

Justin Lanier

- CONTACT INFORMATION Department of Mathematics jlanier@math.uchicago.edu
University of Chicago <http://math.uchicago.edu/~jlanier>
5734 S University Ave
Chicago IL, 60637
- RESEARCH INTERESTS Geometric group theory and geometric topology.
Algebraic, geometric, and dynamical properties of mapping class groups of surfaces.
Thurston maps, topological polynomials, and the branched mapping class monoid.
- POSITIONS **Dickson Instructor and NSF postdoc, University of Chicago**
2020–2023
- EDUCATION **Ph.D. in Mathematics, Georgia Tech**
2015–2020
Thesis: *Small torsion generating sets for mapping class groups*
Advisor: Dan Margalit
- M.S. in Mathematics, Georgia Tech**
2015–2017
- B.A. in Liberal Arts, St. John’s College**
2002–2005
- AWARDS Best Ph.D. Thesis Award, 2020, School of Mathematics, Georgia Tech
Top Graduate Student Award, 2020, School of Mathematics, Georgia Tech
Mathematical Sciences Postdoctoral Research Fellowship, 2020, NSF
Outstanding Student Evaluations TA award, Fall 2019, Georgia Tech
Graduate Student Travel Grant for Fall Sectional Meeting, 2018, AMS
Travel support to visit ICTS from Graduate Committee, 2017, Georgia Tech
John R. Festa Fellowship for academic achievement and leadership, 2016, Georgia Tech
Graduate Research Fellowship, 2016, NSF
STEM Fellowship, Spring 2016, Georgia Tech
- PAPERS **Constraining mapping class group homomorphisms using finite subgroups.**
with Lei Chen.
preprint: people.math.gatech.edu/~jlanier8/homeo.pdf, 2019.
- Recognizing topological polynomials by lifting trees.**
with James Belk, Dan Margalit, and Rebecca R. Winarski.
preprint: arxiv.org/abs/1906.07680, 2019.
- Centers of subgroups of big mapping class groups and the Tits alternative.**
with Marissa Loving.
to appear in *Glasnik Matematički*. preprint: arxiv.org/abs/1904.10060, 2019.
- Adding a point to configurations in closed balls.**
with Lei Chen and Nir Gadish.
to appear in *Proceedings of the AMS*. preprint: arxiv.org/abs/1809.06946, 2018.

How to hear the shape of a billiard table.

with Aaron Calderon, Solly Coles, Diana Davis, and Andre Oliveira.
submitted. preprint: arxiv.org/abs/1806.09644, 2018.

Normal generators for mapping class groups are abundant.

with Dan Margalit.
submitted. preprint: arxiv.org/abs/1805.03666, 2018.

Generating mapping class groups with elements of fixed finite order.

Journal of Algebra, 511 (2018), pp 455-470.

RESEARCH
TALKS

**Universal bounds for torsion generating sets of mapping class groups*
Nearly Carbon Neutral Geometric Topology Conference, June 2020

(* INDICATES A
LIGHTNING TALK, †
INDICATES
CANCELLATION DUE
TO CORONAVIRUS)

Constraining mapping class group homomorphisms using finite subgroups

Hyperbolic Geometry Seminar, CUNY, October 2020
* Tech Topology Conference, Georgia Tech, December 2019

Surfaces and their symmetries

Undergraduate Seminar, Georgia Tech, November 2019
Southeastern Undergraduate Mathematics Workshop, Georgia Tech, August 2019

Polynomial or not? Twisting rabbits and lifting trees,
or *Recognizing topological polynomials by lifting trees*

