

Theresa C. Anderson
The Gregg Zeitlin Associate Professor of Mathematical Sciences

CONTACT INFORMATION

Carnegie Mellon University
Mathematics Department
tanders2@andrew.cmu.edu
<https://faculty.math.cmu.edu/anderson/>

8125 Wean Hall, Hammerschlag Dr.
Pittsburgh, PA 15213
Citizenship: USA

EMPLOYMENT AND EDUCATION

- Carnegie Mellon University: Pittsburgh, PA, July 2022-present
- The Gregg Zeitlin Associate Professor of Mathematical Sciences, July 2024- present
 - The Gregg Zeitlin Assistant Professor of Mathematical Sciences, October 2023- June 2024
 - Assistant Professor (tenure-track)
- Purdue University: West Lafayette, IN, August 2018-June 2022
- Assistant Professor (tenure-track)
- University of Wisconsin-Madison: Madison, WI, 2015-2018
- NSF Mathematical Sciences Postdoctoral Research Fellow
 - Van Vleck Visiting Assistant Professor
- Brown University: Providence, Rhode Island, 2010-2015
- Ph.D. in Mathematics, May 2015
 - M.A. in Mathematics, May 2012
 - Advisor: Jill Pipher
- University of Wisconsin-Madison: Madison, WI, 2006-2010
- B.S. with Honors: majors in Mathematics, Chemistry, and Spanish

GRANTS, AWARDS, AND HONORS

- 2023-2028 NSF CAREER DMS-2237937 jointly in Algebra, Number theory and Combinatorics and Analysis
- 2023 NSF grant for PLANT (analysis, number theory conference): co-PI (PI: Wang-Erickson, co-PI: Schikorra)
- 2023 CMU nominee for Packard Fellowship (top 100 overall in all STEM disciplines, top 20 chosen as fellows)
- 2020-2025 NSF Grant DMS-1954407 funded jointly by Analysis DMS and Algebra and Number theory DMS
- 2020 Purdue College of Engineering/College of Science Violet B. Haas Memorial Fellowship Honoree
- 2015-2019 NSF Grant DMS-1502464: Mathematical Sciences Postdoctoral Research Fellow
- 2017 MSRI semester in Harmonic Analysis research member
- 2011-2015 NSF Graduate Research Fellowship in Mathematics (funded in Algebra and Number theory)
- 2011 Joint Mathematics Meetings poster session prize winner
- 2010 UW-Madison University Bookstore award for best Undergraduate Thesis
- 2009-2010 UW-Madison College of Letters and Science Scholarships: David H. Dura Scholarship, Summer Senior Honors Thesis Grant, Besozzi Scholarship
- 2009 American Chemical Society Excellence in Physical Chemistry Award
- 2009 Outstanding Junior Award - Wisconsin Alumni Association
- 2008, 2009 UW-Madison Mathematics Department Cady Scholarship
- 2008, 2009 UW-Madison Chemistry Department awards: Margaret Bender award, 2008 Hypercube Scholar, Eugene and Patrica Kreger Herscher award for summer research, Martha Gunhild Week award
- 2008 Hilldale Undergraduate research fellowship

2007-2008 Honor Societies: Phi Beta Kappa, Phi Kappa Phi
 2006 U.S. Department of Education Presidential Scholar
 2006 Coca Cola Scholar (out of 50,000 applicants, I was chosen to be a finalist with 250 others)

RESEARCH INTERESTS

My interests are broadly in number theory and analysis including connecting these areas in new ways. Some recent work has been in discrete (number theoretic) variants of tools from harmonic analysis, lattice point counting on surfaces, structure theorems in harmonic analysis and relating these to number theory, and development of Fourier analytic methods in arithmetic statistics.

PUBLICATIONS AND PREPRINTS

The symbol * indicates a graduate student coauthor, ** indicates an undergraduate student coauthor. Most papers are available freely at <https://arxiv.org>.

