

PATRICIA L. HERSH

University of Oregon

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<https://pages.uoregon.edu/plhersh/>

EDUCATION

- Ph.D., **Massachusetts Institute of Technology** in Mathematics June 1999
Thesis: *Decomposition and Enumeration in Partially Ordered Sets.*
Advisor: Richard Stanley
- A.B., Magna cum laude, **Harvard University** in Mathematics/Computer Science June 1995
Undergraduate Senior Thesis: *Approximate Counting of Contingency Tables Using Markov Chains.*
Advisor: Persi Diaconis

EXPERIENCE

- **University of Oregon**, Department of Mathematics Fall 2019 - present (on leave Fall 2019)
Professor, 2019 - present
- **North Carolina State University**, Department of Mathematics Fall 2008 - Fall 2019
Professor, 2015 - 2019
Associate Professor, 2009 - 2015
Assistant Professor, 2008 - 2009
- **Indiana University-Bloomington**, Department of Mathematics Fall 2004 - Summer 2009
Promoted to Associate Professor with Tenure, Spring 2009
Assistant Professor, 2004 - 2009 (on leave Fall 2008 - Spring 2009)
- **Mathematical Sciences Research Institute (MSRI)**, Berkeley, CA Fall 2004
MSRI Postdoctoral Fellowship, Semester Program on Hyperplane Arrangements
- **University of Michigan**, Department of Mathematics Summer 2001 - Spring 2004
NSF Math. Sciences Postdoctoral Research Fellow and Assistant Professor (postdoctoral position)
- **University of Washington**, Department of Mathematics Fall 1999 - Spring 2001
Acting Assistant Professor (postdoctoral position)

SELECTED GRANTS, FELLOWSHIPS AND AWARDS

- NSF Research Grants in Combinatorics: **DMS-1953931** (2020-2023), **DMS-1500987** (2015-2019), **DMS-1200730** (2012-2016), **DMS-0757935/1002636** (2008-2012), **DMS-0500638** (2005-2009).
- NSF Research Training Grant (RTG) co-PI: **DMS-2039316** (2021-26, 2.3 million USD).
- Fellow of the American Mathematical Society 2016
- AMS One Hour Invited Address, Southeastern Spring Sectional Meeting March 2013
- Ruth Michler Prize Fall 2010
(Association for Women in Mathematics national prize for a recently tenured female mathematician)
- Various NSF, NSA, and Clay Math Institute conference grants for Triangle Lecture in Combinatorics (TLC) Conference Series and Stanley@70 Conference at MIT 2010-2019
- NSF Mathematical Sciences Postdoctoral Research Fellowship Summer 2001-Spring 2004

- Hertz Foundation Graduate Fellowship Fall 1995–Spring 1999
- Elected to Phi Beta Kappa, Harvard University (Harvard-Radcliffe chapter) Spring 1995
- Alice T. Schafer Prize National Runner-up Spring 1994
(Association for Women in Mathematics prize for an undergraduate woman)

INVITED VISITING POSITIONS

- **ICERM**, Providence, RI Fall 2016
Full semester long-term visitor, Program on Topology in Motion (during 2016-17 sabbatical year)
- **University of Chicago**, Chicago, IL May/June 2016
One month visitor and invited mini-course
- **IMA**, Minneapolis, MN Fall 2014
Full semester long-term visitor, Program on Discrete Mathematics (teaching buy-out from IMA)
- **Cornell University**, Ithaca, NY Fall 2010
Ruth I. Michler Prize Winner (national prize providing a research semester)

RESEARCH INTERESTS

- Algebraic and topological combinatorics, especially interaction between combinatorics and such fields as topology, commutative algebra, representation theory and theoretical computer science.

PREPRINTS (Available at <https://pages.uoregon.edu/plhersh/papers.html/> and arXiv)

1. (with Grace Stadnyk) “CC-shellability, generalized recursive atom ordering, and equivalence to CL-shellability”, preprint 2022, 30 pages.
2. (with James F. Davis and Ezra Miller) “Fibers of maps to totally nonnegative spaces”, arXiv:1903.01420, preprint 2019, latest version is 34 pages.
3. “Posets arising as 1-skeleta of simple polytopes, the non-revisiting path conjecture and poset topology”, arXiv:1802.04342, 22 pages.

PUBLICATIONS

1. (with Richard Kenyon) “Shellability of face posets of electrical networks and the CW poset property.”, *Advances in Applied Math.*, **127** (2021), 37 pages.
2. (with Cristian Lenart) “From the weak Bruhat order to crystal posets.” *Mathematische Zeitschrift*, **286** (2017), no. 3-4, 1435–1464.
3. (with Karola Mészáros) “*SB*-labelings and posets with each interval homotopy equivalent to a sphere or a ball.” *J. Combinatorial Theory, Series A*, **152** (2017), 104–120.
4. (with Victor Reiner) “Representation stability for cohomology of configuration spaces in \mathbf{R}^d ” (including an appendix with Victor Reiner and Steven Sam) *IMRN*, **2017** (2017), no. 4, 1433–1486.
5. “Regular cell complexes in total positivity,” *Inventiones Mathematicae*, **197** (2014), no. 1, 57–114.

