

| | | |
|---------------------|---|--|
| CONTACT INFORMATION | Courant Institute of Mathematical Sciences, New York University, 251 Mercer St, New York, NY 10012 | <i>E-mail:</i> buckmaster@cims.nyu.edu |
| CITIZENSHIP | Australia/United Kingdom/United States of America | |
| ACADEMIC POSITIONS | New York University , Courant Institute of Mathematical Sciences, New York, NY, USA <i>Professor</i> | from 2023 to present |
| | University of Maryland , Department of Mathematics, College Park, MD, USA <i>Professor</i> | from 2022 to 2023 |
| | Princeton University , Department of Mathematics, Princeton, NJ, USA <i>Assistant Professor</i> | from 2017 to 2022 |
| | New York University , Courant Institute of Mathematical Sciences, New York, NY, USA <i>Courant Instructor</i> | from 2014 to 2017 |
| VISITING POSITIONS | IAS School of Mathematics , Institute for Advanced Study, Princeton, NJ, USA <i>Senior Participant: H-Principle and Flexibility in Geometry and PDEs</i> | 2021-2022 |
| EDUCATION | University of Leipzig/Max Planck Institute for Mathematics in the Sciences Leipzig, Saxony, Germany (2014) Dr. rer. nat. (<i>summa cum laude</i>) | |
| | 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 | <ul style="list-style-type: none"> • R. E. Moore Prize for Applications of Interval Analysis, 2025 • Lecturer, Hadamard Lectures, Institut des Hautes Études Scientifiques, Paris, France, 2020 • Clay Research Award, 2019 • Awarded the Leipzig Promotionspreis (PhD Prize) by the Research Academy Leipzig | |

GRANTS

- Renewal of Simons Foundation Mathematical and Physical Sciences collaborative grant, *Wave Turbulence*, 2023-2026
- NSF FRG grant DMS-2244879, 2023 - 2026
- NSF CAREER grant DMS-2145716, 2022 - 2027
- Founding PI for Simons Foundation Mathematical and Physical Sciences collaborative grant, *Wave Turbulence*, 2019-2023
- NSF Research grant DMS-1900149, 2019 - 2022
- NSF Research grant DMS-1600868/DMS-1820764, 2016 - 2019

ACADEMIC ACTIVITIES

Publications:

- Y. Wang, T. Léger, C.-Y. Lai, and T. Buckmaster. Resolving sharp gradients of unstable singularities to machine precision via neural networks. *arXiv e-prints*, 2025.
- Y. Wang, M. Bennan, J. Martens, S. Racanière, S. Blackwell, A. Matthews, S. Nikolov, G. Cao-Labora, D. Park, M. Arjovsky, D. Worrall, C. Qin, F. Alet, B. Kozlovskii, N. Tomašev, T. Buckmaster, B. Georgiev, J. Gómez-Serrano, R. Jiang, and C.-Y. Lai. Discovery of unstable singularities. *arXiv e-prints*, 2025.
- T. Buckmaster and J. Chen. Blowup for the defocusing septic complex-valued nonlinear wave equation in \mathbb{R}^{4+1} . *arXiv e-prints*, 2024.
- T. Buckmaster, T.D. Drivas, S. Shkoller, and V. Vicol. Formation and development of singularities for the compressible Euler equations. *Proceedings of the International Congress of Mathematicians*, to appear.
- T. Buckmaster, G. Cao-Labora, and J. Gómez-Serrano. Smooth self-similar imploding profiles to 3D compressible Euler. *Quarterly of Applied Mathematics*, 81(3):517–532, March 2023.
- T. Buckmaster, G. Cao-Labora, and J. Gómez-Serrano. Smooth imploding solutions for 3D compressible fluids. *Forum of Mathematics, Pi*, 13:e6, 2025.
- Y. Wang, C.-Y. Lai, J. Gómez-Serrano, and T. Buckmaster. Asymptotic self-similar blow-up profile for three-dimensional axisymmetric euler equations using neural networks. *Phys. Rev. Lett.*, 130:244002, Jun 2023.
- J. W. Banks, T. Buckmaster, A. O. Korotkevich, G. Kovačič, and J. Shatah. Direct verification of the kinetic description of wave turbulence for finite-size systems dominated by interactions among groups of six waves. *Phys. Rev. Lett.*, 129:034101, Jul 2022.
- T. Buckmaster, T.D. Drivas, S. Shkoller, and V. Vicol. Simultaneous development of shocks and cusps for 2d euler with azimuthal symmetry from smooth data. *Annals of PDE*, 8(2), November 2022.
- T. Buckmaster, N. Masmoudi, M. Novack, and V. Vicol. Intermittent convex integration for the 3D Euler equations. *Annals of Mathematics Studies*, 2023.
- T. Buckmaster and V. Vlad. Convex integration constructions in hydrodynamics. *Bulletin of the American Mathematical Society*, 58(1):1–44, 2020.
- T. Buckmaster and S. Iyer. Formation of unstable shocks for 2D isentropic compressible Euler. *Communications in Mathematical Physics*, 2020.

