

William Golding

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Research Interests

Nonlinear PDEs arising in fluid mechanics, kinetic theory, and related areas.

Academic Appointments

University of Chicago
Dickson Instructor

2024–Present
Chicago, IL

Education

Ph.D. in Mathematics, University of Texas at Austin

2024

Dissertation: Stability and regularity in nonlinear partial differential equations

Austin, TX

Advisors: Alexis Vasseur and Maria Gualdani

B.S. in Mathematics, University of Maryland

2019

High honors in mathematics and minor in computer science

College Park,
MD

Preprints

- [1] Nicholas Gismondi, **William Golding**, and Matthew Novack. “A sharp rigidity/flexibility threshold for the isotropic Landau equation”. Preprint (2026). arXiv: 2608.13758. Submitted.
- [2] **William Golding** and Christopher Henderson. “Global smooth solutions to the inhomogeneous Landau–Fermi–Dirac equation”. Preprint (2026). arXiv: 2608.31071. Submitted to Archive for Rational Mechanics and Analysis.
- [3] **William Golding**, Christopher Henderson, and Luis Silvestre. “Pointwise bounds and obstructions to blowup for the Landau and Boltzmann equations”. Preprint (2026). arXiv: 2605.20426. Submitted to Annales Scientifiques de l’École Normale Supérieure.
- [4] Laurent Desvillettes, **William Golding**, Maria Gualdani, and Amélie Loher. “Production of the Fisher information for the Landau–Coulomb equation with L^1 initial data”. Preprint (2024). arXiv: 2410.10765. Submitted.

Publications

- [1] **William Golding**, Maria Gualdani, and Amélie Loher. “Global smooth solutions to the Landau–Coulomb equation in $L^{3/2}$ ”. *Arch. Ration. Mech. Anal.* 249 (2025), no. 3, Paper No. 34, 54.
- [2] **William Golding**. “Nonlinear asymptotic stability in L^∞ for Lipschitz solutions to scalar conservation laws”. *C. R. Math. Acad. Sci. Paris* 362 (2024), pp. 581–592.
- [3] **William Golding**, Maria Pia Gualdani, and Amélie Loher. “Nonlinear regularization estimates and global well-posedness for the Landau–Coulomb equation near equilibrium”. *SIAM J. Math. Anal.* 56 (2024), no. 6, pp. 8037–8069.
- [4] **William Golding** and Amélie Loher. “Local-in-time strong solutions of the homogeneous Landau–Coulomb equation with L^p initial datum”. *Matematica* 3 (2024), no. 1, pp. 337–369.
- [5] **William Golding**. “Unconditional regularity and trace results for the isentropic Euler equations with $\gamma = 3$ ”. *SIAM J. Math. Anal.* 55 (2023), no. 5, pp. 5751–5781.

- [6] **William Golding**, Sam Krupa, and Alexis Vasseur. “Sharp a -contraction estimates for small extremal shocks”. *J. Hyperbolic Differ. Equ.* 20 (2023), no. 3, pp. 541–602.
- [7] **William Golding**, Maria Pia Gualdani, and Nicola Zamponi. “Existence of smooth solutions to the Landau-Fermi-Dirac equation with Coulomb potential”. *Commun. Math. Sci.* 20 (2022), no. 8, pp. 2315–2365.
- [8] Jacob Bedrossian and **William Golding**. “Uniqueness criteria for the Oseen vortex in the 3d Navier-Stokes equations”. *Comm. Partial Differential Equations* 46 (2021), no. 6, pp. 1092–1136.

