

Robin Neumayer

Curriculum Vitae

Education

- 2017 **Ph.D. in Mathematics**, *University of Texas*, Austin.
Supervised by Alessio Figalli and Francesco Maggi.
- 2014 **M.S. in Mathematics**, *University of Texas*, Austin.
- 2012 **B.S. in Mathematics**, *University of South Carolina*, Columbia.
Summa cum laude, degree with distinction.

Academic Appointments

- 2017–2021 **Northwestern University**, RTG Postdoctoral Fellow.
On leave for 2018–2019 academic year.
- 2018–2019 **Institute for Advanced Study**, Member.
For the Variational Methods in Geometry special year.

Grants and Awards

- 2019–2022 **NSF Grant**, DMS-1901427.
“Stability of functional and geometric inequalities and applications.”
- 2019 **AWM Travel Grant**.
Declined after receiving NSF grant.
- 2019 **US Junior Oberwolfach Fellow**.
- 2018 **Oberwolfach Leibniz Graduate Student**.
- 2017 **AustMS Travel Award**.
For the International Conference on PDEs, Geometric Analysis, and Functional Analysis in Sydney, Australia.
- 2012–2017 **NSF Graduate Research Fellowship**, DGE-1110007.
- 2012–2013 **Graduate Fellowship**, UT Department of Mathematics.
- 2012 **Outstanding Student of Mathematics Award**, University of South Carolina.
- 2011 **Rising Senior in Mathematics Award**, University of South Carolina.

Research Publications

- [1] **d_p Convergence and ϵ -regularity theorems for entropy and scalar curvature lower bounds.**
M.-C. Lee, A. Naber, and R. Neumayer. Submitted for publication, preprint available at arXiv:2010.15663.
- [2] **Quantitative stability for minimizing Yamabe metrics.**
M. Engelstein, R. Neumayer, and L. Spolaor. Submitted for publication, preprint available at arXiv:2009.14362.
- [3] **A note on strong-form stability for the Sobolev inequality.**
R. Neumayer. *Calc. Var. Partial Differential Equations*, **59** (2020), no. 1, Paper No. 25, 8pp.
- [4] **Anisotropic liquid drop models.**
R. Choksi, R. Neumayer, and I. Topaloglu. Accepted to *Adv. Calc. Var.*, preprint available at arXiv:1810.08304.
- [5] **Bubbling with L^2 -almost constant mean curvature and an Alexandrov-type theorem for crystals.**
M.G. Delgadino, F. Maggi, C. Mihaila, and R. Neumayer. *Arch. Ration. Mech. Anal.* **230** (2018) no. 3, 1131–1177.
- [6] **The Cheeger constant of a Jordan domain without necks.**
G.P. Leonardi, R. Neumayer, and G. Saracco. *Calc. Var. Partial Differential Equations*. **56** (2017), no. 6, Art. 164, 29 pp.
- [7] **A bridge between Sobolev and Escobar inequalities and beyond.**
F. Maggi and R. Neumayer. *J. Funct. Anal.* **273** (2017), no. 6, 2070–2106.
- [8] **Higher regularity of the free boundary for the fractional obstacle problem.**
Y. Jhaveri and R. Neumayer, *Adv. Math.* **311** (2017), 748–795.
- [9] **Gradient stability for the Sobolev inequality: the case $p \geq 2$.**
A. Figalli and R. Neumayer. *J. Eur. Math. Soc. (JEMS)* **21** (2019), no. 2, 319–354.
- [10] **A strong form of the quantitative Wulff inequality.**
R. Neumayer. *SIAM J. Math. Anal.* **48** (2016), no. 3, 1727–1772.
- [11] **A note on the stability of the Cheeger constant of N -gons.**
M. Caroccia and R. Neumayer. *J. Convex Anal.* **22** (2015), no. 4, 1207–1213.

Other Publications – Thesis, Proceedings, and Reports

- [12] **Stability and minimality properties in Sobolev and isoperimetric inequalities.**
R. Neumayer. Ph.D. thesis containing the results of [6], [8], and [9]. Available at <https://math.northwestern.edu/~neumayer/NeumayerThesis.pdf>.

