

Theodore Weisman

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Department of Mathematics
University of Michigan

CURRENT POSITION

Assistant professor (non-tenure) and research fellow, University of Michigan
Ann Arbor, Michigan

2022 – present (on leave 2023 – 2024)

PAST POSITIONS

Postdoctoral researcher, Max Planck Institute for Mathematics in the Sciences
Leipzig, Germany

2023 – 2024

EDUCATION

University of Texas at Austin, Austin, Texas

Ph.D. in Mathematics

August 2022

Advisor: Jeffrey Danciger

Thesis: Higher-rank generalizations of convex cocompact and geometrically finite dynamics

Yale University, New Haven, Connecticut

B.S. in Mathematics (intensive), magna cum laude

May 2016

AWARDS AND HONORS

NSF Postdoctoral Research Fellowship

2022 – present

Frank Gerth III Outstanding Dissertation Award

2022

University of Texas at Austin

Provost's Graduate Excellence Fellowship

University of Texas at Austin

2016 – 2021

Outstanding Presentation Award

MAA Mathfest Undergraduate Paper Sessions

2014

PUBLICATIONS AND PREPRINTS

1. *Singular value gap estimates for free products of semigroups* (with K. Tsouvalas). arXiv:2409.20330, 2024. (submitted, 20 pages).
2. *Limits of limit sets in rank-one symmetric spaces* (with A. Guilloux). arXiv:2407.04301, 2024. (submitted, 27 pages).
3. *Morse properties in convex projective geometry* (with M. Islam). 2405.03269, 2024. (submitted, 59 pages).
4. *Topological stability of relatively hyperbolic groups acting on their boundaries* (with K. Mann and J. F. Manning). arXiv:2402.06144, 2024. (submitted, 33 pages).
5. *Examples of extended geometrically finite representations*. arXiv:2311.18653, 2023 (35 pages).
6. *Cubulated hyperbolic groups admit Anosov representations* (with S. Douba, B. Fléchettes, and F. Zhu). arXiv:2309.03695, 2023 (submitted, 59 pages).
7. *Combination theorems for geometrically finite convergence groups* (with A. Traaseth). arXiv:2305.08011, 2023 (submitted, 38 pages).
8. *Stability of hyperbolic groups acting on their boundaries* (with K. Mann and J.F. Manning). Accepted for publication in *Groups, Geometry, and Dynamics*.

9. *An extended definition of Anosov representation for relatively hyperbolic groups*. arXiv:2205.07183, 2022. (submitted, 54 pages).
10. *Dynamical properties of convex cocompact actions in projective space*. *Journal of Topology*, 16.3 (2023), pp 990-1047A.
11. *Realization of Groups with Pairing as Jacobians of Finite Graphs* (with L. Gaudet, D. Jensen, D. Ranganathan, and N. Wawrykow). *Annals of Combinatorics*, 22.4 (2018), pp 781-801.

TEACHING EXPERIENCE

Instructor, University of Michigan
MATH 285 (Honors multivariable & vector calculus) *Fall 2024*

Teaching Assistant, University of Texas at Austin
M427L (Advanced calculus for applications II) *Spring 2022*
M408C (Differential and integral calculus) *Fall 2018, Spring 2020*
M408S (Integral calculus for science) *Spring 2019*

SI (Supplemental Instruction) Teaching Assistant, University of Texas at Austin
M408C (Differential and integral calculus) *Fall 2019*

In addition to taking on normal TA duties, SI teaching assistants met weekly to develop better teaching strategies and discuss ways to improve classroom environment.

Peer Tutor, Yale University
MATH 244 (Discrete mathematics) *Fall 2014, Fall 2015*
MATH 222 (Linear algebra with applications) *Spring 2016*

MENTORSHIP

Faculty mentor, University of Michigan math REU
University of Michigan *Summer 2023*

Advised an undergraduate student on a research project relating to hyperbolic groups and finite-state automata.