36. Anderson, Theresa C., Bertilli, Adam**, and O’Dorney, Evan M. Galois groups of reciprocal polynomials and the van der Waerden-Bhargava theorem. Submitted. Preprint on arXiv.
35. Anderson, Theresa C., Bellah, E., Markman, Z.**, Pollard, T.** and Zeitlin, J.** Arbitrary finite intersections of doubling measures and applications. To appear in *Journal of Functional Analysis*.
34. Anderson, Theresa C., Maldague, Dominique, Pierce, Lillian, and Yung, Po-Lam. On polynomial Carleson operators along quadratic hypersurfaces. To appear in *Journal of Geometric Analysis*.
33. Anderson, Theresa C., Lehrback, Juha, Mudarra, Carlos, and Vahäkangas, Antti. Weakly porous sets and Muckenhoupt A_p distance functions. To appear in *Journal of Functional Analysis*.
32. Anderson, Theresa C. Having children at critical career stages and flourishing. To appear in *Notices of the AMS*.
31. Anderson, Theresa C., Hughes, Kevin, Gafni, Ayla, Lemke Oliver, Robert, Lowry-Duda, David, Thorne, Frank, Wang, Jiuya, and Zhang, Ruixiang. Improved bounds on number fields of small degree. To appear in *Discrete Analysis*.
30. Anderson, Theresa C., Kumchev, A.V. and Palsson, E.A. A framework for discrete bilinear spherical averages and applications to ℓ^p -improving. To appear in *Colloq. Math.*
29. Anderson, Theresa C. Discrete multilinear maximal functions and number theory. To appear in *Illinois Journal of Math.*
28. Anderson, Theresa C., Hu, Bingyang, Liu, Yu-Ru, and Talmage, Alan. Bounds on tenth moments of (x, x^3) for ellipsephic sets. To appear in *Contemporary Mathematics*.
27. Anderson, Theresa C. and Hu, Bingyang. On the general dyadic grids in \mathbb{R}^d . *Canad. J. Math.* 75(2023), no.4, 1147–1175.
26. Anderson, Theresa C. and Hu, Bingyang. A structure theorem on intersections of general doubling measures and its applications. *Int. Math. Res. Not. IMRN* (2023), no.9, 7423–7485.
25. Anderson, Theresa C., Travasset, Chiara** and Veltri, Joey**. A structure theorem for weight and function classes with coprime bases. *Q. J. Math.* 74(2023), no.2, 459–470.
24. Anderson, Theresa C., Gafni, Ayla, Lemke Oliver, Robert, Lowry-Duda, David, Shakan, George, and Zhang, Ruixiang. Quantitative Hilbert Irreducibility and almost prime values of polynomial discriminants. *Int. Math. Res. Not.* 2023, no. 3, 2188–2214.

