

Sarah Brauner

CONTACT

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EDUCATION

- 2017—2023 **University of Minnesota**
PhD Candidate in Mathematics
Advisor: Vic Reiner
- 2019 M.S. in Mathematics
- 2016-2017 **Smith College**
Post-Baccalaureate Program for Women in Mathematics, GPA: 4.0
- 2012-2016 **Reed College**
B.A. in Mathematics/Economics, GPA: 3.87

RESEARCH INTERESTS

Algebraic combinatorics and its intersection with representation theory, algebraic topology

PUBLICATIONS AND PREPRINTS

4. “[Eulerian representations for real reflection groups](#),” *To appear in the Journal of the London Mathematical Society* (2022). [arXiv:2005.05953](#).
3. (With T. Friedmann) “[A Simplified Presentation of Specht Modules](#),” *Journal of Pure and Applied Algebra* (2022): 226(7). [arXiv:1803.10918](#).
2. (With E. Banaian, H. Chandramouli, K. Klinger-Logan, A. Nadeau and M. Philbin.) “[A Workshop to Build Community and Broaden Participation in Mathematics: Reflections on the Mathematics Project at Minnesota](#),” *PRIMUS* (2021).
1. (With F. Glebe and D. Perkinson) “[Enumerating Linear Systems on Graphs](#),” *Mathematische Zeitschrift* (2020) 296(3): 1101-1134. [arXiv:1906.04768](#).

REFEREED CONFERENCE PRECEEDINGS

2. “[Eulerian representations for real reflection groups](#)” *Séminaire Lotharingien de Combinatoire* **85B** (2021), Article # 15. Formal Power Series and Algebraic Combinatorics (FPSAC), Ramat Gan, Israel. (Talk).
1. (With F. Glebe and D. Perkinson) “[Enumerating Linear Systems on Graphs](#)” *Séminaire Lotharingien de Combinatoire* **82B** (2019), Article # 17. Formal Power Series and Algebraic Combinatorics (FPSAC), Ljubljana, Slovenia. (Poster).

IN PREPARATION

2. “A Type B analog of the Whitehouse representation,” *Manuscript in preparation*.
1. (With A. Christiansen and N. Pham.) “Symmetries of complete linear systems on graphs.” *Manuscript in preparation*.

AWARDS AND HONORS

- 2021 UMN School of Mathematics Outstanding Service Award
2021 UMN President's Student Leadership and Service Award
2019-2023 NSF Graduate Research Fellowship
2017-2023 UMN College of Science and Engineering Graduate Fellowship
Three year graduate fellowship
2017 UMN School of Mathematics Naresh Jain Fellowship
Travel and technology fellowship; \$1500.
2016 Phi Beta Kappa
2016 Reed College Meier Award for Distinguished Thesis in Economics
Awarded to 1-2 graduating students annually
2012-2016 Reed College Commendation for Academic Excellence (received annually)

GRANTS

- 2021 MAA Tensor Grant for the Mathematics Project at Minnesota
With E. Banaian, M. Philbin, PI Paul Carter; \$6000.
2020 NSA Mathematical Sciences Program for Graduate Student Combinatorics Conference 2021
With E. Banaian, G. Dorpalen-Barry, E. Kelley, E. Stucky, L. Webster, PI Vic Reiner; \$25,000[†].
2020 MAA Tensor Grant for the Mathematics Project at Minnesota
With E. Banaian, H. Chandramouli, M. Philbin, PI Paul Carter; \$6000[†].
2019 UMN Campus Climate Grant for the Mathematics Project at Minnesota
With E. Banaian, H. Chandramouli, M. Philbin; \$500.
2017 Smith College Summer Research Fellowship Program
To conduct research with T. Friedmann; \$4500
2014 Reed College McGill Lawrence Grant
To conduct research in South Africa; \$3000

INVITED SEMINAR AND CONFERENCE TALKS

A Type B analog of the Whitehouse representation

- 2022 *RTG seminar in Combinatorics, Geometry, Representation Theory and Topology*
University of Oregon, Eugene, OR
2022 *Algebra and Discrete Mathematics Seminar*
UC Davis, Davis, CA
2021 CAGE (Combinatorics, Algebra, and Geometry) Seminar
University of Pennsylvania, Philadelphia PA
2021 *UMass Amherst Discrete Math Seminar*
University of Massachusetts, Amherst, MA
2021 *Cornell Discrete Geometry and Combinatorics Seminar*
Cornell University, Ithaca, NY
2021 *Dartmouth Combinatorics Seminar*
Dartmouth College, Hanover, NH

Eulerian representations for real reflection groups

- 2021 *Women in Combinatorics and Representation Theory*
UC Riverside Diversity and Excellence Workshop (online)

[†] Due to COVID-19, both conferences were made virtual and only a portion of the grants were used.

