Galen Dorpalen-Barry

Curriculum Vitae

Academic Positions

8/2024 - Present   **Assistant Professor**

Department of Mathematics, Texas A&M University

10/2023 - 6/2024   **Postdoctoral Scholar (RTG)**

Department of Mathematics, University of Oregon

Mentor: Nicholas Proudfoot

10/2021 - 9/2023   **Postdoctoral Researcher (Wissenschaftlicher Mitarbeiter)**

Faculty for Mathematics, Ruhr-University Bochum

Mentor: Christian Stump

Education

9/2018 - 7/2021   **PhD in Mathematics**, University of Minnesota

Thesis: Cones of Hyperplane Arrangements, Advisor: Victor Reiner

9/2015 - 9/2018   **Masters of Mathematics**, University of Minnesota

Thesis: Whitney Numbers for Poset Cones, Advisor: Victor Reiner

9/2011 - 5/2015   **Bachelor of Arts**, Bard College

Thesis: Rational Tilings of the Unit Square, supervised by John Cullinan

Research Interests

- Topology, geometry, and combinatorics of hyperplane arrangements

- Geometry and combinatorics of matroids and oriented matroids, especially their connections to convexity

- Nonnegativity of polynomials with connections to topology and discrete geometry

Publications and Preprints

1. Colin Crowley, Galen Dorpalen-Barry, André Henriques, and Nicholas Proudfoot. The geometry of zonotopal algebras i: cohomology of graphical configuration spaces (arxiv:2502.12768), 2025

2. Sarah Brauner, Galen Dorpalen-Barry, Selvi Kara, Caroline Klivans, and Lisa Schneider. A three-regime theorem for flow-firing (arxiv:2402.07737), 2023

3. Galen Dorpalen-Barry, Joshua Maglione, and Christian Stump. The Poincaré-extended **ab**-index. *J. Lond. Math. Soc. (2)*, 111(1):Paper No. e70054, 2025

4. Galen Dorpalen-Barry, Joshua Maglione, and Christian Stump. The Poincaré-extended **ab**-index (Extended Abstract). *Sém. Loth. de Combinat.*, (4), 2024

5. Galen Dorpalen-Barry and Christian Stump. Shi arrangements restricted to Weyl cones. *Annals of Combinatorics*, 2024

6. Galen Dorpalen-Barry, Nicholas Proudfoot, and Jidong Wang. Equivariant cohomology and conditional oriented matroids. *Int. Math. Res. Not. IMRN*, (11):9292–9322, 2024

7. Galen Dorpalen-Barry. The Varchenko-Gel'fand ring of a cone. *J. Algebra*, 617:500–521, 2023

8. The 2020 Polymath Jr. "q-binomials and the Grassmannian" group. Filtering cohomology of ordinary and Lagrangian Grassmannians. *Involve*, 15(2):271–288, 2022

9. Galen Dorpalen-Barry, Jang Soo Kim, and Victor Reiner. Whitney Numbers for Poset Cones. *Order*, 2021

10. Galen Dorpalen-Barry, Cyrus Hettle, David C. Livingston, Jeremy L. Martin, George D. Nasr, Julianne Vega, and Hays Whitlatch. A positivity phenomenon in Elser's Gaussian-cluster percolation model. *J. Combin. Theory Ser. A*, 179:Paper No. 105364, 27, 2021

11. Ayomikun Adeniran, Steve Butler, Galen Dorpalen-Barry, Pamela E. Harris, Cyrus Hettle, Qingzhong Liang, Jeremy L. Martin, and Hayan Nam. Enumerating Parking Completions using Join and Split. *Electron. J. Combin.*, 27(2):Paper No. 2.44, 19, 2020

Grants & Fellowships

2023 - 2025	AIM SQuaRE Collaboration Grant
	Topic: "Positroid Polytopes"
9/2021 - 12/2021	ICERM Semeseter Fellowship through the Research Community in Algebraic Combinatorics

Talks

2/10/2025	Computational Interactions between Algebra, Combinatorics, and Discrete Geometry (IPAM Workshop)
	Title: "Yoshinaga's Criteron & the Topology of a Complexified Complement of a Real Arrangement"
10/25/2024	UT Dallas Algebra and Combinatorics Seminar
	Title: "The Poincare-extended ab-index"
10/18/2024	Texas A&M Algebra and Combinatorics Seminar
	Title: "The Poincare-extended ab-index"
4/10/2024	Univeristy of Washington Combinatorics Seminar
	Title: "The Poincare-extended ab-index"
3/11/2024-3/15/2024	Hot Topics (Artin Groups and Arrangements - Topology, Geometry, and Combinatorics)
	Title: "The complexified complement of an arrangement–set pair"

