

ZACHARY HAMAKER

CURRICULUM VITAE

ACADEMIC POSITIONS

- | | |
|---|---|
| Associate professor | August 2019 – present |
| Department of Mathematics
University of Florida | |
| Postdoctoral assistant professor | September 2016 – May 2019
(away Fall 2017) |
| Department of Mathematics
University of Michigan | |
| Postdoctoral fellow | August 2014–August 2016 |
| Institute for Mathematics and its Applications
University of Minnesota | |

EDUCATION

- | | |
|--|-------------------------|
| Dartmouth College | Fall 2009–Spring 2014 |
| Advisor: Peter Winkler, Research Area: Algebraic combinatorics and discrete probability. | |
| Ph.D., Mathematics. | June 2014 |
| M.A., Mathematics. | June 2011 |
| CSU East Bay | Summer 2008–Spring 2009 |
| M.S., Mathematics, | June 2009 |
| Bard College | Fall 2004–Spring 2008 |
| B.A., Mathematics | June 2008 |

PUBLICATIONS AND PREPRINTS

(ordered by arXiv upload date, * indicates undergraduate coauthor, † graduate student coauthor at time of writing)

- | | |
|--|---------------------------------------|
| 31. Coxeter and Schubert combinatorics of μ-involutions. | submitted |
| with Jack Chen-An Chou†. | |
| https://arxiv.org/abs/2604.03379 | |
| 30. Odd shifted parking functions. | 2026 |
| with Jesse Kim. | |
| https://arxiv.org/abs/2505.10763 | |
| Advances in Mathematics Volume 494, Article 110941 (21 pages). | |
| 29. Moments of permutations by cycle type. | to appear, Forum of Mathematics Sigma |
| with Brendon Rhoades. | |
| https://arxiv.org/abs/2503.17556 | |
| 28. Partial Permutations and Character Evaluations. | to appear, Combinatorial Theory |
| with Brendon Rhoades. | |
| https://arxiv.org/abs/2503.17552 | |
| 27. Type C K–Stanley symmetric functions and Kraskiewicz–Hecke insertion. | submitted |
| with Joshua Arroyo†, Graham Hawkes and Jianping Pan. | |
| https://arxiv.org/abs/2503.16641 | |
| Séminaire Lotharingien de Combinatoire, 93B.89 (2025), 12 pp. (peer reviewed extended abstract) | |

26. **Tableau formula for vexillary double Edelman–Greene coefficients.** 2026
with Adam Gregory[†] and Tianyi Yu.
<https://arxiv.org/abs/2412.20615>
Selecta Mathematica 32 (4), 82
25. **Dual Schubert polynomials via a Cauchy identity.** submitted
<https://arxiv.org/abs/2311.18099>
24. **Lenart’s bijection via bumpless pipe dreams.** 2022
With A. Gregory[†].
<https://arxiv.org/abs/2207.00523>
Electronic Journal of Combinatorics Volume 30, Issue 1 P1.24 pp. 1–18
23. **Characters of local and regular permutation statistics.** Not intended for publication
With B. Rhoades.
<https://arxiv.org/abs/2206.06567>
22. **Three coloring via triangle counting.** 2023
With V. Vatter.
<https://arxiv.org/abs/2203.08136>
Australasian Journal of Combinatorics, to appear
21. **Involutions under Bruhat order and labeled Motzkin Paths.** 2022
With M. Coopman[†].
<https://arxiv.org/abs/2106.06021>
European Journal of Combinatorics, Volume 103, article 103513 pp. 1–7
20. **Bijecting hidden symmetries for skew staircase shapes.** 2023
With A. Morales, I. Pak, L. Serrano and N. Williams.
<https://arxiv.org/abs/2103.09551>
Algebraic Combinatorics, Volume 6, no. 4, pp. 1095–1118.
19. **On pattern avoidance in matchings and involutions.** 2022
With J. Fang* and J. Troyka.
<https://arxiv.org/pdf/2009.00079>
Electronic Journal of Combinatorics (2022) Volume 29, Issue 1 P1.39 pp. 1–22
18. **Gröbner geometry of Schubert polynomials through ice.** 2022
With O. Pechenik and A. Weigandt.
<https://arxiv.org/pdf/2003.13719>
Advances in Mathematics, Volume 398, article 108228
Seminaire Lotharingien de Combinatoire 85B, FPSAC 2021 #5 pp. 1–12 (peer reviewed extended abstract)
17. **Involution pipe dreams.** 2022
With E. Marberg and B. Pawlowski.
<https://arxiv.org/pdf/1911.12009>
Canadian Journal of Mathematics, Volume 74, Issue 5 pp. 1310–1346
Seminaire Lotharingien de Combinatoire 82B, FPSAC 2019 12 pp. (peer reviewed extended abstract)
16. **Wronskian Appell polynomials and symmetric functions.** 2019
With N. Bonneux[†], J. Stembridge and M. Stevens.
<https://arxiv.org/abs/1812.01864>
Advances in Applied Mathematics, Volume 111, Article 101932, pp. 1–18
15. **Derivatives of Schubert polynomials and proof of a conjecture of Stanley.** 2020
With O. Pechenik, D. Speyer and A. Weigandt.
<https://arxiv.org/abs/1812.00321>
Algebraic Combinatorics (2020) Volume 3, Issue 2 pp. 301–307