† CUNY Hyperbolic Geometry Seminar, March 2020
† Spring Topology and Dynamical Systems Conference, Murray State, March 2020
† AMS Spring Southeastern Sectional Meeting, UVA, March 2020
UCLA Analysis and PDE Seminar, February 2020
USC Geometry, Topology, and Categorification Seminar, February 2020
Temple Geometry and Topology Seminar, October 2019
* Combinatorial & algebraic aspects of geometric structures, Chiang Mai, July 2019
* Curvature in Group Theory: Bestvina Birthday Conference, CIRM, June 2019
Boston College Dynamics Seminar, April 2019
Rice Topology Seminar, April 2019
Northwestern Complex and Arithmetic Dynamics Working Seminar, April 2019
Graduate Student Conference in Geometry and Topology, March 2019
University of Georgia Topology Seminar, March 2019

Solving the twisted rabbit problem with mapping class group techniques

Special Session on Mapping Class Groups,
AMS Spring Southeastern Sectional Meeting, March 2019

Adding points to configurations in closed balls

* Tech Topology Conference, Georgia Tech, December 2018

Two results about points on surfaces

Georgia Tech Research Horizons Seminar, October 2018

Normal generators for mapping class groups are abundant

University of Pittsburgh Analysis, Geometry & Topology Seminar, April 2019
Glasgow Geometry and Topology Seminar, February 2019

St. Andrews Algebra & Combinatorics Seminar, February 2019
Vanderbilt Topology & Group Theory Seminar, November 2018
Special Session on Groups in Low-dimensional Topology and Dynamics,
AMS Fall Southeastern Sectional Meeting, November 2018
Brown Geometry & Topology Seminar, October 2018
UIUC Geometry, Groups and Dynamics Seminar, September 2018
New Trends in Teichmüller Theory and MCGs, Oberwolfach, September 2018
* The Roots of Topology, June 2018
Grad Student Conference in Algebra, Geometry, and Topology, Temple, June 2018
Special Session on Boundaries and Non-positive Curvature in Group Theory,
AMS Spring Southeastern Sectional Meeting, April 2018
University of Michigan Topology Seminar, February 2018
Tech Topology Conference, Georgia Tech, December 2017
* No Boundaries: Farb Birthday Conference, October 2017
University of Georgia Geometry Seminar, October 2017

Generating mapping class groups with periodic elements

Grad Student Conference in Algebra, Geometry, and Topology, Temple, June 2017
Special Session on Mapping Class Groups and their Subgroups, JMM, January 2017
* Effective Methods in Hyperbolic Geometry & Free Groups, ICERM, May 2016
Spring Topology and Dynamical Systems Conference, Baylor, March 2016
* Tech Topology Conference, Georgia Tech, December 2015