23. Anderson, Theresa C., Kumchev, A. V. and Palsson, E.A. Discrete maximal functions over surfaces of higher codimension. *Matematica* 1 (2022), no. 2, 442–479.
22. Anderson, Theresa C., and Palsson, E. A.. Bounds for multilinear spherical maximal functions. *Collectanea Mathematica* 73 (2022), no. 1, 75–87.
21. Anderson, Theresa C., Cook, Brian, Hughes, Kevin and Kumchev, Angel. The Ergodic Goldbach-Waring problem. *Journal of Functional Analysis*, Volume 282, Issue 5, 1 March 2022.
20. Anderson, Theresa C. and Hu, Bingyang. A structure theorem on doubling measures: a number theoretic approach. *J. Math. Anal. Appl.*, volume 505, issue 1, 1 January 2022,
19. Anderson, Theresa C. and Damián, Wendolín*. Calderón–Zygmund operators and commutators in spaces of homogeneous type: weighted inequalities. *Anal. Math.* 48 (2022), no. 4, 939–959.
18. Anderson, Theresa C. and Hu, Bingyang. Sharp Mei’s lemma with different bases. *Results in Mathematics* 77 (2022), no. 2, Paper No. 69.
17. Anderson, Theresa C., Cladek, Laura, Pramanik, Malabika, and Seeger, Andreas. Spherical means on the Heisenberg group: stability of a maximal function estimate. *J. Anal. Math* 145 (2021), no. 1, 1–28..
16. Anderson, Theresa C., Hu, Bingyang*, and Roos, Joris. Sparse bounds for discrete singular Radon transforms. *Colloq. Math.* 165 (2021), no. 2, 199–217.
15. Anderson, Theresa C., and Palsson, E. A.. Bounds for multilinear spherical maximal functions in higher dimensions. *Bull. Lond. Math. Soc.* 53 (2021), no. 3, 855–860.
14. Anderson, Theresa C., Hughes, Kevin, Roos, Joris, and Seeger, Andreas. $L^p \rightarrow L^q$ bounds for spherical maximal operators. *Mathematische Zeitschrift* 297 (2021), no. 3-4, 1057–1074.
13. Anderson, Theresa C. Quantitative l^p improving for discrete spherical averages along the primes. *J. Fourier Anal. Appl.* 26 (2020), no. 2, Paper No. 32, 12 pp.
12. Anderson, Theresa C., Hu, Bingyang*, Jiang, Liwei**, Olson, Connor**, and Wei, Zeyu**. On the translates of general dyadic systems on \mathbb{R} . *Mathematische Annalen*, 377(3), 911-933 (2020).
11. Anderson, Theresa C. and Hu, Bingyang*. A unified method for maximal truncated Calderón-Zygmund operators in general function spaces by sparse domination. *Proc. Edinburgh Math Soc.* (2) 63 (2020), no. 1, 229–247.
10. Anderson, Theresa C., Cook, Brian, Hughes, Kevin and Kumchev, Angel. Improved l^p boundedness for integral k-spherical maximal functions. *Discrete Analysis*, May 29, 2018.
9. Anderson, Theresa C. and Weirich, David E.* A Dyadic Gehring Inequality on spaces of homogeneous type and applications. *New York Journal of Math*, Volume 24, 2018.
8. Anderson, Theresa C., Cruz-Uribe OFS, David, and Moen, Kabe. Extrapolation in the scale of generalized reverse Hölder weights. *Rev. Math Complutense* 31 (2018), 2, 263–286.
7. Anderson, Theresa C., Hytönen, Tuomas, and Tapiola, Olli*. Weak A-infinity weights and weak reverse Hölder property in a space of homogeneous type. *J. Geom. Anal.* 27 (2017), no. 1, 95–119.
6. Anderson, Theresa C. A new sufficient two-weighted bump assumption for L^p boundedness of Calderon-Zygmund operators. *Proceedings of the AMS* Volume 143, Number 8, August 2015, Pages 3573-3586.
5. Anderson, Theresa C. A Framework for Calderón-Zygmund operators on Spaces of Homogeneous Type. PhD thesis, Brown University, 2015. See my website for a copy.

4. Anderson, Theresa C., Cruz-Uribe, David, SFO and Moen, Kabe. Logarithmic bump conditions for Calderón-Zygmund Operators on spaces of homogeneous type. *Publicacions Matemàtiques* 59(1), 2015.
3. Anderson, Theresa C. and Vagharshakyan, Armen. A simple proof of the sharp weighted estimate for Calderon-Zygmund operators on homogeneous spaces. *Journal of Geometric Analysis*. July 2014, Volume 24, Issue 3, pp 1276-1297.
2. Anderson, Theresa C. and Mari-Beffa, Gloria. A completely integrable flow of star-shaped curves on the light cone in Lorenzian R^4 . *J. Phys. A: Math. Theor.* 44 (2011) 445203. *Featured in IOP Select <http://Select.iop.org>.
1. Anderson, Theresa C., Rolin, Larry**, and Stoehr, Ruth E.** Benford's Law for coefficients of modular forms and partition functions. *Proceedings of the American Mathematical Society*. 139 (2011) 1533-1541.

PRESS

My joint article "Quantitative Hilbert Irreducibility and almost prime values of polynomial discriminants" (IMRN) was featured in an article on Bhargava's proof of van der Waerden's conjecture entitled "New proof illuminates the hidden structure of common equations" in Quanta Magazine. We were also interviewed by the French daily newspaper *Le Monde* about the same work.

I was featured in the article: Hershberger, S. "Dedicated Parents, Successful Mathematicians: Child Care Grant Recipients Share Their Stories." *Notices of the AMS*, Volume 69, No. 10, pages 1819-1821.