14. **Pattern avoidance and quasisymmetric functions.** 2020
 With B. Pawlowski and B. Sagan.
<https://arxiv.org/abs/1810.11372>
 Algebraic Combinatorics (2020) Volume 3, Issue 2 pp. 365–388
13. **Weak order and descents for monotone triangles.** 2020
 With V. Reiner.
<https://arxiv.org/abs/1809.10571>
 European Journal of Combinatorics (2020) Volume 86, article 103083, pp. 1–21.
12. **Atoms for signed permutations.** 2021
 With E. Marberg.
<https://arxiv.org/abs/1802.09805>
 European Journal of Combinatorics (2021) Volume 94, article 103288, pp. 1–40.
11. **Involution Schubert-Coxeter combinatorics (peer reviewed extended abstract).** 2017
 With E. Marberg and B. Pawlowski.
 Séminaire Lotharingien de Combinatoire 78B, FPSAC 2017, pp. 1–12.
 summarizes 4, 6, 8, 9 and 10
10. **Fixed-point-free involutions and Schur P-positivity.** 2020
 With E. Marberg and B. Pawlowski.
<https://arxiv.org/abs/1706.06665>
 Journal of Combinatorics, Volume 11, No. 1, pp. 65–110
9. **Schur P-positivity and involution Stanley symmetric functions.** 2019
 With E. Marberg and B. Pawlowski.
<https://arxiv.org/abs/1701.02824>
 International Mathematics Research Notices Volume 2019, Issue 17, pp. 5389–5440
8. **Transition formulas for involution Schubert polynomials.** 2018
 With E. Marberg and B. Pawlowski.
<https://arxiv.org/abs/1609.09625>
 Selecta Mathematica, Volume 24, Issue 4, pp. 2991–3025
7. **Doppelgänger: bijections of plane partitions.** 2020
 With R. Patrias[†], O. Pechenik and N. Williams.
<https://arxiv.org/abs/1602.05535>
 International Mathematics Research Notices, Volume 2020, Issue 2 pp. 487–540
6. **Involution words II: braid relations and atomic structures.** 2016
 With E. Marberg and B. Pawlowski.
<https://arxiv.org/abs/1601.02269>
 Journal of Algebraic Combinatorics, Volume 44 , Number 4 pp. 1–43.
5. **Shifted Hecke insertion and the K -theory of $OG(n, 2n + 1)$.** 2017
 With A. Keilthy*, R. Patrias[†], L. Webster*, Y. Zhang* and S. Zhou*.
<https://arxiv.org/abs/1510.08972>
 Journal of Combinatorial Theory Series A, Volume 151, pp. 207–240
 Séminaire Lotharingien de Combinatoire 78B, FPSAC 2017, pp. 1–12 (peer reviewed extended abstract)
4. **Involution words: counting problems and connections to Schubert calculus for symmetric orbit closures.** 2018
 With E. Marberg and B. Pawlowski.
<https://arxiv.org/abs/1508.01823>
 Journal of Combinatorial Theory Series A, Volume 160, pp. 217–260