6. (with John Shareshian and Dennis Stanton) “The $q = -1$ phenomenon via homology concentration.” *Journal of Combinatorics*, **5** (2014), no. 1, 167–194.
7. (with Ruth Davidson) “A lexicographic shellability characterization of geometric lattices.” *J. Combinatorial Theory, Ser. A*, **123** (2014), no. 1, 8–13.
8. (with Anne Schilling) “Symmetric chain decomposition for cyclic quotients of Boolean algebras and relation to cyclic crystals.” *IMRN*, **2013** (2013), 463–473.
9. (with Alex Engström and Bernd Sturmfels) “Toric cubes.” *Rend. Circ. Mat. Palermo (2)* (special volume on algebraic geometry), **62** (2013), no. 1, 67–78.
10. (with Drew Armstrong) “Sorting orders, subword complexes, Bruhat order and total positivity.” *Advances in Applied Mathematics*. (special volume in honor of Dennis Stanton’s 60th birthday), **46** (2011), 46–53.
11. (with Cristian Lenart) “Combinatorial constructions of weight bases: the Gelfand-Tsetlin basis,” *Electronic J. Combinatorics*, **17** (2010), no. 1, R33, 14 pp.
12. “Shelling Coxeter-like complexes and sorting on trees.” *Advances in Mathematics*, **221** (2009), no. 3, 812–829.
13. (with Sam Hsiao) “Random walks on quasisymmetric functions.” *Advances in Mathematics*, **222** (2009), no. 3, 782–808.
14. (with Robert Kleinberg) “A multiplicative deformation of the Möbius function for the poset of partitions of a multiset.” *Contemporary Mathematics*, **479** (2009), 113–119. (Special volume in honor of Joe Gallian’s 65th birthday.)
15. (with John Shareshian and Dennis Stanton) “The $q = -1$ phenomenon for bounded (plane) partitions via homology concentration.” *Discrete Mathematics and Theoretical Computer Science*, 471–484. (Special volume for FPSAC 2009.)
16. (with Stephen Fienberg, Allesandro Rinaldo and Yi Zhou) “On maximum likelihood estimation in latent class models for contingency table data.” In “Algebraic and geometric methods in statistics”, Cambridge University Press, 2009.
17. (with Edward Swartz) “Coloring complexes and arrangements.” *J. Algebraic Combinatorics*, **27** (2008), no. 2, 205–214.
18. (with Alexander Berglund and Jonah Blasiak) “Combinatorics of multigraded Poincaré series for monomial rings.” *J. Algebra*, **308** (2007), no. 1, 73–90.
19. (with John Shareshian) “Chains of modular elements and lattice connectivity.” *Order*, **23** (2006), no. 4, 339–342.
20. “On optimizing discrete Morse functions.” *Advances in Applied Math.*, **35** (2005), 294–322.
21. (with Volkmar Welker) “Gröbner basis degree bounds on $Tor_{\bullet}^{k[\Lambda]}(k, k)_{\bullet}$ and discrete Morse theory for posets”, Integer Points in Polyhedra–Geometry, Number Theory, Algebra, Optimization, 101–138, *Contemporary Mathematics*, **374**, Amer. Math. Soc., Providence, RI, 2005.
22. (with Eric Babson) “Discrete Morse functions from lexicographic orders.” *Trans. Amer. Math. Soc.*, **357** (2005), 509–534.
23. (with Phil Hanlon) “A Hodge decomposition for the complex of injective words.” *Pacific J. Math.*, **214** (2004), no. 1, 109–125.
24. “Connectivity of h -complexes.” *J. Combinatorial Theory, Ser. A*, **105** (2004), no. 1, 111–126.

25. “Chain decomposition and the flag f -vector.” *J. Combinatorial Theory, Ser. A*, **103** (2003), No. 1, 27–52.
26. “Lexicographic shellability for balanced complexes.” *J. Algebraic Combinatorics*, **17** (2003), No. 3, 225–254.
27. “A partitioning and related properties for the quotient complex $\Delta(B_{lm})/S_l \wr S_m$.” *J. Pure and Applied Algebra*, **178** (2003), No. 3, 255–272. (With an appendix by Victor Reiner.)
28. (with Phil Hanlon) “Multiplicity of the trivial representation in rank-selected homology of the partition lattice.” *J. Algebra*, **266** (2003), no. 2, 521–538.
29. “Two generalizations of posets of shuffles.” *J. Combinatorial Theory, Ser. A*, **97** (2002), No. 1, 1–26.
30. (with Isabella Novik) “A short simplicial h -vector and the upper bound theorem.” *Discrete and Computational Geometry*, **28** (2002), No. 3, 283–289.
31. “Deformation of chains via a local symmetric group action.” *Electronic J. Combinatorics*, **R27** (1999).
32. “Decomposition and enumeration in partially ordered sets.” MIT Ph.D. Thesis, 1999.
33. “On exact n -step domination.” *Discrete Mathematics*, **205** (1999), 235–239. Based on research done as an undergraduate at Joe Gallian’s REU at the University of Minnesota, Duluth.

