

MARTIN HAIRER

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United Kingdom

Born: November 14, 1975

Citizenship: Austria

Civil status: Married, name of spouse: Xue-Mei Li

Languages: Fluent in French, German, and English

Last update of this document: January 7, 2010

Education

November 2001 PHD IN PHYSICS – University of Geneva.
October 1998 MSC IN PHYSICS – University of Geneva.
July 1998 BSC IN MATHEMATICS – University of Geneva.
June 1994 HIGH SCHOOL DIPLOMA – Collège Claparède, Geneva.

Honours and prizes

- Recipient of a 2008 Whitehead prize awarded by the LMS
- Recipient of a 2008 Philip Leverhulme Prize
- Recipient of a 2009 Royal Society Wolfson Research Merit Award
- Associate editor for the journal “Probability Theory and Related Fields”
- Associate editor for the journal “NoDea”
- Associate editor for the “Journal of Mathematical Analysis and Applications”

Employment history

From 01/2010	FULL PROFESSOR The University of Warwick.
01/2009 – 12/2009	ASSOCIATE PROFESSOR New York University (Courant institute).
09/2007 – 01/2009	ASSOCIATE PROFESSOR (READER) The University of Warwick.
09/2006 – 09/2007	ASSOCIATE PROFESSOR The University of Warwick.
10/2004 – 09/2006	LECTURER The University of Warwick.
10/2003 – 10/2004	ADVANCED FELLOWSHIP (from the Swiss NSF) Mathematics Research Centre, University of Warwick.
10/2002 – 10/2003	POSTDOCTORAL FELLOWSHIP (from the Swiss NSF) Mathematics Research Centre, University of Warwick.
01/1999 – 10/2002	RESEARCH ASSISTANT Département de Physique Théorique, University of Geneva.
09/1997 – 09/1999	HIGHSCHOOL LABORATORY ASSISTANT (part time) Collège Claparède, Geneva.

Past and current PhD students

D. Kelly (PhD started November 2009).

C. Manson (PhD started November 2006).

P. Bubak (PhD completed January 2009). Joint supervision with J. Robinson

A. Ohashi (PhD completed October 2006). Joint supervision with P. Ruffino

Organisation of workshops and seminars

May 2–3, 2003	<i>Workshop on fractional Brownian motion</i> , co-organiser
August 4–15, 2003	<i>Workshop on SPDEs and related topics</i> , co-organiser
July 9, 2004	<i>Third East Midlands Stochastic Analysis Seminar</i> , Warwick, co-organiser
2003 – 2007	<i>Organiser of the Stochastic Analysis Seminar of the University of Warwick</i>
July 9–13 2007	<i>SciCADE07</i> Co-organiser for two minisymposia
June 2008	<i>Easter Probability Meeting</i> , Warwick, co-organiser
July 27–31 2009	<i>SPA 2009</i> Organiser of a minisymposium
January – July 2010	Organiser of a thematic semester on SPDEs at the Newton In- stitute (Cambridge)

Minicourses

- March 1–2, 2007 Winter intensive course: *Hypoellipticity : Analysis & Stochastic Analysis*, Imperial College, London
- July, 2007 Chinese Probability Summerschool, Wuhan, China
- July 7–11, 2008 LMS Short Course Programme: *Stochastic Partial Differential Equations*, Imperial College, London
- December, 2008 Necas Seminar on Continuum Mechanics, Prague
- July, 2009 Technical University, Berlin
- December, 2009 Stochastic and Statistical Methods in Multi-Scale Systems, Shanghai, China

Fellowships awarded

- 10/2006 5-year EPSRC Advanced Research Fellowship EP/E002269/1. (£413k)
- 10/2004 2-year Advanced research fellowship of the Swiss National Science Foundation (CHF 96k could not be taken up because it clashed with the position in Warwick).
- 10/2003 1-year Advanced research fellowship of the Swiss National Science Foundation. (CHF 48k)
- 10/2002 1-year Research fellowship of the Swiss National Science Foundation. (CHF 39k)

