Paul P. Hager

Curriculum Vitae

July 18, 2021

Technische Universität Berlin
Institut für Mathematik - Sekr. MA 7-2
Straße des 17. Juni 136
10623 Berlin

Education

since April 2019	PhD studies, Technische Universität Berlin, Thesis working title: "*Rough Analysis with Application in Markets and Related Fields*", supervision by Prof. P. K. Friz and Dr. 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*".

Professional Experience

since April 2019	Scientific Assistant at the Technical University of Berlin in the MATH+ project AA4-2 "*Optimal control in energy markets using rough analysis and deep networks*".
Oktober 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.

Teaching Experience

Fall Semester 2015/2016	Tutor in Linear Algebra I for Engineers.
Spring Semester 2016	Tutor in Stochatics for Computer scientist.
Fall Semester 2016/2017	Tutor in Linear Algebra I for Engineers.

Current Research Interest

- Signatures and their applications in stochastic control and machine learning.
- Fractional Brownian motion, log-correlated fields, Gaussian multiplicative chaos and their applications to volatility modelling.

Research Publications

Preprints

(5) C. Bayer, P. Hager, S. Riedel, and J. Schoenmakers. "Optimal stopping with signatures". In: *arXiv e-prints*, arXiv:2105.00778 (May 2021). `https://arxiv.org/abs/2105.00778`

(4) P. K. Friz, P. Hager, and N. Tapia. "Unified Signature Cumulants and Generalized Magnus Expansions". In: *arXiv e-prints*, arXiv:2102.03345 (Feb. 2021). `https://arxiv.org/abs/2102.03345`

(3) C. Bayer, D. Belomestny, P. Hager, P. Pigato, J. Schoenmakers, and V. Spokoiny. "Reinforced optimal control". In: *arXiv e-prints*, arXiv:2011.12382 (Nov. 2020). `http://arxiv.org/abs/2011.12382`

(2) P. Hager and E. Neuman. "The Multiplicative Chaos of $H = 0$ Fractional Brownian Fields". In: *arXiv e-prints*, arXiv:2008.01385 (Aug. 2020). `https://arxiv.org/abs/2008.01385` (accepted at the *Annals of Applied Probability*)

(1) C. Bayer, D. Belomestny, P. Hager, P. Pigato, and J. Schoenmakers. "Randomized optimal stopping algorithms and their convergence analysis". In: *arXiv e-prints*, arXiv:2002.00816 (Feb. 2020). `https://arxiv.org/abs/2002.00816`, arXiv:2002.00816 (accepted at the *SIAM Journal on Financial Mathematics*)

Talks

- *"The Multiplicative Chaos of H=0 fractional Brownian Fields"*:
  - June 4, 2021, SIAM Conference on Financial Mathematics and Engineering (online conference), SIAM Philadelphia.
- *"Optimal Stopping with Signatures"*:
  - June 10, 2021, Big Data and Machine Learning in Finance Conference (online conference), Politecnico di Milano,
  - May 11, 2021, Seminar "Modern Methods in Applied Stochastics and Nonparametric Statistics", WIAS Berlin,
  - March 3, 2021, BMS Student Conference (online conference), Berlin Mathematical School,
  - January 29, 2021, XXII Workshop On Quantitative Finance (online conference), University of Verona.
- *"Unified Signature Cumulants and Generalized Magnus Expansions"*:
  - February 24, 2021, Cumulants in Stochastic Analysis (online conference), TU Berlin,
  - February 11, 2021, 14th Oxford-Berlin Young Researchers Meeting on Applied Stochastic Analysis (online conference), University of Oxford,
  - August 25, 2020, Bernoulli-IMS One World Symposium (pre-recorded talk),
  - June 9, 2020, 13th Berlin-Oxford Young Researchers Meeting on Applied Stochastic Analysis (online conference), WIAS Berlin.
- *"Reinforced Optimal Control"*:
  - July 7, 2020, Seminar "Modern Methods in Applied Stochastics and Nonparametric Statistics", WIAS Berlin.
- *"What is Gaussian multiplicative chaos?"*:
  - Jan 1, 2020, "What is . . . ? Seminar", Berlin Mathematical School.
- *"The Multiplicative Chaos of Fractional Brownian Motions with Vanishing Hurst Parameters"*:
  - December 5, 2019, 12th Oxford-Berlin Young Researchers Meeting on Applied Stochastic Analysis, University of Oxford.
  - June 26, 2019, Seminar "Finance and Stochastics", Imperial College London,
  - May 29, 2019, Seminar "Modern Methods in Applied Stochastics and Nonparametric Statistics", WIAS Berlin.

Miscellaneous

Languages	German (mother tongue), English (fluent), Italian (beginner).
Programming Languages	Python, Cython, Scala.
Referee Activity	For the *Annals of Applied Probability* and the Journal of *Mathematical Finance*.