

federico ardila

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<http://math.sfsu.edu/federico>

Research interests	The investigation of objects in geometry, algebra, topology, and applications by understanding their underlying combinatorial structure.
Education	Ph.D. in Mathematics, Massachusetts Institute of Technology, Cambridge, MA, USA, 2003. Advisor: Richard P. Stanley B.Sc. in Mathematics, Massachusetts Institute of Technology, Cambridge, MA, USA, 1998.
Honors (career)	Miembro Correspondiente, Academia Colombiana de Ciencias, Colombia, 21. Premio Nacional de Matemáticas, Colombia, 19. Fellow, American Mathematical Society, USA, 18. CAREER Award, National Science Foundation, USA, 10-16.
(research)	Invited Speaker, International Congress of Mathematicians, 22. Simons Fellow in Mathematics, Simons Foundation, 19-20. Simons Research Professor, Mathematical Sciences Research Institute, Berkeley, CA, 17. Premio Nacional de Ciencias Alejandro Ángel Escobar, Colombia, 15. Clay Mathematics Institute, Affiliate Scholar, 04-06. American Institute of Mathematics, Five-Year Fellowship, runner up, 03.
(teaching)	Mathematical Association of America, National Haimo Award for Teaching, 20. SFSU Distinguished Faculty Award for Excellence in Teaching, 16-17. MIT Department of Mathematics, Housman Award for Excellence in Teaching, 01.
(service)	Mathematics Programs that Make a Difference Award, American Math. Soc., 21 (MSRI-UP) Diverse Issues in Higher Education, Emerging Scholar Award, 11.
(other)	William Lowell Putnam Mathematics Competition, top 10, 96. International Mathematical Olympiad, silver medal, 94.
Employment	Professor, San Francisco State University, San Francisco, CA, 16-current. Associate Professor, San Francisco State University, San Francisco, CA, 11-16. Assistant Professor, San Francisco State University, San Francisco, CA, 05-11. MSRI-Microsoft Postdoc. Fellow, Microsoft Theory Group, Redmond, 04-05. MSRI-Microsoft Postdoc. Fellow, Mathematical Sciences Research Institute, Berkeley, 03-04. Adjunct Professor, Universidad de Los Andes, Bogotá, Colombia, 06-current.
Visiting positions	Member, Institute of Advanced Studies, Princeton, Spring 20. Visiting Professor, Institut Mittag-Leffler, Djursholm, Sweden, Spring 20. Visiting Fellow, Istituto di Studi Avanzati, Bologna, Italy, Fall 19. Visiting Professor, Sorbonne University, Paris, France, Fall 19. Visiting Professor, Simons Institute for Theoretical Computer Science, Berkeley, Spring 19. Simons Research Professor, Mathematical Sciences Research Institute, Berkeley, Fall 17. Visiting Professor, University of California at Berkeley, Berkeley, 12-13. Research Member, Mathematical Sciences Research Institute, Berkeley, Fall 09. Visiting Professor, University of Washington, Seattle, USA, Fall 05.

Professional activities

Advisory Board, Combinatorial Theory, 20-current.
 Advisory Board, Journal of Combinatorial Theory Ser. A, 19-20.
 Editor-in-Chief, Journal of Combinatorial Theory Ser. A, 14-19.
 Editor, Revista Academia Colombiana de Ciencias Ex. Fis. y Nat., 20-current.
 Editor, Revista Colombiana de Matemáticas, 11-current.
 Editor, Lecturas Matemáticas, 08-current.
 Director, MSRI Undergraduate Program, Berkeley, CA, USA, 14-current.
 Director, SFSU-Colombia Combinatorics Initiative, 06-current.
 Faculty Agent of Change, SF BUILD (Bldg. Infrastructure Leading to Diversity), 16-current.
 Advisory Board Member, Alliance of Indigenous Math Circles, 20-current.
 Advisory Board Member, Underrep. Students in Topology + Algebra (USTARS), 15-current.
 Fellows of the AMS Selection Committee, American Mathematical Society, 20-23.
 NAM-MAA Joint Lecture Program Committee, 20-current.
 Western Section Program Committee, American Mathematical Society, 19-22.
 Robbins Prize Committee, Mathematical Association of America, 18-24.
 Chairman, Problem Selection Committee, International Mathematical Olympiad, 13.
 Advisory Board Member, International Mathematical Olympiads, 03-06.
 International Jury Member, International Mathematical Olympiads, 99-08.