BOOKS EDITED

1. Selected Works of Richard P. Stanley (co-edited with Thomas Lam, Pavlo Pylyavskyy and Victor Reiner). Published by the American Mathematical Society, 2017.
2. The Mathematical Legacy of Richard P. Stanley (co-edited with Thomas Lam, Pavlo Pylyavskyy and Victor Reiner). Published by the American Mathematical Society, 2017.

CONFERENCE PLENARY TALKS, COLLOQUIA, AND MINI-COURSES

- 2022: *AlGeCom Conference Plenary talk*, UIUC, October 22, 2022.
- 2021: *University of Oregon Computer Science Departmental Colloquium*, on zoom, May 27, 2021; *Northeast Women in Algebra and Combinatorics Conference Celebrating the 50th Anniversary of the Association for Women in Mathematics* (one hour plenary talk), on zoom, November 20, 2021.
- 2020: *51st Southeastern Conference in Combinatorics, Graph Theory and Computing* (two one hour plenary talks), Boca Raton, FL, March 9-13, 2020; *Western Carolina/Appalachian State University Math Departmental Colloquium*, on zoom, October 29, 2020.
- 2019: *UC Irvine Math Departmental Colloquium*, March 14, 2019; *University of Oregon Math Departmental Colloquium*, January 28, 2019.
- 2018: *Combinatorics and beyond: the many facets of Sergey Fomin’s mathematics conference* (one hour invited address), Ann Arbor, MI, November 8-11, 2018; *Notre Dame Math Departmental Colloquium*, October 3, 2018; *ICM Satellite Meeting* (45 minute invited talk), University of Miami, July 26-29, 2018; *Cumberland Conference* (one hour plenary address), Huntington, WV, May 19-20, 2018; *UNC-Greensboro Helen Barton Distinguished Lecture*, April 6, 2018.
- 2017: *MSRI Connections for Women Conference on Geometric and Topological Combinatorics* (one hour invited address), Berkeley, CA, August 31–Sept. 1, 2017; *Algebraic and Geometric Combinatorics of Reflection Groups Conference* (one hour invited address), June 5-9, 2017, UQAM, Montreal, Canada; *University of Washington-PIMS Mathematics Departmental Colloquium*, February 10, 2017; *University of Southern California Math Departmental Colloquium*, February 8, 2017.

- 2016: *Cornell Topology Festival* (one hour invited address), May 13-15, 2016; *University of Chicago mini-course (3 lectures) on “Topological combinatorics of posets and stratified spaces”*, May 25, 27, and June 1, 2016; *ICERM Workshop on “Topology and Geometry in a Discrete Setting”*, (one hour invited address), November 28-December 2, 2016; *ICERM mini-course (3 lectures) on “Topological combinatorics of posets and stratified spaces”*, Nov. 8, 12, and 15, 2016.
- 2015: *Brown University Math Departmental Colloquium*, February 23, 2015; *Combinatorial Algebra meets Algebraic Combinatorics Conference* (one hour invited address), January 23-25, 2015, Queen’s U., Kingston, Ontario, Canada; *WachsFest Conference* (one hour invited address), Jan. 5-9, 2015, U. Miami, Miami FL.
- 2014: *Institute for Math and its Applications (IMA) Workshop on Topology and Geometry of Networks and Discrete Metric Spaces* (45 minute invited talk), April 28-May 2, 2014, Minneapolis, MN.
- 2013: *AMS Southeastern Sectional Meeting* (one hour plenary address), March 1-3, 2013, Oxford, Mississippi; *FPSAC Conference* (one hour plenary address), June 24-28, 2013, Paris, France.
- 2012: *George Mason University Math Departmental Colloquium*, Nov. 16, 2012.
- 2011: *University of Southern California Math Departmental Colloquium*, March 9, 2011; *MIT Women in Math Lecture Series*, April 4, 2011; *McKnight-Zame mini-symposium, University of Miami*, March 2011; *UNC Charlotte Math Departmental Colloquium*, January 21, 2011.
- 2010: *Cornell Oliver Club (Math Departmental Colloquium)*, Nov. 4, 2010; *SUNY Albany Math Departmental Colloquium*, Oct. 29, 2010; *UBC Math Departmental Colloquium*, March 19, 2010; *Southeastern Lie Theory Conference, Athens, GA* (one hour plenary address), May 22-24, 2010; *Combinatorics 2010: Advances, Trends and Speculations, Lexington, KY* (one hour plenary address), March 26-28, 2010.
- 2009: *Virginia Tech Math Departmental Colloquium*, April 2009; *IDA-CCR Princeton Colloquium*, November 9, 2009.
- 2008: *CombinaTexas Conference, El Paso, TX* (one hour plenary address), April 2008.
- 2007: *North Carolina State University Special Seminar*, March 2007; *Georgia Tech Special Seminar*, February 2007; *University of Illinois, Urbana-Champaign Math Departmental Colloquium*, February 2007; *UT Austin Special Algebra Seminar*, January 2007.
- 2005: *Conference on Trends in Topological Combinatorics, KTH-Stockholm, Sweden* (one hour plenary address), February 2005.
- 2004: *University of Virginia Math Departmental Colloquium*, March 2004; *Indiana University Math Departmental Colloquium*, February 2004.
- 2003: *LSU Math Departmental Colloquium*, December 2003; *Temple University Math Departmental Colloquium*, November 2003; *University of Wisconsin Special Seminar*, November 2003; *Western Michigan University Math Departmental Colloquium*, October 2003; *Topological and Geometric Combinatorics Conference, Oberwolfach, Germany* (one hour plenary address), April 2003; *UCSD Special Seminar*, January 2003.
- 2002: *Michigan State University Math Departmental Colloquium*, December 2002.