CONFERENCES AND WORKSHOPS ORGANIZED

- 2024 Mar. (co)-organizer, PLANT conference (analysis and number theory - NSF funded)
- 2023 Oct. (co)-organizer, AMS special session on Number theory and friends
- 2023 Mar. (co)-organizer, AIM SquaRE (topics in Arithmetic Statistics)
- 2025 tba Organizer, AIM workshop (topic tba) with Frank Thorne and Trevor Wooley
- 2022 Apr. Organizer, Special Session on Interface of Harmonic Analysis and Analytic Number Theory, AMS Spring central sectional meeting
- 2021 Feb. Organizer, AIM workshop on Arithmetic statistics, Discrete restriction, and Fourier analysis
- 2020 Dec. Organizer (Invited), CMS meeting special session on Discrete Analysis
- 2019 Sept. Organizer, Special Session on Recent Developments in Harmonic Analysis, AMS fall central sectional meeting
- 2019 Feb. Organizer, A Kaleidoscope of Mathematics: A conference celebrating our diversity (held at Purdue)
- 2013 Jan. Organizer, Special Session on Harmonic Analysis, Geometric Measure Theory and Partial Differential Equations at the Joint Math Meetings

PLENARY LECTURES, LARGE INVITED ADDRESSES AND COLLOQUIA

- 2024 June Plenary: Harmonic Analysis and Differential Equations - In Honour of Professor Jill Pipher
- 2023 Oct. Invited Address of the AMS: Southeastern Sectional Meeting
- 2023 July Plenary speaker, Modern trends in harmonic analysis, Tata Institute/ICTS
- 2022 Sept. Plenary speaker, PANTS
- 2022 Apr. Colloquium, CMU Math Club
- 2022 Feb. Colloquium, Loyola University Chicago
- 2022 Feb. Colloquium, Carnegie Mellon
- 2022 Jan. Colloquium, UT-Austin
- 2022 Jan. Colloquium, NC State

2021 Dec. Colloquium, UNC
 2021 Oct Plenary speaker: Maine-Quebec Number Theory Conference
 2021 Sept Colloquium, UMass Lowell
 2019 May Madison Lectures in Fourier Analysis
 2018 Nov. Colloquium, University of Cincinnati
 2018 May AWM seminar (Colloquium-style talk), UW-Milwaukee
 2017 Nov. Colloquium, Temple University
 2017 Nov. Colloquium, Purdue
 2017 Sept. Colloquium, UW-Madison
 2017 Mar. Joint Harmonic Analysis/Analytic Number Theory seminar, MSRI

OTHER SELECTED INVITED TALKS AND LECTURE SERIES

2024 Apr. Number Theory Web Seminar
 2024 Feb. Quebec-Vermont Number Theory Seminar
 2023 Aug. Number theory seminar, University of Georgia
 2023 Mar. Combinatorics seminar, University of Rochester
 2023 Feb. IAS Workshop on Dynamics, Discrete Analysis and Multiplicative Number Theory
 2023 Jan. Joint Math Meetings, special session on Arithmetic Statistics
 2023 Jan. Joint Math Meetings, special session on Celebrating the Mathematical Contributions of the AWM
 2022 Oct. Nonlinear Analysis Seminar, NTNU (Taiwan)
 2022 July Analysis and PDE seminar, University of Bonn
 2022 June Number theory seminar, Warwick University
 2022 Apr. HAPPY Director's Cuts (flagship series for the HAPPY channel)
 2022 Mar. AMS sectional meeting, Analytic methods in arithmetic statistics, Tufts University
 2022 Mar. Additive Combinatorics Webinar
 2021 Oct AMS sectional meeting (originally Albuquerque, NM), invited special session speaker
 2021 Sept Online Analysis Research Seminar, invited speaker
 2021 Aug MAGNTS, panelist (algebraic geometry and number theory)
 2021 July Mathematical Congress of America, invited speaker
 2021 July Workshop on Arithmetic Statistics Problems (WASP), invited discussion leader
 2021 Apr Analysis seminar, UW-Madison
 2021 Apr Probability and Analysis Webinar (PAW), invited seminar speaker
 2021 Mar Analysis seminar, University of Alabama
 2021 Mar Analysis seminar, NC State
 2021 Mar Analysis and Geometry seminar, Bristol University
 2021 Feb Analysis and PDE seminar, University of New Mexico
 2021 Jan Joint Math Meetings, Special session of the AWM
 2020 Oct Invited lecture series, Mid-Atlantic analysis seminar
 2020 Oct Number theory seminar, University of Mississippi
 2020 Oct Fall Eastern AMS Sectional Meeting (held virtually) special session in Analytic Number Theory
 2020 June Analysis and PDE seminar, CUNY
 2020 May Combinatorial and Additive Number Theory (CANT), invited speaker
 2020 May Number theory and Combinatorics seminar, Towson University
 2020 March Spring Southeastern AMS Sectional Meeting, invited special session speaker (cancelled due to COVID)
 2020 Feb. Joint Caltech/UCLA analysis seminar
 2020 Jan. Joint Math Meetings, invited special session speaker
 2019 Oct. Midwestern Workshop on Asymptotic Analysis, invited speaker
 2019 July SUMIRFAS conference, invited speaker (at TAMU)

