

Johannes Zimmer

Department of Mathematical Sciences
University of Bath
Bath BA2 7AY
United Kingdom
++44 12 25 38 60 97
zimmer@maths.bath.ac.uk
<http://www.maths.bath.ac.uk/~zimmer>

Education

PhD in Mathematics, Technische Universität München, October 2000, summa cum laude

Diploma in Mathematics, Technische Universität München, November 1997, average 1.0

Professional experience

Professor of Mathematics, University of Bath, Department of Mathematical Sciences, since 2014

Reader (Associate Professor) in Applied Mathematics, University of Bath, Department of Mathematical Sciences, 2009 – 2014

Lecturer (Assistant Professor) in Applied Mathematics, University of Bath, Department of Mathematical Sciences, 2004 – 2009

Postdoctoral Fellow and Emmy Noether Fellow, Max Planck Institute for Mathematics in the Sciences, September 2003 – August 2004

Lecturer in Mechanical Engineering, California Institute of Technology, Division of Engineering and Applied Science, January 2002 – June 2002

Postdoctoral Fellow, California Institute of Technology, Division of Engineering and Applied Science, September 2001 – August 2003

Awards and fellowships

Royal Society Wolfson Research Merit Award, 2016

Timoshenko Visiting Scholar, Stanford University, 2004 – 2005

Advanced Research Fellowship, Engineering and Physical Sciences Research Council, October 2004 – September 2009

Emmy Noether Stipend, Deutsche Forschungsgemeinschaft, January 2004

Award of the Deutsche Mathematiker-Vereinigung (German Mathematical Society) at the students' conference 1997 (14 awards nationwide)

Award of the Hurwitz-Gesellschaft zur Förderung der Mathematik an der TU München (Mathematical Society of the Technische Universität München) for excellent PhD thesis, 2001

Award of the Hurwitz-Gesellschaft zur Förderung der Mathematik an der TU München (Mathematical Society of the Technische Universität München) for excellent diploma thesis, 1997
Scholar, Studienstiftung des Deutschen Volkes, 1992 – 1997 (German National Merit Foundation)

Research interests

Applied Analysis and Modelling: partial differential equations, calculus of variations, dynamical systems, multiscale problems, stochastic systems, nonlocal equations. Nonequilibrium thermodynamics, mathematical problems from physics and engineering.

Publications and theses (Online at <http://www.maths.bath.ac.uk/~zimmer>)

Five central publications covering the spectrum of my interest are [2, 6, 29, 22, 4].

