

## BENJAMIN J. FEHRMAN

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### CONTACT INFORMATION

Louisiana State University  
Department of Mathematics  
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### ACADEMIC POSITIONS

#### Louisiana State University

Assistant Professor August 2023–present

#### University of Oxford

EPSRC Early Career Fellow July 2021–August 2023

Stipendiary Lecturer, Queen’s College July 2021–August 2023

Titchmarsh Research Fellow September 2018–June 2021

College Lecturer, Keble College September 2019–June 2021

#### Max Planck Institute Leipzig

NSF Postdoctoral Fellow (Sponsor: Felix Otto) August 2015–August 2018

### EDUCATION

#### University of Chicago

Ph.D. Mathematics (Advisor: Panagiotis Souganidis) August 2015

M.S. Mathematics June 2011

#### University of Notre Dame

B.S. Honors Mathematics, Summa Cum Laude May 2008

### AWARDS

- 2022 Excellence Award, University of Oxford.
- 2021 EPSRC Early Career Fellowship (£853,552).
- 2018 Fulbright Postdoctoral Fellowship (\$40,000, declined).
- 2015 NSF Mathematical Sciences Postdoctoral Research Fellowship (\$150,000).
- 2013 Lawrence and Josephine Graves Teaching Prize, University of Chicago.
- 2011 Physical Sciences Division Teaching Prize, University of Chicago.
- 2007 Barry M. Goldwater Fellowship.

### PUBLICATIONS AND PREPRINTS

- (1) *Periodic homogenisation for two dimensional generalised parabolic Anderson model*, with Y. Chen and W. Xu, arXiv:2401.05718.
- (2) *A central limit theorem for nonlinear conservative SPDEs*, with A. Clini, arXiv:2310.19924.
- (3) *Green function and invariant measure estimates for nondivergence form elliptic homogenization*, with S. Armstrong and J. Lin, arXiv:2211.13279.

- (4) *Stochastic homogenization with space-time ergodic divergence-free drift*, **Ann. Probab.**, 52(1):350–380, 2024.
- (5) *Ergodicity and random dynamical systems for conservative SPDEs*, with B. Gess and R. Gvalani, arXiv:2206.14789.
- (6) *Well-posedness of the Dean–Kawasaki and the nonlinear Dawson–Watanabe equation with correlated noise*, with B. Gess, **Arch. Ration. Mech. Anal.**, 248(20): 2024.
- (7) *Conservative stochastic PDE and fluctuations of the symmetric simple exclusion process*, with N. Dirr and B. Gess, arXiv:2012.02126.
- (8) *Large-scale regularity in stochastic homogenization with divergence-free drift*, **Ann. Appl. Probab.**, 33(4):2559–2599, 2023.
- (9) *Non-equilibrium large deviations and parabolic-hyperbolic PDE with irregular drift*, with B. Gess, **Invent. Math.**, 234:573–636, 2023.
- (10) *Convergence rates for the stochastic gradient descent method for non-convex objective functions*, with B. Gess and A. Jentzen, **J. Mach. Learn. Res.**, 21(136):1–48, 2020.
- (11) *Path-by-path well-posedness of nonlinear diffusion equations with multiplicative noise*, with B. Gess, **J. Math. Pures Appl.**, 148(9):221–266, 2021.
- (12) *Well-posedness of nonlinear diffusion equations with nonlinear, conservative noise*, with B. Gess, **Arch. Ration. Mech. Anal.**, 233(1):249–322, 2019.
- (13) *A Liouville theorem for stationary and ergodic ensembles of parabolic systems*, with P. Bella and A. Chiarini, **Probab. Theory Relat. Fields**, 173(3):759–812, 2019.
- (14) *Stochastic homogenization of linear elliptic equations: Higher-order estimates in weak norms via second-order correctors*, with P. Bella, J. Fischer and F. Otto, **SIAM J. Math. Anal.**, 49(6):4658–4703, 2017.
- (15) *A Liouville theorem for elliptic systems with degenerate ergodic coefficients*, with P. Bella and F. Otto, **Ann. Appl. Probab.**, 28(3):1379–1422, 2018.
- (16) *On the exit time and stochastic homogenization of isotropic diffusions in large domains*, **Ann. Inst. H. Poincaré Probab. Statist.**, 55(2):720–755, 2019.
- (17) *Exit laws of isotropic diffusions in random environment from large domains*, **Electron. J. Probab.**, 22: 2017.
- (18) *A Liouville property for isotropic diffusions in random environment*, arXiv:1406.1549.
- (19) *On the existence of an invariant measure for isotropic diffusions in random environment*, **Probab. Theory Relat. Fields**, 168(1-2):409–453, 2017.
- (20) *A partial homogenization result for nonconvex viscous Hamilton–Jacobi equations*, arXiv:1402.5191.
- (21) *Stochastic homogenization of monotone systems of viscous Hamilton–Jacobi equations with convex nonlinearities*, **SIAM J. Math. Anal.**, 45(4):2441–2476, 2012.
- (22) *Moduli spaces of punctured Poincaré disks*, with S. Devadoss, T. Heath and A. Vashist, **Associahedra, Tamari Lattices, and Related Structures: Tamari Memorial Festschrift**, 99–117, 2008.