Grants awarded

- 10/2006 EPSRC Grant EP/E002269/1 (funding for a 3 year postoc position; joint with A. Stuart) (£267k)
- 10/2007 EPSRC Grant EP/F029950/1 (funding for a 1 week meeting; joint with W. Kendall (PI) and J. Warren) (£20k)

Visiting professorships with honorarium

- December 2006 Université Paul Sabatier, Toulouse, invited professor (1 month)
- July 2009 Technical University, Berlin, invited professor (1 month)

Publications and Preprints

Refereed articles

- [1] J.-P. Eckmann and M. Hairer, *Non-Equilibrium Statistical Mechanics of Strongly Anharmonic Chains of Oscillators*, Commun. Math. Phys. **212** (2000), no 1, pp. 105–164
- [2] J.-P. Eckmann and M. Hairer, *Invariant Measures for Stochastic PDE's in Unbounded Domains*, Nonlinearity **14** (2001), pp. 133–151
- [3] J.-P. Eckmann and M. Hairer, *Uniqueness of the Invariant Measure for a Stochastic PDE Driven by Degenerate Noise*, Commun. Math. Phys. **219** (2001), no 3, pp. 523–565

- [4] M. Hairer, *Exponential Mixing for a Stochastic PDE Driven by Degenerate Noise*, *Nonlinearity* **15** (2002), pp. 271–279
- [5] M. Hairer, *Exponential Mixing Properties of Stochastic PDEs Through Asymptotic Coupling*, *Probab. Theory Relat. Fields* **124** (2002), no 3, pp. 345–380
- [6] J.-P. Eckmann and M. Hairer, *Spectral Properties of Hypocoelliptic Operators*, *Commun. Math. Phys.* **235** (2003), no 2, pp. 233–253
- [7] D. Blömker and M. Hairer, *Stationary Solutions for a Model of Amorphous Thin-Film Growth*, *Stochastic Analysis and Applications* **22** (2004), no 4, pp. 903–922
- [8] D. Blömker and M. Hairer, *Multiscale expansion of invariant measures for SPDEs*, *Commun. Math. Phys.* **251** (2004), pp. 515–555
- [9] M. Hairer and G. Pavliotis, *Periodic Homogenization for Hypocoelliptic Diffusions*, *J. Stat. Phys.* **117** (2004), no. 1/2, pp. 261–279
- [10] M. Hairer and J. Mattingly, *Ergodicity of the 2D Navier-Stokes Equations with Degenerate Stochastic Forcing*, *Annals of Maths* **164** (2006), no 3, pp. 993–1032
- [11] D. Blömker, M. Hairer, and G. Pavliotis, *Modulation Equations: Stochastic Bifurcation in Large Domains*, *Commun. Math. Phys.* (258) (2005), no 2, pp. 479–512
- [12] M. Hairer, J. Mattingly, and E. Pardoux, *Malliavin calculus for highly degenerate 2D stochastic Navier-Stokes equations*, *C. R. Acad. Sci. Paris, Ser. I* **339** (2004), no. 11, pp. 793–796
- [13] M. Hairer and J. Mattingly, *Ergodic properties of highly degenerate 2D stochastic Navier-Stokes equations*, *C. R. Acad. Sci. Paris, Ser. I* **339** (2004), no. 12, pp. 879–882
- [14] M. Hairer, *Ergodicity of stochastic differential equations driven by fractional Brownian motion*, *The Annals of Probability* **33** (2005), no 3, pp. 703–758
- [15] M. Hairer, A. M. Stuart, J. Voß, and P. Wiberg, *Analysis of SPDEs Arising in Path Sampling Part I: The Gaussian Case*, *Comm. Math. Sci.* **3** (2005), no 4, pp. 587–603
- [16] A. Apte, M. Hairer, A. M. Stuart, and J. Voß, *A Bayesian approach to data assimilation*, *Physica D* **230** (2007), pp. 50–64
- [17] M. Hairer and A. Ohashi, *Ergodic theory for SDEs with extrinsic memory*, *The Annals of Probability* **35** (2007), no 5, pp. 1950–1977
- [18] F. Baudoin and M. Hairer, *Hörmander’s theorem for fractional Brownian motion*, *Probab. Theory Rel. Fields* **139** (2007), no 3/4, pp. 373–395
- [19] D. Blömker, M. Hairer, and G. Pavliotis, *Multiscale Analysis for SPDEs with Quadratic Nonlinearities*, *Nonlinearity* **20** (2007), no 7, pp. 1721–1744