- [13] **Characterizing minimizers of a constrained planar isoperimetric problem.**
R. Neumayer. *Oberwolfach Rep.* **16** (2019), no. 3, 2046–2048.
- [14] **On minimizers and critical points for anisotropic isoperimetric problems.**
R. Neumayer. *2018 Matrix Annals*, 293–302.
- [15] **Mass transportation methods in functional inequalities and a new family of sharp constrained Sobolev inequalities.**
R. Neumayer. *RIMS Kôkyûroku* (2017), no. 2046, 39–49.

Invited Conference Talks (including upcoming/scheduled)

- May 2021 John Barrett Memorial Lectures (University of Tennessee)
- March 2021 AMS Sectional Meeting (Virtual)
Special Session on “Geometric and Functional Inequalities and Nonlinear Partial Differential Equations”
- Feb. 2021 Seminario Interuniversitario de Investigación en Ciencias Matemáticas (Virtual)
- Jan. 2021 Joint Mathematics Meeting (Virtual)
Special Session on “PDEs in optimization, control, and games”
- Nov. 2019 AMS Sectional Meeting (UC Riverside)
Special Session on “Analysis of Nonlinear Partial Differential Equations and Applications”
- Oct. 2019 Modern Math Workshop (Honolulu, HI, Satellite of SACNAS National Conference)
Research Session and IAS/PCMI Representative
- Oct. 2019 Local and Nonlocal Trends in Analysis and Geometry (University of Pittsburgh)
- Sept. 2019 Dynamics, Equations, and Applications (AGH UST, Kraków, Poland)
- July 2019 Oberwolfach Workshop on Partial Differential Equations
- June 2019 RTG Conference on Geometric Analysis (Princeton University)
- May 2019 Geometry Workshop (University of British Columbia)
- April 2019 AMS Sectional Meeting (University of Connecticut)
Special Session on “Regularity Theory of PDEs and Calculus of Variations on Domains with Rough Boundaries”
- March 2019 AMS Sectional Meeting (University of Hawaii)
Special Session on “Analysis of Nonlinear Geometric Equations”
Special Session on “New Trends in Geometric Measure Theory”
Special Session on “Interactions between Geometric Measure Theory, PDE, and Harmonic Analysis”
- Nov. 2018 Recent Trends in Nonlinear PDEs of Elliptic and Parabolic Type (MATRIX Institute)

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- Nov. 2018 Recent Trends in Nonlinear PDEs (University of Sydney)
- Oct. 2018 82nd Midwest PDE Seminar (Purdue University)
- July 2018 Workshop for Women in Differential Equations (Universidade Federal do ABC, Santo André, Brazil)
- July 2018 PCMI Research Program in Harmonic Analysis
- April 2018 81st Midwest PDE Seminar (University of Wisconsin)
- April 2018 AMS Sectional Meeting (Portland State University)
Special session on “Analysis at the intersection of Geometric Measure Theory and Partial Differential Equations”
- April 2018 6th Annual Midwest Women in Mathematics Symposium (Purdue University)
- April 2018 Graduate Student Topology and Geometry Conference (University of Illinois at Chicago)
- July 2017 Mathematical Congress of the Americas (Montreal)
Special session on “Nonlocal Variational Problems”
- March 2017 International Conference on PDEs, Geometric Analysis and Functional Inequalities (University of Sydney)
- Nov. 2016 RIMS Workshop on Analysis on Shapes of Solutions to Partial Differential Equations (Kyoto University)
- July 2016 AIMS Conference on Dynamical Systems, Differential Equations and Applications (Orlando, FL)
Special session on “Geometric functional inequalities and application to PDEs”
Special session on “Quantitative geometric and functional inequalities and new trends in nonlinear PDEs”

Invited Seminar Talks (including upcoming/scheduled)

