

Sarah Brauner

CONTACT

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CV updated on August 7, 2020

EDUCATION

- 2017— **University of Minnesota**
PhD Candidate in Mathematics
Advisor: Vic Reiner
- 2019 M.S. in Mathematics
Major topic: combinatorics and reflection groups
Minor topic: algebraic topology
- 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. *Submitted*.
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,” 2020. *Submitted*.
2. (With F. Glebe and D. Perkinson) “[Enumerating Linear Systems on Graphs](https://arxiv.org/abs/1906.04768),” *Mathematische Zeitschrift* (2020). [arXiv:1906.04768](https://arxiv.org/abs/1906.04768).
1. (With T. Friedmann) “On Specht Modules and the CataLAnKe Theorem,” [arXiv:1803.10918](https://arxiv.org/abs/1803.10918), 2018.

REFEREED CONFERENCE PRECEEDINGS

1. (With F. Glebe and D. Perkinson) “[Enumerating Linear Systems on Graphs](https://arxiv.org/abs/1906.04768)” *Séminaire Lotharingien de Combinatoire* **82B** (2019), Article # 17. Formal Power Series and Algebraic Combinatorics (FPSAC), Ljubljana, Slovenia.

AWARDS AND HONORS

- 2019-2023 NSF Graduate Research Fellowship
 Three year graduate fellowship
- 2017-2023 UMN College of Science and Engineering Graduate Fellowship
 Three year graduate fellowship

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 (awarded annually)

GRANTS

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>
2014	Reed College McGill Lawrence Grant <i>To conduct research in South Africa; \$3000</i>

INVITED TALKS

2020	Eulerian representations for real reflection groups <i>Arrangements at Home III: Algebraic Aspects</i> Virtual Conference <i>Graduate Online Combinatorics Colloquium</i> Virtual Seminar
2020	Random walks and hyperplane arrangements <i>Reed College Mathematics Colloquium</i> Reed College, Portland, OR
2019	Enumerating Linear Systems on Graphs <i>AMS Central Fall Sectional Meeting: Combinatorial Algebraic Geometry</i> University of Wisconsin, Madison WI <i>CAGE (Combinatorics, Algebra, and Geometry) Seminar</i> Drexel University, Philadelphia PA <i>AMS Northeast Spring Sectional Meeting: Chip Firing and Divisor Theory</i> University of Hartford, Hartford CT <i>Smith College Mathematics Colloquium Lunch Talk</i> Smith College, Northampton MA
2018	On Specht Modules and the CataLAnKe Theorem <i>AMS Central Fall Sectional Meeting: Combinatorics in Algebra and Geometry</i> University of Michigan, Ann Arbor MI

CONTRIBUTED TALKS AND POSTERS

2019	Enumerating Linear Systems on Graphs (Poster) <i>Formal Power Series and Algebraic Combinatorics (FPSAC)</i> Ljubljana, Slovenia <i>ALGECOM XVI</i> Loyola University, Chicago, IL
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- 2018 **A generalization of the free Lie algebra and its representations**
USTARS (Underrepresented Students in Topology and Algebra) Conference
 Reed College, Portland OR

LOCAL TALKS

- 2020 **Combinatorics at Minnesota** (virtual)
Minnesota graduate students visiting weekend
- 2020 **Solomon's descent algebra and hyperplane arrangements**
Student Combinatorics Seminar
- 2019 **An introduction to reflection groups**
AMS Intro to Research Seminar
- 2019 **Topics in Hyperplane Arrangements** (series)
Hyperplane Arrangement reading group
- 2019 **A guide to combinatorics at Minnesota**
AWM Lunch talks
- 2019 **Eulerian representations for coincidental reflection groups**
Student Representation Theory Seminar
- 2019 **Enumerating Linear Systems on Graphs**
UMN Math Club
- 2018 **Garnir relations and Specht modules**
Student Combinatorics Seminar
- 2017 **A generalization of the free Lie algebra**
Student Combinatorics Seminar

TEACHING

- University of Minnesota**
- 2019-2020 TA, Calculus II for UMN Talented Youth in Mathematics Program (UMTYMP)
- 2019 TA, UMN REU in Combinatorics
- BEAM (Bridge to Enter Advanced Mathematics)**
- 2018 Instructor of record and course designer for Logical Reasoning (6th 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
- 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)**
 An annual 4-day workshop for undergraduates from underrepresented groups to increase participation and success in mathematics.
- 2020— *Co-organizer* with H. Chandramouli, E. Banaian, M. Philbin
- 2018-2019 *Mentor*: Planned and implemented several workshop sessions

- April 2021 **Graduate Student Combinatorics Conference (GSCC) 2021**
National weekend conference organized by and for graduate students.
Co-organizer with E. Banaian, G. Dorpalen-Barry, E. Kelley, E. Stucky, L. Webster
- 2018-2020 **UMN Math Club**
Weekly club for undergraduate math majors to build community and foster mathematical curiosity
Co-organizer with M. Avery
- Fall 2019 **Hyperplane arrangement seminar and reading group**
- 2018-2019 **UMN Graduate Student Combinatorics and Algebra Seminar**
Co-organizer with E. Banaian

MENTORING

- 2019— Research mentor for undergraduates N. Pham and A. Christiansen
Directing research project on chip-firing
- Fall 2018 Directed Reading Project (DRP) course on graph theory with S. 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