3. **Subwords and plane partitions (peer reviewed extended abstract).** 2015
 With N. Williams.
 DMTCS Proceedings, FPSAC 2015, pp. 241–252
2. **Coxeter-Knuth graphs and a signed Little Map for the hyperoctahedral group.** 2014
 With S. Billey, A. Roberts[†] and B. Young.
<https://arxiv.org/abs/1405.4891>
 Electronic Journal of Combinatorics, Volume 21, Issue 4, P4.6 pp. 1–39
1. **Relating Edelman-Greene insertion to the Little Map.** 2014
 With B. Young.
<https://arxiv.org/abs/1210.7119>
 Journal of Algebraic Combinatorics, Volume 40, Issue 3, pp 693–710.
 DMTCS Proceedings, FPSAC 2013, pp. 229–240 (peer reviewed extended abstract)
0. **Thesis: Bijective combinatorics of reduced decompositions.** 2014
 Defended May, 2014. Comprised primarily of 1 and 2.

HONORS AND AWARDS

Grants

Conference on Enumerative and Algebraic Combinatorics (co-PI) \$22,356.00	March 2024
NSF Grant DMS-2054423 \$299,810	June 2021 – May 2024
Simons Collaboration Grant \$42,000 (declined)	September 2021 – August 2026
AMS Travel Grant \$4000	July 2018 – December 2020

Funding at Dartmouth College

GAANN Fellowship	Sept. 2012 – 2013
Dartmouth College Graduate Fellowship	Fall 2009 – Summer 2012, Fall 2013–Spring 2014

STUDENTS SUPERVISED

Ph.D. Students

Adam Gregory	2021–2025
Michael Coopman	2022–2025
Joshua Arroyo	2022–2026
Minseo Cho	2025–present

Master's Students

Leo Adaryukov	2024–2026
Chen-An (Jack) Chou	2025–2026

TEACHING EXPERIENCE

Instructor, University of Florida.

MAD7397 Topics in Combinatorial Theory 2	Spring 2026
MAS4301 Abstract Algebra 1	Spring 2026
STA4321 Introduction to Probability	Spring 2025
MAD4301 Graph Theory	Spring 2025
MAP6472: Probability and Potential Theory I	Fall 2024
MAS4105: Linear Algebra 1	Fall 2024
MAD4204: Introduction to Combinatorics	Spring 2024
MAD4203: Introduction to Combinatorics	Fall 2023
MAD4204: Introduction to Combinatorics II	Spring 2023
MH3202: Sets and Logic	Spring 2023
MH3202: Sets and Logic	Fall 2022
MAD7397: Topics in Combinatorial Theory 2	Spring 2022
MH3202: Sets and Logic	Fall 2021
MAS4105: Linear Algebra 1	Fall 2021
MAD6207: Combinatorial Theory 2	Spring 2021
MAD6206: Combinatorial Theory 1	Fall 2020
MAS4105: Linear Algebra 1	Fall 2020
MAD4204: Introduction to Combinatorics II	Spring 2020
MAC2311: Analytic Geometry and Calculus 1	Fall 2019
MAD4203: Introduction to Combinatorics	Fall 2019

Instructor, University of Michigan.

Math 425: Introduction to Probability	Winter 2019
Math 416: Theory of Algorithms	Winter 2019
Math 217: Linear Algebra with proofs (two sections)	Fall 2018
Math 115: Calculus I (two sections)	Winter 2018
Math 217: Linear Algebra with proofs (two sections)	Winter 2017
Math 115: Calculus I (two sections)	Fall 2016

Instructor, University of Minnesota.

Math 4707: Introduction to Combinatorics and Graph Theory	Fall 2015
---	-----------

Instructor, Dartmouth College.

