Tristan Buckmaster January 2021

CONTACT INFORMATION

Department of Mathematics,
Princeton University,
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CITIZENSHIP

Dual Australian/British Citizen, US Permanent Resident

ACADEMIC POSITIONS

Princeton University Mathematics Department, Princeton University, Princeton, NJ, USA

Assistant Professor (Tenure Track) **from 2017 to present**

Courant Institute of Mathematical Sciences, New York University, New York, NY, USA

Courant Instructor **from 2014 to 2017**

VISITING POSITIONS

IAS School of Mathematics, Institute for Advanced Study, Princeton, NJ, USA

Special Year on h-Principle and Flexibility in Geometry and PDEs **2021-2022**

EDUCATION

University of Leipzig/Max Planck Institute for Mathematics in the Sciences Leipzig, Saxony, Germany (2014)

Dr. rer. nat. (*summa cum laude*)

University of Bonn, Bonn, North Rhine-Westphalia, Germany

MSc. Mathematics (*'Sehr gut'/'Excellent'*)

Australian National University, Canberra, ACT, Australia

B.Sc (Hons). Mathematics (First Class)

Monash University, Clayton, Victoria, Australia

B.Sc/B.CompSc. (Science Major: Pure Mathematics, Science Minor: Physics)

AWARDS AND HONORS

- Clay Research Award, 2019
- Lecturer, Hadamard Lectures, Institut Henri Poincaré, Paris, France, 2020
- Awarded the Leipzig Promotionspreis (PhD Prize) by the Research Academy Leipzig

GRANTS

- Founding PI for Simons Foundation Mathematical and Physical Sciences collaborative grant, *Wave Turbulence*, 2019-2023 (multi-million dollar collaborative grant)
- NSF Research grant DMS-1900149, 2019 - 2022 ($200,687)
- NSF Research grant DMS-1600868/DMS-1820764, 2016 - 2019 ($116,582)

Academic Activities

Advising:

- Kexin Jin, Princeton, PhD Student, 2019 - present (co-advised with Alexandru Ionescu)
- Tristan Léger, Princeton, Postdoc, 2020 - present (co-advised with Alexandru Ionescu)

Publications:

- T. Buckmaster, T. Drivas, S. Shkoller and V. Vicol, Simultaneous development of shocks and cusps for 2D Euler with azimuthal symmetry from smooth data, preprint
- T. Buckmaster, N. Masmoudi, M. Novack and V. Vicol, Non-conservative $H^{\frac{1}{2}-}$ weak solutions of the incompressible 3D Euler equations, preprint
- T. Buckmaster and V. Vicol, Convex integration constructions in hydrodynamics, Bulletin of the AMS, 2020
- T. Buckmaster and S. Iyer, Formation of unstable shocks for 2D isentropic compressible Euler, submitted
- T. Buckmaster, S. Shkoller and V. Vicol, Shock formation and vorticity creation for 3d Euler, submitted
- T. Buckmaster and V. Vicol, A Heuristic Approach to Convex Integration for the Euler Equations, Progress in Mathematical Fluid Dynamics, 2020
- T. Buckmaster, S. Shkoller and V. Vicol, Formation of point shocks for 3D compressible Euler, submitted
- R. Beekie, T. Buckmaster, V. Vicol, Weak solutions of ideal MHD which do not conserve magnetic helicity, Annals of PDE, 2020
- T. Buckmaster, P. Germain, Z. Hani and J. Shatah, On the kinetic wave turbulence description for NLS, Quarterly of Applied Mathematics, 2019
- T. Buckmaster, S. Shkoller and V. Vicol, Formation of shocks for 2D isentropic compressible Euler, Communications on Pure and Applied Mathematics, to appear
- T. Buckmaster, P. Germain, Z. Hani and J. Shatah, Onset of the wave turbulence description of the longtime behavior of the nonlinear Schrödinger equation, Inventiones Mathematicae, 2021
- T. Buckmaster and V. Vicol, Convex integration and phenomenologies in turbulence, European Mathematical Society, Surveys in Mathematical Sciences, 2019
- T. Buckmaster, M. Colombo, V. Vicol, Wild solutions of the Navier-Stokes equations whose singular sets in time have Hausdorff dimension strictly less than 1, Journal of the European Mathematical Society, to appear
- T. Buckmaster, A. Nahmod, G. Staffilani, K. Widmayer, The Surface Quasi-Geostrophic Equation with Random Diffusion, International Mathematics Research Notices, 2018
- T. Buckmaster and V. Vicol, Nonuniqueness of weak solutions to the Navier-Stokes equation, Annals of Mathematics, 2019
- T. Buckmaster, C. De Lellis, L. Székelyhidi Jr. and V. Vicol, Onsager's conjecture for admissible weak solutions, Communications on Pure and Applied Mathematics, 2019
- T. Buckmaster, P. Germain, Z. Hani and J. Shatah, Analysis of (CR) in higher dimension, International Mathematics Research Notices, 2017