- T. Buckmaster, S. Shkoller, and V. Vicol. Shock formation and vorticity creation for 3d euler. *Communications on Pure and Applied Mathematics*, 76(9):1965–2072, 2023.
- T. Buckmaster and V. Vicol. *Progress in Mathematical Fluid Dynamics: Cetraro, Italy 2019*, 2020.
- T. Buckmaster, S. Shkoller, and V. Vicol. Formation of Point Shocks for 3D Compressible Euler. *Communications on Pure and Applied Mathematics*, 76(9):2073–2191, 2023.
- R. Beekie, T. Buckmaster, and V. Vicol. Weak solutions of ideal MHD which do not conserve magnetic helicity. *Annals of PDE*, 6(1), 2020.
- T. Buckmaster, P. Germain, Z. Hani, and J. Shatah. On the kinetic wave turbulence description for NLS. *Quarterly of Applied Mathematics*, 78(2):261–275, 2020.
- T. Buckmaster, S. Shkoller, and V. Vicol. Formation of shocks for 2D isentropic compressible Euler. *Communications on Pure and Applied Mathematics*, 75(9):2069–2120, 2022.
- 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. *EMS Surveys in Mathematical Sciences*, 6(1):173–263, 2020.
- T. Buckmaster, M. Colombo, and 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*, 24(9):3333–3378, 2022.
- T. Buckmaster, A. Nahmod, G. Staffilani, and K. Widmayer. The Surface Quasi-geostrophic Equation With Random Diffusion. *International Mathematics Research Notices*, 2020(23):9370–9385, 2018.
- T. Buckmaster and V. Vicol. Nonuniqueness of weak solutions to the Navier-Stokes equation. *Annals of Mathematics*, 189(1):101, 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*, 72(2):229–274, 2019.
- T. Buckmaster, P. Germain, Z. Hani, and J. Shatah. Analysis of (CR) in Higher Dimension. *International Mathematics Research Notices*, 2019(4):1265–1280, 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*, 71(7):1407–1460.
- T. Buckmaster, S. Shkoller, and V. Vicol. Nonuniqueness of weak solutions to the SQG equation. *Communications on Pure and Applied Mathematics*, 72(9):1809–1874, 2019.
- T. Buckmaster, C. De Lellis, and L. Székelyhidi Jr. Dissipative Euler flows with Onsager-critical spatial regularity. *Comm. Pure Appl. Math.*, 69(9):1613–1670, 2016.
- T. Buckmaster. Onsager’s conjecture almost everywhere in time. *Communications in Mathematical Physics*, 333(3):1175–1198, 2015.
- T. Buckmaster, C. De Lellis, P. Isett, and L. Székelyhidi Jr. Anomalous dissipation for $1/5$ -Hölder Euler flows. *Annals of Mathematics*, 182(1):127–172, 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. *Ann. Inst. H. Poincaré C Anal. Non Linéaire*, 32(5):1071–1098, 2015.

- T. Buckmaster. Onsager’s Conjecture. *PhD Thesis*, 2014.