Math 20: Discrete Probability	Spring 2014
Math 8: Calculus of Functions of One and Several Variables	Spring 2013
Math 20: Discrete Probability	Fall 2011

Teaching Assistant, Dartmouth College.

Math 10: Introduction to Statistics	Spring 2011
Math 8: Calculus of Functions of One and Several Variables	Fall 2010
Math 13: Calculus of Vector-Valued Functions	Winter 2010
Math 3: Introduction to Calculus	Fall 2009

Teaching Associate, CSU East Bay.

Math 802: Elementary Algebra B	Spring 2009
Math 950: Intermediate Algebra	Fall 2008

SELECTED RESEARCH PRESENTATIONS

CONFERENCE AND SEMINAR PRESENTATIONS

Mu involutions, Schubert polynomials and the variety of complete quadrics

2026 Spring Southeastern Sectional Meeting 3/28/26	Savannah, GA
Algebra and Combinatorics Seminar at TAMU 11/20/25	Texas A&M University, College Station, TX
UT Dallas Algebra and Combinatorics Seminar 11/19/25	University of Texas at Dallas, Richardson, TX

Odd Shifted Parking Functions

University of Minnesota Combinatorics Seminar 9/25/25

University of Minnesota, Minneapolis, MN

Uncle Paul and Random Graphs

Plectics 3/8/25

Clemson, SC

Permutation Statistics and Cycle Type

2025 Spring Southeastern Sectional Meeting 3/8/25

Clemson, SC

Permutation patterns – the typical case

Permutation Patterns 2024 *plenary speaker* 6/11/2024

University of Idaho, Moscow, ID

Duality for Polynomials

University of Florida Combinatorics Seminar 2/13/24

University of Florida, Gainesville, FL

UC San Diego Combinatorics Seminar 1/30/2024

UC San Diego, La Jolla, CA

Shifted tableaux and Schubert Calculus

Schubert Conference Summer 2023 6/18/2023

University of Illinois, Champaign, IL

Fourier Analysis and the Symmetric Group

Department Colloquium 9/29/23

DePaul University, Chicago, IL

Simple Words 3/23/23

University of Florida, Gainesville, FL

Low-degree permutation statistics

UT Dallas Algebra and Combinatorics Seminar 4/8/24

Richardson, TX

Georgia Tech Combinatorics Seminar 3/31/23

Georgia Institute of Technology, Atlanta, GA

NY Combinatorics Seminar 3/24/23

CUNY Graduate Center, New York, NY

A derivative identity for Schubert polynomials

AMS Special Session on MacDonald Theory 3/19/23

Georgia Tech, Atlanta, GA

Functions of permutations via partial permutations

UF Combinatorics Seminar 11/8/22

University of Florida, Gainesville, FL

Virtual characters of permutation statistics

Algebraic and Enumerative Combinatorics Seminar 6/9/22

University of Waterloo, Waterloo, ON

Kennesaw State Combinatorics Seminar 9/29/22

Kennesaw State University, Kennesaw, GA

UF Combinatorics Seminar 2/14/23

University of Florida, Gainesville, FL

Symplectic bumpless pipe dreams

Combinatorics Seminar 3/11/22

University of Michigan, Ann Arbor, MI

Combinatorics Seminar 11/22/21

Washington University, St. Louis, MO

What is a... Schubert polynomial

Combinatorics Seminar 11/3/20

University of Florida, Gainesville, FL

(Almost) symmetries of sorting networks

AMS Special Session 5/3/20

Cancelled

Some techniques for shellability

Bubenik Research Meeting 2/23/20

University of Florida, Gainesville, FL

Topology and Dynamics Seminar 2/17/20

University of Florida, Gainesville, FL

Döppelgangers – an example of algebraic combinatorics in action

Graduate Mathematics Association Colloquium 11/20/19

University of Florida, Gainesville, FL

Pattern avoidance for matchings and for involutions under one roof

Special Session on Patterns in Permutations (25min) 11/2/19

AMS Sectional Meeting, Gainesville, FL

Gröbner geometry of Schubert polynomials through ice

AMS Special Session 5/3/20
Algebra Seminar 10/25/19

Cancelled
University of Florida, Gainesville, FL

Involution pipe dreams

FPSAC Poster session 7/2/19

University of Ljubljana, Ljubljana, Slovenia

Schubert polynomials and the strong Sperner property

Combinatorics Seminar 10/29/19
6th Lake Michigan Workshop on Combinatorics and Graph Theory
4/6/19

