

Sarah Brauner

CONTACT

University of Minnesota - Twin Cities
Department of Mathematics
Pronouns: she / her / hers

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CV updated on December 12, 2022

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

AWARDS AND HONORS

- 2022 FPSAC Conference [Best Graduate Student Paper Award](#) (*for FPSAC 2021*)
- 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 (*3 years of support*)
- 2017 UMN School of Mathematics Naresh Jain (travel) Fellowship
- 2016 Phi Beta Kappa
- 2016 Reed College Meier Award for Distinguished Thesis in Economics
- 2012-2016 Reed College Commendation for Academic Excellence (*received annually*)

PUBLICATIONS AND PREPRINTS

6. (With P. Commins and V. Reiner) “Invariant theory of the free left-regular band and a q -analogue,” *Submitted*. [arXiv:2206.11406](#).
5. “A Type B analog of the Whitehouse representation,” *to appear in Mathematische Zeitschrift*. [arXiv:2203.09504](#).
4. “Eulerian representations for real reflection groups,” *Journal of the London Mathematical Society* (2022) 105(1): 412-444. [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 F. Glebe and D. Perkinson) “Enumerating Linear Systems on Graphs,” *Mathematische Zeitschrift* (2020) 296(3): 1101-1134. [arXiv:1906.04768](#).
1. (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* (2022) 32:6, 738-754.

REFEREED CONFERENCE PRECEEDINGS

3. “A Type B analog of the Whitehouse representation” *Séminaire Lotharingien de Combinatoire* **86B** (2022), Article # 12. Proceedings of the 34th Conference on Formal Power Series and Algebraic Combinatorics (FPSAC), Bangalore, India. **(Talk)**.
2. “Eulerian representations for real reflection groups” *Séminaire Lotharingien de Combinatoire* **85B** (2021), Article # 15. Proceedings of the 33rd Conference on 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. Proceedings of the 31st Conference on Formal Power Series and Algebraic Combinatorics, Ljubljana, Slovenia. **(Poster)**.

IN PREPARATION

3. (With G. Dorpalen-Barry, S. Kara, C. Klivans, and L. Schneider) “A three-regime theorem for flow-firing.”
2. (With M. Aguiar and V. Reiner) “On configuration space invariants and the peak algebra”.
1. (With J. Bastidas and F. Saliola) “Left regular bands of groups and the Mantaci–Reutenauer algebra.”

GRANTS

- 2022 MAA Tensor Grant for the Mathematics Project at Minnesota
With E. Banaian, P. Commins, M. Philbin, PI Max Engelstein; \$6000.
- 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

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

CONFERENCE TALKS

- Jan. 2023 *The JMM: Research Communities in Algebraic Combinatorics*
Boston, MA
- Nov. 2022 *Northeast Discrete Math Workshop*
Smith College, Amherst, MA
- Oct. 2022 *AMS Northeast Fall Sectional Meeting: Young Voices in Combinatorics*
University of Massachusetts, Amherst, MA
- Oct. 2022 *AMS Northeast Fall Sectional Meeting: Geometric aspects of algebraic combinatorics*
University of Massachusetts, Amherst, MA
- Sep. 2022 *AMS Central Fall Sectional Meeting: Algebraic, Geometric, and Topological Combinatorics*
University of Texas at El Paso, El Paso, TX

- July 2022 *34th Conference on Formal Power Series and Algebraic Combinatorics (FPSAC)*
Indian Institute of Science, Bangalore, India
- Jan. 2022 *33rd Conference on Formal Power Series and Algebraic Combinatorics (FPSAC)*
Bar-Ilan University, Ramat-Gan, Israel (Online).
- Nov. 2021 *Northeast Women in Algebra and Combinatorics Celebrating the 50th anniversary of the Association for Women in Mathematics (NEWAC50AWM)*
Hosted by University of Albany and the AWM (Online).
- May 2021 *Women in Combinatorics and Representation Theory*
UC Riverside Diversity and Excellence Workshop (Online).
- Aug. 2020 *Arrangements at Home III: Algebraic Aspects*
Virtual Conference
- Sep. 2019 *AMS Central Fall Sectional Meeting: Combinatorial Algebraic Geometry*
University of Wisconsin, Madison WI
- April 2019 *AMS Northeast Spring Sectional Meeting: Chip Firing and Divisor Theory*
University of Hartford, Hartford CT
- Oct. 2018 *AMS Central Fall Sectional Meeting: Combinatorics in Algebra and Geometry*
University of Michigan, Ann Arbor MI