- March 2021 Harmonic Analysis, GMT, and PDE Seminar, University of Minnesota and University of Missouri (Virtual)
- Feb. 2021 Geometric Analysis Seminar, UC San Diego (Virtual)
- Feb. 2021 Analysis Seminar, University of Trento (Virtual)
- Feb. 2021 Applied PDEs Seminar, Imperial College London (Virtual)
- Feb. 2021 Topology and Geometry Seminar, Duke University (Virtual)
- Jan. 2021 Colloquium, University of Toronto (Virtual)
- Jan. 2021 Colloquium, Rice University (Virtual)
- Jan. 2021 Analysis Seminar, Cal Tech (Virtual)
- Dec. 2020 Colloquium, Texas A&M (Virtual)
- Dec. 2020 Colloquium, Notre Dame (Virtual)
- Nov. 2020 Webinários do PPGMat, UFRGS (Virtual)
- Nov. 2020 Geometric Analysis Seminar, CUNY (Virtual)
- Oct. 2020 PDE/Analysis Seminar, University of Minnesota (Virtual)

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- Oct. 2020 Analysis Seminar, Georgia Tech (Virtual)
- Dec. 2019 Geometry Seminar, University of Notre Dame
- Nov. 2019 Department-Wide Seminar, University of Pennsylvania
- Sept. 2019 PDE/Applied Math Seminar, Indiana University
- Sept. 2019 PDE Seminar, Brown University
- Aug. 2019 Departmental Seminar, Duke University
- April 2019 Geometry and Analysis Seminar, Columbia University
- April 2019 Analysis Seminar, University of Pennsylvania
- April 2019 Nonlinear Analysis Seminar, Rutgers University
- Feb. 2019 Variational Methods in Geometry Special Year Seminar, Institute for Advanced Study
- Feb. 2019 Analysis Seminar, Princeton University
- Jan. 2019 Geometric Analysis Seminar, University of Tennessee
- April 2018 SEDNOL Seminar, Universidad Nacional Autónoma de México
- March 2018 Analysis Seminar, Michigan State University
- Jan. 2018 Geometric Analysis Seminar, University of Chicago
- Nov. 2017 Rainwater Seminar, University of Washington
- Oct. 2017 Analysis Seminar, Johns Hopkins University
- Oct. 2017 CAMP Seminar, University of Chicago
- April 2017 Geometry and Analysis Seminar, Columbia University
- March 2017 Analysis Seminar, University of Florence
- Feb. 2017 Analysis Seminar, University of Modena and Reggio Emilia
- Jan. 2017 Analysis Seminar, Northwestern University
- Jan. 2016 CNA Seminar, Center for Nonlinear Analysis, Carnegie Mellon University
- Dec. 2015 PDE Seminar, Purdue University
- Nov. 2015 Analysis Seminar, University of Modena and Reggio Emilia
- Oct. 2015 Analysis Seminar, École Normale Supérieure de Lyon
- Sept. 2014 Analysis Seminar, ETH Zürich
- June 2014 Seminar for Elliptic PDEs, Weierstrauss Institute, Berlin

Invited Visits

- Nov. 2017 University of Washington, invited by T. Toro (one week)
- Feb. 2017 University of Modena and Reggio Emilia, invited by G.P. Leonardi (one week)
- Jan. 2017 Northwestern University, invited by E. Getzler (one week)
- Spring 2017 ICTP (Trieste, Italy), invited by F. Maggi (one semester)
- Nov. 2016 Tohoku University (Sendai, Japan), invited by N. Ioku (one week)
- Fall 2016 ETH Zürich, invited by A. Figalli (one semester)

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- Jan. 2016 Center for Nonlinear Analysis, Carnegie Mellon University, invited by M. Caroc-
cia (one week)
- Oct. 2015 École Normale Supérieure de Lyon, invited by A. Figalli (one month)
- Dec. 2015 Purdue University, invited by M. Torres (one week)
- Nov. 2015 University of Modena and Reggio Emilia, invited by G.P. Leonardi (one week)
- Oct. 2014 ETH Zürich, invited by A. Figalli (one month)

Teaching (including upcoming appointments)

Northwestern University

- Spring 2021 **Instructor**, Topics in Analysis (Graduate Topics Class).
- Spring 2021 **Instructor**, Elementary Differential Equations.
- Fall 2020 **Instructor**, Introduction to Differential Geometry.
- Winter 2020 **Instructor**, Foundations of Higher Mathematics.
- Fall 2019 **Instructor**, Single-Variable Differential Calculus.
- Winter 2018 **Instructor**, Differential Calculus of Multivariable Functions.
- Fall 2017 **Instructor**, Integral Calculus of One-Variable Functions.

