Nestor Guillen

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[Google Scholar link]

Appoinments

Associate Professor
Texas State University — 2022 - present
Assistant Professor
Texas State University — 2019 - 2022
Associate Professor (on leave)
University of Massachusetts at Amherst — 2019 - 2020
Assistant Professor
University of Massachusetts at Amherst — 2014 - 2019
E.R. Hedrick Assistant Adjunct Professor
University of California at Los Angeles — 2011 - 2014
Postdoctoral Fellow
Mathematical Sciences Research Institute, Berkeley — Spring 2011

Education

Ph.D. in Mathematics — December 2010
University of Texas at Austin
Advisor: Luis Caffarelli
Licenciado en Matemáticas — July 2006
Universidad Simón Bolívar. Sartenejas, Venezuela
Advisor: Lázaro Recht

Fellowships, grants and awards

NSF CAREER Grant DMS-2144232. Award: $\$498,969.00$ — 2022-present.
NSF Research Grant DMS-1700307. Award: $\$135,000.00$ — 2017-2020.
NSF Research Grant DMS-1201413. Award: $\$102,000.00$ — 2012-2016.
Visiting Researcher at the *Fields Institute* in Toronto, Canada. — Fall 2014.
Graduate School Continuing Fellowship. — 2009-2010.
Lefevre Fellowship. — Spring 2009.
Wall Memorial Fellowship. — Spring 2009.
Frank Sid Richardson Foundation Regents Fellowship. — Spring 2007.
Frank Gerth III Graduate Excellence Award. — 2007.

Editorial

Electronic Journal of Differential Equations (2022-present)

Doctoral students

René Cabrera (PhD 2022).	UT Austin postdoc
Michaael Boratko (PhD 2018, co-advised with Andrea Nahmod).	Google Deepmind

Publications (short list)

1. **The Landau equation does not blow up**, with L. Silvestre. arXiv preprint 2311.09420.
2. **A Convex Optimization Framework for Regularized Geodesic Distances**, with M. Edelstein, J. Solomon, and M. Ben-Chen. SIGRAPH Conference (2023).
3. **Pointwise estimates and regularity in geometric optics and other Generated Jacobian Equations**, with J. Kitagawa. Communications on Pure and Applied Mathematics (2017).
4. **Estimates for radial solutions of the homogeneous Landau equation with Coulomb potential**, with M. Gualdani. Analysis and PDE (2016).
5. **Aleksandrov-Bakelman-Pucci Type Estimates For Integro-Differential Equations**, with R. Schwab. Archive for Rational Mechanics and Analysis (2012).

Publications (full list)

Note: Links to preprints and journal articles can be found in my homepage www.ndguillen.com.

26. **The Landau equation does not blow up**
    N. Guillen and L. Silvestre.
    arXiv preprint 2311.09420.
25. **Regularization estimates of the Landau diffusion operator**.
    R. Cabrera, M. Gualdani, and N. Guillen.
    arXiv preprint 2310.16012.
24. **A Convex Optimization Framework for Regularized Geodesic Distances**
    M. Edelstein, N. Guillen, J. Solomon, and M. Ben-Chen.
    SIGRAPH Conference (2023).
23. **Hardy's inequality and the isotropic Landau equation**.
    M. Gualdani and N. Guillen.
    Journal of Functional Analysis, (2022).
22. **A Hele-Shaw limit without monotonicity**.
    N. Guillen, I. Kim, and A. Mellet.
    Archive for Rational Mechanics and Analysis (2022).
21. **Optimal transport and the Gauss curvature equation**.
    N. Guillen and J. Kitagawa.
    Methods and Applications of Analysis (2020).