Published or accepted articles

- [1] Horacio González Duhart, Peter Mörters, and Johannes Zimmer. The Semi-Infinite Asymmetric Exclusion Process: Large Deviations via Matrix Products. *Potential Anal.* 48.3 (2018), 301–323.
- [2] Peter Embacher, Nicolas Dirr, Johannes Zimmer, and Celia Reina. Computing diffusivities from particle models out of equilibrium. *Proc. Roy. Soc. London Ser. A* 474.2212 (2018).
- [3] Shangjiang Guo and Johannes Zimmer. Travelling wavefronts in nonlocal diffusion equations with nonlocal delay effects. *Bull. Malaysian Math. Soc.* 41.2 (2018), 919–943.
- [4] Marcus Kaiser, Robert L. Jack, and Johannes Zimmer. Canonical structure and orthogonality of forces and currents in irreversible Markov chains. *J. Stat. Phys.* 170.6 (2018), 1019–1050.
- [5] Nadia Ansini, Andrea Braides, and Johannes Zimmer. Minimising movements for oscillating energies: the critical regime. *Proc. Roy. Soc. Edinburgh Sect. A*, to appear (<http://arxiv.org/abs/1605.01885>) (2017).
- [6] Boris Buffoni, Hartmut Schwetlick, and Johannes Zimmer. Travelling waves for a Frenkel-Kontorova chain. *J. Differential Equations* 263.4 (2017), 2317–2342.
- [7] Dietmar Hömberg, Francesco Saverio Patacchini, Kenichi Sakamoto, and Johannes Zimmer. A revisited Johnson-Mehl-Avrami-Kolmogorov model and the evolution of grain-size distributions in steel. *IMA J. Appl. Math.* 82 (2017), 763–780.
- [8] Robert L. Jack, Marcus Kaiser, and Johannes Zimmer. Symmetries and Geometrical Properties of Dynamical Fluctuations in Molecular Dynamics. *Entropy* 19.10 (2017), 562.
- [9] Marcus Kaiser, Robert L. Jack, and Johannes Zimmer. Acceleration of convergence to equilibrium in Markov chains by breaking detailed balance. *J. Stat. Phys.* 168.2 (2017), 259–287.
- [10] Nicolas Dirr, Marios Stamatakis, and Johannes Zimmer. Entropic and gradient flow formulations for nonlinear diffusion. *J. Math. Phys.* 57.8 (2016), 081505, 13.
- [11] Nicolas Dirr, Marios Stamatakis, and Johannes Zimmer. Hydrodynamic limit of condensing two-species zero range processes with sub-critical initial profiles. *J. Stat. Phys.* 168.4 (2016), 794–825.
- [12] Hartmut Schwetlick and Johannes Zimmer. A convergent string method: Existence and approximation for the Hamiltonian boundary-value problem. Ed. by Thomas Hagen, Florian Rupp, and Jürgen Scheurle. *Dynamical Systems, Number Theory and Applications: A Festschrift in Honor of Armin Leutbecher's 80th Birthday*. World Scientific, 2016.
- [13] Shangjiang Guo and Johannes Zimmer. Stability of travelling wavefronts in discrete reaction-diffusion equations with nonlocal delay effects. *Nonlinearity* 28.2 (2015), 463–492.
- [14] Celia Reina and Johannes Zimmer. Entropy production and the geometry of dissipative evolution equations. *Phys. Rev. E* 92.5 (2015), 052117, 7.

- [15] Hartmut Schwetlick, Daniel C. Sutton, and Johannes Zimmer. On the Γ -limit for a non-uniformly bounded sequence of two-phase metric functionals. *Discrete Contin. Dyn. Syst.* 35.1 (2015), 411–426.
- [16] Hartmut Schwetlick, Daniel C. Sutton, and Johannes Zimmer. The Finsler metric obtained as the Γ -limit of a generalised Manhattan metric. *J. Convex Anal.* 22.1 (2015), 19–36.
- [17] Manh Hong Duong, Mark A. Peletier, and Johannes Zimmer. Conservative-dissipative approximation schemes for a generalized Kramers equation. *Math. Methods Appl. Sci.* 37.16 (2014), 2517–2540.
- [18] Robert L. Jack and Johannes Zimmer. Geometrical interpretation of fluctuating hydrodynamics in diffusive systems. *J. Phys. A* 47.48 (2014), 485001, 17.
- [19] Christine R. Venney and Johannes Zimmer. Travelling lattice waves in a toy model of Lennard-Jones interaction. *Quart. Appl. Math.* 72.1 (2014), 65–84.
- [20] Stefan Adams, Nicolas Dirr, Mark Peletier, and Johannes Zimmer. Large deviations and gradient flows. *Philos. Trans. R. Soc. Lond. Ser. A Math. Phys. Eng. Sci.* 371.2005 (2013), 20120341, 17.
- [21] Amit Das, Amit Acharya, Karsten Matthies, and Johannes Zimmer. Can equations of equilibrium predict all physical equilibria? A case study from Field Dislocation Mechanics. *Math. Mech. Solids* 18.8 (2013), 803–822.
- [22] Manh Hong Duong, Mark A. Peletier, and Johannes Zimmer. GENERIC formalism of a Vlasov-Fokker-Planck equation and connection to large-deviation principles. *Nonlinearity* 26.11 (2013), 2951–2971.
- [23] Michael Herrmann, Karsten Matthies, Hartmut Schwetlick, and Johannes Zimmer. Subsonic phase transition waves in bistable lattice models with small spinodal region. *SIAM J. Math. Anal.* 45.5 (2013), 2625–2645.
- [24] Nicolas Dirr, Vaios Laschos, and Johannes Zimmer. Upscaling from particle models to entropic gradient flows. *J. Math. Phys.* 53.6 (2012), 063704, 9.
- [25] Michael Herrmann, Hartmut Schwetlick, and Johannes Zimmer. On selection criteria for problems with moving inhomogeneities. *Contin. Mech. Thermodyn.* 24.1 (2012), 21–36.
- [26] Martin Kružík and Johannes Zimmer. On an extension of the space of bounded deformations. *Z. Anal. Anwend.* 31.1 (2012), 75–91.
- [27] Hartmut Schwetlick, Daniel C. Sutton, and Johannes Zimmer. Nonexistence of slow heteroclinic travelling waves for a bistable Hamiltonian lattice model. *J. Nonlinear Sci.* 22.6 (2012), 917–934.
- [28] Hartmut Schwetlick and Johannes Zimmer. Kinetic relations for a lattice model of phase transitions. *Arch. Ration. Mech. Anal.* 206.2 (2012), 707–724.
- [29] Stefan Adams, Nicolas Dirr, Mark A. Peletier, and Johannes Zimmer. From a large-deviations principle to the Wasserstein gradient flow: a new micro-macro passage. *Comm. Math. Phys.* 307.3 (2011), 791–815.
- [30] Carl-Friedrich Kreiner and Johannes Zimmer. Existence of subsonic heteroclinic waves for the Frenkel-Kontorova model with piecewise quadratic on-site potential. *Nonlinearity* 24.4 (2011), 1137–1163.
- [31] Martin Kružík and Johannes Zimmer. A model of shape memory alloys taking into account plasticity. *IMA J. Appl. Math.* 76.1 (2011), 193–216.
- [32] Julia Kundin, Heike Emmerich, and Johannes Zimmer. Mathematical concepts for the micro-mechanical modeling of dislocation dynamics with a phase-field approach. *Phil. Mag.* 91.1 (2011), 97–121.