University of Texas at Austin

- Spring 2016 **Teaching Assistant**, Integral and Multivariable Calculus.

Mini-Courses

- May 2019 **Teaching Assistant**, Ancient Solutions to Geometric Flows.
Mini-course taught by P. Daskalopoulos, Topics in Geometric Analysis Summer School
for Women in Mathematics, Institute for Advanced Study.

Mentorship

- Summer **REU Mentor**, University of Chicago Mathematics REU.
2020 Served as the REU mentor for K. DeMason, an undergraduate who was an unofficial
participant in the University of Chicago Mathematics REU for a project on anisotropic
isoperimetric problems.

Conference Organization

- June 2021 **Co-organizer**, Special Session on “Nonlinear PDE and Applications” at AIMS
Conference on Dynamical Systems, Differential Equations and Applications
(Atlanta, GA).
With C. Mooney and F. Rindler.
- Jan. 2020 **Co-organizer**, Special Session “Interfaces between PDEs and Geometric Mea-
sure Theory” at Joint Mathematics Meetings (Denver, CO).
With Z. Zhao.

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July 2018 **Co-organizer**, Special Session “Recent Advances in the Calculus of Variations and Elliptic PDE” at AIMS Conference on Dynamical Systems, Differential Equations and Applications (Taipei, Taiwan).
With C. Mooney.

Service

- Ongoing **Referee**, for the following journals.
Annali della Scuola Normale Superiore di Pisa; Annali di Matematica Pura ed Applicata; Communications in Analysis and Geometry; Geometriae Dedicata; International Mathematics Research Notices; Journal of Geometric Analysis; Journal of Nonlinear Science; Nonlinear Analysis; Revista Matemática Iberoamericana; SIAM Journal on Mathematical Analysis; Transactions of the American Mathematical Society.
- Jan. 2021 **Judge**, AWM Poster Session, Joint Mathematics Meetings.
- Oct. 2020 **Panelist**, Academic Job Panel, Northwestern University.
- Oct. 2019 **IAS/PCMI Representative**, Modern Math Workshop (Satellite of SACNAS National Conference), Honolulu, HI.
- Oct. 2019 **Panelist**, Academic Job Panel, Northwestern University.
- 2019–2020 **Faculty mentor**, Directed Reading Program, Northwestern University.
- 2019–2021 **Organizer**, Women in Math Program, Northwestern University.
- 2019–2020 **Committee Member**, Climate Committee, Northwestern University.
Postdoctoral representative for committee aimed at addressing departmental concerns.
- 2018–2019 **Co-organizer**, Women in Math Lunches, Institute for Advanced Study.
with A. Bucur.
- Nov. 2018 **Speaker**, Mathematical Conversations, Institute for Advanced Study.
- Oct. 2017 **Volunteer**, Graduate Research Opportunities for Women (GROW).
Conference for undergraduate women in mathematics at Northwestern University.
Participated in conference and breakout mentoring session.
- March 2017 **Panelist**, “Promoting Gender Diversity in Mathematics” Discussion Panel, International Conference on PDEs, Geometric Analysis and Functional Inequalities (University of Sydney).
- 2013–2016 **Co-organizer**, Distinguished Women in Mathematics (DWM) Program, UT Austin.
Managed the website, invited speakers, and helped organize visits for DWM, a program and lecture series bringing accomplished female mathematicians to UT Austin.
- April 2016 **Speaker**, Undergraduate Math Club, UT Austin.
- May 2015 **Organizer**, Math Day, The Girls’ School of Austin.
Planned and directed interactive math activities for a first grade class.
- Nov. 2014 **Speaker**, “They Blinded Me With Science” science radio show on Austin radio station KVRX.
- Nov. 2014 **Speaker**, Undergraduate Math Club, UT Austin.

- Spring 2014 **Mentor**, IE Pre-Graduate School Internship Program, UT Austin.
Directed an independent study on measure theory taken by an undergraduate student for course credit.
- Fall 2013 **Mentor**, Directed Reading Program, UT Austin.
Directed a reading course on optimal transport for an undergraduate student.
- 2012–2015 **Tutor and aid**.
Worked weekly with a disabled high school student in Austin.