Faculty mentor, Lab of Geometry at Michigan
University of Michigan *Winter 2023*

Designed and led an undergraduate project aimed at producing computer visualizations of Coxeter group actions in projective space.

Mentor, Texas Geometry Lab
University of Texas at Austin *Spring 2021, Fall 2021, Spring 2022*

Mentored a group of undergraduates on a computer visualization project. Met with students twice a week, provided guidance and suggestions for their programming project, and helped build the website for the lab.

Mentor, UT Directed Reading Program
University of Texas at Austin *2017–2021*

Mentored an undergraduate student through the process of reading a mathematical text. Mentoring involved meeting the student weekly to discuss the text and coaching them through a 15-minute talk at the end of the semester.

OUTREACH

Volunteer, Michigan Math Circle
University of Michigan *2024*

Ran an interactive session with Ann Arbor middle school students interested in mathematics.

Volunteer, Sunday Morning Math Group
University of Texas at Austin *2019–2020*

Worked with Austin middle school and high school students biweekly on math problems, and gave a talk at one session on geometry of map projections.

Volunteer teacher, Splash at Yale
Yale University

Summer/Fall 2014, Spring 2015

Taught one-hour long minicourses to high school students. Each class met 1-4 times and had 20-30 students. Titles included *Abstract algebra*, *What is a number?*, and *The game of hex*.

MathCounts Coach, Columbus Family Academy
New Haven, CT

2013

Led weekly problem sessions for 7-10 students on the Columbus Family Academy middle school MathCounts team.

INVITED TALKS

1. "Dehn filling in semisimple Lie groups"
*AMS fall southwestern sectional meeting,
Special session on geometry and dynamics of character varieties* October 2024
2. "Anosov representations of cubulated hyperbolic groups"
UC Riverside Geometry seminar June 2024
3. "Anosov representations of cubulated hyperbolic groups"
IMJ-PRG Séminaire Géométrie et Topologie February 2024
4. "Anosov representations of cubulated hyperbolic groups"
University of Texas Groups & Dynamics seminar September 2023
5. "Combination theorems for geometrically finite convergence groups"
Nearly Carbon Neutral Geometric Topology June 2023
6. "Topological stability for (relatively) hyperbolic boundary actions"
Geometric Topology in New York, Columbia University June 2023
7. "Topological stability for hyperbolic group actions on their boundaries"
CUNY hyperbolic geometry seminar October 2022
8. "Ping-pong, automata, and hyperbolic stability"
University of Michigan geometry seminar September 2022
9. "Extended geometrically finite representations"
AMS-SMF-EMS Joint International Meeting special session (deformation spaces of geometric structures) July 2022
10. "Extended geometrically finite representations"
Spring Topology and Dynamical Systems Conference: Special Session on Geometric Topology March 2022
11. "Relative Anosov representations and convex projective structures"
University of Virginia geometry seminar February 2022
12. "Extended convergence dynamics and relative Anosov representations"
NUS Topology and Geometry seminar February 2022
13. "Extended convergence dynamics and relative Anosov representations"
Heidelberg University differential geometry seminar December 2021
14. "Relative Anosov representations and convex projective structures."
University of Wisconsin dynamics seminar October 2021
15. "Relative Anosov representations and convex projective structures."
Rice University topology seminar September 2021
16. "Relative Anosov representations and convex projective structures."
Florida State University geometry and topology seminar September 2021
17. "Extended convergence dynamics, relative Anosov representations, and stability"
IHES September 2021
18. "Anosov representations: the relatively hyperbolic case." (Expository talk)
Workshop on Anosov representations in Aussois September 2021
19. "Group actions on boundaries of convex divisible domains."
*AMS fall southeastern sectional meeting,
Special session on geometric structures on manifolds* November 2019

CONTRIBUTED TALKS

“Expansion/contraction dynamics for non-strictly convex projective manifolds.”
GTA Philadelphia, Temple University *May 2021*

“Jacobians of finite graphs,” with L. Gaudet and N. Wawrykow.
MAA Mathfest Undergraduate Paper Sessions *August 2014*