- [20] M. Hairer, A. M. Stuart, and J. Voß, *Analysis of SPDEs Arising in Path Sampling Part II: The Nonlinear Case*, *Annals of Applied Probability* **17** (2007), no 5/6, pp. 1657–1706
- [21] F. Flandoli, M. Gubinelli, M. Hairer, and M. Romito, *Remarks on the K41 scaling law in turbulent fluids*, *Commun. Math. Phys.* **278** (2008), no 1, pp. 1–29
- [22] M. Hairer and G. Pavliotis, *From ballistic to diffusive behavior in periodic potentials*, *J. Stat. Phys.* **131** (2008), no 1, pp. 175–202
- [23] F. Baudoin, M. Hairer, and J. Teichmann *Ornstein-Uhlenbeck processes on Lie groups*, *J. Func. Anal.* **255** (2008), no 4, pp. 877–890
- [24] M. Hairer and E. Pardoux *Homogenization of periodic linear degenerate PDEs*, *J. Func. Anal.* **255** (2008), no 9, pp. 2462–2487
- [25] M. Hairer and J. Mattingly, *Spectral gaps in Wasserstein distances and the 2D stochastic Navier-Stokes equations*, *The Annals of Probability* **36** (2008), no 6, pp. 2050–2091
- [26] M. Hairer, *Ergodic properties of a class of non-Markovian processes*, ‘Trends in Stochastic Analysis’, LMS Lecture Notes Series 353
- [27] M. Hairer, A. Stuart and J. Voß, *Sampling conditioned diffusions*, ‘Trends in Stochastic Analysis’, LMS Lecture Notes Series 353
- [28] M. Hairer and J. Mattingly, *Slow energy dissipation in anharmonic oscillator chains*, *Commun. Pure Appl. Math.* **68** (2009), no 8, pp. 999-1032
- [29] M. Hairer, *How hot can a heat bath get?*, *Commun. Math. Phys.* **292** (2009), no 1, pp. 131-177
- [30] R. F. Bass, K. Burdzy, Z.-Q. Zheng, and M. Hairer, *Stationary distributions for diffusions with inert drift*, *Probab. Theo. Rel. Fields* **146** (2010), no 1, pp. 1-47
- [31] M. Hairer, J. Mattingly, and M. Scheutzow, *Asymptotic coupling and a weak form of Harris’ theorem with applications to stochastic delay equations*, *Probab. Theory Rel. Fields* (2010; online first)

Proceedings articles

- [1] E. Hairer and M. Hairer, *GniCodes - Matlab programs for geometric numerical integration. Frontiers in Numerical Analysis (Durham 2002)*, Springer, Berlin, 2003.
- [2] M. Hairer, *Coupling stochastic PDEs*, Proceedings of the ICMP, 2003
- [3] D. Blömker and M. Hairer, *Amplitude Equations for SPDEs: Approximate Centre Manifolds and Invariant Measures*, Proceedings of the IMA (2003)
- [4] M. Hairer and C. Manson *Periodic homogenization with an interface*, Proceedings of ISAAC 2009
- [5] M. Hairer *Hypoellipticity in Infinite Dimensions*, Proceedings of ISAAC 2009

Articles in press

- [1] M. Hairer and J. Mattingly *Yet another look at Harris ergodic theorem for Markov chains*, Preprint (2008)