- T. Buckmaster, P. Germain, Z. Hani and J. Shatah, Effective dynamics of the nonlinear Schrödinger equation on large domains, Communications on Pure and Applied Mathematics, 2018
- T. Buckmaster, S. Shkoller and V. Vicol, Nonuniqueness of weak solutions to the SQG equation, Communications on Pure and Applied Mathematics, 2019
- T. Buckmaster, C. De Lellis and L. Székelyhidi Jr., Dissipative Euler flows with Onsager-critical spatial regularity, Communications on Pure and Applied Mathematics, 2016
- T. Buckmaster, Onsager's conjecture almost everywhere in time, Communications in Mathematical Physics, 2015
- T. Buckmaster, C. De Lellis, P. Isett and L. Székelyhidi Jr., Anomalous dissipation for 1/5-Hölder Euler flows, Annals of Mathematics, 2015
- T. Buckmaster, C. De Lellis and L. Székelyhidi Jr. Transporting microstructure and dissipative Euler flows, preprint 2013
- T. Buckmaster and H. Koch, The Korteweg-de-Vries equation at H^{-1} regularity, Annales de l'Institut Henri Poincaré (C) Analyse Non Linéaire, 2015
- T. Buckmaster. *Onsager's Conjecture*. Ph.D thesis (University of Leipzig Library), 2014

Professional service:

- Organizer for the Princeton Analysis Seminar, from 2017-2021
- Organizer for the Simons Collaboration Wave Turbulence Seminar from 2019 until present
- Organizer for BIRS workshop, "Mathematical Questions in Wave Turbulence", Banff, 2022
- Organizer for CMI workshop, "New Developments in Mathematical Hydrodynamics", Princeton, 2021
- Organizer for BIRS workshop, "Mathematical Questions in Wave Turbulence", Banff, 2020 (via Zoom)
- Served on NSF panel, 2019
- Organizer for Special Session, "Spring Central and Western Joint Sectional Meeting, University of Hawaii", Manoa, Honolulu, 2019
- Organizer for AIM workshop, "Mathematical questions in wave turbulence theory", San Diego, 2017
- Organizer for Special Session, "Mathematical Congress of the Americas", Montreal, 2017
- Organizer for Special Session, "AMS Spring Eastern Sectional Meeting, City University of New York", New York, 2017

Seminars and talks:

- Workshop talk, "Convex Integration and Nonlinear Partial Differential Equations", ICMS, 2021
- Workshop talk, "New Mechanisms for Regularity, Singularity, and Long Time Dynamics in Fluid Equations", Banff International Research Station for Mathematical Innovation and Discovery, Banff, 2021
- Lecture, "International Congress of Mathematical Physics", IAMP, Geneva, 2021
- Conference talk, "SIAM Annual Meeting", (via Zoom) 2021
- Conference talk, "Mathematical Congress of the Americas", (via Zoom) 2021