- [33] Christine R. Venney and Johannes Zimmer. Persistence of supersonic periodic solutions for chains with anharmonic interaction potentials between neighbours and next to nearest neighbours. *Dyn. Syst.* 26.4 (2011), 503–518.
- [34] Amit Acharya, Karsten Matthies, and Johannes Zimmer. Travelling wave solutions for a quasilinear model of field dislocation mechanics. *J. Mech. Phys. Solids* 58.12 (2010), 2043–2053.
- [35] Martin Kružík and Johannes Zimmer. Evolutionary problems in non-reflexive spaces. *ESAIM Control Optim. Calc. Var.* 16.1 (2010), 1–22.
- [36] Julia Kundin, Heike Emmerich, and Johannes Zimmer. Three-dimensional model of martensitic transformations with elasto-plastic effects. *Phil. Mag.* 90.11 (2010), 1495–1510.
- [37] Natalia Babych and Johannes Zimmer. Asymptotics of resonances in a thermoelastic model with light local mass perturbations. *Quart. Appl. Math.* 67.2 (2009), 311–326.
- [38] Isaac Vikram Chenchiah, Marc Oliver Rieger, and Johannes Zimmer. Gradient flows in asymmetric metric spaces. *Nonlinear Anal.* 71.11 (2009), 5820–5834.
- [39] Patrick W. Dondl, Kai Hormann, and Johannes Zimmer. Modeling transformation paths of multiphase materials: The triple point of zirconia. *Phys. Rev. B* 79.10, 104114 (2009), 104114, 12.
- [40] Carl-Friedrich Kreiner and Johannes Zimmer. Heteroclinic travelling waves for the lattice sine-Gordon equation with linear pair interaction. *Discrete Contin. Dyn. Syst.* 25.3 (2009), 915–931.
- [41] Carl-Friedrich Kreiner and Johannes Zimmer. Travelling wave solutions for the discrete sine-Gordon equation with nonlinear pair interaction. *Nonlinear Anal.* 70.9 (2009), 3146–3158.
- [42] Marc Oliver Rieger and Johannes Zimmer. Young measure flow as a model for damage. *Z. Angew. Math. Phys.* 60.1 (2009), 1–32.
- [43] Hartmut Schwetlick and Johannes Zimmer. Calculation of long time classical trajectories: Algorithmic treatment and applications for molecular systems. *J. Chem. Phys.* 130.12, 124106 (2009), 124106, 11.
- [44] Hartmut Schwetlick and Johannes Zimmer. Existence of dynamic phase transitions in a one-dimensional lattice model with piecewise quadratic interaction potential. *SIAM J. Math. Anal.* 41.3 (2009), 1231–1271.
- [45] Julia Collins and Johannes Zimmer. An asymmetric Arzelà-Ascoli theorem. *Topology Appl.* 154.11 (2007), 2312–2322.
- [46] Kai Hormann and Johannes Zimmer. On Landau theory and symmetric energy landscapes for phase transitions. *J. Mech. Phys. Solids* 55.7 (2007), 1385–1409.
- [47] Hartmut Schwetlick and Johannes Zimmer. Solitary waves for nonconvex FPU lattices. *J. Nonlinear Sci.* 17.1 (2007), 1–12.
- [48] Carl-Friedrich Kreiner and Johannes Zimmer. Topology and geometry of nontrivial rank-one convex hulls for two-by-two matrices. *ESAIM Control Optim. Calc. Var.* 12.2 (2006), 253–270 (electronic).
- [49] Johannes Zimmer. Jog my shape memory: dynamics as a challenge in mathematical materials science. *Philos. Trans. R. Soc. Lond. Ser. A Math. Phys. Eng. Sci.* 364.1849 (2006), 3285–3300.
- [50] Marc Oliver Rieger and Johannes Zimmer. Global existence for nonconvex thermoelasticity. *Adv. Math. Sci. Appl.* 15.2 (2005), 559–569.
- [51] Kaushik Bhattacharya, Sergio Conti, Giovanni Zanzotto, and Johannes Zimmer. Crystal symmetry and the reversibility of martensitic transformations. *Nature* 428.6978 (2004), 55–59.

