

## BENJAMIN J. FEHRMAN

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### CONTACT INFORMATION

University of Oxford

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Mathematical Institute

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### ACADEMIC POSITIONS

#### University of Oxford

Titchmarsh Research Fellow

September 2018–present

College Lecturer, Keble College

September 2019–present

#### 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

2018 Fulbright Postdoctoral Fellowship (declined).

2015 NSF Mathematical Sciences Postdoctoral Research Fellowship.

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) *Conservative stochastic PDE and fluctuations of the symmetric simple exclusion process*, with N. Dirr and B. Gess, December 2020, arXiv:2012.02126.
- (2) *Large-scale regularity in stochastic homogenization with divergence-free drift*, June 2020, arXiv:2010.16892.
- (3) *Large deviations for conservative stochastic PDE and non-equilibrium fluctuations*, with B. Gess, March 2020, arXiv:1910.11860.
- (4) *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.
- (5) *Path-by-path well-posedness of nonlinear diffusion equations with multiplicative noise*, with B. Gess, July 2018, arXiv:1807.04230. (to appear in **J. Math. Pures Appl.**)

- (6) *Well-posedness of nonlinear diffusion equations with nonlinear, conservative noise*, with B. Gess, **Arch. Ration. Mech. Anal.**, 233(1):249-322, 2019.
- (7) *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.
- (8) *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.
- (9) *A Liouville theorem for elliptic systems with degenerate ergodic coefficients*, with P. Bella and F. Otto, **Ann. Appl. Probab.**, 28(3):1379-1422, 2018.
- (10) *On the exit time and stochastic homogenization of isotropic diffusions in large domains*, **Ann. Inst. H. Poincaré Probab. Statist.**, 55(2):720-755, 2019.
- (11) *Exit laws of isotropic diffusions in random environment from large domains*, **Electron. J. Probab.**, 22, 2017.
- (12) *A Liouville property for isotropic diffusions in random environment*, June 2014, arXiv:1406.1549.
- (13) *On the existence of an invariant measure for isotropic diffusions in random environment*, **Probab. Theory Relat. Fields**, 168(1-2):409-453, 2017.
- (14) *A partial homogenization result for nonconvex viscous Hamilton-Jacobi equations*, February 2014, arXiv:1402.5191.
- (15) *Stochastic homogenization of monotone systems of viscous Hamilton-Jacobi equations with convex nonlinearities*, **SIAM J. Math. Analysis**, 45(4):2441-2476, 2012.

**EARLIER PUBLICATIONS**

- (1) *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.
- (2) *On the dimension of the virtually cyclic classifying space of a crystallographic group*, with F. Connolly and M. Hartglass, August 2006, arXiv:0610387.

**CONFERENCE AND SEMINAR TALKS**

- January 2020      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.
- 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.

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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 the University of Oxford:

<b>Lecturer</b>	Fall 2020	Stochastic differential equations (Math C8.1)
	Spring 2020	Stochastic homogenization (CDT in PDE)
	Fall 2019	Stochastic differential equations (Math C8.1)
<b>Tutor</b>	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)

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### 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)

## STUDENTS SUPERVISED

### Ph.D. Students

Andrea Clini	2020–present	University of Oxford (Co-advised with J. A. Carillo)
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### Master’s Students

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

## PROFESSIONAL ACTIVITIES

2020–present	Organizer, PDE CDT Seminar, University of Oxford.
Summer 2020	Supervisor, UNIQ+ Program, University of Oxford.
2019–present	Mentor, Oxford Master’s in the Mathematical Sciences.
2018–present	Early Career Research Committee, University of Oxford.
2018–2019	Organizer, Data analysis working group, University of Oxford.
2014	Instructor, Collegiate Scholars Program, University of Chicago.
2012–2013	Instructor, Chicago Academic Achievement Program, University of Chicago.
2013	Organizer, Research Experience for Undergraduates, University of Chicago.
2010–2014	Mentor, Research Experience for Undergraduates, University of Chicago.

## CITIZENSHIP: USA