Submitted articles

- [1] M. Hairer and J. Mattingly *A Theory of Hypocoellipticity and Unique Ergodicity for Semilinear Stochastic PDEs*, Preprint (2008)
- [2] M. Hairer and C. Manson *Periodic homogenization with an interface: the one-dimensional case*, Preprint (2009)
- [3] M. Hairer and C. Manson *Periodic homogenization with an interface: the multi-dimensional case*, Preprint (2009)
- [4] M. Hairer and A. Majda *A simple framework to justify linear response theory*, Preprint (2009)
- [5] M. Hairer and N. S. Pillai *Ergodicity of hypoelliptic SDEs driven by fractional Brownian motion*, Preprint (2009)
- [6] M. Hairer, A. Stuart, and J. Voß *Sampling Conditioned Hypocoelliptic Diffusions*, Preprint (2009)

Unpublished notes

- [1] M. Hairer, *A probabilistic argument for the controllability of conservative systems*, Unpublished note (2007).
- [2] M. Hairer, *Ergodic properties of Markov processes*, Unpublished lecture notes (2005).
- [3] M. Hairer, *Ergodic Theory for Stochastic PDEs*, Unpublished lecture notes (2008).
- [4] M. Hairer, *Introduction to Stochastic PDEs*, Unpublished lecture notes (2009).

Theses

- [1] M. Hairer, *Systèmes Mécaniques Couplés à des Bains Thermiques de Températures Différentes*, Diploma Thesis, University of Geneva, 1998
- [2] M. Hairer, *Comportement Asymptotique d'Équations à Dérivées Partielles Stochastiques*, PhD Thesis, University of Geneva, 2001

Invited talks at conferences and seminars (from 2005)

- 04/03/2005 East Midlands Stochastic Analysis seminar, University of Hull
21/03/2005 Institute colloquium, Chinese Academy of Science, Beijing, China
24/03/2005 Applied Mathematics seminar, Chinese Academy of Science, Beijing
31/03/2005 Miniworkshop on the stochastic Navier-Stokes equations and related topics, Wuhan, China
20/04/2005 *Dynamics and Fluctuations in Extended Systems*, IHP Paris. Title of talk: 'Ergodic properties of the 2D Navier-Stokes equations'
08/05/2005 Swiss Probability Seminar, Bern
25/05/2005 *SIAM Conference on Applications of Dynamical Systems*, Snowbird, USA, Title of talk: 'Ergodicity and Stochastic PDEs'
06/08/2005 *New Directions In Probability Theory*, Minneapolis, USA, Title of talk: 'Stochastic modulation equations'
22/11/2005 Probability seminar, Cambridge
08/12/2005 Probability seminar, Toulouse, France
22/12/2005 Colloquium, Institute of Statistics, Bangalore, India
13/01/2006 Bonn Stochastic Days 2006, Bonn
25/01/2006 Probability seminar, ETH Zurich
03/03/2006 Probability seminar, Bath
04/04/2006 *Stochastic Partial Differential Equations*, Scuola Normale, Pisa, Italy, Title of talk: 'A spectral gap for the stochastic Navier-Stokes equations'
24/04/2006 Stochastic Analysis seminar, Oxford
26/04/2006 East Midlands Stochastic Analysis seminar, York
18/05/2006 Stochastic Analysis seminar, Imperial College London
13/06/2006 Probability Seminar, Toulouse, France
17/07/2006 *Stochastic Processes and Applications*, Paris V
26/07/2006 *Stochastic Fluid Mechanics and SPDEs*, Scuola Normale, Pisa
19/09/2006 *Computational Aspects of SPDEs*, Salzburg
31/10/2006 SFB-Seminar, Bonn
15/12/2006 Numerical analysis seminar, Berlin
24/01/2007 *Dynamics and statistics of non-equilibrium phenomena*, IHP Paris
15/02/2007 Stochastic analysis seminar, Loughborough
24/02/2007 *Multiscale Analysis and Computations in Stochastic Differential Equation Modelling*, Sussex
26/03/2007 *Stochastic Dynamical Systems and Control*, MSRI Berkeley
21/04/2007 *Stochastic Analysis, Stochastic Differential Geometry and Applications*, Swansea
22/05/2007 *Partial differential equations and fluid mechanics*, Warwick
06/06/2007 *Functional inequalities: Probabilities and PDEs*, Paris
20/06/2007 *Stochastic Analysis and Related Fields*, Toulouse
22/06/2007 *Séminaire Hypatie*, Marseille
03/07/2007 *Recent Developments in Random Walks*, Durham
11/08/2007 *EquaDiff*, Vienna (**Plenary Talk**)
11/09/2007 *Stochastic Partial Differential Equations*, Mittag-Leffler institute