- [52] Patrick W. Dondl and Johannes Zimmer. Modeling and simulation of martensitic phase transitions with a triple point. *J. Mech. Phys. Solids* 52.9 (2004), 2057–2077.
- [53] Carl-Friedrich Kreiner, Johannes Zimmer, and Isaac Chenchiah. Towards the efficient computation of effective properties of microstructured materials. *C. R. Mecanique* 332.3 (2004), 169–174.
- [54] Johannes Zimmer. Global existence for a nonlinear system in thermoviscoelasticity with nonconvex energy. *J. Math. Anal. Appl.* 292.2 (2004), 589–604.
- [55] Johannes Zimmer. Stored energy functions for phase transitions in crystals. *Arch. Ration. Mech. Anal.* 172.2 (2004), 191–212.
- [56] Dierk Schleicher and Johannes Zimmer. Escaping points of exponential maps. *J. London Math. Soc. (2)* 67.2 (2003), 380–400.
- [57] Dierk Schleicher and Johannes Zimmer. Periodic points and dynamic rays of exponential maps. *Ann. Acad. Sci. Fenn. Math.* 28.2 (2003), 327–354.

Conference proceedings

- [58] Johannes Zimmer. On fluctuations in Markov chains. *Oberwolfach Reports*, to appear (2018). Workshop *Variational Methods for Evolution*.
- [59] Johannes Zimmer. From particles to a conservation law: large deviations for the totally asymmetric exclusion process on the half line. *Oberwolfach Reports* 11.4 (2014). Workshop *Variational Methods for Evolution*, 3188–3190.
- [60] Martin Kružík and Johannes Zimmer. Modelling of thin martensitic films with nonpolynomial stored energies. *Recent trends in dynamical systems*. Vol. 35. Springer Proc. Math. Stat. Springer, Basel, 2013, pp. 587–608.
- [61] H. Schwetlick and J. Zimmer. The computation of long time Hamiltonian trajectories for molecular systems via global geodesics. *Numerical mathematics and advanced applications 2011*. Springer, Heidelberg, 2013, pp. 227–234.
- [62] Johannes Zimmer. From simple particle models to GENERIC. *Oberwolfach Reports* 10.4 (2013). Mini-Workshop *Inelastic and Non-equilibrium Material Behavior: from Atomistic Structure to Macroscopic Constitutive Relations*, 3182–3184.
- [63] Martin Kružík and Johannes Zimmer. Rate-independent processes with linear growth energies and time-dependent boundary conditions. *Discrete Contin. Dyn. Syst. Ser. S* 5.3 (2012), 591–604.
- [64] Johannes Zimmer. A variational approach to the Hamiltonian boundary value problem: existence and approximation. *Oberwolfach Reports* 7.1 (2010). Workshop *Microstructures in Solids: From Quantum Models to Continua*, 792–794.
- [65] Johannes Zimmer. Travelling waves in atomistic chains and kinetic relations. *Oberwolfach Reports* 5.2 (2008). Workshop *Atomistic Models of Materials: Mathematical Challenges*, 1092–1094.
- [66] Johannes Zimmer. Discrete dynamic models for phase transitions. *Oberwolfach Reports* 4.1 (2007). Miniworkshop *Multiscale and Variational Methods in Material Science and Quantum Theory of Solids*, 391–392.
- [67] Johannes Zimmer. Evolutionary problems with energies with linear growth. *Oberwolfach Reports* 4.1 (2007). Workshop *Analysis and Numerics for Rate-Independent Processes*, 655–657.
- [68] Johannes Zimmer. Travelling waves in atomic models for phase-transforming materials and kinetic relations. *Oberwolfach Reports* 4.2 (2007). Workshop *Phase Transitions*, 1642–1645.