20. **Geometry of graph partitions via optimal transport**.
    T. Abrishami, N. Guillen, P. Rule, Z. Schutzman, J. Solomon , T. Weighill, and S. Wu.
    SIAM Journal on Scientific Computing (2020).
19. **A primer on Generated Jacobian Equations: Geometry, optics, economics**.
    N. Guillen.
    Notices of the American Mathematical Society 66.9 (2019).
18. **Some free boundary problems recast as nonlocal parabolic equations**.
    H. Chang-Lara, N. Guillen, and R. Schwab.
    Journal of Nonlinear Analysis (2019).
17. **Coupling Levy measures and comparison principles for viscosity solutions.**
    N. Guillen, C. Mou, and A. Swiech.
    Transactions of the American Mathematical Society (2019).
16. **Estimates for Dirichlet-to-Neumann maps as integro-differential operators.**
    N. Guillen, J. Kitagawa, and R. Schwab.
    Potential Analysis (2019).
15. **On A_p weights and the Landau equation**.
    M. Gualdani and N. Guillen.
    Calculus of Variations and Partial Differential Equations (2019).
14. **Min-max formulas for nonlocal elliptic operators on Euclidean space.**
    N. Guillen and R. Schwab.
    Journal of Nonlinear Analysis (2019).
13. **Min-max formulas for nonlocal elliptic operators**.
    N. Guillen and R. Schwab.
    Calculus of Variations and Partial Differential Equations (2019).
12. **From the free boundary condition for Hele-Shaw to a fractional parabolic equation**.
    H. Chang-Lara and N. Guillen.
    Preprint.
11. **Neumann Homogenization via Integro-Differential Operators, Part 2: singular gradient dependence**.
    N. Guillen and R. Schwab.
    SIAM Journal on Mathematical Analysis (2018).
10. **Estimates for radial solutions of the homogeneous Landau equation with Coulomb potential**.
    M. Gualdani and N. Guillen.
    Analysis and PDE (2016).

9. **Pointwise estimates and regularity in geometric optics and other Generated Jacobian Equations**.

   N. Guillen and J. Kitagawa.

   Communications on Pure and Applied Mathematics (2017).

8. **Neumann Homogenization via Integro-Differential Operators**.

   N. Guillen and R. Schwab.

   Discrete and Continuous Dynamical Systems (2016).

7. **Mean curvature, diffusion generated motion, and phase field theory on finite graphs**.

   A. Bertozzi, Y. van Gennip, N. Guillen, and B. Osting

   Milan Journal of Mathematics (2014).

6. **Quasistatic droplets in randomly perforated domains**.

   N. Guillen and Inwon Kim.

   Archive for Rational Mechanics and Analysis (2015).

5. **On the local geometry of maps with c-convex potentials**.

   N. Guillen and J. Kitagawa.

   Calculus of Variations and Partial Differential Equations (2015).

4. **Aleksandrov-Bakelman-Pucci Type Estimates For Integro-Differential Equations**.

   N. Guillen and R. Schwab.

   Archive for Rational Mechanics and Analysis (2012).

3. **Five lectures on optimal transportation: geometry, regularity and applications**.

   N. Guillen and R. McCann.

   Lecture Notes of the Seminaire de Mathematiques Superieure (2011).

2. **Regularity for non-local almost minimal boundaries and applications**.

   N. Guillen and C. Caputo.

   Unpublished preprint.

1. **Optimal regularity for the Signorini problem**.

   N. Guillen.

   Calculus of Variations and Partial Differential Equations (2009).

Conference talks

- *ICERM workshop, Optimal Transport in Data Science*, May 2023.
- *V Escuela sobre Análisis Funcional y Geometría*, Octubre 20232.
- *Midwest Geometry Conference.* Plenary speaker. Wichita State University. March 2022.
- *Congreso Latinoamericano de Matemáticos.* (Análisis Funcional y Geometría). September 2021.
- *Gerrymandering workshop.* Duke University, October 2018.
- *Voting Rights Data Institute.* Tufts-MIT, June 2018.

- *BIRS Workshop: Advanced Developments for Surface and Interface Dynamics - Analysis and Computation* . Banff International Research Station. June 2018.
- *Geometry of Redistricting Workshop.* Session on Optimal Transport. Boston. August 2017.
- *Mathematical Congress of the Americas.* Session on Nonlocal variational problems. Montreal. July 2017.
- *BIRS Workshop: Generated Jacobian Equations: from geometric optics to economics.* Banff International Research Station. April 2017.
- *SIAM Conference on Nonlinear Waves and Coherent Structures.* Session on Nonlocal dynamics in mechanics, transport, and electromagnetics. Philadelphia. August 2016.
- *3rd Conference on Nonlocal Operators and Partial Differential Equations.* Stefan Banach International Mathematical Center, Bedlewo. June 2016.
- *Conference on Recent Trends on Elliptic Nonlocal Equations.* Fields Institute, Toronto. June 2016
- *Nonlocal PDEs Workshop.* IPAM, Los Angeles. February 2012.