PROFESSIONAL SERVICE ACTIVITIES RELATED TO RESEARCH

- **Ph.D. students:** **Stephen Lacina** (current 6th year student, expected graduation spring 2023). **Grace Stadnyk** (NCSU), graduated June 2019, tenure track position at Furman University. **Molly Lynch** (NCSU), graduated May 2019, first position Hollins University. **Chetak Hossain** (NCSU), graduated

September 2019 (coadvised by Nathan Reading), first position Texas State University. **Ruth Davidson** (NCSU), graduated May 2014 (coadvised with Seth Sullivant), first position NSF postdoctoral research fellow at UIUC math and computer science departments. **Rebecca Swanson** (Indiana University–Bloomington), graduated May 2010 and now a Teaching Professor at Colorado School of Mines.

- **Postdoctoral fellows mentored:** **John Machacek** (University of Oregon), 2021–2024. **John Wiltshire-Gordon** (ICERM), Fall 2016.
- **Editorial Boards and Advisory Boards:** Forum of Mathematics, March 2019–December 2023; Springer Graduate Texts in Mathematics (GTM) Advisory Board, April 2019–March 2022; Proceedings of the American Mathematical Society (combinatorics editor), February 2014 – June 2021; SIAM Journal on Discrete Mathematics, January 2011 – December 2016.
- **AMS Nominating Committee:** elected for three year term. Jan. 1, 2021–Dec. 31, 2023 (chair Feb. 1, 2021–Jan. 31, 2022).
- **AMS Nominating Committee of the Executive Committee and Board of Trustees:** ex officio one year term. Feb. 1, 2021–Jan. 31, 2022.
- **AMS Fellows Selection Committee:** appointed for three year term, Feb. 1. 2017–Jan. 31, 2020. Committee chair, Feb. 1, 2018–Jan. 31, 2020.
- **AMS Southeastern Section Program Committee:** appointed for two year term, Feb. 1, 2017–Jan. 31, 2019. Committee chair, Feb. 1, 2018–Jan. 31, 2019.
- **AMS Council:** elected to three year term, Feb. 1, 2011–Jan. 31, 2014, American Mathematical Society.
- **AMS Committee on the Profession, Chair of Prize Oversight Subcommittee, and Liaison to AWIS:** appointed as AMS council representative to Committee on the Profession for Feb. 1, 2011–Jan. 31, 2014. Chair of subcommittee on AMS prize oversight; member of subcommittee on membership services; organizer of panel at 2013 joint math meetings (JMM) on “Getting started as a research mathematician” and coorganizer of panel at 2014 joint math meetings (JMM) on “Online courses: benefits and pitfalls”; AMS liaison to AWIS (Association for Women in Science).
- **NSF Panels and Site Visit Teams:** served/serving on eight NSF panels and two NSF math research institute site visit teams since 2006. These have included panels for grants in my research area, combinatorics, and various general mathematical panels including multiple years on the postdoctoral research fellowship panel and on the CAREER grants panel for mathematics.
- **AWM Michler Prize Selection Committee:** Aug. 1, 2013 – July 31, 2016. Committee chair, Aug. 1, 2015–July 31, 2016.
- **FPSAC Program Committees:** served/serving on program committees for annual conferences on Formal Power Series and Algebraic Combinatorics (FPSAC) held in Valparaiso, Chile in summer 2008, Reykjavik, Iceland in summer 2011, and Chicago, Illinois in summer 2014, respectively.
- **AWM Mentoring Travel Grants Selection Committee:** reviewed proposals for the Association for Women in Mathematics, Feb. 1, 2010 – Jan. 31, 2012. Committee chair, Feb. 1, 2011–Jan. 31, 2012.
- **Refereeing and Reviewing:** Advances in Mathematics, Algebraic Combinatorics, American Math Monthly, Annals of Combinatorics, Beitrage zur Algebra und Geometrie, Bulletin London Math. Soc., Discrete and Computational Geometry, Discrete Math, Duke Math Journal, Electronic J. Combinatorics, European J. Combinatorics, Geometry and Topology, Indiana University Math Journal, Israel J. Math., J. Algebraic Combinatorics, J. Combinatorial Theory Ser. A, Math Reviews, Memoirs Amer. Math. Soc., Order, Pacific J. Math., Proc. Amer. Math. Soc., Rocky Mountain Math. J., SIAM J. on Discrete Math., Trans. Amer. Math. Soc.