Professional service:

- Organizer for NSF-FRG Summer School at Princeton University, Princeton 2025
- Organizer for NSF-FRG Conference at Princeton University, Princeton 2025
- Organizer for “Analysis and Computation of dispersive PDE and fluid dynamic”, Institut Henri Poincaré, Paris 2025
- Organizer for NSF-FRG Conference at University of Minnesota, Minneapolis 2024
- Organizer for “Workshop on Recent developments in incompressible fluid dynamics”, Institute for Advanced Study, 2022
- Organizer for the Simons Collaboration Wave Turbulence Seminar from 2019 - 2021
- Organizer for BIRS workshop, “Mathematical Questions in Wave Turbulence”, Banff, 2022
- Organizer for the Princeton Analysis Seminar, from 2017-2021
- 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

Press:

- J. Cepelewicz. Deep Learning Poised to ‘Blow Up’ Famed Fluid Equations. Quanta Magazine, Apr 2022
- K. Hartnett. Mathematicians find wrinkle in famed fluid equations. Quanta Magazine, Dec 2017 (reprinted in Wired Magazine, Jan 2018)
- K. Hartnett. What makes the hardest equations in physics so difficult? Quanta Magazine, Jan 2018.
- S. Valot. Mathematicians find wrinkle in famed fluid equations. Quanta Magazine Podcast, 2018.

Seminars and talks:

- Speaker, “Recent Trends in the Mathematics of Fluid Dynamics”, ICMAT and CUNEF, Madrid 2025
- Speaker, “Simons Collaboration on Wave Turbulence Annual Meeting”, Simons Foundation, New York 2025
- Speaker, “Fluid Dynamics and Turbulence”, Institute for Computational and Experimental Research in Mathematics, Providence 2025
- Speaker, “Analysis Seminar”, University of Texas at Austin, Austin 2025
- Speaker, “DeepMind Math+AI Workshop”, Institute for Advanced Study, Princeton 2025
- Speaker, “NSF-FRG Summer School on Fluid Dynamics and Computer Assisted Proofs”, Princeton University, Princeton 2025
- Speaker, “Applied PDE Seminar”, University of Washington, Virtual Seminar 2025
- Speaker, “SMRI Seminar”, University of Sydney, Sydney 2025
- Speaker, “PDE Seminar”, University of Sydney, Sydney 2025
- Speaker, “Mathematics and Machine Learning Program”, Harvard CMSA, Cambridge 2024
- Speaker, “MAD Seminar”, New York University, New York 2024
- Speaker, “Wave Dynamics and Fluid-Structure Interaction”, Lake Como School of Advanced Studies, Lake Como, 2024
- Speaker, “Münster Cluster of Excellence midterm conference”, University of Münster, Münster 2024
- Plenary speaker, “Panorama of Mathematics 2023”, Hausdorff Center, Bonn University, Bonn 2023
- Plenary speaker, “13th AIMS Conference”, University of North Carolina, Wilmington 2023
- Conference talk, “Harmonic Analysis and Partial Differential Equations, a conference in honor of Herbert Koch 60th”, Bonn University, Bonn 2023
- Colloquium, Georgetown University, Washington DC 2023
- Conference talk ‘Incompressible fluids conference in honor of Peter Constantin’s 70th birthday’, Duke University, Durham, 2023
- Lecture series, University of California, Davis, 2022
- Seminar, “Analysis Seminar”, New York University, New York 2022
- Colloquium, “Hypatia Colloquium”, Centre de Recerca Matemàtica, Barcelona 2022
- Workshop talk, “Small scale dynamics in fluid motion”, Simons Center for Geometry and Physics, Stony Brook 2022
- Workshop talk, “Stochastic Approaches to Turbulence in Hydrodynamical Equations: New Challenges at the Mathematics-Physics Interface”, Banff International, Banff, 2022
- Colloquium, University of Maryland, College Park, 2022
- Colloquium, Johns Hopkins, Baltimore, 2021
- Seminar, “PDE/Analysis Seminar”, MIT, Cambridge, 2021
- Seminar, “Analysis Seminar”, UT Austin, Austin, 2021
- Workshop talk, “Convex Integration and Nonlinear Partial Differential Equations”, ICMS, 2021
- Seminar talk, “Seminar in Analysis and Geometry”, IAS, Princeton 2021
- Lecture, “International Congress of Mathematical Physics”, (via Zoom), 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”, Johns 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