OUTREACH TALKS

1. “Unsolvable problems.” *UMich math circle* *Fall 2024*
2. “The word problem and the isoperimetric problem.” *UMich undergraduate math club* *Winter 2023*
3. “Basics of the probabilistic method.” *UT undergraduate math club* *Spring 2022*
4. “Geometry in Minkowski space.” *UT undergraduate math club* *Spring 2021*
5. “Solving the word problem with geometry.” *UT undergraduate math club* *Fall 2020*
6. “Map projections.” *UT Sunday morning math group* *Fall 2019*

SERVICE

Organizer, *20 Years of Anosov Representations* conference
Max Planck Institute for Mathematics in the Sciences *October 2024*

Minicourse leader
“Boundaries of Groups and Spaces” *June 2020*
“Hyperbolic Groups” *August 2019*

Led weeklong courses for graduate students as part of a University of Texas summer minicourse program

Organizer, Topology seminar
University of Michigan *Fall 2022 - Winter 2023*

Co-organizer, Learning seminar on geometric group theory
University of Texas at Austin *Fall 2021, Spring 2022*

Organizer, Learning seminar on relative Anosov representations
University of Texas at Austin *Summer 2020*

Organizer, Junior Topology Seminar
University of Texas at Austin *Fall 2019*

Co-organizer, Geometric topology seminar
University of Texas at Austin *2018 - 2021*

Co-founder, SUMS
Yale University *2014 – 2016*

Co-organized weekly meetings for math talks given by a small group of undergraduates

OTHER

Author and maintainer, *geometry_tools* Python package
(https://public.websites.umich.edu/~tjwei/geometry_tools/geometry_tools.html)

Developed package for performing numerical computations and producing visualizations in hyperbolic and projective geometry.

CONFERENCES ATTENDED

1. Graduate Student Geometry and Topology Conference, Michigan State University *April 2017*

2. Graduate Student Conference in Algebra Geometry and Topology, Temple University *May 2017*
3. Texas Geometry and Topology Conference, University of Texas at Austin *November 2017*
4. Thin Groups in Number Theory, Geometry, and Topology, Rice University *May 2018*
5. Representation Varieties and geometric structures in low dimensions, University of Warwick *July 2018*
6. Young Topologists Meeting, University of Copenhagen *July 2018*
7. Young Geometric Group Theory, UPV/EHU *June 2019*
8. Aspects of Geometric Group Theory, IHES *July 2019*
9. Nearly Carbon Neutral Geometric Topology (virtual) *June 2020*
10. Virtual Topology Festival, NUS *January 2021*
11. Graduate Student Geometry and Topology Conference (virtual), University of Indiana Bloomington *April 2021*
12. GTA Philadelphia (virtual) *May 2021*
13. Nearly Carbon Neutral Geometric Topology (virtual) *June 2021*
14. Beyond Hyperbolicity, The Ohio State University *July 2021*
15. Workshop on Anosov representations in Aussois, France *August-September 2021*
16. Virginia Topology Conference (Geometry and dynamics in hyperbolic space), University of Virginia *November 2021*
17. Texas Geometry and Topology Conference, University of Texas Dallas *February 2022*
18. Spring Topology and Dynamical Systems Conference, Baylor University *March 2022*
19. Geometry, Arithmetic, and Groups, University of Texas at Austin *June 2022*
20. AMS-SMF-EMS International Meeting *July 2022*
21. Oberwolfach Arbeitsgemeinschaft on Higher Teichmüller Theory *October 2022*
22. Geometric Topology in New York, Columbia University *June 2023*
23. Homogeneous Dynamics and Geometry in Higher-Rank Lie Groups, IHES *June 2023*
24. Nearly Carbon Neutral Geometric Topology (virtual) *June 2023*
25. Advances in Hierarchical Hyperbolicity, BIRS *May 2024*
26. Moving to Higher Rank (Canaryfest), Cetraro *July 2024*
27. 20 Years of Anosov Representations, Leipzig *October 2024*