

Aaron Calderon

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(he/him/his)

Research Interests

Teichmüller theory, flat surfaces, mapping class groups, hyperbolic geometry, geometric group theory, dynamics on moduli spaces

Academic Positions

L.E. Dickson Instructor The University of Chicago, Chicago, IL 2022–
NSF Postdoctoral Fellow The University of Chicago, Chicago, IL 2022–25

Education

Yale University New Haven, CT 2016–22
Ph.D. in Mathematics, advised by Yair Minsky
M.S., M. PHIL. in Mathematics
Lang Fellowship

The University of Nebraska–Lincoln Lincoln, NE 2012–16
B.S. in Mathematics, minor in Philosophy, University Honors Program
Highest Distinction, Phi Beta Kappa, Chair’s Prize for Mathematics

Other Educational Experiences

The Independent University of Moscow Moscow, Russia Spr. 2015
Math in Moscow
AMS Math in Moscow Scholarship, Diploma with Distinction

The Pennsylvania State University University Park, PA Fall 2013
Mathematics Advanced Study Semesters
MASS Fellowship, Diploma with Distinction

Honors & Awards

NSF Mathematical Sciences Postdoctoral Research Fellowship 2022–25
NSF Graduate Research Fellowship 2016–21
Barry Goldwater Scholar 2015
Dean H. and Floreen G. Eastman Scholarship 2012–16

Publications & Preprints

The shapes of complementary subsurfaces to simple closed hyperbolic multi-geodesics
(with F. Arana-Herrera)
Preprint (2022). arXiv:2208.04339.

Shear-shape cocycles for measured laminations and ergodic theory of the earthquake flow
 (with J. Farre)
Submitted (2021). arXiv:2102.13124.

Framed mapping class groups and the monodromy of strata of Abelian differentials
 (with N. Salter)
J. Eur. Math. Soc. (accepted) (2021). arXiv:2002.02472.

Relative homological representations of framed mapping class groups
 (with N. Salter)
B. Lond. Math. Soc. **53** (1): 204–219 (2021). arXiv:2002.02471.

Higher spin mapping class groups and strata of Abelian differentials over Teichmüller space
 (with N. Salter)
Adv. Math. **389**: Paper no. 107926 (2021). arXiv:1906.03515.

Connected components of strata of Abelian differentials over Teichmüller space
Comment. Math. Helv. **95** (2): 361–420 (2020). arXiv:1901.05482.

How to hear the shape of a billiard table
 (with S. Coles, D. Davis, J. Lanier, and A. Oliveira)
Submitted (2018). arXiv:1806.09644.

Generalized bipyramids and hyperbolic volumes of alternating k -uniform tiling links
 (with C. Adams and N. Mayer)
Topology Appl. **271**:1–28 (2020). arxiv:1709.00432.

Volume and determinant densities of hyperbolic rational links
 (with C. Adams, X. Jiang, A. Kastner, G. Kehne, N. Mayer, and M. Smith)
J. Knot Theory Ramifications **26** (2017), No. 1 1750002. arXiv:1510.06050

Teaching Experience

YALE UNIVERSITY

Instructor, Math 111 Introduction to Functions and Calculus II	Spr. 2022
Instructor, Math 120 Vector Calculus	Fall 2020
Teaching assistant, Math 120 Vector Calculus	Sum. 2020
Instructor, Math 115 Integral Calculus	Spr. 2020
Instructor, Math 120 Vector Calculus	Fall 2018
Coach (group tutor), Math 120 Vector Calculus	Fall 2016

THE UNIVERSITY OF NEBRASKA–LINCOLN

Teaching assistant, Math 106 Differential Calculus	Spr. 2016
Teaching assistant, Math 106 Differential Calculus	Fall 2015
Teaching assistant, Math 208 Vector Calculus	Fall 2014

Mentoring Experience

SUMRY (YALE REU)

Developed projects, oversaw research, gave feedback on writing and presentations

Advisor, “Cylinder configurations on flat surfaces”	Sum. 2021
Co-advisor (with I. Adelstein), “Oblivious points on flat surfaces”	Sum. 2019

Co-advisor (with I. Adelstein), “Minimizing geodesics on doubled polygons” Sum. 2018

DIRECTED READING PROGRAM (YALE)

Led undergraduate reading groups, suggested problems, assigned individual projects and presentations

Rational points on elliptic curves	Fall 2021
Lie groups and homogeneous spaces	Spr. 2021
Braid groups	Spr. 2020
Riemann surfaces and dessins d’enfants	Spr. 2019
An introduction to geometric group theory	Fall 2018

