

2. (with K.N. Lin, W. Liske) Rees algebras of unit interval determinantal facet ideals, 15 pages. *Journal of Pure and Applied Algebra*, 228.5 (2024): 107601. [arXiv:2008.10950](#), [Journal version](#)
- 2022 3. (with K. VandeBogert) Polarizations and Hook Partitions, *J. Pure and Applied Algebra*, 226 (2022), no. 9, 20 pages. [arXiv:2107.07535](#), [Journal version](#)
4. (with G. Fløystad and H. Lohne) Polarizations of powers of graded maximal ideals, *J. Pure and Applied Algebra*, 226 (2022), no. 5, Paper No. 106924, 33 pages. [arXiv:1912.03898](#), [Journal version](#)
5. (with K. VandeBogert) Linear strands of initial ideals of determinantal facet ideals, *Comm. Algebra* 50 (2022) no. 5, 2198-2214. [arXiv:2101.07279](#)
6. (with K. VandeBogert) Determinantal facet ideals for smaller minors, *Arch. Math. (Basel)*, 118 (2022), no. 3, 247-256. [arXiv:2006.14434](#), [Journal version](#)
- 2020 7. (with J. Bruce, M. Loper, and M. Sayrafi) The VirtualResolutions package for Macaulay2, *J. Softw. Algebra Geom.*, 10 (2020), no. 1, 51-60. [arXiv:1905.07022](#), [Journal version](#)
- 2014 8. (with Melanie Matchett Wood) Counting polynomials over finite fields with given root multiplicities, *J. Number Theory* **136** (2014), 394-402. [Journal version](#)

Preprints

9. (with V. Reiner, S. Sundaram) Koszulity, supersolvability, and Stirling representations, 72 pages. [arXiv:2404.10858](#).
10. (with S. Grate, D. Huang, P. Klein, A. LaClair, Y. Luo, J. McDonough) The MatrixSchubert package for Macaulay2, 13 pages. [arXiv:2312.07393](#).
11. (with S. Gao, D. Huang) Standard Monomials and Gröbner Bases for Positroid Varieties, 30 pages. [arXiv:2309.15384](#).
12. (with K. Bruegge, M. Juhnke, U. Nagel, A. Pevzner) Alexander duals of symmetric simplicial complexes and Stanley-Reisner ideals, 38 pages. [arXiv:2209.14132](#).
13. (with A. Dochtermann, B. Smith) Root polytopes, tropical types, and toric edge ideals, 45 pages. [arXiv:2209.09851](#)

Lectures and presentations

Invited (international audience)

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| 2024 Jan | (Plenary talk) Montréal, Québec: Combinatorial Algebra meets Algebraic Combinatorics (CAAC) 2024 |
| 2023 Mar | Montréal, Québec: La Séminaire du LaCIM |
| 2022 Dec | Virtual: Copenhagen-Jerusalem Combinatorics Seminar |
| 2022 Jan | Virtual: Combinatorial Algebra meets Algebraic Combinatorics (CAAC), The Fields Institute at Toronto |
| 2021 Dec | Virtual: Special Session Combinatorial Methods in Algebraic Geometry and Commutative Algebra, Canadian Mathematical Society Winter Meeting |
| 2020 Oct | Virtual: Copenhagen-Jerusalem Combinatorics Seminar |
| 2020 Mar | Hamilton, Ontario: McMaster University Algebra Seminar |
| 2019 Oct | Kingston, Ontario: Route 81 Conference, Queens University |
| 2019 Feb | Bergen, Norway: University of Bergen Algebra and Geometry Seminar |
| 2018 June | Barranquilla, Colombia: Encuentro Colombiano de Combinatoria |

Invited (domestic audience; not including seminars)

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| 2025 Mar | Ames, IA: Commutative Algebra + (CA+) |
| 2025 Feb | Los Angeles, CA: IPAM Workshop on Computational Interactions between Algebra, Combinatorics, and Discrete Geometry |

