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**Dr. Alexander Kalinin****Work address**

Department of Mathematics  
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**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**

- 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:*  
McKean-Vlasov equations, stochastic Volterra integral equations,  
path-dependent stochastic differential equations and Markov processes
- *Mathematical finance:*  
valuation of contingent claims, stochastic volatility models and  
mild solutions to parabolic partial differential equations

## Accepted and published articles

4. *Mild to classical solutions for XVA equations under stochastic volatility*, D. Brigo, F. Graceffa and A. Kalinin, revised version of the arXiv preprint ([link](#)) accepted for publication in SIAM Journal on Financial Mathematics, 2023.

*Short abstract:* We extend the valuation of contingent claims in presence of default, collateral and funding. Thereby, we allow for an arbitrary default-free filtration and construct a broad class of default times. Under stochastic volatility, we also 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 integral equation with regular path-dependent coefficients in a multidimensional setting. Under an absolute continuity condition, the unique solution is a semimartingale that admits almost surely 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 Brownian motion, 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 ordinary differential equations. 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:* This paper analyses 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 within a class of solutions is established. Moreover, a multidimensional Feynman-Kac formula and a one-dimensional global existence- and uniqueness result are provided.

## Articles on arXiv

4. *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.

3. *Stability, uniqueness and existence of solutions to McKean-Vlasov SDEs in arbitrary moments*, A. Kalinin, T. Meyer-Brandis and F. Proske, arXiv preprint, 2022 ([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.

2. *Stability, uniqueness and existence of solutions to McKean-Vlasov SDEs: a multi-dimensional Yamada-Watanabe approach*,

A. Kalinin, T. Meyer-Brandis and F. Proske, arXiv preprint, 2021 ([link](#)).

*Short abstract:* We establish stability and pathwise uniqueness of solutions to Wiener noise driven McKean-Vlasov equations with random coefficients, which are allowed to be non-Lipschitz continuous. In the deterministic case we also derive unique strong solutions. By using our approach, which is based on an extension of the Yamada-Watanabe ansatz to the multidimensional setting, we prove first moment and pathwise exponential stability of solutions. Furthermore, we are able to compute Lyapunov exponents explicitly.

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.

## Seminar talks

- *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.

## Conferences with contributed talks

- *16<sup>th</sup> German Probability and Statistics Days*,  
University of Duisburg-Essen, March 7 - 10, 2023.
- *15<sup>th</sup> Bachelier Colloquium on Mathematical Finance and Stochastic Calculus*, Métabief in France, January 18 - 20, 2023.

- 10<sup>th</sup> *Austrian Stochastics Days*,  
University of Vienna, September 8 - 9, 2022.
- 15<sup>th</sup> *German Probability and Statistics Days* (online),  
University of Mannheim, September 27 - 30, 2021.
- 14<sup>th</sup> *Bachelier Colloquium on Mathematical Finance and Stochastic Calculus*, Métabief in France, January 13 - 16, 2020.
- 2<sup>nd</sup> *Imperial-CUHK Workshop on Quantitative Finance*,  
Hong Kong, May 21 - 22, 2019.
- 13<sup>th</sup> *Bachelier Colloquium on Mathematical Finance and Stochastic Calculus*, Métabief in France, January 8 - 10, 2019.
- 10<sup>th</sup> *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.
- 13<sup>th</sup> *German Probability and Statistics Days*,  
University of Freiburg, February 27 - March 2, 2018.
- 12<sup>th</sup> *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 conferences**

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

#### **Some journals I reviewed for**

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

#### **Teaching experience**

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|-------------|---|
| 2021 - 2023 | Lecturing at LMU Munich in <ul style="list-style-type: none"> <li>■ <i>Financial Modelling with Stochastic Partial Differential Equations</i> (master, 2 terms)</li> </ul>  |
| 2019 - 2023 | Teaching assistant at LMU in the bachelor courses <ul style="list-style-type: none"> <li>■ <i>Linear Algebra 2</i></li> <li>■ <i>Measure Theory and Multivariate Calculus</i></li> <li>■ <i>Multivariate Calculus</i></li> <li>■ <i>Probability Theory</i> (2 terms)</li> <li>■ <i>Stochastics</i></li> </ul> |

- 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*