## BENJAMIN J. FEHRMAN

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(23) *On the dimension of the virtually cyclic classifying space of a crystallographic group*, with F. Connolly and M. Hartglass, arXiv:0610387.

### CONFERENCE AND SEMINAR TALKS

March 2024 Oberseminar, MPI Leipzig.  
March 2024 Mathematical Physics & Analysis Seminar, IST Austria.  
February 2024 Analysis Seminar, University of Texas, Austin.  
December 2023 New Trends in Homogenization, Station biologique de Roscoff.  
November 2023 Applied Math Seminar, Tulane University.  
September 2023 Probability Seminar, Louisiana State University.  
May 2023 Asymptotics, operators and functionals, University of Bath.  
May 2023 Probability Seminar, University of Warwick.  
April 2023 North British Probability Seminar, University of Edinburgh.  
March 2023 Oxbridge PDE, University of Cambridge.  
February 2023 KWIM Conference on Cross-Diffusion Systems, Universität Konstanz.  
February 2023 Probability Seminar, University of Leeds.  
November 2022 YEQT XV, TU Eindhoven.  
September 2022 Open Japanese-German Conference on Stochastics, Universität Münster.  
August 2022 Berline SRA 2022, Harnack-Haus Berlin.  
August 2022 Stochastic Dynamics for Complex Systems, CSH Vienna.  
May 2022 Unifying concepts in PDEs with randomness, CRM Montreal.  
April 2022 Probability/PDE Interactions, CIRM Marseille.  
April 2022 Frontiers between Probability and Kinetic theory, ICMS Edinburgh.  
November 2021 Probability Seminar, University of Bielefeld.  
November 2021 Random Systems CDT Seminar, University of Oxford.  
September 2021 Minicourse for the Berlin-Oxford IRTG Summer School, Harnack-Haus Berlin.  
September 2021 PDE and Randomness, University of Bath.  
August 2021 Mathematics of Machine Learning, University of Bielefeld.  
June 2021 Stochastic Evolution Equations, ECM 2021 Mini-Symposium.  
April 2021 Probability Seminar, Universidade Estadual de Campinas.  
April 2021 Probability Seminar, University of Wisconsin.  
April 2021 Oxbridge PDE, University of Cambridge.  
February 2021 Stochastic analysis seminar, University of Oxford.  
January 2021 Stochastic analysis seminar, University of Bielefeld.  
October 2020 Probability seminar, University of Bath.  
June 2020 13th annual ERC Berlin–Oxford meeting, TU Berlin.  
April 2020 Remote math machine learning seminar, UCLA and MPI Leipzig.  
February 2020 Analysis seminar, University of Cardiff.

## BENJAMIN J. FEHRMAN

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January 2020	Applied analysis seminar, University of Utrecht.
January 2020	Stochastic analysis seminar, Imperial College London.
December 2019	12th annual ERC Berlin–Oxford meeting, University of Oxford.
November 2019	North Meets South Colloquium, University of Oxford.
October 2019	Probability seminar, University of Warwick.
September 2019	Data Day, MPI Leipzig.
August 2019	First Berlin–Leipzig workshop on fluctuating hydrodynamics, FU Berlin and MPI Leipzig.
April 2019	Random matrix and probability seminar, Harvard University.
March 2019	Oxford–ETH workshop on mathematical finance, University of Oxford.
January 2019	PDE CDT seminar, University of Oxford.
December 2018	10th annual ERC Berlin–Oxford meeting, University of Oxford.
November 2018	Mathematics of data seminar, MPI Leipzig.
August 2018	Homogenization in disordered media conference, Durham University.
June 2018	9th annual ERC Berlin–Oxford meeting, WIAS Berlin.
May 2018	Stochastic partial differential equations conference, CIRM.
April 2018	Geometric functional analysis and probability seminar, Weizmann Institute of Science.
April 2018	AMS sectional meeting, Northeastern University.
December 2017	Berlin–Leipzig workshop on analysis and stochastics, MPI Leipzig.
November 2017	Mitteldeutscher stochastik workshop, MPI Leipzig.
October 2017	Homogenization theory and applications 2017, WIAS Berlin.
June 2017	Arbeitsgemeinschaft seminar, MPI Leipzig.
May 2017	7th annual ERC Berlin–Oxford meeting, WIAS Berlin.
June 2016	New trends in nonlinear PDE conference, Cardiff University.
April 2016	Berlin–Leipzig workshop in analysis and stochastics, MPI Leipzig.
March 2015	PDE and geometric analysis seminar, University of Wisconsin-Madison.
August 2014	Oberseminar, MPI Leipzig.
March 2013	Workshop on the interplay of theory and numerics for deterministic and stochastic homogenization, Oberwolfach.