- Workshop talk, "Recent Developments in Fluid Dynamics", MSRI, Berkeley 2021
- Seminar, "Virtual Analysis and PDE Seminar", (via Zoom) 2021
- Conference talk, "Wave Turbulence Annual meeting ", Simons Foundation, (via Zoom) 2020
- Lecture series, University of California, Davis, (via Zoom) 2020
- Colloquium, University of Illinois at Chicago, (via Zoom) 2020
- Seminar, "Virtual Maxwell Analysis Seminar", Heriot-Watt/University of Edinburgh, (via Zoom) 2020
- Conference talk, "Workshop on Euler and Navier-Stokes Equations: Regular and Singular Solutions", Fields Institute, (via Zoom) 2020
- Seminar, "Analysis and Partial Differential Equations Seminar", Stanford University, (via Zoom) 2020
- Seminar, "Nonlinear Analysis Discussion Group", Simons Foundation, New York, 2020
- Seminar, "Analysis and Partial Differential Equations Seminar", John Hopkins University, Baltimore 2020
- Seminar, "Analysis and Math Physics Seminar", IAS, Princeton 2019
- Colloquium, Monash University, Melbourne 2019
- Seminar, "PDE Seminar", Monash University, Melbourne 2019
- Seminar, "Partial Differential Equations Seminar", Brown University, Providence 2019
- Workshop talk, "Oberwolfach Workshop: Mathematical Aspects of Hydrodynamics", Oberwolfach, 2019
- Workshop talk, "Advances in Dispersive Equations: Challenges & Perspectives", Banff International, 2019
- Conference talk, "ERC Mafran", University of Cambridge, Cambridge, 2019
- Lecture series, "Summer school on Fluid Mechanics", ICMAT, Madrid, 2019
- Conference talk, "Material theories, statistical mechanics, and geometric analysis: A conference in honor of Stephan Luckhaus' 66th birthday", IMPRS, Leipzig, 2019
- Lecture series, "CIME Summer school on Fluid Mechanics", Cetraro, 2019
- Lecture series, "Summer School on Recent Advances in Mathematical Fluid Dynamics", USC, Los Angeles, 2019
- Seminar, "Differential Equation Seminar", University of Michigan, Ann Arbor, 2019
- Colloquium, Tulane University, New Orleans, 2019
- Seminar, "Analysis Seminar", New York University, New York 2019
- Conference talk, "New ideas and tools for turbulence", IAS, Princeton 2019
- Conference talk, "FRG-PDE conference", University of Chicago, Chicago, 2018
- Workshop talk, "Regularity and Blow-up of Navier-Stokes Type PDEs using Harmonic and Stochastic Analysis", Banff International Research Station for Mathematical Innovation and Discovery, Banff, 2018
- Conference talk, "International Workshop on Hyperbolic and Kinetic Problems: Theory and Applications", Academia Sinica, Taipei, 2018
- Conference talk, "Workshop and conference on nonlinear waves: stability vs turbulence", Georgia Institute of Technology, Atlanta, 2018
- Seminar, "Calderon-Zygmund Analysis Seminar", University of Chicago, Chicago, 2018
- Conference talk, "AMS Fall Sectional Meeting in Boston", Boston, 2018
- Seminar, "Nonlinear Analysis Seminar", Rutgers University, New Brunswick, 2018
- Seminar, "Analysis Seminar", Duke University, Durham, 2018
- Seminar, "Analysis Seminar", Institute for Advanced Study, Princeton, 2017
- Seminar, "Analysis Seminar", Massachusetts Institute of Technology, Cambridge, 2017
- Conference talk, "Princeton-Tokyo Fluid Mechanics Workshop", Princeton University, Princeton, 2017