20/09/2007 Seminar, Mittag-Leffler institute
22/10/2007 Stochastic Analysis seminar, Oxford
24/10/2007 Applied mathematics seminar, ETH Zurich
26/10/2007 Theoretical Physics seminar, Geneva
12/11/2007 *Particle systems, nonlinear diffusions, and equilibration*, Hausdorff Center, Bonn
28/11/2007 Applied mathematics seminar, Courant Institute, New York
29/11/2007 Dynamical systems seminar, Courant Institute, New York
26/03/2008 *British Mathematical Colloquium* (splinter session), York
14/04/2008 Mathematical Physics Seminar, Geneva
18/04/2008 Berlin Leipzig Seminar, Analysis / Probability Theory, Leipzig
16/06/2008 Analysis Seminar, Reims
15/07/2008 *European Congress of Mathematics*, Amsterdam
22/08/2008 Stochastic Analysis seminar, Campinas
27/08/2008 *Workshop on Stochastic Modelling*, Ribeirão Preto
09/09/2008 Analysis seminar, Campinas
20/11/2008 Stochastic Analysis seminar, Sheffield
08/12/2008 Continuum mechanics seminar, NCMM Prague
10/12/2008 *Workshop on Mathematical Analysis of Fluid Models*, NCMM Prague
16/12/2008 PDE seminar, Prague
02/03/2009 Dynamical Systems seminar, Courant Institute, New York
05/03/2009 Colloquium, University of Connecticut
03/04/2009 Probability seminar, Courant Institute, New York
10/04/2009 Probability seminar, Rochester University
28/04/2009 Mathematics colloquium, Brown University
01/05/2009 *Princeton - Columbia probability day*, New York
13/05/2009 Analysis seminar, Institute of Advanced Studies, Princeton
29/05/2009 *East Midlands Stochastic Analysis Seminar*, York
10/06/2009 *Workshop on Random Dynamical Systems*, Tianjing
20/06/2009 *Conference on Scientific Computing*, Geneva
15/07/2009 *ISAAC 2009*, Imperial College London
29/07/2009 *Stochastic Processes and Applications*, Berlin
06/10/2009 Probability Seminar, Brown
13/10/2009 ORFE Seminar, Princeton
05/11/2009 Mathematics colloquium, Kansas
08/12/2009 *SIAM conference on analysis of PDEs*, Miami
05/01/2010 *Stochastic Partial Differential Equations*, Cambridge

Awards and achievements outside of academia

- 1989 Distinction “Very Good” for the work “REDO: Résolution d’Équations Différentielles Ordinaires” at the Swiss national contest for young scientists.
- 1990 Distinction “Excellent” for the work “ElectroSim: Simulation de circuits électriques sur Macintosh” at the Swiss national contest for young scientists. This work was selected to represent Switzerland at the European Community Contest for Young Scientistst.
- 1991 The program “ElectroSim” is distinguished with the “COMETT Award” at the third European Community Contest for Young Scientistst in Zürich.
- 1994 Distinction “Excellent” for the work “Amadeus: traitement et analyse de sons sur Macintosh” at the Swiss national contest for young scientists.
- 1997–2007 Development of the Macintosh sharewares “Amadeus II” and “Amadeus Pro”. These popular sound editors are used by more than 50’000 private and professional registered users worldwide, including many schools and universities.
- 2000 Development of a \LaTeX to $\mathcal{A}\mathcal{M}\mathcal{S}\text{-}\text{\TeX}$ converter for the journal “L’Enseignement Mathématique”.
- 2001 Development of the \LaTeX document class file `ensmath.cls` that is used by the journal “L’Enseignement Mathématique”.
- 2007 The software Amadeus Pro obtains the ‘MacWorld Editor’s Choice Award’.