

# Theodore Weisman

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Department of Mathematics  
University of Michigan

## CURRENT POSITION

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

2022 – present (on leave 2023 – 2024)

## PAST POSITIONS

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

2023 – 2024

## EDUCATION

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**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

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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

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1. *Limits of limit sets in rank-one symmetric spaces* (with A. Guilloux). arXiv:2407.04301, 2024. (27 pages).
2. *Morse properties in convex projective geometry* (with M. Islam). 2405.03269, 2024. (submitted, 59 pages).
3. *Topological stability of relatively hyperbolic groups acting on their boundaries* (with K. Mann and J. F. Manning). arXiv:2402.06144, 2024. (submitted, 33 pages).
4. *Examples of extended geometrically finite representations*. arXiv:2311.18653, 2023 (35 pages).
5. *Cubulated hyperbolic groups admit Anosov representations* (with S. Douba, B. Fléchettes, and F. Zhu). arXiv:2309.03695, 2023 (submitted, 59 pages).
6. *Combination theorems for geometrically finite convergence groups* (with A. Traaseth). arXiv:2305.08011, 2023 (submitted, 38 pages).
7. *Stability of hyperbolic groups acting on their boundaries* (with K. Mann and J.F. Manning). arXiv:2206.14914, 2022 (submitted, 22 pages).
8. *An extended definition of Anosov representation for relatively hyperbolic groups*. arXiv:2205.07183, 2022. (submitted, 78 pages).

9. *Dynamical properties of convex cocompact actions in projective space*. Journal of Topology, 16.3 (2023), pp 990-1047A.
10. *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

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**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 meet 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

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**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

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**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*.

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

## INVITED TALKS

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

## CONTRIBUTED TALKS

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- "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

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|---|--------------------|
| 1. "The word problem and the isoperimetric problem." <i>UMich undergraduate math club</i> | <i>Winter 2023</i> |
| 2. "Basics of the probabilistic method." <i>UT undergraduate math club</i>                | <i>Spring 2022</i> |
| 3. "Geometry in Minkowski space." <i>UT undergraduate math club</i>                       | <i>Spring 2021</i> |
| 4. "Solving the word problem with geometry." <i>UT undergraduate math club</i>            | <i>Fall 2020</i>   |
| 5. "Map projections." <i>UT Sunday morning math group</i>                                 | <i>Fall 2019</i>   |

## SERVICE

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**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

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**Author and maintainer**, `geometry_tools` Python package  
([https://public.websites.umich.edu/~tjwei/geometry\\_tools/geometry\\_tools.html](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

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|---|----------------------|
| 1. Graduate Student Geometry and Topology Conference, Michigan State University               | <i>April 2017</i>    |
| 2. Graduate Student Conference in Algebra Geometry and Topology, Temple University            | <i>May 2017</i>      |
| 3. Texas Geometry and Topology Conference, University of Texas at Austin                      | <i>November 2017</i> |
| 4. Thin Groups in Number Theory, Geometry, and Topology, Rice University                      | <i>May 2018</i>      |
| 5. Representation Varieties and geometric structures in low dimensions, University of Warwick | <i>July 2018</i>     |
| 6. Young Topologists Meeting, University of Copenhagen  | <i>July 2018</i>     |

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