

# Curriculum vitae Dr. math. Marco Rehmeier

I was born on 10.07.1993 in Herford, Germany.

## Contact

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## Research Interests

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Probability theory and stochastic analysis, in particular: Nonlinear Fokker-Planck-Kolmogorov equations and nonlinear Markov processes; Convex integration for fluid dynamical (S)PDEs; Stochastic effects on fluid dynamical PDEs.

## Positions

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**since 10.2024: Postdoc (Wissenschaftlicher Mitarbeiter)**

Group of Prof. Dr. Peter Friz, TU Berlin

**03.2024-09.2024: Postdoc (Wissenschaftlicher Mitarbeiter)**

CRC 1283, Project A5 *Fokker-Planck-Kolmogorov equations on general state spaces*

Stochastic Analysis group, Prof. Dr. Michael Röckner, Bielefeld University

**06.2023-02.2024: Walter-Benjamin-Postdoc (funded by German Research Foundation)**

Prof. Franco Flandoli, Scuola Normale Superiore Pisa

**10.2021-05.2023: Postdoc (Wissenschaftlicher Mitarbeiter)**

CRC 1283, Project A5 *Fokker-Planck-Kolmogorov equations on general state spaces*

Stochastic Analysis group, Prof. Dr. Michael Röckner, Bielefeld University

**05.2021-06.2021: Research stay at Seoul National University**

Research group Prof. Dr. Seung-Yeal Ha

**10.2018-09.2021: PhD student in the IRTG 2235 Bielefeld-Seoul, Bielefeld University**

Speaker of the IRTG 2235-PhD fellows

Advisor: Prof. Dr. Michael Röckner

Thesis defended on 28.09.2021 (summa cum laude)

## Education

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**10.2016-09.2018: Study of Mathematics, Bielefeld University**

Master of Science (Grade: 1.0, awarded price for best degree in mathematics)

**10.2013-09.2016: Study of Mathematics (major) and Economics (minor), Bielefeld University**

Bachelor of Science (Grade: 1.0, awarded price for best degree in mathematics)

**08.2004-06.2013: Rudolph-Brandes-Gymnasium, Bad Salzuffen, Germany**

Degree: Abitur (Grade: 1.0, awarded price for best degree)

## Publications and Preprints

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6. **Emergence of phase-locked states for a deterministic and stochastic Winfree model with inertia**, with Myeongju Kang  
*Commun. Math. Sci.*, 21(7), 1875-1894 (2023)
5. **Nonuniqueness in law for stochastic hypodissipative Navier–Stokes equation**, with Andre Schenke  
*Nonlinear Anal.*, 227, 113179 (2023)
4. **Flow selections for (nonlinear) Fokker-Planck-Kolmogorov equations**  
*J. Differential Equations*, 328, 105-132 (2022).
3. **Linearization and a superposition principle for deterministic and stochastic nonlinear FPK equations**  
*Ann. Sc. Norm. Super. Pisa Cl. Sci.*, 24(3), 1705-1739 (2023)
2. **Existence of flows for linear Fokker-Planck-Kolmogorov equations and its connection to well-posedness**  
*J. Evol. Equ.*, 21(1), 17-31 (2021)
1. **On Cherny’s results in infinite dimensions: A theorem dual to Yamada-Watanabe**  
*Stoch. Partial Differ. Equ. Anal. Comput.*, 9, 33–70 (2021)

## Preprints

13.  **$p$ -Brownian motion and the  $p$ -Laplacian**, with Viorel Barbu and Michael Röckner (2024)  
available under: arXiv:2409.18744
12. **2D vorticity Euler equations: Superposition solutions and nonlinear Markov processes**, with Marco Romito (2024)  
available under: arXiv:2407.16609
11. **Remarks on regularization by noise, convex integration and spontaneous stochasticity**, with Franco Flandoli (2024)  
available under: arXiv:2402.16525
10. **Average dissipation for stochastic transport equations with Lévy noise**, with Franco Flandoli and Andrea Papini (2024)  
available under: arXiv:2402.08461
9. **Weighted  $L^1$ -semigroup approach for nonlinear Fokker–Planck equations and generalized Ornstein–Uhlenbeck processes** (2023)  
available under: arXiv:2308.09420
8. **Nonlinear Fokker–Planck–Kolmogorov equations as gradient flows on the space of probability measures**, with Michael Röckner (2023)  
available under: arXiv:2306.09530
7. **On nonlinear Markov processes in the sense of McKean**, with Michael Röckner  
available under: arXiv:2212.12424 (2022)