- [69] Johannes Zimmer. Dynamical problems with nonconvex energies as a model of damage in materials. *Oberwolfach Reports* 1.3 (2004). Workshop *Phasenübergänge*, 1650–1652.

Introductions to Oberwolfach Reports

- [70] Volker Betz, Wolfgang König, Florian Theil, and Johannes Zimmer. Introduction, Workshop *Interplay of Analysis and Probability in Applied Mathematics*. *Oberwolfach Rep.* 12.3 (2015). Abstracts from the workshop held July 26–August 1, 2015, 1989–1991.
- [71] Wolfgang König, Peter Mörters, Mark A. Peletier, and Johannes Zimmer. Introduction, Workshop *Interplay of analysis and probability in physics*. *Oberwolfach Rep.* 9.1 (2012). Abstracts from the workshop held January 22–28, 2012, 281–283.
- [72] Wolfgang König, Peter Mörters, and Johannes Zimmer. Introduction, Workshop *Interplay of analysis and probability in physics*. *Oberwolfach Rep.* 5.4 (2008). Abstracts from the workshop held November 30–December 6, 2008, 3065–3066.
- [73] Isabelle Catto, Isaac Vikram Chenchiah, Ivan Veselić, and Johannes Zimmer. Introduction, Miniworkshop *Multiscale and Variational Methods in Material Science and Quantum Theory of Solids*. *Oberwolfach Rep.* 4.1 (2007), 371–372.

Editorial activity

- [74] Peter Mörters, Roger Moser, Mathew Penrose, Hartmut Schwetlick, and Johannes Zimmer, eds. *Analysis and stochastics of growth processes and interface models*. Oxford University Press, Oxford, 2008, pp. x+336.

Book review

- [75] Johannes Zimmer. Review of *Variational and Extremum Principles in Macroscopic Systems*, Stanislaw Sieniutycz and Henrik Farkas (eds). *J. Phys. A: Math. Gen.* 39.14 (2006), 3851–3852.

Selected grants

As PI in total approximately £ 1 800 000.

As Principal Investigator:

GW4 Accelerator Fund ‘Controlling Nucleation and Growth to Deliver Novel Materials Functionality’, 2015, £73 500

The Leverhulme Trust, ‘A novel passage from particles to PDEs far from equilibrium’, 1 June 2014 – 31 May 2017, £192 378

EPSRC Responsive Mode, ‘Analysis of the effective long time-behaviour of molecular systems’, 16 December 2013 – 15 December 2016, £277 718

Marie Curie FP7 Intra-European Fellowship ‘Microstructures in Dynamic and Anisotropic Systems’ (MIDAS) 1 August 2013 – 31 January 2015, € 231 926

EPSRC Network Grant ‘Mathematical Challenges of Molecular Dynamics: A Mathematical-Chemical Forum’, 1 April 2008 – 31 March 2011, £78 234

EPSRC Advanced Research Fellowship 'Mathematical Analysis of the Static and Dynamic Behaviour of Materials with Phase Transitions and Microstructures', 1 October 2004 – 30 September 2009, £271 225

