

Dr. Alexander Kalinin**Work address**

Department of Mathematics
Ludwig-Maximilians-Universität München
Theresienstr. 39
80333 Munich
kalinin@math.lmu.de

Academic occupations

- 2020 - today Academic advisor at LMU Munich
in the work group *Stochastics and Financial Mathematics*
- 2019 - 2020 Postdoc at LMU Munich
in the work group *Stochastics and Financial Mathematics*
- 2017 - 2019 Chapman fellow at Imperial College London
in the *Mathematical Finance Section*
- 2013 - 2017 Research associate at the University of Mannheim
and associate member of the research training group
Statistical Modelling of Complex Systems and Processes

Education

- 2023 - today Habilitation candidate, LMU Munich
- 2013 - 2017 Doctorate in Mathematics, University of Mannheim
Dissertation: *Markovian Integral Equations and
Path-Dependent Partial Differential Equations*
Supervisor: Prof. Dr. Alexander Schied
- 2011 - 2013 Mathematics in Business and Economics M.Sc.,
University of Mannheim
Master's thesis: *Viscosity Solutions of the Log-Laplace
Equation of a Superprocess*
- 2008 - 2011 Mathematics in Business and Economics B.Sc.,
University of Mannheim
Bachelor's thesis: *Stability of Competitive Equilibrium
with Liapunov's Second Method*

Research interests

- *Stochastic analysis and stochastic processes*: stochastic Volterra integral equations, McKean-Vlasov equations and Markov processes
- *Functional analysis*: a novel type of derivative in Banach spaces
- *Mathematical finance*: valuation of contingent claims and stochastic volatility models

Published and accepted articles

6. *Stability, uniqueness and existence of solutions to McKean-Vlasov SDEs: a multidimensional Yamada-Watanabe approach*, A. Kalinin, T. Meyer-Brandis and F. Proske, accepted for publication in *Stochastics and Dynamics*, 2024 ([link](#)).

Short abstract: We establish stability and pathwise uniqueness of solutions to McKean-Vlasov equations with random non-Lipschitz continuous coefficients. In the deterministic case, we also obtain the existence of unique strong solutions. By using our approach, which is based on an extension of the Yamada-Watanabe ansatz, we prove first moment and pathwise exponential stability. Furthermore, Lyapunov exponents are computed explicitly.

5. *Stability, uniqueness and existence of solutions to McKean-Vlasov SDEs in arbitrary moments*, A. Kalinin, T. Meyer-Brandis and F. Proske, *Journal of Theoretical Probability*, 2024 ([link](#)).

Short abstract: We deduce stability and pathwise uniqueness for a McKean-Vlasov equation with random coefficients. Our analysis focuses on a non-Lipschitz drift and includes moment estimates for random Itô processes. For deterministic coefficients, we provide unique strong solutions, even if the drift fails to be of affine growth. The theory that we develop leads to moment and pathwise exponential stability with explicit Lyapunov exponents.

4. *Mild to classical solutions for XVA equations under stochastic volatility*, D. Brigo, F. Graceffa and A. Kalinin, *SIAM Journal on Financial Mathematics*, 2024 ([link](#)).

Short abstract: We extend the valuation of contingent claims in presence of default, collateral and funding. En route, we relax conditions on the market information and construct a broad class of default times. Moreover, under stochastic volatility, we characterise pre-default value processes via mild solutions to parabolic PDEs and give sufficient conditions for mild solutions to exist uniquely and to be classical.

3. *Support characterization for regular path-dependent stochastic Volterra integral equations*, A. Kalinin, *Electronic Journal of Probability*, 2021 ([link](#)).

Short abstract: We consider a stochastic Volterra equation with path-dependent coefficients in a multidimensional setting. Under an absolute continuity condition, the unique solution is a semimartingale that admits Hölder continuous paths. We prove that the support of its law can be described by a flow of mild solutions to ordinary integro-differential equations.

2. *On the support of solutions to SDEs with path-dependent coefficients*, R. Cont and A. Kalinin, *Stochastic Processes and their Applications*, 2020 ([link](#)).

Short abstract: Given a path-dependent SDE driven by a multidimensional Wiener process, we show that the support of the law of the solution can be represented by the image of the Cameron-Martin space under the flow of mild solutions to a system of path-dependent ODEs. Our result extends the Stroock-Varadhan support theorem for diffusion processes to the path-dependent case.

1. *Markovian integral equations*, A. Kalinin, *Annales de l'Institut Henri Poincaré*, 2020 ([link](#)).

Short abstract: We analyse multidimensional integral equations that are formulated with a Markov process. In the case of a path process of a diffusion, the solutions lead to the concept of mild solutions to path-dependent PDEs. Uniqueness, stability and non-extendibility among a class of maps is established. Moreover, a multidimensional Feynman-Kac formula and a one-dimensional global existence- and uniqueness result are provided.

Articles on arXiv

2. *The oriented derivative*, A. Kalinin, arXiv preprint, 2023 ([link](#)).

Short abstract: We show that the derivatives in the sense of Fréchet and Gâteaux can be viewed as derivatives oriented towards a star convex set with the origin as center. The resulting oriented differential calculus extends the mean value theorem, the chain rule and the Taylor formula in Banach spaces.

1. *Mild and viscosity solutions to semilinear parabolic path-dependent PDEs*, A. Kalinin and A. Schied, arXiv preprint, 2018 ([link](#)).

