitigation Humboldt University of Berlin.
- *"Some Aspects of Semimartingale Expected Signatures"*:
  - June 24, 2024, Young Researchers Meeting on Applied Stochastic Analysis, WIAS Berlin.

Co-Organization of Conferences and Workshops

- (upcoming) April 23-25, 2025, Workshop on Neural-Dynamical Methods for Time Series Data, WPI Vienna,
- September 4-6, 2024, 7th Berlin Workshop on Mathematical Finance for Young Researchers, Humboldt University of Berlin.

Industry Experience

October 2017 - March 2019	Student job at Digitec GmbH, Hamburg, researching and developing software for interest rate term structure modelling with multiple yield curves.
April 2017 - September 2017	Student job at Onwrks (StarTUp Incubator), Berlin, developing statistical and machine learning methods for maintenance prediction of wind turbines.

Miscellaneous

Languages	German (mother tongue), English (fluent), Italian (intermediate).
Programming Languages	Python, Cython, Scala.
Memberships	Data Science Network @Uni Vienna.
Referee Activity	For several top journals in the field of probability and mathematical finance including: *Annals of Applied Probability* , *Mathematical Finance*, *Finance and Stochastics*, *Quantitative Finance*.