University of Florida, Gainesville, FL
Western Michigan University, Kalamazoo, MI

Schubert calculus, involutions and symmetric matrices

Combinatorics Seminar 2/27/20
Math Colloquium 1/15/19
Department Colloquium 1/7/19

Michigan State University, East Lansing MI
Drexel University, Philadelphia, PA
University of Florida, Gainesville, FL

Wronskian Appell polynomials and symmetric functions

Integrable Systems and Random Matrix Theory. 11/12/18

University of Michigan, Ann Arbor, MI

Coxeter combinatorics of involutions with applications to geometry

Minnesota Combinatorics Seminar. 3/30/18

University of Minnesota, Minneapolis, MN

K-triangulations, subwords and plane partitions

Michigan Combinatorics Seminar. 3/9/18

University of Michigan, Ann Arbor, MI

Some thoughts on K -theory of the Lagrangian Grassmannian

Special Session on Cohomologies and Combinatorics 5/6/17

AMS Sectional Meeting, New York, NY

Transition Equations for K -orbit closures

MIT Combinatorics Seminar 5/5/17

Massachusetts Institute of Technology, Cambridge, MA

Involution words – a survey

CAGE Comb. and Alg. Geometry Seminar. 2/4/16
UW Combinatorics Seminar. 1/6/16
Michigan Combinatorics Seminar. 12/4/15
Michigan State Combinatorics Seminar. 12/1/15
UC Davis Combinatorics Seminar. 11/6/15
Ohio State Combinatorics Seminar. 10/21/15
UIUC Combinatorics Seminar. 10/26/15
MIT Combinatorics Seminar. 10/2/15
Dartmouth College Combinatorics Seminar. 10/1/15

University of Pennsylvania, Philadelphia, PA
University of Washington, Seattle, WA
University of Michigan, Ann Arbor, MI
Michigan State University, East Lansing, MI
UC Davis, Davis, CA
The Ohio State University, Columbus, OH
University of Illinois Urbana-Champaign, Urbana, IL
Massachusetts Institute of Technology, Cambridge, MA
Dartmouth College, Hanover, NH.

Involution Sorting networks

University of Minnesota Combinatorics Seminar. 4/3/15

University of Minnesota, Minneapolis, MN.

Subword complexes and plane partitions

University of Oregon Probability Seminar 1/15/15

University of Oregon, Eugene, OR.

Little maps and insertion algorithms.

IMA Postdoc Seminar. 11/18/2014
Special Session in Algebraic combinatorics. 9/21/14
University of Washington Combinatorics Seminar. 1/29/14
CAGE Comb. and Alg. Geometry Seminar. 11/26/13
LaCIM Combinatorics Seminar. 10/18/2013

IMA, Minneapolis, MN.
AMS Sectional Meeting, Eau Claire, WI.
University of Washington, Seattle, WA.
Drexel University, Philadelphia, PA.
LaCIM at UQAM, Montréal QC.

Relating Edelman-Greene insertion to the Little map.

FPSAC. 6/25/13 (30 min)	Université Sorbonne Nouvelle, Paris, France.
Graduate Student Combinatorics Conference. 4/21/13 (30 min)	University of Minnesota, Minneapolis, MN.
University of Michigan Combinatorics Seminar. 10/26/12	University of Michigan, Ann Arbor, MI.
Dartmouth Combinatorics Seminar. 10/18/12	Dartmouth College, Hanover, NH.
UVM Combinatorics Seminar. 10/10/12	University of Vermont, Burlington, VT.