Short abstract: We study and compare mild and viscosity solutions to semilinear parabolic path-dependent PDEs. The aim is to show that right-continuous mild solutions are also viscosity solutions. Since unique mild solutions exist under weak condition, we obtain a general existence result for viscosity solutions to semilinear parabolic path-dependent PDEs.

Dissertation

Markovian Integral Equations and Path-Dependent PDEs, University of Mannheim, 2017 ([link](#)).

Short abstract: The thesis provides a construction of solutions to Markovian integral equations. By introducing path-dependent diffusion processes, this yields a general existence and uniqueness result for mild solutions to semilinear parabolic path-dependent PDEs. In this connection, it can be verified that mild solutions are also solutions in a viscosity sense.

Talks in seminars, workshops and conferences

- *International Conference on Stochastic Calculus and Applications to Finance* (online), IIT Madras, June 5, 2024.
- *Colloquium of the Department of Mathematics*, LMU Munich, April 20, 2023.
- *Finance and Stochastics Seminar*, Imperial College London, March 21, 2023.
- *3rd BYO Workshop in Probability and Finance* (online), LMU Munich, February 11, 2022.
- *Financial and Actuarial Mathematics Seminar*, Technical University of Munich, November 11, 2019.
- *Seminar of the Stochastic Analysis Group*, University of Oxford, March 4, 2019.
- *Imperial Stochastics Day*, Imperial College London, October 3, 2017.
- *Colloquium of the School of Business Informatics and Mathematics*, University of Mannheim, December 14, 2015.

Participation in workshops and conferences with contributed talks

- *Bernoulli-IMS 11th World Congress in Probability and Statistics*, Ruhr University Bochum, August 12 - 15, 2024.
- *XLIV Dynamics Days Europe*, Constructor University Bremen, July 29 - 31, 2024.

- 16th *German Probability and Statistics Days*,
University of Duisburg-Essen, March 7 - 10, 2023.
- 15th *Bachelier Colloquium on Mathematical Finance and Stochastic Calculus*, Métabief in France, January 18 - 20, 2023.
- 10th *Austrian Stochastics Days*,
University of Vienna, September 8 - 9, 2022.
- 15th *German Probability and Statistics Days (online)*,
University of Mannheim, September 27 - 30, 2021.
- 14th *Bachelier Colloquium on Mathematical Finance and Stochastic Calculus*, Métabief in France, January 13 - 16, 2020.
- 2nd *Imperial-CUHK Workshop on Quantitative Finance*,
Hong Kong, May 21 - 22, 2019.
- 13th *Bachelier Colloquium on Mathematical Finance and Stochastic Calculus*, Métabief in France, January 8 - 10, 2019.
- 10th *World Congress of the Bachelier Finance Society*,
Trinity College Dublin, July 16 - 20, 2018.
- *Imperial-ETH Workshop on Mathematical Finance*,
ETH Zurich, April 4 - 6, 2018.
- 13th *German Probability and Statistics Days*,
University of Freiburg, February 27 - March 2, 2018.
- 12th *Bachelier Colloquium on Mathematical Finance and Stochastic Calculus*, Métabief in France, January 15 - 20, 2018.
- *Workshop on Pathwise Methods, Functional Calculus and Applications in Mathematical Finance*, Wolfgang Pauli Institute in Vienna, April 4 - 6, 2016.

Jointly organised workshop

- *LMU Spring Workshop in Stochastics and Finance*,
University of Munich, May 5, 2022.

Several journals I reviewed for

- *Mathematical Finance*
- *Stochastic Processes and their Applications*
- *Electronic Communications in Probability*
- *Applied Probability Journals*
- *Journal of Theoretical Probability*
- *Stochastic Analysis and Applications*
- *SIAM Journal on Control and Optimization*
- *Journal of Differential Equations*
- *Asia-Pacific Financial Markets*
- *Journal of Inequalities and Applications*

Teaching experience

- 2021 - 2024 Lecturing at LMU Munich in
- *Stochastic Processes* (master)
 - *Financial Modelling with Stochastic Partial Differential Equations* (master, 3 terms)
- 2019 - 2023 Teaching assistant at LMU in the bachelor courses
- *Linear Algebra 2*
 - *Measure Theory and Multivariate Calculus*
 - *Multivariate Calculus*
 - *Probability Theory* (2 terms)
 - *Stochastics*
- 2018 - 2019 Lecturing at Imperial College London in
- *Path-Dependent Partial Differential Equations* (master, 2 terms)
- 2013 - 2017 Teaching assistant at the University of Mannheim in
- *Mathematical Finance* (bachelor)
 - *Continuous-Time Finance* (bachelor)
 - *Modelling, Measuring and Managing Risk* (master)
 - *Advanced Mathematical Finance* (master)
 - *Stochastic Analysis* (master)
 - *Risk Measurement and Risk Management* (master)

Experience abroad

- 2016 Five-week research visit at the University of Waterloo
- 2014 *European Summer School in Financial Mathematics*
at the University of Oxford
- 2011 Semester abroad at the University of California, Berkeley

Awards

- 2013 Honour for the master's thesis and
Werner-Oettli award for an excellent master's degree
- 2011 Honour for the bachelor's thesis
- 2010 - 2013 Fellow of the *German Academic Scholarship Foundation*