COLLOQUIUM TALKS

- Feb. 2023 University of San Diego, San Diego, CA
- Feb. 2022 Colby College, Waterville, ME
- Mar. 2020 Reed College, Portland, OR
- April 2019 Smith College, Northampton, MA

SEMINAR TALKS

- Feb. 2023 *UC Berkeley Combinatorics Seminar*
UC Berkeley, Berkeley, CA
- Feb. 2023 *UC San Diego Combinatorics Seminar*
UC San Diego, La Jolla, CA
- Nov. 2022 *Brown Combinatorics Seminar*
Brown University, Providence, RI
- May 2022 *Le Séminaire du LACIM*
UQAM, Montreal, Quebec, Canada
- April 2022 *MIT/Harvard Combinatorics Seminar*
Harvard University, Cambridge, MA
- Feb. 2022 *RTG seminar in Combinatorics, Geometry, Representation Theory and Topology*
University of Oregon, Eugene, OR
- Jan. 2022 *Algebra and Discrete Mathematics Seminar*
UC Davis, Davis, CA
- Dec. 2021 *CAGE (Combinatorics, Algebra, and Geometry) Seminar*
University of Pennsylvania, Philadelphia PA
- Dec. 2021 *UMass Amherst Discrete Math Seminar*
University of Massachusetts, Amherst, MA
- Nov. 2021 *ICERM Research Communities in Algebraic Combinatorics*
Online as part of an ICERM Workshop
- Oct. 2021 *Cornell Discrete Geometry and Combinatorics Seminar*
Cornell University, Ithaca, NY

- Sep. 2021 *Dartmouth Combinatorics Seminar*
Dartmouth College, Hanover, NH
- Sep. 2021 *University of Minnesota Combinatorics Seminar*
University of Minnesota, Minneapolis, MN
- Oct. 2020 *Graduate Online Combinatorics Colloquium*
Virtual Seminar
- Oct. 2020 *University of Minnesota Combinatorics Seminar (online)*
University of Minnesota, Minneapolis, MN
- April 2019 *CAGE (Combinatorics, Algebra, and Geometry) Seminar*
Drexel University, Philadelphia PA

TEACHING

- University of Minnesota**
- 2022 Mentor for UMN REU in Combinatorics and Algebra: designed research problem and mentored team of undergraduates
- 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
- 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
- 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 week long 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 — *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
- 2018-2019 *UMN Graduate Student Combinatorics and Algebra Seminar*

MENTORING

Research mentor

- 2022 — Ilani Axelrod-Freed, Judy Chiang, and Veronica Lang: directed research through UMN Combinatorics REU
- 2019–2021 Nhung Pham: directed research funded through UMN UROP grant
- 2019–2021 Annika Christensen: directed research funded through UMN UROP grant
- 2020–2021 Maxwell McKinney: Served as official UMN Senior Capstone Advisor

Directed reading project (DRP) mentor

- Fall 2021 Abigail Goldman-Nagel, chip-firing
- Fall 2018 Sophie Perron, graph theory

Advisor

- 2021–2022 Habiba Heshmat
- 2021–2022 Marie Therese Guerrier
- 2021–2022 Mirta Hernandez Carrion

ACADEMIC SERVICE

- 2022— Referee for *Annals of Combinatorics*

OUTREACH

- 2019 Teacher at Saturday Enrichment for MathCEP, University of Minnesota
- 2019 *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*

BIOGRAPHY

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