GENERAL AUDIENCE AND UNDERGRADUATE-LEVEL TALKS**Boolean functions and decision**

Undergraduate Mathematics Society Seminar 2/6/23	University of Florida, Gainesville, FL
--	--

Involution words – a survey

Encuentro Colombiano de Combinatoria. 6/9/18	Universidad del Norte, Barranquilla, Colombia
--	---

Random Sorting Networks.

Bi-college Colloquium. November 25, 2013	Haverford College Haverford, PA.
Bard College Mathematics Seminar. November 21, 2013	Bard College Annandale-on-Hudson, NY.

SERVICE AND OUTREACH**Editorial Work**

2022-2023

FPSAC 2023, member Program Committee

Referee

Ongoing

Journal of Combinatorial Theory Series A, Algebraic Combinatorics, Journal of Algebraic Combinatorics, SIAM Journal of Discrete Mathematics, European Journal of Combinatorics, FPSAC, Electronic Journal of Combinatorics, Discrete Mathematics, Annals of Combinatorics, Journal of Combinatorics, Proceedings of the American Math Society, Journal of the American Mathematics Society, Ars Mathematica Contemporanea, Australasian Journal of Combinatorics, Selecta Mathematica, Journal of Algebra, International Mathematics Research Notices, Involve, Combinatorial Theory, Combinatorica, Transactions of the American Mathematical Society, Advances in Mathematics, Forum of Mathematics Sigma

Committee work

Ongoing

Chair, Undergraduate Research Committee	2024–2025
Advanced Undergraduate Curriculum Committee	2019–2025
Colloquium Committee	2019–2020
Graduate Admissions Committee	2020, 2023–2025
Hiring Committee	2021, 2022

University Service

Ongoing

Department experiential learning coordinator	2024–2025
--	-----------

Co-organizer – Professional development seminar

September–Ongoing

Co-organized biweekly seminar on professional development for graduate students at University of Florida

Organizer – University of Florida Combinatorics Seminar

September 2019–Ongoing

Organized weekly seminar

Organizer – Special Session on Algebraic Combinatorics in the Southeast

November 2021

Organized special session at AMS Fall Southeastern Sectional Meeting

Supervisor – undergraduate research project

May–July 2021

Collaborated with University of Florida undergraduate, supported by an NSF grant

Supervisor – undergraduate research project

May–July 2020

Collaborated with University of Florida undergraduate, resulting in one publication (19.)

- Mentor – University of Michigan REU** May-July 2019
Mentored one student in research project on the Happy Ending conjecture
- Mentor, Geometry Lab** January-April 2019
Co-supervised three undergrads in research project on moduli space of origami folds at University of Michigan
- CR coordinator – Linear algebra** September-December 2018
Met weekly with several high school students enrolled in Math 217 at University of Michigan
- Organizer – Special Session on Combinatorics in Algebra and Geometry** October 2018
Organized special session at AMS Fall Central Sectional Meeting
- Mentor – University of Washington REU** June – July 2016
Mentored three undergraduate students, resulting in the preprint arxiv.org/abs/1710.10407
- Mentor – University of Minnesota REU** June – July 2015
Mentored four undergraduate students, resulting in one publication (6.) and another paper currently in preparation.
- Organizer – IMA Postdoc Seminar** September 2014-May 2015
Organized weekly seminar
- Exploring Mathematics** July-August 2011
Instructor for a math camp for local middle and high school students
- Other outreach** Ongoing
Faculty Advisor, Puppy Club at University of Florida (2020–2021)
Panelist advising graduate students on ‘The academic job process’ at University of Florida
Volunteer at GROW conference for undergraduate women in mathematics
Panelist advising graduate students on the ‘The academic job process’ at University of Michigan
Instructor and volunteer at multiple math circles affiliated with University of Michigan
Organizer and presenter for IMA outreach at the Minnesota State Fair
Graduate Student Council department representative (2012–2013)
Volunteer assistant coach, Dartmouth Women’s Volleyball team (2011)

REFERENCES

Available upon request.