Grants

National Science Foundation Grant, Combinatorics, 22-25.
 National Science Foundation Grant, Combinatorics, 19-22.
 National Science Foundation Grant, Combinatorics, 16-19.
 National Science Foundation Grant, CAREER Award, 10-16.
 National Science Foundation Grant, Algebra, Number Theory and Combinatorics, 08-11.
 National Science Foundation Grant, Mathematical Sciences Workforce (MSRI-UP), 17-22.
 Sloan Foundation Grant (MSRI-UP), 17-18, 18-21, 21-24.
 National Security Agency Grant (MSRI-UP), 15, 16, 18.
 NSF and NSA Grants, Conferences and Workshops in Math (FPSAC) 10-11.

Publications (research)

1. *The geometry of geometries: matroid theory, old and new*, Proceedings of the International Congress of Mathematicians 2022, to appear.
2. *Lagrangian geometry of matroids*, with Graham Denham and June Huh, Journal of the American Mathematical Society, to appear.
3. *Lagrangian combinatorics of matroids*, with Graham Denham and June Huh, Algebraic Combinatorics, to appear.
4. *Hopf monoids and generalized permutohedra*, with Marcelo Aguiar, Memoirs of the American Mathematical Society, to appear.
5. *The bipermutohedron*, Combinatorial Theory, to appear.
6. *Valuations and the Hopf monoid of generalized permutohedra*, with Mario Sanchez, International Mathematics Research Notice (2022) rnab355.
7. *The harmonic polytope*, with Laura Escobar, Selecta Mathematica **27** (2021) 1–31.
8. *Deformations of Coxeter permutahedra and Coxeter submodular functions*, with F. Castillo, C. Eur, and A. Postnikov, Advances in Mathematics **365** (2020) 107039.
9. *CAT(0) geometry, robots, and society*, Notices of the American Mathematical Society **67** (2020): 977–987.

10. *The equivariant Ehrhart theory of the permutahedron*, with M. Supina and A. Vindas-Meléndez, Proceedings of the American Mathematical Society **148** (2020) 5091-5107.
11. *The equivariant volumes of the permutahedron*, with A. Schindler and A. Vindas-Meléndez. Discrete and Computational Geometry **65** (2021) 618-635.
12. *The arithmetic of Coxeter permutahedra*, with M. Beck and J. McWhirter, Revista de la Academia Colombiana de Ciencias Exactas, Físicas y Naturales **44** (173) (2020) 1152-1166.
13. *The geometry of matroids*, Notices of the Amer. Math. Soc. **65** (2018) 902-908.
14. *Algebraic structures on polytopes*, Notices of the Amer. Math. Soc. **65** (2018), 11-12.
15. *Positively oriented matroids are representable*, with F. Rincón and L. Williams. Journal of the European Math. Society. **19** (2017) 815-833.
16. *The double Gromov-Witten invariants of Hirzebruch surfaces are piecewise polynomial*, with E. Brugallé. Int. Math. Research Notices. **2017** (2017) 614-641.
17. *The configuration space of a robotic arm in a tunnel*, with H. Bastidas, C. Ceballos, and J. Guo. SIAM Journal of Discrete and Applied Mathematics. **31** (2017) 2675-2702.
18. *Positroids and non-crossing partitions*, with F. Rincón and L. Williams. Transactions of the American Math. Society. **368** (2016) 337-363.
19. *The closure of a linear space in a product of lines*, with A. Boocher. Journal of Algebraic Combinatorics. **43** (2016) 199-235.
20. *The topology of the external activity complex of a matroid*, with F. Castillo and J. Samper, Electronic Journal of Combinatorics. **23** (2016) #P3.8.
21. *The configuration space of a robotic arm in a tunnel of width 2*, with H. Bastidas, C. Ceballos, and J. Guo. Proceedings of FPSAC 2016, Discrete Mathematics and Theoretical Computer Science, BC (2016) 61-72.
22. *The arithmetic Tutte polynomials of the classical root systems*, with F. Castillo and M. Henley. Int. Math. Research Notices. **2015** (2015) 3830-3877
23. *Two counterexamples for power ideals of hyperplane arrangements*, with A. Postnikov. Correction to "Combinatorics and geometry of power ideals." Transactions of the American Mathematical Society. **367** (2015) 3759-3762.
24. *Moving robots efficiently using the combinatorics of $CAT(0)$ cubical complexes*, with T. Baker and R. Yatchak. SIAM Journal of Discrete and Applied Mathematics **28** (2014) 986-1007.
25. *Universal polynomials for Severi degrees of toric surfaces*, with F. Block. Advances in Mathematics. **237** (2013) 165-193.
26. *Lifted generalized permutahedra and composition polynomials*, with J. Doker. Advances in Applied Mathematics **50** (2013) 607-633.
27. *Acyclic systems of permutations and fine mixed subdivisions of simplices*, with C. Ceballos. Discrete and Computational Geometry. **49** (2013) 485-510.
28. *Geodesics in $CAT(0)$ cubical complexes*, with M. Owen and S. Sullivant. Advances in Applied Mathematics **48** (2012) 142-163.
29. *Staircase Schur functions are P -Schur positive*, with L. Serrano. J. of Algebraic Combinatorics **36** (2012) 409-423.
30. *Gelfand-Tsetlin polytopes and Feigin-Fourier-Littelmann-Vinberg polytopes as marked poset polytopes*, with T. Bliem and D. Salazar. J. of Combinatorial Theory, Ser. A. **118** (2011) 2454-2462.
31. *Root polytopes and growth series of root lattices*, with M. Beck, S. Hosten, J. Pfeifle, and K. Seashore. SIAM Journal of Discrete Mathematics **25** (2011) 360-378.
32. *Combinatorics and geometry of power ideals*, with A. Postnikov, Transactions of the American Mathematical Society **362** (2010), 4357-4384.