CONFERENCES & WORKSHOPS ATTENDED († INDICATES CANCELLATION DUE TO CORONAVIRUS)	March	2020	† Spring Topology and Dynamical Systems Conference, Murray State
	March	2020	† AMS Spring Southeastern Sectional Meeting, UVA
	December	2019	Tech Topology Conference, Georgia Tech
	November	2019	Algorithms in Complex Dynamics and Mapping Class Groups, ICERM
	July	2019	Combinatorial & algebraic aspects of geometric structures, Chiang Mai
	July	2019	Perspectives on Dehn Surgery, ICERM
	July	2019	Summer Graduate School on Geometric Group Theory, Oaxaca
	June	2019	Curvature in Group Theory: Bestvina Birthday Conference, CIRM
	May	2019	Analytic Low-Dimensional Dynamics, Fields Institute
	April	2019	Surfaces of Infinite Type, AIM
	April	2019	Geometry of Teichmüller spaces, Stonybrook
	April	2019	Bloomington Geometry Workshop, U Indiana
	March	2019	Graduate Student Conference in Geometry and Topology, UIUC
	March	2019	AMS Spring Southeastern Sectional Meeting, Auburn
	December	2018	Tech Topology Conference, Georgia Tech
	November	2018	AMS Fall Southeastern Sectional Meeting, U Arkansas
	September	2018	New Trends in Teichmüller Theory and MCGs, Oberwolfach
	August	2018	Geodesics on real hyperbolic manifolds, Connecticut College
	June	2018	The Roots of Topology, U Chicago
	June	2018	Topology Students Workshop, Georgia Tech
	June	2018	Graduate Student Conference in AG&T, Temple
	May	2018	Nonpositively Curved Groups on the Mediterranean, Haifa
	April	2018	AMS Spring Southeastern Sectional Meeting, Vanderbilt
	March	2018	ComSciCon, Atlanta
	December	2017	Tech Topology Conference, Georgia Tech
	November	2017	Geometry, Groups, and Dynamics, ICTS
	October	2017	No Boundaries: Farb Birthday Conference, U Chicago
	August	2017	Hamilton Workshop on Moduli Spaces, Trinity College
	August	2017	Braids and Rational Maps, Harvard
	August	2017	Geometry of Redistricting Workshop, Tufts
	June	2017	Graduate Student Conference in AG&T, Temple
	May	2017	Georgia International Topology Conference, University of Georgia
May	2017	Shanks Lecture on Low-Dimensional Topology, Vanderbilt	
April	2017	Redbud Topology Conference, University of Arkansas	
March	2017	Young Geometric Group Theory Meeting VI, Oxford	
January	2017	Joint Mathematics Meetings, Atlanta	
December	2016	Tech Topology Conference, Georgia Tech	
November	2016	Virginia Topology Conference, UVA	
October	2016	Geometry of mapping class groups and $\text{Out}(F_n)$, MSRI	
July	2016	Second Summer School in Geometry & Topology, U Chicago	
June	2016	Illustrating Mathematics, ICERM	
June	2016	Topology Students Workshop, Georgia Tech	
May	2016	Effective Methods in Hyperbolic Geometry & Free Groups, ICERM	
April	2016	Geometric Methods in Group Theory, Vanderbilt	
March	2016	Spring Topology and Dynamical Systems Conference, Baylor	
March	2016	AMS Spring Southeastern Sectional Meeting, University of Georgia	
December	2015	Tech Topology Conference, Georgia Tech	
June	2015	First Summer School in Geometry & Topology, U Chicago	
June	2015	Princeton Low-Dimensional Topology Workshop, Princeton	
January	2015	Joint Mathematics Meetings, San Antonio	
June	2014	Thurston Legacy Conference, Cornell	
January	2014	Joint Mathematics Meetings, Baltimore	

RESEARCH EXPERIENCES	July 2017	Polygonal Billiards Research Cluster, Tufts University Topics: Bounce Spectra; Square Flows on Translation Surfaces Organizer: Moon Duchin	
	July 2010	University of Arizona REU in Geometry Topic: Visualizing Piecewise Flat Manifolds Advisor: David Glickenstein	
	July 2007	PROMYS for Teachers, Boston University Topic: Fractional Linear Functions and Finite Fields Advisor: Kalin Kostadinov	
GRADUATE COURSEWORK	Georgia Tech	Algebra I, Differential Geometry, Differential Topology, Algebra II, Algebraic Topology, Real Analysis I, Algebraic Curves, Graph Theory, Teichmüller Theory, Advanced Classical Probability, Probabilistic Combinatorics, Thurston Maps, Heegaard Floer Homology, Torelli Groups, Galois Theory, 4-Manifolds, Geometric Structures on Surfaces	
	NYU	Topology I, Topology II, Complex Variables	
	Hunter College Boston University	Geometries Number Theory	
TEACHING EXPERIENCE	2019-20	Georgia Tech	Teaching assistant, Introduction to Linear Algebra
	2015-16	Georgia Tech	Teaching assistant, Integral Calculus
	2013-15	Princeton Learning Cooperative	Unschooling counselor, teacher, and outreach coordinator
	2006-13	Saint Ann's School	Middle and high school math teacher
	2005-06	The Calverton School	High school math teacher
SEMINARS ATTENDED	2015-present	Geometry and Topology Seminar, Georgia Tech Geometry and Topology Working Seminar, Georgia Tech Geometry and Topology Student Seminar, Georgia Tech Research Horizons Seminar, Georgia Tech	
	2014-15	Topology Seminar, Princeton	
	2013-14	Discrete Math Seminar, Princeton	
	2011-13	Hyperbolic Geometry Seminar, CUNY Graduate Center	
	SERVICE ACTIVITIES	2019-present	Co-organizer of SUBgroups, online peer groups for math grad students gradsubgroups.org
2019-2020		Organizer for Georgia Tech Geometry and Topology Seminar	
2018-present		Organizer of Mod Squad, an online grad student reading group	
2017		Organizer for the Tech Topology Conference	
2017, 18		Research team leader at Georgia Tech REU	
2017-18		Founding member of School of Math Graduate Student Council	
2017		Panelist on grad school at KSU Undergrad Math Conference	
2017-20		Volunteer judge for AWM Essay Contest	
2017		Organizer of Geometry and Topology Student Seminar	
2016, 17, 18		Panelist in first-year course: finding an advisor, NSF GRFP	
2016-17	Graduate student representative to the Graduate Committee		
2015-17	Co-organizer of the Research Horizons Seminar		
2016, 17, 18	Student organizer of visiting day for admitted math grad students		