- 2020 *Arrangements at Home III: Algebraic Aspects*
Virtual Conference
- 2020 *Graduate Online Combinatorics Colloquium*
- 2020 *University of Minnesota Combinatorics Seminar* (online)
Enumerating Linear Systems on Graphs
- 2019 *AMS Central Fall Sectional Meeting: Combinatorial Algebraic Geometry*
University of Wisconsin, Madison WI
- 2019 *CAGE (Combinatorics, Algebra, and Geometry) Seminar*
Drexel University, Philadelphia PA
- 2019 *AMS Northeast Spring Sectional Meeting: Chip Firing and Divisor Theory*
University of Hartford, Hartford CT
On Specht Modules and the CataLANKe Theorem
- 2018 *AMS Central Fall Sectional Meeting: Combinatorics in Algebra and Geometry*
University of Michigan, Ann Arbor MI

INVITED COLLOQUIUM

- 2022 Colby College, Waterville, ME
- 2020 Reed College, Portland, OR
- 2019 Smith College, Northampton, MA

TEACHING

- BEAM (Bridge to Enter Advanced Mathematics)**
- 2021 Junior Faculty: Designed and taught intensive 2-week course on discrete geometry to rising eighth graders
- 2018 Junior Faculty: Designed and taught 6-week course on Logical Reasoning to rising seventh graders
- University of Minnesota**
- 2019-2020 TA, UMTYMP Calculus II (year-long course covering introduction to proofs and basic linear algebra) for UMN Talented Youth in Mathematics Program (UMTYMP)
- 2019 TA, UMN REU in Combinatorics
- 2021 Instructor of record for Senior Capstone Project (Maxwell McKinney)
- Smith College**
- 2016-2017 TA in Tutoring Center, Calculus I, II, III and Linear Algebra
- Reed College**
- 2014-2016 TA in Tutoring Center, Calculus I, II, III and Linear Algebra

ORGANIZING

- 2018 — **Mathematics Project at Minnesota (MPM)**
Co-organizer of an annual 4-day workshop for undergraduates from underrepresented groups to increase participation and success in mathematics. As co-organizer I obtain funding, recruit 30+ undergraduate participants and oversee 10-15 graduate student volunteers to plan and implement each workshop session.

- 2021-2022 **Graduate Online Combinatorics Colloquium (GOCC)**
Weekly seminar highlighting the work of graduate students in combinatorics.
- April 2021 **Graduate Student Combinatorics Conference (GSCC) 2021**
Weekend conference organized by and for graduate students. The conference featured over 80 graduate student talks, three plenary talks and community building activities. Held online due to COVID-19.
- 2018-2020 **UMN Math Club**
Weekly club for undergraduate math majors to build community and foster mathematical curiosity
- Fall 2019 **Hyperplane arrangement seminar and reading group**
- 2018-2019 **UMN Graduate Student Combinatorics and Algebra Seminar**

MENTORING

- Fall 2021 Directed reading project (DRP) mentor with Abigail Goldman-Nagel on chip-firing
2021— Advisor for Habiba Heshmat, Marie Therese Guerrier, and Mirta Hernandez Carrion
2020— Research mentor for undergraduate Maxwell McKinney
Directing research project on combinatorics of McKay-Cartan quivers
Served as official UMN Senior Capstone Advisor Spring 2021
- 2019— Research mentor for undergraduates Nhung Pham and Annika Christiansen
Directing research project on chip-firing; paper forthcoming
Assisted both students in obtaining University funding
- Fall 2018 Directed Reading Project (DRP) mentor with Sophie Perron on graph theory
2018— Mentor for undergraduate math majors through MPM
Assist with application materials for fellowships, REUs and graduate school
- 2018-2019 Mentor and host for incoming graduate students
- 2017-2019 UMN Women in Science and Engineering Graduate Mentor
Mentor for UMN undergraduates interested in STEM
- 2013 Reed College International Student Mentor

OUTREACH

- 2019 Teacher at Saturday Enrichment for MathCEP, University of Minnesota
Logic Games and Puzzles (grades 5-6)
- 2018 *Fractals and Chaos (grades 5-6)*
- 2018 *Graph Theory (grades 7-8)*
- 2017 *Cryptology (grades 5-6)*
- 2017-2019 Volunteer math tutor for adults seeking GED, *Franklin Public Library*
- 2016 MathFest Teaching Assistant: Platonic Solids (grades 6-8), *Reed College*
- 2012-2016 Volunteer tutor for low-income youth (grades 9-12), *Friends of the Children*

BIOGRAPHY

- BORN: January 9, 1993 in New York, NY
CITIZENSHIP: United States