JACOB W. ERICKSON

Email: jwericks@umd.edu

EDUCATION

University of Maryland, College Park
Ph.D. Mathematics   2019-2025 (expected)

University of Chicago
B.A. Mathematics (with honors)   2015-2019

WRITING

- Erickson, J. W.: *Closed surface pairs with maximal local rolling symmetries.*
  (Ph.D dissertation, copy available upon request)

- Erickson, J. W.: *Holonomy of parabolic geometries near isolated higher-order fixed points.*
  (Preprint at arXiv:2406.05497)

- Erickson, J. W.: *A method for determining Cartan geometries from the local behavior of automorphisms.*
  (Preprint at arXiv:2303.00561, submitted to Geometriae Dedicata)

- Erickson, J. W.: *Higher rank parabolic geometries with essential automorphisms and nonvanishing curvature.* Transformation Groups, vol 27 (2022)

- Erickson, J. W.: *Intrinsic holonomy and curved cosets of Cartan geometries.* European Journal of Mathematics, vol 8, 446-474 (2022)

UPCOMING WORKS

- Erickson, J. W.: *A Visual Introduction to Cartan Geometries.*
  (Expository book on Cartan geometries, draft to be put on AMS Open Math Notes soon.)

- Erickson, J. W.: *Exceptional geometry from constant torsion curves on 3-manifolds.* (Expected 2025)
  (In preparation. Classifies the 3-dimensional Thurston geometries admitting a flat $(2, 3, 5)$-distribution on their projective tangent bundle coming from curves of constant torsion.)

- Erickson, J. W.: *A visual proof of the 1:3 ratio for rolling spheres.*
  (In preparation. Streamlined version of the section of my dissertation describing why the $(2, 3, 5)$-distribution arising from a pair of rolling spheres is flat precisely when the ratio of the radii is 1:3.)

AWARDS

- Michael and Eugenia Brin Graduate Fellowship (2019-2023)

- University of Maryland Graduate School Summer Research Fellowship (2022)

- Hauptman Summer Fellowship (2023)

TEACHING

- Mentor for Directed Reading Program in Spring 2020; topic was elementary Lie theory

- TA for MATH 240 ("Linear Algebra") in Fall 2020 and Spring 2021

- Lecturer for MATH 113 ("College Algebra and Trigonometry") in Fall 2021 and Spring 2022

- TA for MATH 115 ("Precalculus") in Fall 2022

- Organizer and main lecturer for the University of Maryland RIT (Research Interaction Team) on parabolic geometries (better known as "Parabolic Geometries for People that Like Pictures") in Fall 2022

RESEARCH EXPERIENCE BEFORE GRADUATE SCHOOL

Wright State University   Summer 2014

Employed as research assistant. Studied Hadamard matrices and abelian difference sets.

University of Chicago REU   Summer 2016

Studied automorphisms of Cartan geometries.

U.C. Berkeley
Geometry and Topology REU   Summer 2017

Studied quantum invariants of knots and their relation to hyperbolic structures on 3-manifolds.

CONFERENCES, WORKSHOPS, AND TALKS

University of Lethbridge
Workshop on Algebraic Design Theory
and Hadamard Matrices   July 2014

Gave a talk on viewing Hadamard matrices as global maxima of an 'entropy' function on $\mathrm{SO}(4n)$.

Banff International Research Station
Workshop 14w2199   July 2014

Participated in a variety of discussions on open problems in algebraic design theory.

Ohio State University
Young Mathematicians Conference   August 2014

Presented work on optimization of smooth functions on compact Lie groups that I created to help find Hadamard matrices while employed at Wright State University.

University of Notre Dame
Geometry and Topology Workshop   August 2018

Gave a talk on my research related to holonomy reductions of Cartan geometries.

Washington University in St. Louis
Midstates Undergraduate Research Symposium November 2018
Gave a talk presenting my research on holonomy reductions and curved cosets of Cartan geometries.

University of Maryland, College Park
Geometry-Topology Seminar November 2021
Gave a talk about "Building homogeneous parabolic geometries out of curvature", discussing the construction of curvature trees for higher rank parabolic geometries.

Université de Strasbourg
Geometric Structures, Compactifications, and Group Actions June 2022
Presented a talk outlining my work on the global characterization of Cartan geometries from certain local behaviors of automorphisms, using "sprawls" generated by a given automorphism.

Geilo Winter School
Cartan Geometry and Related Topics March 2023
Gave an expository talk on Cartan geometries and their intuition.

MISCELLANEOUS

- Eagle Scout

- Vice President of UChicago Math Club (2016-2017)

- Principal organizer of University of Maryland Student Geometry-Topology Seminar (2021-2024)