Sarah Brauner

Contact

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Department of Mathematics
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Employment

2024-	**Brown University** NSF Postdoc and Prager Assistant Professor, beginning July 2024
2023-2024	**LACIM at Université du Québec à Montréal** NSF Postdoc, October 2023 to June 2024
2023	**Max Planck Institute for Mathematics in the Sciences, Leipzig** Postdoctoral fellow in Nonlinear algebra group, June 2023 to September 2023

Education

2017-2023	**University of Minnesota** PhD in Mathematics, expected May 2023 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

2023-2026	NSF Mathematical Sciences Postdoctoral Research Fellow
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," *to appear in the Pacific Journal of Mathematics.* 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

4. (With P. Commins and V. Reiner) "Invariant theory of the free left-regular band and a q-analogue" *to appear in the Proceedings of the 35th Conference on Formal Power Series and Algebraic Combinatorics (FPSAC)*, Davis, California. **(Poster, presented by P. Commins).**

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

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

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

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

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

2018-2023	*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.

2021-2023	*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

	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