33. *Matroid polytopes and their volumes*, with C. Benedetti and J. Doker, Discrete and Computational Geometry **43** (2010) 841-854.
34. *When do two planted graphs have the same cotransversal matroid?*, with A. Ruiz. Boletín de la Sociedad Mexicana de Matemáticas. **16** (2010) 63-73.
35. *Valuations for matroid polytope subdivisions*, with A. Fink and F. Rincón. Canadian Journal of Mathematics **62** (2010) 1228-1245.
36. *Tropical hyperplane arrangements and oriented matroids*, with M. Develin, Mathematische Zeitschrift. **262** (2009) 795-816.
37. *Pruning processes and a new characterization of convex geometries*, with E. Maneva, Discrete Mathematics. **309** (2009) 3083-3091.
38. *Flag arrangements and triangulations of products of simplices*, with S. Billey, Advances in Mathematics. **214** (2007) 495-524.
39. *Transversal and cotransversal matroids via the Lindström lemma*, Electronic Journal of Combinatorics **14** (2007) N6.
40. *Computing the Tutte polynomial of a hyperplane arrangement*, Pacific J. Math. **230** (2007) 1-26.
41. *Semimatroids and their Tutte polynomials*, Revista Colombiana de Matemáticas. **41** (2007) 39-66.
42. *Bergman complexes, Coxeter arrangements, and graph associahedra*, with V. Reiner and L. Williams, Seminaire Lotharingien de Combinatoire **54A** (2006) B54Aj.
43. *The positive Bergman complex of an oriented matroid*, with Carly Klivans and Lauren Williams, European J. Combin. **27** (2006) 577-591.
44. *The Bergman complex of a matroid and phylogenetic trees*, with Carly Klivans, J. Combin. Th. Ser. B. **96** (2006) 38-49.
45. *Subdominant matroid ultrametrics*, Ann. Comb. **8** (2004) 379-389.
46. *The number of halving circles*, Amer. Math. Monthly **111** (2004) 586-592.
47. *The Catalan matroid*, J. Combin. Theory Ser. A **104** (2003) 43-62.
48. *The coefficients of a Fibonacci power series*, Fibonacci Quart. **42** (2003) 202-204.
49. *A generalization of Euler's $R \geq 2r$* , Crux Math. **21** (1995) p.1-2.
50. *Enumerative and algebraic aspects of matroids and hyperplane arrangements*, Ph.D. thesis, Massachusetts Institute of Technology, 2003.