12/15/2023	MFO Workshop "Geometric, Algebraic, and Topological Combinatorics"
	Title: "The Poincare-extended ab-index"
5/1/2023	Texas A&M Colloquium
	Title: "Cones of Hyperplane Arrangements"
3/29/2023	89th Séminaire Lotharingien de Combinatoire
	Title: "The Poincare-extended ab-index"
3/15/2023	Various Guises of Reflection Arrangements (Invited Participant)
	Title: "The Poincare-extended ab-index"
3/2023	CATs Seminar (Kentucky)
	Title: "The Poincare-extended ab-index"
11/10/2022	Special Combinatorics Seminar (at the MPI Leipzig)
	Title: "Hyperplane Arrangements and Algebra"
10/25/2022	Oberseminar "Kombinatorik" (RUB)
	Title: "Balanced Flag Poincaré Polynomials"
9/5/2022 - 9/9/2022	Geometry meets Combinatorics in Bielefeld (Invited Speaker)
	Title: "Real Hyperplane Arrangements and the Varchenko-Gelfand Ring"
8/26/2022	Algebra and Combinatorics Seminar at Texas A&M
	Title: "Real Hyperplane Arrangements and the Varchenko-Gelfand Ring"
8/19/2022	Algebraic Combinatorics Seminar at University of Texas at Dallas
	Title: "Real Hyperplane Arrangements and the Varchenko-Gelfand Ring"
6/27/2022 - 7/1/2022	Arrangements in Ticino (Invited Speaker)
	Title: "The Varchenko-Gel'fand Ring for Weyl Cones"
3/21/2022	Combinatorial Coworkspace (Invited Participant)
	Title: "Narayana numbers from the geometry of Shi arrangements"
3/10/2022	ICERM Research Communities in Algebraic Combinatorics Seminar
	Title: "The Varchenko-Gel'fand Ring of a Hyperplane Arrangement or a Cone"
2/28/2022	Berkeley Combinatorics Seminar
	Title: "The Varchenko-Gel'fand Ring of a Hyperplane Arrangement or a Cone"
1/10/2022	Algebra and Combinatorics Seminar at Universität Osnabrück
	Title: "The Varchenko-Gel'fand Ring of a Hyperplane Arrangement or a Cone"
12/2/2021	Brown Combinatorics Seminar
	Title: "The Varchenko-Gel'fand Ring of a Hyperplane Arrangement or a Cone"

11/18/2021	Discrete Geometry and Topological Combinatorics Seminar at FU Berlin
	Title: "The Varchenko-Gel'fand Ring of a Hyperplane Arrangement or a Cone"
11/8/2021, 11/15/2021	Oberseminar "Arrangements and Symmetries" (RUB)
	Title: "Cones of Hyperplane Arrangements (Two-Part Series)"
9/5/2021 - 9/8/2021	86th Séminaire Lotharingien de Combinatoire
	Title: "The Varchenko-Gel'fand Ring of a Hyperplane Arrangement or a Cone"

Seminars & Conferences Organized

10/2024	SIAM TX-LA Minisymposium: "Hyperplane Arrangements and Polytopes" (with Christin Bibby)
7/2024	FPSAC 2024 (Organizing Committee, member)
1/2024 - 3/2024	Reading Seminar on Positive Geometries (with Colin Crowley)
10/2023 - 12/2023	University of Oregon Combinatorics Quasi-Seminar (with Colin Crowley)
10/2022 - 7/2023	Oberseminar "Kombinatorik" at RUB (with Christian Stump)
10/2021 - 7/2022	Oberseminar "Arrangements and Symmetries" at RUB (with Georges Neaime, Gerhard Röhrle, and Christian Stump)
10/2021 - 7/2022	Bochum-Frankfurt Joint Oberseminar "Kombinatorik" (with Raman Sanyal, Christian Stump)
4/2021	Graduate Student Combinatorics Conference
	(organized with Esther Banaian, Sarah Brauner, Elizabeth Kelley, Eric Nathan Stucky, Lilly Webster)
	(This conference recieved an NSA grant for $ 25,000, but the conference was moved online due to COVID-19, and the grant was returned.)
4/2020 - 5/2021	Graduate Online Combinatorics Colloquium (organized with Alex McDonough and Andrés Vindas-Meléndez)
9/2017 - 6/2018	Student Combinatorics Seminar at Minnesota with Elizabeth Kelley, University of Minnesota

Outreach

6/2020 - 8/2020	Polymath Jr. Research Experience for Undergraduates (REU)
	Assistant Mentor for the project: "Filtering cohomology of ordinary and Lagrangian Grassmannians," proposed by Victor Reiner
1/2020	Mathematics Project at Minnesota (MPM), Mentor
1/2020 - 5/2020	Directed Reading Program, Project Mentor
	Topic: "Cyclotomic Polynomials"

9/2019 - 5/2019   Women in Science and Engineering (WiSE), Mentor
5/2017 - 8/2017   University of Minnesota Research Experience for Undergraduates (REU)
                  Teaching assistant for two projects: "Supports of skew Schur functions" and
                  "Correlations among patterns," both proposed by Pavlo Pylyavskyy.

Reviews

Advances in Applied Mathematics, Algebraic Combinatorics, Communications in Algebra, Combinatorial Theory, Discrete and Computational Geometry, European Journal of Combinatorics, MathSciNet, Minnesota Journal of Undergradaute Mathematics

Teaching

8/2024 - 12/2024   Math 323: Linear Algebra
4/2024 - 6/2024   Math 232: Discrete Math 2 (University of Oregon)
1/2024 - 3/2024   Math 231: Discrete Math 1 (University of Oregon)
10/2023 - 12/2023   Calculus II (University of Oregon)
4/2023 - 8/2023   Student Seminar "Polytope und Simplizialkomplexe" (= Polytopes and Simplicial Complexes) with Elena Hoster and Christian Stump (Ruhr-Universität Bochum)
10/2022 - 2/2023   Introduction to Combinatorics (Ruhr-Universität Bochum)
9/2020 - 12/2020   Math 2263: Multivariable Calculus (University of Minnesota)
5/2019 - 12/2019   Math 1031: College Algebra and Probability (University of Minnesota)