2019 April Number Theory seminar, Tufts University
 2019 Mar. Ohio River Analysis Conference
 2018 May RTG Fourier Analysis Workshop, UW-Madison
 2018 Apr. The Ergodic Theory Workshop, UNC, invited speaker
 2018 Feb. Applied Math and Analysis seminar, Virginia Tech
 2017 Dec. Analysis seminar, UC-Davis
 2017 Nov. Analysis seminar, University of Illinois Urbana-Champaign
 2017 Feb. Postdoc Seminar, MSRI (Colloquium-style talk)
 2016 Oct. Fall Central AMS Sectional Meeting, invited special session speaker
 2016 Sept. Fall Eastern AMS Sectional Meeting, invited special session speaker
 2016 May Conference in honor of Michael Christ (invited short talk)
 2016 May Analysis seminar, University of Wisconsin-Milwaukee
 2016 Apr. Analysis seminar, University of Missouri
 2016 Feb. New Mexico Analysis seminar
 2015 Nov. Indiana University Analysis seminar
 2015 Mar. Yale Analysis seminar
 2015 Feb. Royal Spanish Mathematical Society, invited special session speaker
 2014 Dec. UCLA Analysis seminar
 2014 Nov. University of Rochester Analysis seminar
 2014 Sept. University of Pennsylvania Analysis seminar
 2014 Sept. University of Wisconsin-Madison Analysis seminar
 2014 July University of Alabama Analysis Seminar
 2014 Apr. AMS Sectional Meeting, Special Session on "Weighted Norm Inequalities"
 2013 Dec. University of Helsinki, Harmonic Analysis Seminar
 2013 May. Universidad de Sevilla (University of Seville, Spain) Analysis seminar
 2013 Mar. Lecture series in Harmonic Analysis, University of New Mexico Analysis Seminar
 2013 Mar. AWM Research Symposium, Santa Clara, California, invited special session speaker
 2013 Feb. Georgia Tech, Analysis Seminar
 2010 Apr. AMS Sectional Meeting, Special Session on Differential Geometry, Minneapolis, invited speaker

LEADERSHIP, SERVICE, AND DEI

I am extensively and actively involved in diversity, equity and inclusion (DEI) efforts. Some of these are listed below, but further information and activities available upon request.

2024 AWM Policy and Advocacy Committee, member
 2023-present Pittsburgh Number Theory Day (a semesterly event), (co)-founder and organizer
 2023-present Department Colloquium committee, CMU
 2023-present ASCEND mentor (associated with NSF ASCEND)
 2023 SUAMI REU (at CMU) - organizer
 2023 CMU Women in Science faculty advisor
 2023 Pittsburgh Women in math and computing, panelist
 2022-2023 Postdoc committee, CMU
 2021- 2023 Johnny Houston Distinguished Colloquium series - creator, organizer (University-wide, at Purdue)
 2021 Basic Skills Seminar (Purdue) - invited: "Combating racism and sexism in mathematics"
 2021 Twin Lakes High School: Discussion leader on "Careers in STEM"
 2020-2021 University committee for COACHE implementation (recommend large-scale policy changes)
 2020-2021 Purdue summer research school in number theory and analysis - founder and organizer
 2020-2021 Invited Reviewer and Panelist for NSF
 2020-2021 Diversity Committee (Purdue Mathematics)
 2019-2020 Appointed to Mathematics Head Search Committee (Purdue)

