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Lukas Niebel

PhD Student at Ulm University

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I am a PhD student at Ulm University under the supervision of Prof. Rico Zacher. My research concerns the regularity theory of linear and nonlinear kinetic partial differential equations. I am interested in a precise L^p-solution theory for linear kinetic PDE and in understanding a priori estimates for weak solutions of kinetic PDE. The goal is to apply these results to nonlinear kinetic PDEs such as the Boltzmann and Landau equations. Preprints of all publications are available on arXiv.

List of Publications

Kinetic maximal L^p-regularity with temporal weights and application to quasilinear kinetic diffusion equations 01/2022
*with Rico Zacher, Journal of Differential Equations, **307**, p. 29–82*, link to the article.

Kinetic maximal $L^p_\mu(L^p)$-regularity for the fractional Kolmogorov equation with variable density 01/2022
*Nonlinear Analysis, **214***, link to the article.

Kinetic maximal L^2-regularity for the (fractional) Kolmogorov equation 04/2021
*with Rico Zacher, Journal of Evolution Equations, **21**, p. 3585–3612*, link to the article.

Education

PhD student **since 04/2019**
Ulm University

- Working title: Analytic aspects of kinetic partial differential equations
- Advisor: Prof. Dr. Rico Zacher
- My studies are funded by a graduate scholarship (grant number 1902 LGFG-E).

M.Sc. Mathematics **03/2018 — 03/2019**
Ulm University

- Thesis: Kolmogorov equations - Well-posedness, regularity, asymptotics and Harnack inequalities
- Grade: 1.0 with distinction, awarded for best graduation
- During my master's studies, I focused on Analysis by taking courses on the calculus of variations, evolution equations, functional calculus, partial differential equations and optimal transport. This was supported by courses in applied mathematics, such as numerical finance, as well as a series of lectures on econophysics.

B.Sc. Mathematics **10/2014 — 02/2018**
Ulm University

- Thesis: Long-time behaviour of Markov chains by discrete functional inequalities and entropic Ricci curvature
- Grade: 1.1 with distinction, awarded for best graduation

Abitur, *Joachim-Hahn-Gymnasium Blaubeuren* 06/2014
Junior studies in mathematics, *Fernuniversität Hagen and PfH Göttingen* 04/2013 — 09/2014

Working and Teaching Experience

Teaching assistant **since 03/2020**
University of Applied Sciences Neu-Ulm (HNU) *Neu-Ulm, Germany*

- Design and supervision of a supplementary course on statistics and applications for first-year students with an emphasis on programming in R.

Pre-doctoral fellow **04/2019 — 10/2019**
Ulm University *Ulm, Germany*

- Head of teaching assistants for Analysis 1.
  Creation and presentation of exercises supplementary to the lectures, responsible for the student assistants.
  Assisting in the creation and correction of the exams.
- Organisation of the Trainingscamp, a yearly event for first-year students to refresh their mathematical skills.

Teaching assistant **10/2017 — 03/2019**
Ulm University *Ulm, Germany*

- Head of teaching assistants for Analysis 2, Dynamical Systems and Elements of Functional analysis.

Working student **03/2015 — 03/2019**
Daimler AG Research & Development *Ulm, Germany*

- Statistical Analysis with Matlab and Excel.
- Supervising the operation of a quasi-static tension-compression testing machine.

Student assistant **10/2015 — 09/2017**
Ulm University *Ulm, Germany*

- Tutor for the Mathlabs Analysis 1 and Analysis 2.

Awards and Scholarships

Travel grant by the ProTrainU Mobility-Programm, Ulm University (1000 €) 06/2022
Master graduation award “Absolventenpreis M.Sc. Mathematik Uni Ulm 2020” for the best graduation 04/2022
Graduate scholarship granted by the State of Baden-Wuerttemberg, Germany (grant number 1902 LGFG-E) since 11/2019
Bachelor graduation award “Absolventenpreis B.Sc. Mathematik Uni Ulm 2018” for the best graduation 05/2018
Ferry Porsche Award and graduation award of the ”Deutsche Physikalische Gesellschaft” 06/2014

Volunteer Work

Elected member of the council of PhD students at Ulm University since 02/2021
- *Representing the interests of doctoral students in university committees, e.g. for the change of the PhD regulations. Since 12/2021, chair of the council PhD students.*

Elected member of the faculty council for Mathematics and Economic Sciences of Ulm University since 02/2020
Member of the Academic Student Council Mathematics 07/2017 — 03/2019
- *For example member of the appointment committee for a professorship in “Stochastics”.*

Other Scientific Activities

Co-organisation of the seminar “Mathematisches Kolloquium” at Ulm University since 03/2020
- *A series of talks at which researchers are invited to give a talk accessible to a broad audience.*

Organisation of a mini-workshop for PhD students in mathematics at Ulm University 06/2022
- *One weekend, 15 participants, funding (approx. 2000 €) acquired by the StuVe Ulm University.*

Supervision of a project for the workshop of the 25th Internetseminar 03/2022 — 06/2022
- *Title: Kolmogorov equation in $L^p(\mathbb{R}^{2n})$ – Semigroup, spectrum, maximal regularity?*

Research stay at Prof. Dr. Cyril Imbert, École normale supérieure Paris, one week 11/2021
Facilitator at the autumn school “COLLAB – Collaboratory for Global Sustainability 2021”, Toronto/Ulm 10/2021

Talks and Posters

Poster — When Kinetic Theory meets Fluid Mechanics, ETH Zürich 07/2022
Poster — 11th Summer school on “Methods and Models of Kinetic Theory”, Pesaro 06/2022
Poster — Frontiers in analysis of kinetic equations, INI Cambridge 01/2022
Talk — Nonlinear Evolution Equations and Approximations, Essen 07/2021
Talk — Oberseminar Analysis, Ulm 03/2021
Poster — Winterschool on Analysis and Applied Mathematics, Münster 02/2021

Attended Conferences

2nd IST Austria Summer School in Analysis and PDEs, IST Austria 07/2022
When Kinetic Theory meets Fluid Mechanics, ETH Zürich 07/2022
25th Internetseminar “Spectral Theory for Operators and Semigroups”, Agropoli 06/2022
11th Summer school on “Methods and Models of Kinetic Theory”, Pesaro 06/2022
Oxbridge PDE Conference, Oxford 05/2022
Frontiers in the Interplay Between Probability and Kinetic Theory, Edinburgh 04/2022
Kinetic Theory: old and new tutorial, INI Cambridge 01/2022
Frontiers in analysis of kinetic equations, INI Cambridge 01/2022
Deep Learning and partial differential equations, INI Cambridge 07/2021
Recent advances in Gradient Flows, Kinetic Theory, and Reaction-Diffusion Equations, Vienna 03/2021
Kinetic Equations: from Modeling Computation to Analysis, CIRM Marseille 03/2021
Winterschool on Analysis and Applied Mathematics, Münster 02/2021
Gradient flows and variational methods in PDEs, Ulm University 11/2019
PDE/Probability Interactions: Particle Systems, Hyperbolic Conservation Laws, CIRM Marseille 10/2019
Parabolic Evolution Equations, Harmonic Analysis And Spectral Theory, Bad Herrenalb 05/2019
Non Standard Diffusions in Fluids, Kinetic Equations and Probability, CIRM Marseille 12/2018
Evolutionsgleichungen in Ulm, Ulm University 04/2018

Skills

Communication German (native speaker), English (C1), French (B1)
IT C++, Excel (VBA), Java, LaTeX, Mathematica, Matlab, R, Swift
Advanced understanding of software and hardware