EPSRC, 'Mathematical Analysis of the Static and Dynamic Behaviour of Materials with Phase Transitions and Microstructures', 1 October 2004 – 30 September 2007, £69 172

Emmy Noether Stipend (ca. € 502 400), 2004

As Investigator:

ITN Fronts and Interfaces in Science and Technology (FIRST), 1 January 2010 – 31 December 2013, Investigator work package B7, Upscaling of interacting particle systems. In total € 3 974 552; contribution for Bath € 487 376

Bath Institute for Complex Systems, Deputy Theme Manager, January 2005 – December 2009, £1 009 317 (Theme budget approx. £225 000)

Professional activities

Organiser (with Ben Goddard, Serafim Kallidasis, Michela Ottobre, Grigoris Pavliotis), Conference 'Challenges in statistical mechanics: from mathematics to molecular dynamics to technological applications', Imperial College, 7 – 10 December 2015

Organiser (with Volker Betz, Wolfgang König, Florian Theil), Oberwolfach conference 'Interplay of Analysis and Probability in Applied Mathematics', Oberwolfach, 26 July – 1 August 2015

Organiser (with Dan Crisan, Tobias Kuna), LMS & EPSRC-CDT Mathematics of Planet Earth, Meeting 'Analysis, Geometry and Stochastics for Planet Earth', Reading, 2 June 2015

Organiser (with Geoffrey Burton, Jeyabal Sivlaloganathan, Karsten Matthies, Roger Moser, Hartmut Schwetlick), South West PDE Meeting, Bath, 3 – 4 January 2013

Organiser (with Wolfgang König, Peter Mörters, Mark Peletier), Oberwolfach conference 'Interplay of Analysis and Probability in Physics', Oberwolfach, 22 – 28 January 2012

Organiser (with Chris Budd), Mid-term Meeting, EU Initial Training Network FIRST (Fronts and InteRfaces in Science and Technology), Bath, 13 – 15 December 2011

Organiser (with Ben Leimkuhler, Carl Dettmann), Minisymposium 'Novel mathematical developments for molecular modelling', Multiscale Molecular Modelling (M3), Edinburgh, 30 June – 3 July 2010

Organiser (with Giovanni Ciccotti, Saiful Islam, Roman Schubert, Florian Theil), Conference 'Mathematical Challenges of Molecular Dynamics', Warwick, 13 – 15 July 2009

Organiser (with Geoffrey Burton, L. Edward Fraenkel), Workshop 'Variational and Topological Methods and Water Waves', Bath, 14 – 16 May 2009

Organiser (with Wolfgang König, Peter Mörters), Oberwolfach conference 'Interplay of Analysis and Probability in Physics', Oberwolfach, 30 November – 6 December 2008

Organiser (with Mike Allen, Gero Friesecke, Saiful Islam, Ben Leimkuhler, Steve Wiggins), Conference 'Mathematical Challenges of Molecular Dynamics', Warwick, 14 – 16 July 2008

Organiser (with Chris. J. Budd, Giles Hunt, Srikanth Phani), Workshop 'Lattice Models', Bath, 30 June – 2 July 2008

Organiser (with Isabelle Catto, Isaac Chenchiah, Ivan Veselić), Mini-Workshop 'Multiscale and variational methods in materials science and the quantum theory of solids', Oberwolfach, 11 – 17 February 2007

Organiser (with Roger Moser, Peter Mörters, Mathew Penrose, Hartmut Schwetlick), Workshop ‘Analysis and stochastics of growth processes’, Bath, 11 – 15 September 2006

Organiser (with Stephen Watson), Minisymposium ‘Dissipative multi-scale models in material science’, British Applied Mathematics Colloquium, Keele, 25 April 2006

Organiser (with Gero Friesecke, Ilia Kamotski, Vladimir Kamotski, Valery Smyshlyaev), Workshop ‘Multi-scale problems: modelling, analysis and applications’, Bath, 12 – 14 September 2005

Organiser (with Stephan Luckhaus), ICMS Workshop ‘Dynamical Problems in Mathematical Materials Science’, Edinburgh, 17 – 23 July 2005

