

Sarah Brauner

CONTACT

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CV updated on July 1, 2021

EDUCATION

- 2017— **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,” [arXiv:2005.05953](https://arxiv.org/abs/2005.05953), 2020. *Under review at the Journal of the London Mathematical Society.*
3. (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).
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 T. Friedmann) “A Simplified Presentation of Specht Modules,” [arXiv:1803.10918](https://arxiv.org/abs/1803.10918), 2018. *Submitted.*

REFEREED CONFERENCE PRECEEDINGS

2. “Eulerian representations for real reflection groups” *Séminaire Lotharingien de Combinatoire* (2021), Formal Power Series and Algebraic Combinatorics (FPSAC), *To appear.* (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. “On orbit configuration spaces and a Type B generalization the Whitehouse representations” *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 (awarded 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 TALKS

- Eulerian representations for real reflection groups**
2021 *Women in Combinatorics and Representation Theory*
UC Riverside Diversity and Excellence Workshop (online)
2020 *Arrangements at Home III: Algebraic Aspects*
Virtual Conference
2020 *Graduate Online Combinatorics Colloquium*
2020 *University of Minnesota Combinatorics Seminar* (online)
Random walks and hyperplane arrangements
2020 *Reed College Mathematics Colloquium*
Reed College, Portland, OR
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

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

- 2019 *Smith College Mathematics Colloquium Lunch Talk*
Smith College, Northampton MA
- On Specht Modules and the CataLANKe Theorem**
- 2018 *AMS Central Fall Sectional Meeting: Combinatorics in Algebra and Geometry*
University of Michigan, Ann Arbor MI

CONTRIBUTED TALKS AND POSTERS

- 2021 **Eulerian representations for real reflection groups** (Talk)
Formal Power Series and Algebraic Combinatorics 2021 (FPSAC)
Representation Theory: Categories and Combinatorics (Postdoc seminar)
Institute for Advanced Studies Program for Women in Mathematics
- 2019 **Enumerating Linear Systems on Graphs** (Poster)
Formal Power Series and Algebraic Combinatorics (FPSAC)
Ljubljana, Slovenia
ALGECOM XVI
Loyola University, Chicago, IL
- 2018 **A generalization of the free Lie algebra and its representations** (Talk)
USTARS (Underrepresented Students in Topology and Algebra) Conference
Reed College, Portland OR

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, 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
- 2013-2016 Tutor for Introductory Analysis, Multivariate Calculus, Linear Algebra
- 2016 Grader, Math 382: Algorithms & Data Structures
- 2015-2016 TA and Grader, Microeconomic Theory
- 2013-2014 TA and Grader, Introduction to Economics

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

- 2021— Mentor 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) course on graph theory with Sophie Perron
- 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