

Trevor K. Karn

CONTACT INFORMATION

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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 \(Honors\)](#)
May 2018

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

PUBLICATIONS

In reverse chronology

3. Equivariant Kazhdan-Lusztig theory of paving matroids (with G. Nasr, N. Proudfoot, and L. Vecchi), [arXiv:2202.06938](#). To appear in *Algebraic Combinatorics*.
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](#).

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](#), Communication, Navigation, and Information Office, Research Assistant, 2019-2021
2. [Pennsylvania State University Applied Research Laboratory](#), Communications, Navigation, and Information Office, Research and Development Engineer, 2018-2019
1. Johns Hopkins University Applied Physics Laboratory [National Security Analysis Department](#), Internship, 2017

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

SUMMER SCHOOLS

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

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

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.

TEACHING

University of Minnesota Lecturer

MATH 5251 Error Correcting Codes, Finite Fields, Algebraic Curves **Spring 2023**
MATH 1272 Calculus II **Fall 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**

MATH 2243 Linear Algebra and Differential Equations **Spring 2021**
Fall 2020

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**

PROFESSIONAL SERVICE

- Grant Reviewer, UMN Council of Graduate Students **April 2023**
- Facilitator, Minn. Graduate Student Teaching Assistant Orientation **August 2022**
- Organizer, Minn. Research Workshop in Algebra and Combinatorics **May 2022**
- 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**

STUDENTS MENTORED	• Calvin Wojahn (University of Minnesota Undergraduate Student)	2023
	<i>Directed Reading Program in algebraic topology</i>	
	• Joe McDonough (University of Minnesota Graduate Student)	2022-2023
	<i>Graduate Student Peer Mentor</i>	
	• Elise Catania (University of Minnesota Graduate Student)	2021-2022
	<i>Graduate Student Peer Mentor</i>	
SOFTWARE CONTRIBUTIONS	• Angel Chavez (University of Minnesota Graduate Student)	2021-2022
	<i>Graduate Student Peer Mentor</i>	
	• Ethan Partida (University of Minnesota Undergraduate Student)	2020-2021
	<i>Directed Reading Program in applied category theory, independent readings in combinatorial commutative algebra and computational topology</i>	
	• LTJG Meghan McDonough (Naval Postgrad. Sch. M.S. Student)	2019-2020
	<i>Tutoring in data science and applied mathematics coursework</i>	
OUTREACH	• Various contributions to SageMath	
	• Instructor, MCFAM Machine Learning Camp for High Schoolers	July 2022
	• Instructor, Saturday Morning Math for Elementary students	Spring 2022, 2023