- **Book Review:** for Math Reviews of “Algebraic combinatorics. Lectures from the Summer School held in Nordfjordeid, June 2003” by Peter Orlik and Volkmar Welker.
- **Additional Dissertation Committees:** **Cruz Godar** (In progress, advisor: Ben Young, U. Oregon, combinatorics); **Tatyana Benko** (In progress, advisor: Ben Young, U. Oregon, combinatorics); **Adam Bamforth** (In progress, advisor: Ben Young, U. Oregon, combinatorics); **Dane Miyata** (In progress, advisor: Nick Proudfoot, U. Oregon, combinatorics); **Jake Potter** (2022, advisor: Ben Young, U. Oregon, combinatorics); **Gautam Webb** (2021, advisor: Ben Young, U. Oregon, combinatorics); **Erika Ordog** (2020, advisor: Ezra Miller, Duke, combinatorial commutative algebra); **Michael Weselcouch** (2019, advisor: Ricky Liu, NCSU, combinatorics); **Daniel Scofield** (2018, advisor: Radmila Sazdanovik, NCSU, topology); **Shira Polster** (2018, advisor: Nathan Reading, NCSU, combinatorics); **Emily Barnard** (2017, advisor: Nathan Reading, NCSU, combinatorics); **Emily Meehan** (2017, advisor: Nathan Reading, NCSU, combinatorics); **Jennifer Gamble** (2015, advisor: Hamid Krim, NCSU Electrical and Computer Engineering, applied topology); **Chris O’Neill** (2014, advisor: Ezra Miller, Duke, commutative algebra and combinatorics); **Shirley Law** (2013, advisor: Nathan Reading, NCSU, combinatorics); **Emily Braley** (2012, advisor: Prakash Belkale, UNC Chapel Hill, representation theory and algebraic geometry); **J.T. Hird** (2012, advisors: Naihuan Jing and Ernie Stitzinger, NCSU, representation theory and combinatorics); **Erin Bancroft** (2011, advisor: Nathan Reading, NCSU, combinatorics); **Daniel Jordan** (2006, advisor: Michael Larsen, Indiana U., computational algebra); **Scott Kravitz** (2004, advisor: Phil Hanlon, U. Michigan, combinatorics); **Jingui Ha** (2001, advisor: Neal Koblitz, U. Washington, cryptography).
- **Member:** AMS (American Mathematical Society), AWM (Association for Women in Mathematics), SIAM (Society of Industrial and Applied Mathematicians).

OTHER RECENT/SELECTED SERVICE ACTIVITIES

- **Institutional hiring plan (IHP) faculty committee:** (2021-2022, U. Oregon university-wide committee).
- **Tuition and fee advisory board (TFAB):** (2020-2022, U. Oregon university-wide committee).
- **Executive committee:** (2020-2023, U. Oregon math department).
- **Colloquium committee:** (2020-2023, chair 2021-2022, U. Oregon math department).
- **Hiring committee:** (2022-2023, U. Oregon math department).
- **Climate committee:** (2021-2022, U. Oregon math department).
- **Math club faculty mentor:** (2020-2021, U. Oregon math department).
- **Ph.D. advisory committee:** (2020-2021, U. Oregon math department).
- **Leader of biography reading group:** (2020-2021, U. Oregon math department), created and ran a reading group that met weekly to read and discuss several biographies of mathematicians from underrepresented groups, which served as a launching point for all sorts of informal discussions of issues that members of underrepresented groups may face and how others may support them. Expected to resume meeting soon after taking a one year break when nearly everyone involved had seemed ready for a pause.
- **Reappointments, promotion and tenure (RPT) committee:** (2017–2019, NCSU math department).
- **Colloquium and Koh lecture committee:** (2015–2019, NCSU math department).
- **Geometry/topology tenure track hiring committee:** (2015–2016, NCSU math department).
- **Teaching assistant observation:** (2009–2016, NCSU math department).

- **Graduate recruitment committee:** (2010–2016, NCSU math department).
- **Library committee:** (2010–2016, NCSU math department).
- **Interdisciplinary hiring cluster proposal:** (2012, NCSU). Led math department component of successful proposal to NCSU Chancellor's Faculty Excellence Fund (jointly with Seth Sullivant) for inter-college hiring cluster (of 4 faculty hires) on data driven science involving colleges of sciences and of engineering.
- **Putnam exam committee member:** (2009, NCSU math department). Led sessions on number theory.
- **Women in science program (WISP) advisory board member:** (2008, Indiana University).
- **Departmental chair election committee member:** (Fall 2005, Indiana University math department) elected by math department to committee (of 3 people) that conducted departmental chair election.
- **MIT Graduate Student Council executive committee, co-chair of two committees and math department representative:** (1996–1998) Co-chaired committee that redesigned MIT-wide new graduate student orientation program.