OUTREACH ACTIVITIES	2019	Classroom Visitor for the Imagining the Future Program Atlanta Science Festival, Atlanta
	2016–present	Session Leader at Emory Math Circle Emory University, Atlanta
	Sept 16, 17	Table Leader at Julia Robinson Mathematics Festival Emory University, Atlanta
	2011–2016	Co-author of Math Munch, A Digest of the Mathematical Internet mathmunch.org
	April 2016	Invited Speaker for Family Friday event on billiards: “Pool Party” Museum of Mathematics, NYC
	Feb 2016–18	Volunteer at math sessions on fractals, bubbles, and knots Science Night, Morningside Elementary School, Atlanta
	Feb 2016	Table Leader: “Designing WiFi Networks” Future Tech, a middle school STEM outreach event, Georgia Tech
	Sept 2015	Visiting Mathematician and Mathematical Artist Math-on-a-Stick, Minnesota State Fair
	July 2015	Core Course Instructor Summer Program in Mathematical Problem Solving
	March 2015	Invited Speaker for Boston Math Teachers’ Circle session on billiards Harvard University, Cambridge
	2014, 2015	Co-organizer of Julia Robinson Mathematics Festival Princeton, NJ
	2013–15	Co-organizer of Mercer County Math Circle Princeton, NJ
	2013–14	Facilitator for “Math Is Personal” online course for teachers ichoosemath.com/smooc-launch
	OTHER TALKS	<i>Perfect polyominoes</i>
Undergraduate Seminar, Georgia Tech, November 2015		
Club Math, Georgia Tech, October 2015		
MOVES Conference, Museum of Mathematics, New York City, August 2015		
<i>Research Experiences for Secondary Teachers</i>		
Joint Mathematics Meetings, San Antonio, January 2015		
<i>Beamer and Inkscape</i>		
AMS Student Chapter Seminar, Georgia Tech, November 2017		
Topology Students Workshop, Georgia Tech, June 2016		
MATHEMATICAL ART EXHIBITS		2014
	2013	<i>Yoshimoto Shorts</i> Bridges Conference
RECREATIONAL MATH & EDUCATION CONFERENCES (SINCE 2015)	March 2018	ComSciCon–Atlanta, Atlanta
	March 2016	Gathering for Gardner 12, Atlanta
	November 2015	NCTM Regional Conference & Exposition, Minneapolis
	October 2015	Georgia Mathematics Conference, Eatonton, GA
	August 2015	MOVES Conference, Museum of Mathematics, NYC
	April 2015	NCTM Annual Meeting & Exposition, Boston
	January 2015	EduCon 2.7, The Science Leadership Academy, Philadelphia