Further administrative and editorial activities

Director of Research, Department of Mathematical Sciences, University of Bath, since August 2015

Member of the Executive Committee of the Department of Mathematical Sciences, University of Bath, since August 2015

Editor, book series “Pathways in Mathematics”, Birkhäuser, since inauguration in 2016

Selected presentations since 2012

(Out of approximately 130 talks in total, about 50 in the last 5 years)

Workshop “Mathematical Aspects of Non-Equilibrium Thermodynamics”, Aachen, 5 – 7 March 2018

Invited talk: *Fluctuations in processes out of equilibrium*

Oberwolfach conference ‘Variational Methods for Evolution’, Oberwolfach, 12 – 17 November 2018

Talk: *Canonical structure of irreversible Markov chains and applications*

Institute of Mathematics and its Applications, Working Group on Multiscale Strategies, Minneapolis, 8 – 15 August 2017

Invited talk: *Canonical Structure of Irreversible Markov Chains and Applications*

EPSRC / RSS Workshop “New trends in Mathematical Physics at the interface of Analysis and Probability”, London, 15 – 17 February 2017

Invited talk: *Particles and the geometry/thermodynamics of macroscopic evolution*

CMC Conference “Analysis, Geometry, and Optimal Transport”, Seoul, 20 – 24 June 2016

Invited talk: *From particles to the geometry of thermodynamic evolution*

Mark Kac Seminar, Utrecht, 13 May 2016

Invited talk: *From particles to the geometry of thermodynamic evolution*

Workshop “Mathematical Topics in Kinetic Theory”, Cambridge, 9 – 13 May 2016

Invited talk: *Nonlinear diffusion: From particles to thermodynamics*

Workshop “Microstructure Evolution in Materials: Defects, Cracks & Interfaces”, Lorentz Center, 11 – 15 April 2016

Invited talk: *Mathematical theory of travelling waves for dislocations*

Workshop “Statistical mechanics and computation of large deviation rate functions”, ENS Lyon, 16 – 19 June 2015

Invited talk: *The semi-infinite asymmetric exclusion process: large deviations via matrix products*

Workshop ‘Analytic approaches to scaling limits for random systems’, Hausdorff Junior Trimester on Optimal Transport, Bonn, 26 – 30 January 2015

Invited talk: *The semi-infinite asymmetric exclusion process: large deviations via matrix products*

Oberwolfach conference ‘Variational Methods for Evolution’, Oberwolfach, 14 – 20 December 2014

Talk: *From particles to a conservation law: large deviations for the totally asymmetric exclusion process on the half line*

Banff International Research Station for Mathematical Innovation and Discovery, Workshop ‘Entropy Methods, PDEs, Functional Inequalities, and Applications’, 29 June – 4 July 2014

Invited talk: *Scale-bridging for entropic flows in the presence of energy or noise*

Isaac Newton Institute for Mathematical Sciences, Programme ‘Mathematics for the Fluid Earth’, Workshop ‘Partial Differential Equations and Geophysical Fluid Dynamics’, 2 – 6 December 2013

Invited talk: *From simple particle models to PDE dynamics* (invited as long-time visitor for the entire duration of the programme, October–December 2013)

Oberwolfach Mini-Workshop ‘Inelastic and Non-equilibrium Material Behavior: from Atomistic Structure to Macroscopic Constitutive Relations’, Oberwolfach, 3 – 9 November 2013

Talk: *Particles and their macroscopic evolution*

Summer school “Microstructure: evolution and dynamics” Technion, Haifa, 25 – 29 August 2013

Course: *Upscaling from particles to PDEs* (Series of 4 lectures)

Workshop ‘Solitons, Vortices, Minimal Surfaces and their Dynamics’, Mittag-Leffler Institute, Djursholm, 14 – 19 July 2013

Invited talk: *Coherent motion in Hamiltonian lattices*

Banff International Research Station for Mathematical Innovation and Discovery, Workshop ‘Nonequilibrium Statistical Mechanics: Mathematical Understanding and Numerical Simulation’, 11 – 16 November 2012

Invited talk: *Scale-bridging from particles to diffusional gradient flows*

Workshop on Image Processing and Reaction-Diffusion, Jerusalem, 11 – 13 September 2012