SEMINAR AND CONFERENCE ORGANIZING

- **Cascade Lectures in Combinatorics (CALICO)**, Eugene, OR Fall 2021–present
Conference Series (Nov. 6, 2021; April 2, 2022; more to come twice a year through Spring 2026)
- **Triangle Lectures in Combinatorics (TLC)**, Raleigh, NC Fall 2009–Spring 2020
Conference Series (Feb. 6, 2010; Sept. 25, 2010; April 9, 2011; Nov. 5, 2011; Feb. 11, 2012; Sept. 22, 2012; Feb. 9, 2013; Sept. 21, 2013; Feb. 22, 2014; Oct. 4, 2014; Feb. 21, 2015; Oct. 3, 2015; Feb. 27, 2016; Nov. 19, 2016; March 24, 2018; Nov. 10, 2018; March 30, 2019; Nov. 16, 2019)
- **MSRI Workshop on Geometric and Topological Combinatorics** October 9–13, 2017
- **AMS Central Sectional Meeting**, Bloomington, IN April 1–2, 2017
Special Session on Representation Stability and its Applications
- **Richard Stanley 70th Birthday Conference**, Cambridge, MA June 23–27, 2014
- **AMS Southeastern Sectional Meeting**, Oxford, MS March 2013
Special Session on Algebraic Combinatorics
- **Joint Math Meetings (JMM)**, New Orleans, LA January 2011
AWM Special Session in memory of Alice T. Schafer
- **AMS Eastern Sectional Meeting**, Syracuse, NY October 2010
Special Session on Topology and Combinatorics
- **SIAM Meeting on Discrete Mathematics**, Austin, TX June 2010
Mini-symposium on Topological Combinatorics
- **North Carolina State University**, Raleigh, NC Fall 2008–Spring 2010
Algebra and Combinatorics Seminar
- **AMS Southeastern Sectional Meeting**, Raleigh, NC April 2009
Special Session on Rings, Algebras, and Varieties in Combinatorics
- **AMS Central Sectional Meeting**, Bloomington, IN April 2008
Special Session on Combinatorial Representation Theory, Topological Combinatorics and their Interactions

- **Indiana University**, Bloomington, IN Spring 2005–Spring 2008
Combinatorics Seminar
- **Joint American/Austrian/German Math. Society Meeting**, Mainz, Germany June 2005
Special Session on Algebraic Combinatorics

TEACHING EXPERIENCE

- **University of Oregon**, Eugene, OR Spring 2020 – present
Instructor - Linear Algebra with Theory (one quarter upper level undergrad and beginning grad class), *Topological Combinatorics* (one quarter graduate topics class), *Point Set Topology* (one quarter upper level undergrad and beginning grad class), *Discrete Math* (one quarter upper level undergrad class), *Algebraic Topology* (one quarter graduate class), *Combinatorics of Coxeter Groups* (one quarter graduate topics class).
- **North Carolina State University**, Raleigh, NC Fall 2008 – Fall 2019
Instructor - Algebra (two semester graduate class), *Enumerative and Geometric Combinatorics* (two semester graduate class), *Topology* (two semester graduate class); *Applied Algebra* (one semester undergraduate class), *Combinatorial Commutative Algebra* (one semester graduate topics class); *Topological Combinatorics* (one semester graduate topics class); *Discrete Mathematics* (one semester undergraduate class).
- **Indiana University**, Bloomington, IN Spring 2005 – Spring 2008
Instructor - Linear Algebra with Applications, Brief Survey of Calculus II, Calculus III, Topological Combinatorics (graduate topics class), *Calculus II, Linear Algebra for Undergrad.*
- **University of Michigan**, Ann Arbor, MI Spring 2004, Fall 2003, Fall 2002
Instructor - Applied Modern Algebra; Combinatorics and Graph Theory (mixture of undergraduate and graduate students); *Linear Spaces and Matrix Theory* (joint math/electrical engineering course)
- **University of Washington**, Seattle, WA Fall 1999 – Spring 2001
Instructor - Calculus I, Calculus II (160 students each); *Graduate Topics in Algebraic Combinatorics, Advanced Multivariable Calculus, Linear Algebra, Undergraduate Graph Theory, Undergraduate Combinatorics*
- **PROMYS Program - Boston University**, Boston, MA Summers 1991, 1992; Summer 1996
Counselor (helped gifted high school students learn number theory in discovery style); *Recitation Instructor.*

OTHER TEACHING AND MENTORING ACTIVITIES

- **Organizer of weekly reading group at U. Oregon reading biographies of mathematicians from underrepresented groups:** Summer 2020-present.
- **ICERM panelist:** (Fall 2020) virtual zoom panel on professional advice for early career mathematicians.
- **Duke SWIM invited speaker:** (Summers 2019 and 2016) one hour talk aimed at gifted female high school students interested in mathematics.
- **NCSU math graduate program advisory committee:** fall 2012–summer 2016.
- **Graduate written preliminary exam committee:** August 2019 (topology), August 2018 (combinatorics), August 2014 (topology), August 2013 (combinatorics), August 2012 (combinatorics), August, 2010 (combinatorics), January 2010 (algebra) and August 2009 (algebra). Wrote, administered and graded the designated exam.
- **Cornell Summer Math Institute invited speaker:** (Summer 2011) gave one hour talk at summer program for undergrads from small colleges, especially minorities.