- Conference talk, “Workshop Geometrical and statistical fluid dynamics”, Simons Center for Geometry and Physics, Stony Brook, 2017
- Seminar, “Analysis Seminar”, Princeton University, Princeton, 2017
- Conference talk, “Fluids, dispersion and blow-up”, Institut Henri Poincaré, Paris, 2017
- Conference talk, “Mathematical Aspects of Water Waves and Related Models”, Bodega Bay, 2017
- Seminar, “Nonlinear Analysis Discussion Group”, Simons Foundation, New York, 2017
- Seminar, “Analysis Seminar”, University of Pennsylvania, New Brunswick, 2017
- Seminar, “PDE-Applied Math Seminar”, University of Maryland, College Park, 2017
- Conference talk, “Dynamics of Small Scales in Fluids”, ICERM, Providence, 2017
- Colloquium, Computational and Applied Mathematics Colloquium, Pennsylvania State University, State College, 2017
- Conference talk, “Turbulent Dissipation, Mixing and Predictability”, IPAM, Los Angeles, 2017
- Conference talk, “AMS Joint Mathematics Meetings”, Atlanta, 2017
- Seminar, “Analysis seminar”, Princeton University, Princeton, 2016
- Conference talk, “AMS Fall Western Sectional Meeting University of Denver”, Denver, 2016
- Conference talk, “AMS Fall Sectional Meeting in Minneapolis”, Minneapolis, 2016
- Seminar, Institut Henri Poincaré, Paris, 2016
- Workshop talk, “Oberwolfach Workshop: Nonlinear Evolution Problems”, Oberwolfach, 2016
- Conference talk, “Shanks Conference”, Vanderbilt University , Nashville, 2016
- Invited participant, “Fifth Abel Conference: Celebrating the Mathematical Impact of John F. Nash Jr. and Louis Nirenberg”, IMA, Minneapolis, 2015
- Conference talk, “SIAM Conference on Analysis of Partial Differential Equations ”, Scottsdale, 2015
- Seminar, “Nonlinear Analysis”, Rutgers University, New Brunswick, 2015
- Seminar, “Analysis seminar”, Princeton University, Princeton, 2015
- Seminar, “Analysis Seminar”, New York University, New York 2015
- Seminar, “PDE seminar”, CUNY, New York, 2015
- Conference talk, “Equadiff 2015 ”, Université Claude Bernard Lyon 1, Lyon, 2015
- Conference talk, “Nonlinear Evolutionary Partial Differential Equations”, Shanghai Jiao Tong University, Shanghai, 2015
- Seminar, “PDE seminar”, Georgia Institute of Technology, Atlanta, 2015
- Conference talk, “AMS Spring Sectional Meeting at Georgetown University”, Washington DC, 2015
- Seminar, “Analysis and PDE seminar”, University of California, Berkeley, 2015
- Conference talk, “AMS Spring Sectional Meeting at Georgetown University”, Washington DC, 2015
- Seminar, “Partial Differential Equations Seminar”, Brown University, Providence 2014
- Seminar, “Differential Equation Seminar”, University of Michigan, Ann Arbor, 2014
- Colloquium, Center for Applied Mathematical Sciences, University of Southern California, Los Angeles, 2014
- Conference talk, “AMS Fall Sectional Meeting at San Francisco State University”, San Francisco, 2014
- Seminar, “Analysis of Fluids and Related Topics Seminar”, Princeton University, Princeton, 2014
- Seminar, “Analysis Seminar”, New York University, New York 2014
- Conference talk, “The 10th AIMS Conference on Dynamical Systems, Differential Equations and Applications”, Madrid, 2014
- Workshop talk, “Mini-workshop: Euler equation and turbulence", Hausdorff Institute, Bonn, 2014
- Seminar, “Analysis Seminars”, Imperial College London, London, 2014
- Lecture series as part of “Thematic Program on Incompressible Fluid Dynamics", Instituto Nacional de Matemática Pura e Aplicada, Rio de Janeiro, Brazil, 2014

- Seminar, "Partial Differential Equations and Analysis seminar", Australian National University, Canberra, 2014
- Conference talk, "Two days on Hyperbolic PDEs, Geometric Measure Theory and Optimal Transport", Trieste, Italy, 2013
- Short talk, "Recent Advances in PDEs and Fluids", Stanford University, Stanford, 2013
- Short talk, "Complex fluids", Darmstadt, Germany, 2012
- Invited participant, "Oberwolfach Seminar: Dispersive Equations", Oberwolfach, 2012
- Seminar, University of Zürich, Zürich 2012