- 2024 May Lincoln, NE: Upcoming Researchers in Commutative Algebra (URiCA)
- 2024 May San Francisco, CA: AMS Special Session on Homological Methods in Commutative Algebra & Algebraic Geometry
- 2024 Apr Milwaukee, WI: AMS Special Session on Connections between Commutative Algebra and Algebraic Combinatorics
- 2024 Jan SLMath, Berkeley, CA: Connections Workshop: Commutative Algebra
- 2024 Jan San Francisco, CA: JMM Special Session on Commutative Algebra and Algebraic Geometry (associated with Invited Address by Daniel Erman)
- 2023 Nov Lafayette, Louisiana: Special Session on Combinatorial Commutative Algebra, SIAM TX-LA
- 2023 Oct Omaha, Nebraska: AMS Special Session on Commutative Algebra
- 2022 Oct University of Illinois at Urbana-Champaign: Algebra, Geometry, and Combinatorics Day (ALGECOM) XXII
- 2022 Sep El Paso, Texas: AMS Special Session on Interactions between Combinatorics and Commutative Algebra
- 2022 Mar Virtual: AMS Special Session on Recent Developments in Commutative Algebra
- 2021 Oct Virtual: AMS Special Session on Commutative Ring Theory
- 2021 Oct Virtual: AMS Special Session on Homological Methods in Commutative Algebra
- 2021 Mar Virtual: AMS Special Session on Commutative Algebra
- 2021 Mar Virtual: AMS Special Session on Current Trends in Combinatorial Commutative Algebra
- 2021 Jan Virtual: Joint Mathematics Meetings Special Session on Commutative Algebra
- 2020 Oct Virtual: AMS Special Session on Free Resolutions, Combinatorics, and Geometry
- 2020 Sep Virtual: Commutative & Homological Algebra Market Presentations (CHAMP)
- 2019 Oct Binghamton, NY: AMS Special Session on Commutative Algebra
- 2019 Apr Minneapolis, MN: Graduate Workshop in Commutative Algebra for Women & Mathematicians of Other Minority Genders

Seminars (domestic)

- 2024 Sep Auburn University: Algebra Seminar
- 2024 Apr University of Kentucky: Combinatorics Seminar
- 2024 Mar Michigan State University: Combinatorics Seminar
- 2023 Nov Iowa State University: Algebra Seminar
- 2023 Oct Georgia Institute of Technology: Algebra Seminar
- 2023 Sep University of Minnesota: Combinatorics Seminar
- 2023 Sep University of Minnesota: Commutative Algebra and Algebraic Geometry (CAAG) Seminar
- 2023 Apr University of Wisconsin-Madison: Algebra & Algebraic Geometry Seminar
- 2023 Apr Purdue University: Commutative Algebra seminar
- 2023 Feb Brown University: Combinatorics Seminar
- 2023 Jan Texas A&M: Algebra and Combinatorics Seminar
- 2022 Dec University of Wisconsin-Madison: Algebra and Algebraic Geometry Seminar
- 2022 Nov University of Minnesota: Combinatorics Seminar
- 2022 Sep University of Minnesota: Commutative Algebra and Algebraic Geometry (CAAG) Seminar
- 2022 Apr University of Minnesota: Student Combinatorics and Algebra Seminar
- 2022 Feb University of Minnesota: Combinatorics Seminar
- 2021 Sep University of Minnesota: Commutative Algebra and Algebraic Geometry (CAAG) Seminar
- 2021 Feb University of South Carolina: Graduate Student Colloquium (Virtual)
- 2020 Oct University of Minnesota: Combinatorics and Commutative Algebra Seminar (Virtual)
- 2020 Sep Cornell University: Olivetti Seminar (Graduate Student Seminar, Virtual)
- 2020 Feb University of South Carolina: Algebra, Geometry, and Number Theory Seminar
- 2020 Jan Cornell University: Olivetti Seminar (Graduate Student Seminar)

- 2019 Nov U. Pittsburgh: Algebra, Combinatorics, and Geometry Graduate Student Research Seminar
- 2019 Nov Cornell University: Discrete Geometry and Combinatorics Seminar
- 2019 Oct Cornell University: Olivetti Seminar (Graduate Student Seminar)
- 2018 Oct Cornell University: Mathematics Teaching Seminar
- 2017 Oct Cornell University: Olivetti Seminar (Graduate Student Seminar)

Poster Presentations

- 2021 Jan (Virtual) Combinatorial Algebra Meets Algebraic Combinatorics (CAAC) 2021
- 2020 Jun (Virtual) Early Commutative Algebra Researchers (eCARS)

Teaching activities

Courses taught at Minnesota*

- 2022 Spring Computational Algebraic Geometry (MATH 5385)
 Flipped classroom approach, including in-class Macaulay2 exercises. Included a scaffolded final paper and presentation project.
- 2021 Fall Linear Algebra and Differential Equations (MATH 2243)
 Flipped classroom approach.

