

Aaron Calderon

The University of Chicago
Department of Mathematics
Eckhart Hall, 5734 S. University Ave
Chicago IL, 60637

Email: aaroncalderon@uchicago.edu
Website: aacalderon.com
Mobile: (402) 350-4827
(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)
Submitted (2022). arXiv:2208.04339.

- Shear-shape cocycles for measured laminations and ergodic theory of the earthquake flow
 (with J. Farre)
Geom. Topol. (accepted, 2023). 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

Random walks on reductive groups Winter 2023

Yale:

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

Indiana Geometry Seminar Feb. 2023

Rice Topology seminar Nov. 2022

Iisc G+T seminar (virtual) Nov. 2022

UChicago Dynamics seminar Oct. 2022

UChicago No Boundaries seminar Oct. 2022

Heidelberg Geometry group meeting July 2022

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). Oct. 2020

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) Jan. 2016
Outstanding Student Presenter

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

Combinatorics, Dynamics and Geometry on Moduli Spaces Sep. 2022
CIRM, Luminy, Marseille.

Mapping class groups of 4-manifolds Aug. 2022
UChicago, Illinois

The circle at infinity June 2022
Harvard, Massachusetts.

Mapping class groups and $\text{Out}(F_n)$ Apr. 2022
IHP, Paris.

Advancing Bridges in Complex Dynamics Sep. 2021
CIRM, Luminy, Marseille.

Creating a better summer experience: a DEI workshop for REU faculty mentors May 2021
Zoom — hosted by the Center for Minorities in the Mathematical Sciences

Holomorphic differentials in mathematics and physics Aug., Nov. 2019
MSRI, Berkeley.

Combinatorial and algebraic aspects of geometric structures July 2019
Chiang Mai University, Thailand. 3

Flat surfaces and dynamics on moduli space, II May 2019
Casa Matemática Oaxaca, Mexico.

Workshop on dynamics and moduli spaces of translation surfaces Oct. 2018
Fields Institute, Toronto.

Teichmüller dynamics, mapping class groups and applications June 2018
Summer school and conference at the Institut Fourier, Grenoble.

Geometry and topology of 3-manifolds workshop May 2018
Okinawa Institute of Science and Technology.

Introduction to geometry, dynamics, and moduli in low dimensions Sep. 2017
LMS–CMI Research School at the University of Warwick.

Polygonal Billiards Research Cluster, Tufts University July, Aug. 2017

Workshop in Geometric Topology, Provo, UT June 2017

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 <i>Algebr. Geom. Topol.</i> , <i>Adv. Math.</i> , <i>Ann. of Math.</i> , <i>Dyn. Syst.</i> , <i>Erg. Th. Dyn. Sys.</i> , <i>Geom. Topol.</i> , <i>Int. Math. Res. Not.</i> , <i>Proc. AMS</i>	
Reviewer for <i>Mathematical Reviews</i>	
Organizer, Dynamics and Ergodic Theory Active and Informal Learning Seminar (DETAILS)	2023
Co-organizer, Chicago Geometry and Topology Seminar	2022–23
Organizer, Session on Teichmüller space and geodesic currents, Nearly Carbon Neutral Geometry and Topology Conference	Sep. 2022
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 <i>Mathematically Bent Theater</i> , 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