Invited talk: *From particles to diffusional gradient flows*

ESF Mathematics Conference in Partnership “Applied Partial Differential Equations in Physics, Biology and Social Sciences: Classical and Modern Perspectives”, Barcelona 2 – 7 September 2012

Invited talk: *From Brownian motion to entropy: a new limit passage to Wasserstein gradient flows*

Workshop ‘Averaging Methods for Multiscale Phenomena in Engineering Materials’ Carnegie Mellon University, Pittsburgh 2 – 4 April 2012

Invited talk: *Toward nonequilibrium: from particles to entropic gradient flows*

Teaching experience

Acting Director of Studies, MSc in Modern Applications of Mathematics, MSc in Mathematical Sciences and Centre for Doctoral Training “Statistical Applied Mathematics at Bath”, January 2015–July 2015

Director of Studies, MSc in Modern Applications of Mathematics, August 2010–July 2013

Teaching at the University of Bath:

2017–18 MA10193: Mathematics 2

2017–18 Advanced Partial Differential Equations

2016–17 MA10193: Mathematics 2

2016–17 Advanced Partial Differential Equations
 2015–16 MA10193: Mathematics 2
 2014–15 MA50190: Methods for Differential Equations
 2014–15 MA10193: Mathematics 2
 2013–14 MA10193: Mathematics 2
 2012–13 MA50200: Topic Review in Applied Mathematics (with Ch. Budd)
 2012–13 MA10193: Mathematics 2
 2012–13 MA10207: Analysis I (with E. P. Ryan)
 2012–13 MA50190: Methods for Differential Equations
 2011–12 MA50200: Topic Review in Applied Mathematics (with Ch. Budd)
 2011–12 MA30170: Numerical Solution of PDEs I (Finite Elements)
 2011–12 MA50190: Methods for Differential Equations
 2010–11 MA50200: Topic Review in Applied Mathematics (with Ch. Budd)
 2010–11 MA30170: Numerical Solution of PDEs I (Finite Elements)
 2009–10 MA50200: Topic Review in Applied Mathematics (with Ch. Budd)
 2009–10 MA30170: Numerical Solution of PDEs I (Finite Elements)
 2004–05 MA50175: Topics in Differential Equations (Mathematical materials science, Calculus of Variations)

Teaching at California Institute of Technology:

2002 AM125c: Engineering Mathematical Principles (Partial Differential Equations)
 2002 AM125b: Engineering Mathematical Principles (Linear Algebra, Functional Analysis, Ordinary Differential Equations)

Supervised postdoctoral scholars and PhD students

Supervision of postdoctoral scholars and Marie Curie Scholars

Augusto Gerolin Gavea, September 2015–August 2016
 Daniel Sutton, June 2014–July 2015
 Marios-Georgios Stamatakis, June 2014–July 2017
 Nadia Ansini (Marie Curie Fellow), August 2013–January 2015
 Natalia Babych, May 2006–April 2007

Supervision of postgraduate research students

Matthias Klar, since 2017 (Joint supervision with Karsten Matthies)
 Daniel Ng, since 2017 (Joint supervision with Alex Cox)
 Federico Cornalba, since 2016 (Joint supervision with Tony Shardlow)
 Xavier Pellet, since 2015 (Joint supervision with Lucia Scardia)

Marcus Kaiser, since 2015 (Joint supervision with Rob Jack)

Horacio Gonzalez Duhart Muñoz De Cote, University of Bath, "Large Deviations for Boundary Driven Exclusion Processes", 2011–2015 (Joint supervision with Peter Mörters)

Manh Hong Duong, TU Eindhoven, "Large deviation and variational approaches to generalized gradient flows", 2010–2014 (Joint supervision with Mark A. Peletier)

Vaios Laschos, University of Bath, "Entropic gradient flows on the Wasserstein space via large deviations from thermodynamic limits", 2009–2013 (Joint supervision with Nicolas Dirr)

Daniel Sutton, University of Bath, "Microscopic Hamiltonian Systems and their Effective Description", 2009–2013 (Joint supervision with Hartmut Schwetlick)

Carl-Friedrich Kreiner, PhD student, Universität Leipzig, "A variational approach to travelling waves in chains with on-site potential", 2004–2007