Selected university colloquia and seminar talks

- Partial Differential Equations Seminar. Arizona State University, February 2023.
- Analysis Seminar. UT Austin, January 2023.
- Online Analysis and PDE Seminar[1]. Universidad de Sevilla. March 2021, Sevilla.
- Applied Mathematics Seminar. Brown University. February 2019, Providence.
- Colloquium. Texas State University. January 2019, San Marcos.
- Colloquium. Tulane University, April 2018, New Orleans.
- Metric Geometry Group Seminar. Tufts University, May 2017, Boston.
- PDE-Applied Math Seminar. University of Maryland, May 2017, College Park.
- Analysis seminar. Massachusetts Institute of Technology, March 2017, Boston.
- Analysis and PDE Seminar. Johns Hopkins University. November 2016, Baltimore.
- Analysis Seminar. University of Chicago. October 2016, Chicago.
- Applied Mathematics Seminar. Michigan State University. March 2016, Lansing.
- Geometric PDE. University of Wisconsin. March 2016, Madison.
- PDE Seminar. Georgia Inst. of Technology, October 2015, Atlanta.
- UCLA-Caltech Analysis Seminar. California Inst. of Technology, May 2015, Pasadena.
- PDE Seminar. Brown University, January 2015, Providence.
- Analysis Seminar. Columbia University, September 2014, New York.
- Colloquium. Drexel University, January 2014, Philadelphia.
- Colloquium. George Washington University. January 2014, Washington, D.C.
- Colloquium. University of Maryland. December 2013, College Park.
- Colloquium. University of Massachusetts. December 2013, Amherst.

[1] https://sites.google.com/view/analysis-pde-seminar/main-page

- Colloquium. Purdue University. December 2013, West Lafayette.
- Geometric PDE seminar. Princeton University. September 2013. Princeton.
- Analysis seminar. California Inst. of Technology. March 2012, Pasadena.
- PDE seminar. UC Berkeley. March 2011, Berkeley.

Minicourses taught

- (planned for January 2024) 1st San Marcos Winter School at Texas State University.
- Minicourse on Stochastic Homogenization. 2016 Gene Golub Summer School, Philadelphia, July 2016.

Organization of scientific meetings

- (planned for Spring 2025, date TBD) AIM workshop on kinetic equations. Co-organized with Maria Gualdani, Russell Schwab, and Maja Taskovic.
- (planned for May 2024) Joint Texas State and UT Austin Summer School and Workshop on Algorithms and PDE. Co-organized with Maria Gualdani.
- Recent Progress in Kinetic and Integro-Differential Equations, November 2022, Banff International Research Station. Co-organized with Maria Gualdani, Russell Schwab, and Maja Taskovic.
- Workshop on Free Boundary Problems, May 2019, Columbia University. Co-organized with Daniela De Silva, Ovidiu Savin, and Hui Yu.
- Workshop on Nonlinear PDEs, December 2018, Columbia University. Co-organized with Daniela De Silva, Ovidiu Savin, and Hui Yu.
- Generated Jacobian Equations: from Geometric Optics to Economics, April 2017, Banff International Research Station. Co-organized with Jun Kitagawa and Robert McCann.
- Optimal Transport School, Lake Arrowhead (October 2013). Co-organized with Dima Shlyakhtenko and Christoph Thiele.
- SIAM Conference on Analysis of PDE 2011. *Non-local equations: perspectives from Probability and PDEs*. Co-organized with Russell Schwab.
- SIAM Conference on Analysis of PDE 2009. *Topics in fractional and geometric PDE*. Co-organized with Luis Caffarelli.

Selected Departmental Service

- Head writer, proposal for a new mathematics PhD at Texas State (currently submitted to the Texas Higher Education Coordinating Board), this was a multiple year effort involving job market analysis, obtanining letters of support from academia and industry, and coordinating curriculum.
- New PhD Proposal Committee, Chair.
- (at Texas State) Member of: Hiring Committee, Graduate Program Committe, the COVID 2019 pandemic Student Listening Committee, and Committee on Committees.
- (at UMass Amherst) Hiring Committe member (3 searches total between 2014 and 2019), Colloquium committee co-chair, Graduate admissions committee (3 years).