(expository)

1. *Tutte polynomials of hyperplane arrangements and the finite field method*, in **Handbook on the Tutte Polynomial and Related Topics** (ed. J. Ellis-Monaghan, I. Moffatt), to appear.
2. *Algebraic and geometric methods in enumerative combinatorics*, in **Handbook of Enumerative Combinatorics** (ed. M. Bona) pg. 1-171. Discrete Mathematics and Its Applications 87, CRC Press – Chapman Hall, 2015.
3. *Tres lecciones en combinatoria algebraica, I. Matrices totalmente negativas y funciones simétricas*, with E. León, M. Rosas, and M. Skandera, universo.math **1** (2014) No. 1, Artículo 5.
4. *Tres lecciones en combinatoria algebraica, II. Funciones simétricas y teoría de representaciones*, with E. León, M. Rosas, and M. Skandera, universo.math **1** (2014) No. 2, Artículo 5.
5. *Tres lecciones en combinatoria algebraica, III. Arreglos de hiperplanos*, with E. León, M. Rosas, and M. Skandera, universo.math **1** (2014) No. 3, Artículo 3.

(education and society)

1. *Todxs cuentan en ECCO: building a mathematical community*, with Carolina Benedetti. Notices of the American Mathematical Society, to appear.
2. *Todxs cuentan en ECCO: building a mathematical community*, with Carolina Benedetti. In *Count Me in: Community and Belonging in Mathematics*, Classroom Resource Materials Vol. 68, AMS/MAA, 2022.
3. *Todxs cuentan: Building community and welcoming humanity from the first day of class*. In *A Conversation on Professional Norms in Mathematics*, American Mathematical Society, 2021.
4. *CAT(0) geometry, robots, and society*, Notices of the American Mathematical Society **67** (2020): 977–987.
5. *Pamela Harris. The mathematical rise and social contribution of a Dreamer*, with Ricardo Cortez. Notices of the American Mathematical Society **65** (2018) 1025–1026.
6. *Todos cuentan. Cultivating diversity in combinatorics*. Notices of the American Mathematical Society **63** (2016) 1164–1170.

(public)

1. *Catalan numbers*, Mathematical Intelligencer **38** (2016) 4–5.
2. *Números de Catalán*, universo.math **2** (2016) No. 3, Artículo 2.
3. *Tilings*, with Richard Stanley. *Clay Mathematics Institute Online Library*. The Mathematical Intelligencer **32** (2010) 32–43
4. *Pflasterungen*, German translation of *Tilings* by Günter Ziegler, Math. Semesterber. **53** (2006) 17–43.
5. *Teselaciones*, Spanish translation of *Tilings* by Carolina Benedetti. Gaceta de la Real Sociedad Matemática Española **14** (2011) 463–490.

(books)

1. *Algebraic and Geometric Combinatorics: Proceedings of ECCO* (editor, with Carolina Benedetti and Alejandro Morales), Cambridge University Press, to appear, 2022.
2. *Actas: Días de Combinatoria 2017* (editor, with Carolina Benedetti and Rafael González d'León), *Lecturas Matemáticas*, **40** 2 (Dic. 2019).
3. *54th International Mathematical Olympiad, Problem Shortlist with Solutions*, with I. Bogdanov, G. Kós, C. Moreira, and C. Reiher. Santa Marta, Colombia, 2013.
4. *Problemas y soluciones de los entrenamientos de las Olimpiadas Colombianas de Matemáticas*, with Carlos Caicedo, Mary Falk de Losada and Carlos Vargas, Universidad Antonio Nariño, Bogotá, Colombia, yearly publications, 1997–2002.

Advising

Raul Penaguiao, Swiss NSF Postdoctoral fellow, San Francisco State University, 20–22.
 Mónica Blanco, Postdoctoral fellow, Mathematical Sciences Research Institute, 17.
 Dustin Ross. NSF Postdoctoral fellow, San Francisco State University 16–17.
 Tristram Bogart. NSF Postdoctoral fellow, MSRI 09, San Francisco State University 10–11.