## Theses

2. **Nonuniqueness of Laws on State and Path Space: Flow Selections and Superposition for Fokker–Planck–Kolmogorov Equations and Convex Integration for Stochastic Hypodissipative Navier–Stokes Equations**

PhD thesis (2021), available here

2. **On Cherny’s results in infinite dimensions: A theorem dual to Yamada–Watanabe**

Master thesis (2018), available on request

1. **On the existence and properties of fractional Brownian motion**

Bachelor thesis (2016), available on request

## Teaching and Supervision

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**2024 (summer):** Lecturer for *Fokker–Planck equations* (Bielefeld)

**2023 (winter):** Lecturer for *Introduction to Convex integration* (Pisa)

**2022 (summer):** Lecturer for *Selected Topics from Probability Theory* (Bielefeld)

**since 10.2015:** Teaching assist and tutor for the courses:

Analysis I+II, Linear Algebra I, Measure Theory, Stochastics, Functional Analysis, Probability Theory, Stochastic Analysis

**Supervision** Bachelor theses:

*Representation theorems for linear functionals* (A. Kniazev)

*Kolmogorovscher Erweiterungssatz und Stetigkeitssatz von Kolmogorov-Tschenow* (B. Bitterlich)

*Fraktionale Brownsche Bewegung: Konstruktion und Eigenschaften* (A. Heide)

Master theses: I currently supervise two master theses on the topics

*Nonlinear Markov processes*

*Nonlinear Fokker–Planck equations on manifolds as gradient flows*

## Organization of Events

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**06.2024 :** Organizer of the *Young Summer School on Stochastic Analysis* (Växjö)

**10.2020 :** Co-Organizer of the *2020 BGTS Doctoral Day* (Bielefeld)

## Grants and Funding

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**06.2024:** Junior researcher promotion grant (German Mathematical Society) financial support for the *Young Summer School on Stochastic Analysis*

**06.2023–02.2024:** Walter–Benjamin fellowship (German Research Foundation) spent with Prof. Franco Flandoli, Scuola Normale Superiore, Pisa

**10.2018** Award for best Master degree, Faculty of Mathematics, Bielefeld University

**04.2018:** Award for best tutor in mathematics (Bielefeld University)

**10.2016** Award for best Bachelor degree, Faculty of Mathematics, Bielefeld University

**10.2015–09.2017:** Scholarship for academic excellence (German Ministry for Education and Research)

## Talks

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- Weighted  $L^1$ -semigroup approach for nonlinear Fokker–Planck equations and generalized Ornstein–Uhlenbeck processes (Bochum, Aug24)
  - Nonlinear Fokker–Planck equations as gradient flows on the space of probability measures (Växjö, Jul24)
  - Probabilistic representation of nonlinear Fokker–Planck equations and nonlinear PDEs by nonlinear Markov processes (Berlin, Jun24)
  - Nonlinear Fokker–Planck equations as gradient flows on the space of probability measures (Bielefeld, Jun24)
  - Nonlinear Fokker–Planck equations as gradient flows on the space of probability measures (Hagen, Jun24)
  - Nonuniqueness of stochastic Leray-solutions for 3D fractional NSE (Bielefeld, May24)
  - Convex Integration and Spontaneous Stochasticity for fluid dynamical equations (Clausthal, May24)
  - Nonlinear Fokker–Planck equations as gradient flows on a space of measures (Bedlewo, Apr24)
  - On nonlinear Markov processes in the sense of McKean (Berlin, Feb24)
  - On nonlinear Markov processes in the sense of McKean (Leipzig, Jan24)
  - Weighted  $L^1$ -semigroup approach for nonlinear Fokker–Planck equations and generalized Ornstein–Uhlenbeck processes (Bielefeld, Nov23)
  - Nonlinear Fokker–Planck–Kolmogorov equations as gradient flows on the space of probability measures (Hammamet, Oct23)
  - On nonlinear Markov processes in the sense of McKean (Hofgeismar, Aug23)
  - On nonlinear Markov processes in the sense of McKean (Lisbon, Jul23)
  - On nonlinear Markov processes in the sense of McKean (Wilmington, Jun23)
  - On nonlinear Markov processes in the sense of McKean (Münster, Jun23)
  - On nonlinear Markov processes in the sense of McKean (Essen, Mar23)
  - On nonlinear Markov processes in the sense of McKean (Pisa, Feb23)
  - On nonlinear Markov processes in the sense of McKean (Bielefeld, Feb23)
  - Superposition for deterministic and stochastic nonlinear Fokker–Planck–Kolmogorov equations (Hammamet, Oct22)
  - Linearization and a superposition principle for deterministic and stochastic nonlinear Fokker–Planck–Kolmogorov equations (Bielefeld, Sep22)
  - Emergence of phase-locked states for a Winfree model with inertia (Bielefeld, Jul22)
  - Nonuniqueness in law for stochastic hypodissipative Navier–Stokes equations (Barcelona, May22)
  - Flow selection for (nonlinear) Fokker–Planck–Kolmogorov equations (Bielefeld, Jan22)
  - Nonuniqueness in law for stochastic hypodissipative Navier–Stokes equations (Seoul, May21)
  - Superposition principle for stochastic nonlinear Fokker–Planck–Kolmogorov equations (Seoul, May21)
  - From Interacting Particle Systems to Nonlinear Fokker–Planck equations (Bielefeld, Oct20)
  - On Cherny’s results in infinite dimensions: A theorem dual to Yamada–Watanabe (Karlsruhe, Sep19)
  - Introduction to quasi-stationary distributions and first general properties (Bielefeld, Aug19)
  - Existence of flows for linear FPK-equations and its connection to well-posedness (Essen, Jun19)
  - On Cherny’s results in infinite dimensions: A theorem dual to Yamada–Watanabe (Bielefeld, Mar19)
- + further talks in Bielefeld, including the mini lecture series *Convex Integration for fluid dynamical PDEs and its origin in Nash’s  $C^1$  isometric embedding theorem*