## TEACHING EXPERIENCE

### At Louisiana State University:

**Lecturer**    Fall 2023        Honors Differential & Integral Calculus (Math 1551)

### At University of Oxford:

**Lecturer**    Fall 2020        Stochastic differential equations (Math C8.1)  
                  Spring 2020      Stochastic homogenization (CDT in PDE)  
                  Fall 2019        Stochastic differential equations (Math C8.1)

**Tutor**        Winter 2023      Integral Transforms (Math ASO)  
                  Winter 2023      Multivariable calculus (Math M5)

## BENJAMIN J. FEHRMAN

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Winter 2023	Fourier series and PDEs (Math M5)
Fall 2022	Differential Equations I (Math A1)
Winter 2022	Integral Transforms (Math ASO)
Winter 2022	Multivariable calculus (Math M5)
Winter 2022	Fourier series and PDEs (Math M5)
Fall 2021	Differential equations I (Math A1)
Winter 2021	Multivariable calculus (Math M5)
Fall 2020	Metric spaces and complex analysis (Math A2)
Winter 2020	Mathematical models of financial derivatives (Math B8.3)
Winter 2020	Differential equations II (Math A6)
Winter 2020	Integral transforms (Math ASO)
Fall 2019	Stochastic differential equations (Math C8.1)
Fall 2019	Probability, measure, and martingales (Math B8.1)
Winter 2019	Stochastic modeling for biological processes (Math B5.1)
Winter 2019	Differential equations II (Math A6)
Fall 2018	Probability, measure, and martingales (Math B8.1)

### At MPI Leipzig:

<b>Lecturer</b>	2017–2018	An introduction to rough paths
	2016–2017	Hamilton–Jacobi equations: viscosity solutions, optimal control, and periodic homogenization
<b>Tutor</b>	2017–2018	Ringvorlesung

### At University of Chicago:

<b>Lecturer</b>	2014–2015	Calculus (Math 131–132)
	2013–2014	Precalculus (Math 105)
	2012–2013	Honors calculus as Inquiry-Based Learning (Math 161–162–163)
	2011–2012	Calculus (Math 131–132–133)
<b>Tutor</b>	2010–2011	Honors analysis (Math 204–205–206)

## POSTDOCTORAL RESEARCHERS

Simone Floreani      2022–2023      University of Oxford

## STUDENTS SUPERVISED

### Ph.D. Students

Shyam Popat            2021–present      University of Oxford (Co-advised with B. Hambly)  
Andrea Clini            2020–present      University of Oxford (Co-advised with J. A. Carrillo)

## **BENJAMIN J. FEHRMAN**

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### **Master's Students**

University of Oxford	2020–2021	Robert Gondris Stefan Petrevski Eoin Simpkins Cameron Spalding
	2019–2020	Edward Hart James Mason Seungjae Son Brendan Sorohan

### **MENTORSHIP AND OUTREACH**

2019–2023	Mentor, Oxford Master's in the Mathematical Sciences.
Summer 2022	Supervisor, UNIQ+ Program, University of Oxford.
Summer 2021	Supervisor, UNIQ+ Program, University of Oxford.
Summer 2020	Supervisor, UNIQ+ Program, University of Oxford.
Summer 2014	Instructor, Collegiate Scholars Program, University of Chicago.
2012–2013	Instructor, Chicago Academic Achievement Program, University of Chicago.
2010–2014	Mentor, Research Experience for Undergraduates, University of Chicago.

### **PROFESSIONAL ACTIVITIES**

2023–present	Organizer, Probability Seminar, LSU.
2022–2023	Organizer, Stochastic Analysis Seminar, University of Oxford.
2021–2023	Organizer, Fridays@4, University of Oxford.
2021–2023	Undergraduate Admissions Committee, Queen's College.
2020–2023	Organizer, OxPDE Lunchtime Seminar, University of Oxford.
2018–2021	Early Career Research Committee, University of Oxford.
2018–2019	Organizer, Data analysis working group, University of Oxford.
2013	Organizer, Research Experience for Undergraduates, University of Chicago.

**CITIZENSHIP:** USA