Invited Talks

Obstructions to Hydrodynamic Implosions in Kinetic Theory Regularity Theory for Evolution Equations, SwissMAP, Les Diablerets, Switzerland	Jul. 2026
Obstructions to Hydrodynamic Implosions in Kinetic Theory Analysis Seminar (virtual), California Institute of Technology	Jun. 2026
Obstructions to Hydrodynamic Implosions in Kinetic Theory PDE-Applied Math Seminar, University of Maryland	Apr. 2026
On Hydrodynamic Implosions and the Landau–Coulomb Equation Calderón–Zygmund Analysis Seminar, University of Chicago	Nov. 2025
Smoothing Effects in the Homogeneous Landau Equation Workshop on Kinetic Theory and Fluids, University of Wisconsin–Madison	Mar. 2025
Recent Advancements for Global Solutions to the Homogeneous Landau Equation Analysis, Dynamics, and Applications Seminar, University of Arizona	Mar. 2025
Uniqueness Criteria for H-Solutions to the Homogeneous Landau–Coulomb Equation Special Session on Advances in Nonlinear Dispersive Equations and Kinetic Theory, Joint Mathematics Meetings, Seattle, WA	Jan. 2025
Recent Advancements for Global Solutions to the Homogeneous Landau Equation Analysis Seminar, Purdue University	Nov. 2024
Recent Advancements for Global Solutions to the Homogeneous Landau Equation Analysis Seminar, University of Illinois Chicago	Nov. 2024
Nonlinear Regularization Effects for a System of Conservation Laws Summer School on Stability and Dynamics in Fluid Mechanics and Kinetic Theory, Imperial College London	Jul. 2023
Global-in-Time Well-Posedness of the Homogeneous Landau–Coulomb Equation for Small L^p Data Special Session on Kinetic Theory, AIMS Conference, Wilmington, NC	Jun. 2023
Trace Theorems for a System of Hyperbolic Conservation Laws via the De Giorgi Method PDE Seminar, Pennsylvania State University	Mar. 2023
Blow-Up and De Giorgi Techniques Applied to a System of Hyperbolic Conservation Laws Oberseminar Analysis, TU Darmstadt	May 2022

Conferences and Seminars Organized

BIRS Workshop in Banff: Recent Breakthroughs and New Perspectives on the Interplay between Fluid Mechanics and Kinetic Theory Aug. 2026
Organized with Dallas Albritton, Maria Gualdani, and Nestor Guillen

Calderón–Zygmund Analysis Seminar Sept. 2025—
Organizer, University of Chicago

Teaching Experience

Math 186: Mathematics of Quantum Mechanics (Instructor) Fall 2026
University of Chicago

Math 184: Mathematical Methods II (Instructor) Winter 2026
University of Chicago

Math 185: Mathematical Methods III (Instructor) Fall 2025
University of Chicago

Math 183: Mathematical Methods I (Instructor) Spring 2025
University of Chicago

Math 186: Mathematics of Quantum Mechanics (Instructor) Fall 2024
University of Chicago

Math 408D: Calculus II (Teaching Assistant) Spring 2023
University of Texas at Austin

Math 383C: Graduate Applied Math I (Grader) Fall 2022
University of Texas at Austin

Math 408C: Calculus I (Teaching Assistant) Fall 2021
University of Texas at Austin

Math 630: Graduate Real Analysis I (Grader) Fall 2018
University of Maryland

Awards and Grants

Frank Gerth III Dissertation Award 2025
University of Texas at Austin

Provost’s Graduate Excellence Fellowship 2019–2024
University of Texas at Austin; five years of full financial support without teaching duties

Best Graduate Student Talk, Theory Category 2022
HYP 2022, Málaga, Spain

Frank Gerth III Teaching Excellence Award 2021
University of Texas at Austin

Mentoring and Service

- Undergraduate research mentor, University of Chicago (2025–2026): supervised a project on Liouville theorems for the one-dimensional isentropic Euler system; the student subsequently entered the mathematics Ph.D. program at MIT.
- Referee for *Archive for Rational Mechanics and Analysis*, *Journal of Functional Analysis*, *Communications in Mathematical Physics*, *Nonlinear Analysis*, *SIAM Journal on Mathematical Analysis*, and *Proceedings of the Royal Society of Edinburgh Section A*.