- **AWM workshop mentor:** served as mentor to graduate student **Patricia Cahn** and postdoc **Elizabeth Niese** in 2011 joint meetings AWM workshop for young mathematicians.
- **Plenary lecturer at REU conference for undergraduates:** (July 2005, Indiana University) conference hosted by Indiana University-Bloomington for students participating in REU programs across Indiana.

SEMINAR TALKS AND NON-PLenary CONFERENCE TALKS

- Upcoming talks and conferences: “Number Theory and Combinatorics in Duluth” Conference, July 31-August 4, 2023; MIT combinatorics seminar.
- “Equivalent conditions to EL-shellability and CL-shellability.” *Washington University in St. Louis Combinatorics Seminar*, October 4, 2021 on zoom.
- “Shelling face posets of stratified spaces of electrical networks and phylogenetic trees.” *ICERM Workshop on Symmetry, Randomness and Computation in Real Algebraic Geometry*, August 24-28, 2020.
- “Fibers of maps to totally nonnegative spaces.” *Oberwolfach Workshop on “Geometric, algebraic and topological combinatorics*, Oberwolfach, Germany, August 25-31, 2019; *AMS Special Session on Combinatorial Lie Theory*, Gainesville, FL, Nov. 2-3, 2019.
- “Posets arising as 1-skeleta of simple polytopes, the nonrevisiting path conjecture and poset topology.” *University of Southern California Combinatorics Seminar*, February 10, 2021; *Simon Fraser Discrete Math Seminar*, November 12, 2020; *University of Oregon Combinatorics/Topology Seminar*, December 6, 2018; *Cornell Discrete Geometry and Combinatorics Seminar*, May 7, 2018; *WINRS conference, Special Session on Algebra and Combinatorics*, Charlottesville, VA, September 15, 2018.
- “Posets from Polytopes.” *Joint Math Meetings Special Session on “Special Functions and Combinatorics” in honor of Dennis Stanton*, San Diego, CA, January 10-13, 2018.
- “Crystal graphs and SB-labelings.” *MIT Combinatorics Seminar*, October 12, 2016; *Brown Discrete Math Seminar*, October 11, 2016; *UCLA Combinatorics Seminar*, February 7, 2017; *Cornell Discrete Geometry and Combinatorics Seminar*, January 30, 2017; *Notre Dame Cluster Algebras Seminar*, November 27, 2017.
- “From the weak Bruhat order to crystal posets.” *AMS Eastern Sectional Meeting 45 Minute Talk* Brunswick, ME, Sept. 24-25, 2016; *2016 Joint Math Meetings AWM session invited talk*, January 9, 2016; *Southeastern Lie Theory Meeting*, Oct. 9-11, 2015, NCSU; *UIUC Combinatorics Seminar*, August 5, 2016; *U. Minnesota Combinatorics Seminar*, December 10, 2015.
- “Representation theoretic stability in the partition lattice.” *UBC Joint Combinatorics/Topology Seminar*, February 15, 2017; *BIRS Workshop on “Free Resolutions, Representations, and Asymptotic Algebra”*, April 3-8, 2016, Banff Canada; *U. Wisconsin Combinatorics Seminar*, Nov. 3, 2014; *Stanford University Representation Stability Seminar*, Dec. 2, 2014.
- “SB-labelings and posets with each interval homotopy equivalent to a sphere or ball.” *AMS Central Sectional Meeting*, Sept. 20-21, 2014, Eau Claire WI; *Stanley@70 Conference*, June 23-27, 2014, Cambridge MA.
- “Regular cell complexes in total positivity.” *University of Illinois at Chicago algebraic geometry seminar*, March 7, 2016; *U. Chicago Topology/Geometry Seminar*, Nov. 18, 2014; *Stanford Topology Seminar*, Dec. 2, 2014; *UC Berkeley Combinatorics Seminar*, March 10, 2014; *University of Michigan Combinatorics Seminar*, November 1, 2013; *UCLA Combinatorics Seminar*, December 12, 2013; *Ohio State Univ. Combinatorics Seminar*, April 18, 2012.
- “Toric cubes.” *AMS Southeastern Sectional Meeting*, October 13-14, 2012, New Orleans, LA.