Mariel Supina, Ph.D. student, U. of California, Berkeley, 21.
 Mario Sanchez, Ph.D. student, U. of California, Berkeley, with Lauren Williams, 21.
 Anastasia Chavez, Ph.D. student, U. of California, Berkeley, with Lauren Williams, 17.
 Jeff Doker. Ph.D. student, U. of California, Berkeley, with Matt Beck, 11.
 Alex Fink. Ph.D. student, U. of California, Berkeley, with Bernd Sturmfels, 10.

Jewell McMillon, M.A. student, San Francisco State University, current.
 Montse Cordero, M.A. student, San Francisco State University, 22.
 Alvaro Cornejo, M.A. student, San Francisco State University, 22, w/ Mariel Supina.
 Luis Perez, M.A. student, San Francisco State University, 22, w/ Matt Beck.

Eliana Tolosa, M.A. student, San Francisco State University, 21.
Jeshu Dastidar, M.A. student, San Francisco State University, 21, w/ Dusty Ross.
César Meza, M.A. student, San Francisco State University, 20.
Maria Isabel Perez, M.A. student, San Francisco State University, 19.
Jodi McWhirter, M.A. student, San Francisco State University, 19, w/ Matt Beck.
Nicole Yamzon, M.A. student, San José State University, 19, w/ Elizabeth Gross.
Andrés Rodríguez, M.A. student, San Francisco State University, 18.
John Guo, M.A. student, San Francisco State University, 17.
Anna Schindler, M.A. student, San Francisco State University, 17.
Andrés R. Vindas Meléndez, M.A. student, San Francisco State University, 17.
Maxime Pouokam, M.A. student, San Francisco State University, with J. Arsuaga, 16.
Sandra Zuniga, M.A. student, San Francisco State University, with Matt Beck, 16.
Juan Auli. M.A. student, San Francisco State University, with Matt Beck, 15.
Crista Moreno, M.A. student, San Francisco State University, with M. Vázquez, 15.
Servando Pineda. M.A. student, San Francisco State University, 14.
Hannah Winkler. M.A. student, San Francisco State University, with Matt Beck, 14.
Zach Bowen. M.A. student, San Francisco State University, 13.
Michael Henley. M.A. student, San Francisco State University, 12.
Rika Yatchak. M.A. student, San Francisco State University, 12.
Tia Baker. M.A. student, San Francisco State University, 11.
Dido Salazar. M.A. student, San Francisco State University, with T. Bliem, 11.
Benjamín Iriarte. M.A. student, San Francisco State University, 10.
Laura Escobar. M.A. student, San Francisco State University, 10.
Amanda Ruiz. M.A. student, San Francisco State University, 09.
Jupei Hsiao. M.A. student, San Francisco State University, 09.
Kristen Freeman. M.A. Student, San Francisco State University, 09.
Carolina Benedetti. M.A. student, Universidad de los Andes, 08.
César Ceballos. M.A. student, Universidad de los Andes, 08.
Kim Seashore. M.A. student, San Francisco State University, w/ M. Beck, S. Høsten, 08.
Anna Brown. M.A. student, San Francisco State University, 07.
Felipe Rincón. M.A. student, Universidad de los Andes, 07.

Chiemi Kato. Undergraduate research, San Francisco State University, 19.
Jewell McMillon. Undergraduate research, San Francisco State University, 19.
Matthew Bland. Undergraduate research, San Francisco State University, 17.
Arllys Asprilla, Undergraduate research. Instituto Tecnológico Metropolitano Medellín, 16.
Andrés Saldaña. Undergraduate thesis. Universidad del Valle, 16.
Hanner Bastidas. Undergraduate thesis. Universidad del Valle, 16.
John Guo. Undergraduate research, San Francisco State University, 15.
David Arcila. Undergraduate thesis. Universidad Nacional de Colombia, 14.
Diego Cifuentes. Undergraduate thesis, Universidad de los Andes, 12.
Federico Castillo. Undergraduate thesis, Universidad de los Andes, 12.
Ana María Botero. Undergraduate thesis, Universidad de los Andes, with B. Uribe, 11.
José Samper. Undergraduate thesis, Universidad de los Andes, 11.
Benjamín Iriarte. Undergraduate thesis, Universidad de Los Andes, 09.
Chris O'Neill. Undergraduate research, San Francisco State University, 09.