Selected Presentations

INVITED TALKS

Cornell Topology Festival	May 2022
Glasgow Geometry and Topology Seminar (virtual)	March 2022
UT Austin Groups, Geometry, and Dynamics Seminar (virtual)	Feb. 2022
Brown Geometry and Topology seminar	Dec. 2021
UC San Diego Group Actions seminar (virtual)	Nov. 2021
Counting Problems, Ventotene, Italy	Sep. 2021
Pacific Dynamics seminar (virtual)	May 2021
Ohio State Geometry and Topology seminar (virtual)	March 2021
Indiana Geometry seminar (virtual)	Oct. 2020
Yale Geometry and Topology seminar (virtual)	Oct. 2020
AMS Special Session on the Geometry of Groups and 3-Manifolds, Penn State (virtual). 2020	Oct.
Nearly Carbon Neutral Geometric Topology Conference (virtual)	June 2020
Billiards and Surfaces a la Teichmüller and Riemann Online seminar (virtual)	May 2020
USC Teichmüller theory and quantum topology seminar	Nov. 2019
Michigan Topology and RTG seminars	Oct. 2019
Flat Surfaces and Dynamics on Moduli Space, II, Oaxaca, Mexico.	May 2019
AMS Graduate Student Conference in Geometry and Topology, Brown.	Apr. 2019
AMS Special Session on Mapping Class Groups, Auburn.	Mar. 2019
Columbia Geometric Topology seminar	Feb. 2019
Tufts Geometric Group Theory and Topology seminar	Feb. 2017

CONTRIBUTED TALKS

Graduate Student Topology & Geometry Conference, UIUC	Mar. 2019
Topology Students Workshop, Georgia Tech	June 2016
AMS Special Session in Topological and Smooth Dynamics, North Dakota State	Apr. 2016
Undergraduate thesis defense, University of Nebraska–Lincoln	Mar. 2016

AMS–MAA Joint Meetings Poster Session, Seattle (with N. Mayer) Outstanding Student Presenter	Jan. 2016
Univ. of Nebraska–Lincoln Groups, Semigroups and Topology Seminar	Oct. 2015
Univ. of Nebraska–Lincoln Groups, Semigroups and Topology Seminar	Dec. 2014

Workshops & Programs Attended

Mapping class groups and $\text{Out}(F_n)$ IHP, Paris.	Apr. 25–29
Advancing Bridges in Complex Dynamics CIRM, Luminy, Marseille.	Sep. 2021
Creating a better summer experience: a DEI workshop for REU faculty mentors Zoom — hosted by the Center for Minorities in the Mathematical Sciences	May 2021
Holomorphic differentials in mathematics and physics MSRI, Berkeley.	Aug., Nov. 2019
Combinatorial and algebraic aspects of geometric structures Chiang Mai University, Thailand. 3	July 2019
Flat surfaces and dynamics on moduli space, II Casa Matemática Oaxaca, Mexico.	May 2019
Workshop on dynamics and moduli spaces of translation surfaces Fields Institute, Toronto.	Oct. 2018
Teichmüller dynamics, mapping class groups and applications Summer school and conference at the Institut Fourier, Grenoble.	June 2018
Geometry and topology of 3-manifolds workshop Okinawa Institute of Science and Technology.	May 2018
Introduction to geometry, dynamics, and moduli in low dimensions LMS–CMI Research School at the University of Warwick.	Sep. 2017
Polygonal Billiards Research Cluster, Tufts University	July, Aug. 2017
Workshop in Geometric Topology, Provo, UT	June 2017
Topology Students Workshop, Georgia Tech.	June 2016

Undergraduate Research Experience

Undergraduate Research , The University of Nebraska–Lincoln NSF grant [DMS–1313559], Nebraska UCARE grant Research in geometric group theory under the direction of Susan Hermiller	2014–16
SMALL REU , Williams College Research in hyperbolic knot theory under the direction of Colin Adams	2015
Penn State REU , Penn State University Research on lattice tilings under the direction of Viorel Nitica	2013

Service & Outreach

Referee or quick opinion for *Algebr. Geom. Topol.*, *Ann. of Math.*, *Erg. Th. Dyn. Sys.*, *Geom. Topol.*, *Int. Math. Res. Not.*, *Dyn. Syst.*

Reviewer for *Mathematical Reviews*

Co-founder and chair of Yale math dept. graduate student advisory committee 2020–22

Co-organizer of Yale math dept. prospective grad student visit day Spr. 2021

Grad student rep. for the Yale math dept.'s committee on diversity, equity, and inclusion Fall 2020

Organizer of “Flat Surfers” online reading group Sum. and Fall 2020

Invited graduate student panelist, CeSMUR Conference, Univ. of Nebraska–Lincoln Apr. 2018

Co-organizer of Yale Graduate Student Seminar Fall 2017

Actor in *Mathematically Bent Theater*, AMS-MAA Joint Meetings. Jan. 2016

Univ. of Nebraska–Lincoln Academic Program Review student representative 2015

Pi Mu Epsilon National Mathematics Honorary Society 2012–16