

Trevor K. Karn

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University of Minnesota *Web:* trevorkarn.github.io
Minneapolis, MN 55455

INTERESTS Combinatorics, algebraic topology, applied topology and geometry

EDUCATION **University of Minnesota**, Minneapolis, Minnesota USA
Ph.D. candidate in Mathematics

Advisor: Vic Reiner

University of Minnesota, Minneapolis, Minnesota USA
Masters of Science in Mathematics
March 2022

U.S. Naval Academy, Annapolis, Maryland USA
BS with Distinction in [Mathematics \(Honors\)](#)
Minor in [Arabic Language](#)
May 2018

Thesis: *Matroid Kazhdan-Lusztig polynomials and Structures of Flags*
Advisor: [Max D. Wakefield](#)

PUBLICATIONS In reverse chronology

4. Topological learning in multiclass data sets (with C. Griffin and B. Apple), *Physical Review E* Volume 109, February 2024
3. Equivariant Kazhdan-Lusztig theory of paving matroids (with G. Nasr, N. Proudfoot, and L. Vecchi), *Algebraic Combinatorics* Volume 6, 2023.
2. Modeling of a Hidden Dynamical System Using Energy Minimization and Kernel Density Estimates (with S. Petrone and C. Griffin), *Physical Review E* Volume 100, October 2019.
1. Stirling Numbers in braid matroid Kazhdan-Lusztig polynomials (with M. Wakefield), *Advances in Applied Mathematics* Volume 103, February 2019.

AWARDS **Team Winner**, Applied Research Laboratory Award for Engineering Excellence, 2021
Professor Henry M. Robert, Jr. Prize, Department of Mathematics, U.S. Naval Academy, 2018
1st Place Student Paper, Undergraduate Research Conference Awards, MAA Maryland-District of Columbia-Virginia, 2017, Awarded for talk [2]
Team Winner, Syn Bio Academies Challenge, Defense Threat Reduction Agency, 2016

TEACHING **University of Minnesota** Lecturer
MATH 5251 Error Correcting Codes, Finite Fields, Algebraic Curves **Spring 2023**
MATH 1272 Calculus II **Fall 2022, Spring 2024**
Machine Learning Summer Camp **Summer 2022**

University of Minnesota Teaching Assistant	
MATH 3283W Sequences, Series, and Foundations	Spring 2022
MATH 1272 Calculus II	Spring 2020 Fall 2021
Research Experience for Undergraduates	Summer 2021, 2023
MATH 2243 Linear Algebra and Differential Equations	Spring 2021 Fall 2020, 2023
MATH 1271 Calculus I	Fall 2019
Summer Heros Youth Program Annapolis, Maryland, USA	
Math Coordinator	Summer 2016
U.S. Naval Academy Midshipman Group Study Leader	
Fundamentals of Mathematics	Spring 2017, 2018
Probability and Statistics I	Fall 2016, 2017
Calculus II	Fall 2015

INVITED TALKS

In reverse chronology

5. *Equivariant Kazhdan-Lusztig theory of paving matroids*, University of Minnesota Combinatorics Seminar, February 2023
4. *Equivariant Kazhdan-Lusztig theory of paving matroids*, Washington University in St. Louis Combinatorics Seminar, November 2022
3. *Equivariant Kazhdan-Lusztig theory of paving matroids*, Matroid Day Conference, November 2022
2. *Google Summer of Code Report*, Sage Days 112.358, June 2022
1. *Equivariant Kazhdan-Lusztig theory of paving matroids*, University of Wisconsin Combinatorics Seminar, April 2022

PROFESSIONAL SERVICE

- Grant Reviewer, UMN Council of Graduate Students **April 2023**
February 2024
- Facilitator, Minn. Graduate Student Teaching Assistant Orientation **August 2022**
- Organizer, Minn. Research Workshop in Algebra and Combinatorics **May 2022**
May 2024
- Camera/Tech support, Open Problems in Algebraic Combinatorics **May 2022**
- Session Chair, Grad. Student Combinatorics Conference **March 2022**
- Session Chair and Recorder, Grad. Student Combinatorics Conference **April 2021**
- Organizer, UMN Student Combinatorics and Algebra Seminar **2020-2021**
- Organizer, UMN Combinatorics Working Groups workshop **Spring 2020**
- Member, UMN [Directed Reading Program](#) organizing committee **2019-2020**

EXPERIENCE

In reverse chronology

5. SageMath, Google Summer of Code 2022, [Rewrite exterior algebra, implement Groebner bases, and peelable tableaux for northwest diagrams](#)