2019-2022	Co-founder, co-organizer: Purdue Analytic Number Theory and Harmonic Analysis seminar
2019	Invited Panelist for faculty panel on postdoctoral appointments (Purdue)
2018	Invited Panelist on "Career and Family Balance" for Graduate Women in Science (Purdue)
2018	UW Madison undergraduate summer school in Analysis (research based) - organizer
2017-2018	Wisconsin Science Festival and Junior Science Cafe - math presentations for students (grades K-12)
2015	Wisconsin Math Circle - presentation for middle school students
2015 and future	Referee for various journals, including LMS journals, J. Geo. Anal., Studia Math, etc.
2014	Invited attendee for Panel on Women in the Workforce with US Senator Jack Reed
2012-2015	Co-founder and organizer, Brown Informal Analysis seminar
2012-2015	Rose Whelan Society organizer (women in math group), Brown University
2013	Awarded "Volunteer of the Month" from State of Rhode Island
2012	Invited Panel Speaker, "Are we selling Mathematics as a Major?" Joint Math Meetings
2011-2015	English/Spanish interpreter for Rhode Island Free Clinic
2008-2010	President, Undergraduate Math Club, UW-Madison
2008-2010	Vice President (2009), Treasurer (2008), American Chemical Society Student Chapter (UW-Madison)

STUDENT AND RESEARCHER TRAINING

In addition to these activities, I am a mentor of several undergraduate and graduate students, both officially and unofficially.

2024	Led 5 undergraduates in research projects, preparing two manuscripts for professional journals
2024	Led 1 undergraduates in a research project, resulting in submitted paper (joint with O'Dorney)
2023-2025	postdoctoral mentor for Dr. Evan O'Dorney
2023-2024	Led 3 undergraduate students in research project, resulting in joint paper in <i>J. Func. Analysis</i>
2022	graduate mentor for Eliza Rodriguez
2020-2022	postdoctoral mentor for Dr. Bingyang Hu
2020-2022	graduate mentor for Anna Natalie Chlopecki
2021-2022	Topics exam committee for Kiseok Yeon, Daniel Flores, James Cumberbach
2020-2022	Led 2 undergraduate students in research project, resulting in joint paper in <i>QJM</i>
2021	Reading course on Dyadic Harmonic Analysis with Nikos Villareal Styles
2018-2019	Led 3 undergraduates in research project, resulting in joint paper in <i>Math Annalen</i>

TEACHING

2024	Spring	CMU, Topics in Undergraduate Research
2023	Fall	CMU, Topics course on Arithmetic Statistics (Graduate)
2022	Fall	CMU, 21-355: Principles of real analysis
2021	Spring	Purdue, Math 265, linear algebra (online section)
2020	Fall	Purdue, Math 265, linear algebra (2 sections) - developed fully online teaching format
2020	Spring	Purdue, Advanced topics class: The Discrete Jungle (discrete harmonic analysis and number theory - self-developed)
2019	Fall	Purdue, Math 265, linear algebra (2 sections)
2019	Spring	Purdue, Math 162i, Impact Calculus II (flipped classroom format)
2018	Spring	UW-Madison, Math 521, Analysis I
2016	Fall	UW-Madison, Math 521, Analysis I (two sections)
2015	Spring	Lecture Series on the Hardy-Littlewood Circle Method (6 lectures), Brown University
2015	Fall	Teaching Assistant, Brown University, Math 0100 (second semester calculus)
2014	Spring	Teaching Fellow (instructor), Brown University, Math 0520 (Linear Algebra)
2013	Spring	Teaching Assistant, Brown University, Math 0100 (second semester calculus)

2008-2009 UW-Madison Mathematics Department WES program student assistant (Math 234)
2006 I designed and submitted a prospectus for an original class "Young Scientists" for the summer Youth Academy program at Carroll University; I organized, planned and taught it. As far as I am aware, this course is a yearly offering.

LANGUAGES AND OTHER BACKGROUND

Spanish-near native level, Hmong-fluent, Japanese-basic. Previous research as an undergraduate includes physical chemistry (Crim lab - UW-Madison) and molecular biology (Miyamoto lab - UW-Madison).