## Attendance at Conferences and Seminars

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- Bernoulli-ims 11th World Congress in Probability and Statistics (Bochum, Aug24)
- New developments and challenges in Stochastic Partial Differential Equations (Lausanne, Aug24)
- Linnaeus Workshop on Stochastic Analysis and Applications 2024 (Växjö, Jul24)
- Young Summer School on Stochastic Analysis (Växjö, Jun24)
- 19th Annual Berlin-Oxford Young Researchers Meeting on Applied Stochastic Analysis (Berlin, Jun24)
- Gradient flows, large deviation theory and macroscopic fluctuation theory (Bielefeld, Jun24)
- Walkshop on Mathematical Physics (Hagen, Jun24)
- The SPDEvent III (Bielefeld, May24)
- Probability and Analysis (Bedlewo, Apr24)
- Turbulence on the Banks of the Arno (Pisa, Jan24)
- Stochastic in Mathematical Finance and Physics (Hammamet, Oct13)
- CRC 1283 Retreat 2023 (Hofgeismar, Aug23)
- 43th Conference on Stochastic Processes and Applications (Lisbon, Jul23)
- 13th AIMS International Conference on Dynamical Systems, Differential Equations and Applications (Wilmington, May23)
- German Statistics and Probability Days 2023 (Essen, Mar23)
- 10th Bielefeld-SNU Joint Workshop in Mathematics (Bielefeld, Feb23)
- Recent Developments in Stochastics with Applications in Mathematical Physics and Finance (Hammamet, Oct22)
- Japanese-German conference on stochastic analysis and applications (Münster, Sep22)
- The SPDEvent (Bielefeld, Sept22)
- Stochastic Analysis and SPDEs (Barcelona, May22)
- Workshop Fractional Differential Equations (Isaac Newton Institute, Cambridge, Apr22)
- Eighth Bielefeld-SNU Joint Workshop in Mathematics (Bielefeld, Feb20)
- Touch down of stochastic analysis in Bielefeld (Bielefeld, Sep2019)
- Annual DMV-Conference 2019 (Karlsruhe, Sep19)
- IRTG Summer School on probability theory and stochastic dynamics (Bielefeld, Aug19)
- 29. Jyväskylä Summer School on Selected Topics in the Theory of BSDEs (Jyväskylä, Aug19)
- Recent Trends in Stochastic Analysis and SPDEs (Pisa, Jul19)
- 41. Nordwestdeutsches Funktionalanalysis-Kolloquium (Essen, Jun19)
- Seventh Bielefeld-SNU Joint Workshop in Mathematics (Bielefeld, Feb19)
- Winter School on Stochastic PDEs and Mean Field Games (Bologna, Jan19)
- 9th International Conference on Stochastic Analysis and Its Applications (Bielefeld, Sep18)

## Service

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- Participation in the *Bielefeld MINT information weeks*: Presentation of mathematics at university level to high school students
- Review work for: Springer Lecture Series in Mathematics, J. Evol. Equ., Potential Anal.
- Member of a tenure track-professorship evaluation committee

*last update: 01.10.2024*