Courses taught at Cornell†

- 2021 Summer Linear Algebra for Engineers (MATH 2940)
 Primary Instructor. Pandemic remote teaching, flipped classroom approach.
- 2019 Fall Calculus II (MATH 1120)
 Primary Instructor for two sections.
- 2017 Spring Linear Algebra for Engineers (MATH 2940)
 Head TA and Recitation TA for three sections. Responsibilities included coordinating 6 TAs and managing exams.
- 2016 Fall Linear Algebra (MATH 2210)
 Recitation TA for three sections.

Other teaching activities

- 2019 Aug. **TA Trainer** for incoming math and applied math graduate students at Cornell.
- 2019 Fall **Cornell Prison Education Program**
 Primary instructor for Contemporary Mathematics (MATH 112), Five Points Correctional Facility in Romulus, NY. Students received credit from Cayuga Community College.
- 2018 Fall **Cornell Prison Education Program**
 Teaching Assistant for Contemporary Mathematics (MATH 112), Five Points Correctional Facility in Romulus, NY. Students received credit from Cayuga Community College.
- 2018 June **Encuentro Colombiano de Combinatoria**
 Teaching Assistant, Polynomial Optimization mini-course by Professor Rekha Thomas.
- 2018 April **Graduate Student Outreach Program (GRASSHOPR)**
 Designed and co-taught a 3-session mini-course “Graph Coloring” to Algebra I students at Ithaca High School (with Avery St. Dizier).
- 2017 April **Graduate Student Outreach Program (GRASSHOPR)**
 Designed and taught a 3-session mini-course “Playing with Infinities” to Algebra II students at Ithaca High School.
- 2014-2015 **Peer Mentor Tutor**, Physics Learning Center, University of Wisconsin–Madison
 Led small group study sessions 2x per week and extra exam review sessions for General Physics I (Fall 2014) and General Physics II (Spring 2015). As part of the program, Peer Mentor Tutors also met for weekly meetings to discuss physics pedagogy.

*I did not teach 2022-2024 because I was on tenure as a President’s Postdoctoral Fellow.

†I did not teach 2017-2019 and 2020-2021 because I was on tenure as an NSF Graduate Student Research Fellow.

Advising activities

REU undergraduate students advised at Minnesota

- 2024 Sum Casey Appleton (Illinois), Zachary Medlin (Mercer), Mario Tomba Morillo (Dartmouth)
- 2023 Sum. Erin Delargy (Binghamton), Rylie Harris (Wesleyan), Jiachen Kang (Michigan), Bryan Lu (Cornell), Ramanuja Charyulu Telekicherla Kandalam (Minnesota)
- 2022 Sum. Hanson Hao (Stanford), Yuyuan Luo (MIT), Sterling Saint Rain (Purdue)

Undergraduate honors thesis students advised

- 2023 Fall (Cornell, remote) Bryan Lu, *A branching rule for the 0-Hecke algebra*
- 2022–2023 (Minnesota) Demetrios Case, *Tropical Hyperplane Arrangements*