4. SageMath, Google Summer of Code 2021, *G*-invariants of Orlik-Solomon and Orlik-Terao algebras
3. Pennsylvania State University Applied Research Laboratory, Communications, Navigation, and Information Office, Research and Development Engineer, 2018-2021
2. Johns Hopkins University Applied Physics Laboratory *National Security Analysis Department*, Internship, 2017
1. Naval Research Laboratory *Center for Biomolecular Science and Engineering*, Internship, 2016

SUMMER SCHOOLS **Hokkaido University**, Schubert Calculus and its Generalizations, August 2023, Sapporo, Japan
Institute of Mathematics of the Jagiellonian University, Algebraic Combinatorics in Kraków 2022, Kraków, Poland
University of Oregon, Workshop on Algebra and Representation Theory, Held on Oregonian Grounds 2022, Eugene, Oregon, USA
Institut des sciences mathématiques, Université du Québec à Montréal, ISM Discovery School: Geometry and Combinatorics of Hessenberg Varieties 2022, Montréal, Québec, Canada
Institute for Advanced Study, Park City Math Institute Undergraduate Summer School 2017, Park City, Utah, USA

ADDITIONAL
TALKS

In reverse chronology

13. *Combinatorics in matroid Kazhdan–Lusztig polynomials*, University of Minnesota Duluth Graduate Colloquium, March 2023
12. *Combinatorics in Kazhdan–Lusztig polynomials of paving matroids*, Graduate Student Combinatorics Conference, March 2023
11. *The Orlik-Solomon algebra and representation theory*, University of Minnesota Student Algebra and Combinatorics Seminar, March 2022
10. *The combinatorics of card shuffling*, University of Minnesota Student Algebra and Combinatorics Seminar, November 2021
9. *Introduction to SageMath*, University of Minnesota Undergraduate Women in Math, October 2021
8. *Equivariant Kazhdan-Lusztig polynomials and their combinatorics*, University of Minnesota Student Representation Theory Seminar, July 2021
7. *Introduction to SageMath*, University of Minnesota Student Combinatorics Seminar, February 2021
6. *Stirling Numbers in braid matroid Kazhdan-Lusztig polynomials*, Graduate Online Combinatorics Colloquium, May 2020
5. *Stirling Numbers in braid matroid Kazhdan-Lusztig polynomials*, Joint Mathematics Meetings, MAA General Session on Other Topics, January 2019
4. *Persistent Homology for Data Scientists*, Pennsylvania State University Applied Research Laboratory Idea Share, December 2018

3. *Stirling numbers of the first kind in braid matroid Kazhdan-Lusztig polynomials*, USNA CAT (Combinatorics, Algebra, and Topology) seminar, March 2018
2. *The flag counting problem for partition lattices*, MAA MD-DC-VA Section Meeting, April, 2017.
1. *Editing the human microbiome: proactively preventing aerosolized conotoxins*, Office of the Assistant Undersecretary of Defense for Research and Engineering, the Pentagon, Washington, D.C., USA, September 2016.

POSTERS
PRESENTED

In reverse chronology

2. *Equivariant Kazhdan-Lusztig theory of paving matroids*, Algebraic Combinatorics in Krakow (Krakow, Poland), July 2022
1. *Equivariant Kazhdan-Lusztig theory of paving matroids*, GradMoCCA (Minneapolis, MN), April 2022

STUDENTS
MENTORED

- Pranjali Dangwal (University of Minnesota Graduate Student) **2023-2024**
Graduate Student Peer Mentor
- Calvin Wojahn (University of Minnesota Undergraduate Student) **2023**
Directed Reading Program in algebraic topology
- Joe McDonough (University of Minnesota Graduate Student) **2022-2023**
Graduate Student Peer Mentor
- Elise Catania (University of Minnesota Graduate Student) **2021-2022**
Graduate Student Peer Mentor
- Angel Chavez (University of Minnesota Graduate Student) **2021-2022**
Graduate Student Peer Mentor
- Ethan Partida (University of Minnesota Undergraduate Student) **2020-2021**
Directed Reading Program in applied category theory, independent readings in combinatorial commutative algebra and computational topology
- LTJG Meghan McDonough (Naval Postgrad. Sch. M.S. Student) **2019-2020**
Tutoring in data science and applied mathematics coursework

SOFTWARE
CONTRIBUTIONS

- Various contributions to SageMath
- Work in progress on contributions to Macaulay2

OUTREACH

- Instructor, MCFAM Machine Learning Camp for High Schoolers **July 2022**
- Instructor, Saturday Morning Math for elementary students **Spring 2022, 2023**