

Sarah Brauner

CONTACT

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CV updated on June 8, 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

PUBLICATIONS AND PREPRINTS

6. (With P. Commins and V. Reiner) “Invariant theory of the free left regular band and a q -analogue,” *In preparation*.
5. “A Type B analog of the Whitehouse representation,” *Submitted*. [arXiv:2203.09504](https://arxiv.org/abs/2203.09504).
4. “Eulerian representations for real reflection groups,” *Journal of the London Mathematical Society* (2022) 105(1): 412-444. [arXiv:2005.05953](https://arxiv.org/abs/2005.05953).
3. (With T. Friedmann) “A Simplified Presentation of Specht Modules,” *Journal of Pure and Applied Algebra* (2022) 226(7). [arXiv:1803.10918](https://arxiv.org/abs/1803.10918).
2. (With F. Glebe and D. Perkinson) “Enumerating Linear Systems on Graphs,” *Mathematische Zeitschrift* (2020) 296(3): 1101-1134. [arXiv:1906.04768](https://arxiv.org/abs/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” *To appear in Séminaire Lotharingien de Combinatoire* (2022). 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**).

AWARDS AND HONORS

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| 2022 | Best Graduate Student Paper (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
<i>Three year graduate fellowship</i> |
| 2017 | UMN School of Mathematics Naresh Jain Fellowship
<i>Travel and technology fellowship; \$1500.</i> |
| 2016 | Phi Beta Kappa |
| 2016 | Reed College Meier Award for Distinguished Thesis in Economics
<i>Awarded to 1-2 graduating students annually</i> |
| 2012-2016 | Reed College Commendation for Academic Excellence (received annually) |

GRANTS

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| 2022 | MAA Tensor Grant for the Mathematics Project at Minnesota
<i>With E. Banaian, P. Commins, M. Philbin, PI Max Engelstein; \$6000.</i> |
| 2021 | MAA Tensor Grant for the Mathematics Project at Minnesota
<i>With E. Banaian, M. Philbin, PI Paul Carter; \$6000.</i> |
| 2020 | NSA Mathematical Sciences Program for Graduate Student Combinatorics Conference 2021
<i>With E. Banaian, G. Dorpalen-Barry, E. Kelley, E. Stucky, L. Webster, PI Vic Reiner; \$25,000[†].</i> |
| 2020 | MAA Tensor Grant for the Mathematics Project at Minnesota
<i>With E. Banaian, H. Chandramouli, M. Philbin, PI Paul Carter; \$6000[†].</i> |
| 2019 | UMN Campus Climate Grant for the Mathematics Project at Minnesota
<i>With E. Banaian, H. Chandramouli, M. Philbin; \$500.</i> |
| 2017 | Smith College Summer Research Fellowship Program
<i>To conduct research with T. Friedmann; \$4500</i> |
| 2014 | Reed College McGill Lawrence Grant
<i>To conduct research in South Africa; \$3000</i> |

CONFERENCE TALKS

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|-----------|---|
| Oct. 2022 | <i>AMS Northeast Fall Sectional Meeting: Geometric aspects of algebraic combinatorics</i>
University of Massachusetts, Amherst, MA |
| July 2022 | <i>34th Conference on Formal Power Series and Algebraic Combinatorics (FPSAC)</i>
Indian Institute of Science, Bangalore, India |
| Jan. 2022 | <i>33rd Conference on Formal Power Series and Algebraic Combinatorics (FPSAC)</i>
Bar-Ilan University, Ramat-Gan, Israel (Online). |
| Nov. 2021 | <i>Northeast Women in Algebra and Combinatorics Celebrating the 50th anniversary of the Association for Women in Mathematics (NEWAC50AWM)</i>
Hosted by University of Albany and the AWM (Online). |
| May 2021 | <i>Women in Combinatorics and Representation Theory</i>
UC Riverside Diversity and Excellence Workshop (Online). |
| Aug. 2020 | <i>Arrangements at Home III: Algebraic Aspects</i>
Virtual Conference |

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

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

SEMINAR TALKS

- 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*
- Oct. 2020 *University of Minnesota Combinatorics Seminar (online)*
- 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 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 — *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

Research mentor

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 Directed Reading Project (DRP) mentor with Sophie Perron on graph theory

Advisor

2021 — Habiba Heshmat

2021 — Marie Therese Guerrier

2021 — Mirta Hernandez Carrion

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