Undergraduate senior capstone students advised at Minnesota

- 2022 Spring Cole Hengel, *Domino Tilings*

Professional service

Diversity and outreach activities

- 2023, 2024 Co-coordinator, *UMN Algebra and Combinatorics REU*
 In 2023, Daoji Huang and I assisted Professor Pavlo Pylyavskyy in coordinating the UMN REU in Combinatorics & Algebra; in 2024, I assisted Vic Reiner in coordinating the REU. Duties included: creating an equitable rubric for student admissions, coordinating and participating in training for mentors and TAs, aiding administration, and arranging program activities during the summer.
- Jan. 2023 Mini-Workshop Leader, *Mathematics Project at Minnesota (MPM)*
 The Mathematics Project at Minnesota (MPM) is an annual four day workshop for undergraduates at the University of Minnesota who come from underrepresented groups in mathematics. I ran a one-day mini-workshop on the Catalan numbers.
- 2022-2023 Mentor, Prison Mathematics Project (PMP)
 I mentored by mail a “pen pal” incarcerated in Arizona on his journey to self-teach physics (and the required mathematics prerequisites) April 2022-September 2023.
- 2019-2020 Co-founder and mentor, *Women Mentoring Women in Mathematics Program*
 Through Cornell’s local chapter of the Association for Women in Mathematics. The program pairs underclasswomen with individual mentors who are either seniors or graduate students in mathematics, applied mathematics, operations research, or statistics. In addition to meeting in these pairs, we also hosted large group workshops approximately once a month. These workshops provide opportunities for group mentoring as well as personal and professional development activities. (with Ellie Lauri)
- 2017-2019 Vice President, *Association for Women in Mathematics*, Cornell chapter
 During this time, the AWM chapter’s leadership established a grant for early graduate students in the mathematics department who identified as women or gender minorities to attend conferences and begin networking with others early in their careers.
- 2016-2017 Event Coordinator, *Association for Women in Mathematics*, Cornell chapter
 Organized social events, networking “tea-times” with female seminar speakers, and “Spill the Tea” events to discuss difficult subjects plaguing women and gender minorities in mathematics and related fields.
- 2016-2018 Workshop leader, *Expanding Your Horizons* conference, Cornell University
 Expanding Your Horizons (EYH) conferences are designed to introduce 5th-8th grade girls to careers in science, technology, engineering and mathematics (STEM). Every year I helped design and/or lead stations in the *Exploring Math: Patterns and Puzzles* workshop
 - **April 2018.** Designed and implemented “Probability” station.
 - **April 2017.** Designed and implemented “Permutation Groups” station.
 - **April 2016.** Co-led “Graph Coloring” station.

- 2014-2015 Buddy, *Expanding Your Horizons* conference, University of Wisconsin-Madison
Buddies are undergraduate volunteers who serve as role models for a small group of conference participants as they guide them from one workshop to the next. I was a buddy at EYH in October 2014 and October 2015.

Organizing activities for conferences and meetings

- 2023 June Minneapolis, MN: Macaulay2 mini-school for graduate students and software development workshop for researchers (with C. Berkesch, T. Duff, M. Perlman, and M. Sayrafi)
2022 June Minneapolis, MN: Special Session on Combinatorial and Homological Methods in Commutative Algebra at the AWM Research Symposium (With S. Kara)
2021 Apr Virtual: Special Session on Commutative Algebra at the AMS Spring Central Sectional Meeting (with K. Sather-Wagstaff)
2020 Oct. Virtual: Special Session on Commutative Algebra and Connections to Algebraic Geometry and Combinatorics at the AMS Fall Eastern Sectional Meeting (with K.N. Lin)

Seminars organized

- 2021–2024 Commutative Algebra and Algebraic Geometry Seminar, Minnesota
2018–2019 Commutative Algebra Coffee, Cornell
Fall '17, '18 Olivetti Club (Graduate Student Seminar), Cornell
2015 Fall *What is...?* Seminar, Fall 2015
In this seminar, professors give talks for junior graduate students.

Journals refereed

Annals of Combinatorics, FPSAC Proceedings, International Mathematics Research Notices, Journal of Algebra and its Applications, Journal of Pure and Applied Algebra, Rocky Mountain Journal of Mathematics

Professional memberships

AMS (since 2015) AWM (since 2015)

Invited participation at conferences and research experiences

- 2024 Jan. Banff, Canada (BIRS): *Community in Algebraic Combinatorics*
2023 Apr. Banff, Canada (BIRS): *Interactions Between Topological Combinatorics and Combinatorial Commutative Algebra*
2023 Jan. Luminy, France (CIRM): *Géométrie Écrite (Written Geometry): Commutative Algebra*

Language Skills

Native: English, Arabic
Able to teach in: French, Spanish
Reading Fluency: Danish, Norwegian, Swedish