- “Symmetric chain decomposition for cyclic quotients of Boolean algebras and relation to cyclic crystals.” *SIAM Meeting on Discrete Math*, June 18-21, 2012, Halifax, Nova Scotia; *Indiana U. Combinatorics Seminar*, April 20, 2012; *U. Michigan Combinatorics Seminar*, March 30, 2012; *AMS Eastern Sectional Meeting*, March 17-18, 2012, Washington D.C.; *Georgia Tech Combinatorics Seminar*, Nov. 18, 2011; *U. Penn/Drexel Combinatorics and Algebraic Geometry Seminar*, Oct. 18, 2011; *UNC Chapel Hill Geometric Methods in Representation Theory Seminar*, Sept. 16, 2011;
- “Discrete Morse theory (for posets)”, *Banff (BIRS) Algebraic Combinatorix Workshop*, May 2011.
- “Interplay of combinatorics with topology through posets.” *Joint Meetings Michler-Mentoring Session*, New Orleans, January 2011 (talk aimed at young mathematicians from AWM workshop).
- “Subword complexes, 0-Hecke algebras and a map to Bruhat order.” *AMS Central Sectional Meeting Special Session* St. Paul, MN, April 2010; *UIUC Algebra, Geometry and Combinatorics Seminar*, October 2009.
- “A combinatorial topological toolkit for stratified spaces.” *Oberwolfach Geometric and Topological Combinatorics Workshop*, February 2011.
- “The $q = -1$ phenomenon for bounded (plane) partitions via homology concentration.” *University of Miami Minisymposium on Algebraic and Geometric Combinatorics*, March 2011; *UC Davis Combinatorics Seminar*, March 2011; *MIT Combinatorics Seminar*, December 2010; *Cornell Combinatorics Seminar*, October 2010; *SUNY Binghamton Combinatorics Seminar*, October 2010; *Univ. Minnesota Combinatorics Seminar*, October 2010; *FPSAC Conference, Linz, Austria*, July 2009.
- “Combinatorics and topology of regular CW complexes.” *Duke Algebraic Geometry Seminar*, April 2010; *Ulam Centennial Conference, U. Florida*, March 2009; *U. Kentucky WILDCATS Seminar*, February 2009.
- “Regular cell complexes, Bruhat order, and total positivity.” *Univ. Minnesota Combinatorics Seminar*, November 2008; *UNC-Chapel Hill Geometric Methods in Representation Theory Seminar*, October 2008; *MIT Combinatorics Seminar*, February 2008; *Univ. Michigan Combinatorics Seminar*, January 2008.
- “A homological obstruction to weak order on trees.” *UC Berkeley Combinatorics Seminar*, March 2011; *Cornell Topology/Geometric Group Theory Seminar*, Nov. 29, 2010; *Joe Gallian 65th birthday conference, Duluth, Minnesota*, July 2007; *University of Washington Algebra Seminar*, May 2007; *IMA Applications of Algebraic Geometry Seminar*, May 2007; *North Carolina State University Special Seminar*, March 2007.
- “Connectivity bounds in combinatorics.” *Georgia Tech Special Department Seminar*, February 2007.
- “Coloring complexes and arrangements.” *University of Minnesota Combinatorics Seminar*, May 2007; *AMS Eastern Sectional Meeting*, October 2006; *AMS Central Sectional Meeting*, October 2006.
- “Shelling Coxeter-like complexes and sorting on trees.” *Oberwolfach (Germany), Geometric and Topological Combinatorics Conference*, February 2007; *UIUC Geometric Potpourri Seminar*, September 2006; *Joint meetings special session*, January 2006; *AMS Eastern Sectional Meeting*, October 2005.
- “The $q = -1$ phenomenon via homology concentration.” *North Carolina State University Algebra and Combinatorics Seminar*, March 2009; *UBC Joint Discrete Math, Topology and Algebra Seminar*, July 2006; *University of Washington Discrete Geometry and Combinatorics Seminar*, May 2006; *University of Wisconsin Combinatorics Seminar*, May 2006; *Ohio State University Combinatorics Seminar*, May 2006; *University of Michigan Combinatorics Seminar*, March 2006.
- “Combinatorics of multigraded Poincaré series for monomial rings.” *Philipps-Universität Marburg Combinatorics Seminar (Germany)*, June 2005; *Univ. of Kentucky Combinatorics Seminar*, April 2005; *Univ. of Minnesota Combinatorics Seminar*, March 2005.
- “Small resolutions over toric rings and discrete Morse theory for posets.” *Cornell Commutative Algebra Seminar*, November 2010; *Ohio State University Combinatorics Seminar*, March 2005.

- “A $GL_n(q)$ analogue of the partition lattice and discrete Morse theory for posets.” *Stanford University Representation Theory Seminar*, Dec. 2004; *Cornell University Combinatorics Seminar*, Nov. 2004; *Park City Mathematics Institute, Program on Geometric Combinatorics*, July 2004; *North Carolina State University Algebra Seminar*, April 2004; *AMS Eastern Sectional Meeting*, Oct. 2003.
- “Discrete Morse functions on posets.” *University of Pennsylvania Combinatorics Seminar*, January 2003; *AMS Central Sectional Meeting*, March 2001; *MIT Combinatorics Seminar*, March 2001.