Emerson León. Undergraduate thesis, Universidad Nacional de Colombia, 06.

Felipe Rincón. Undergraduate thesis, Universidad de los Andes, 06.

David Otero. Undergraduate thesis, Universidad de los Andes, 04.

**Selected talks
(invited intrnatl.)**

International Congress of Mathematicians, Invited Speaker, Russia, 22.

Geometric and Algebraic Combinatorics, Minicourse, France 19.

Coloquio Latinoamericano de Algebra, Plenary Speaker, México, 19.

Simons Institute Wkshp: Beyond Randomized Rounding + Probabilistic method, USA, 19.

MSRI Workshop: Modern Techniques in Geometric + Topological Combinatorics, USA 17.

MSRI Introductory Workshop: Geometric and Topological Combinatorics USA 17.

Formal Power Series + Algebraic Combinatorics, Plenary Speaker, Canada, 16.

Congreso Latinoamericano de Matemáticos, Invited Speaker, Colombia, 16.

Discrete Models in Geometry and Topology, Germany 15.

Pacific Rim Mathematical Association Congress, Plenary Speaker, Australia, 09.

NIMS Hot Topics Workshop on Algebraic Combinatorics, Korea, 09.

MSRI Minicourse, Connections for Women in Tropical Geometry, USA, 09.

Encuentro Colombiano de Combinatoria, Minicourse, Colombia, 08, 03.

(invited national)

Joint Mathematics Meetings, MAA Plenary Speaker, Denver, CO, 20.

Joint Mathematics Meetings, AMS Plenary Speaker, San Diego, CA, 18.

Congreso Mexicano de Matemáticas, Plenary Speaker, San Luis Potosí, México, 11.

Congreso Colombiano de Matemáticas, Plenary Speaker, Colombia, 11, 05.

Field of Dreams, Keynote Speaker, Minneapolis, MN, USA, 22.

Blackwell-Tapia Conference, Invited Speaker, Berkeley, CA, 21.

Young Mathematicians' Conference, Plenary Speaker, Columbus, OH, 21.

Graduate Student Combinatorics Conference, Plenary Speaker, Minneapolis, MN, 21.

Canadian Discrete and Algorithmic Math Conf., Plenary Speaker, Vancouver, Canada, 19.

Triangle Lectures in Combinatorics, Plenary Speaker, Winston Salem, NC, 19.

SIAM Conference on Discrete Mathematics, Plenary Speaker, Denver, CO, 18.

Blackwell-Tapia Conference, Invited Speaker, Knoxville, TN, 16.

Northern California Undergrad Math Conference, Plenary Speaker, Oakland, CA, 15.

Días de Combinatória, Invited Speaker, Covilhã, Portugal, 15.

SACNAS, Modern Math Workshop Plenary Speaker, San Antonio, TX, 13.

Congreso Colombiano de Matemáticas, Invited Speaker, Barranquilla, Colombia, 13.

USTARS, Plenary Speaker, Iowa City IA, 12.

SACNAS, Modern Math Workshop, Minicourse, San Jose, CA, 11.

CombinaTexas, Plenary Speaker, Huntsville, TX, USA, 11.

Escuela de Matemática Pura y Aplicada, Mini-course, Gurabo, Puerto Rico, 11.

Congreso Regional de Matemáticas, Mini-course, Girardot, Colombia, 06.

Escuela Matem. de América Latina y del Caribe, Mini-course, Socorro, Colombia, 06.

Combinatoria Algebraica y Topológica, Mini-course, Bogotá, Colombia, 03.

(named colloquia)

Endowed Lecture, Macalester College, St. Paul, MN, USA, 22.

Distinguished Lecture, Cal Poly Pomona, Colloquium, Pomona, CA, USA, 21.

Loeb Lecture, Washington University in St. Louis, MO, 19.

William Tutte's Distinguished Lecture Series, University of Waterloo, Waterloo, Canada, 18.

Kickoff Lecturer, Mathematics Lecture Series, University of San Diego, San Diego, CA, 18.

Oliver Lecturer and Class of 1960 Speaker, Williams College, Williamstown, MA, USA, 17.
 Diversity Speaker Series, Michigan State University, East Lansing, MI, USA, 17.
 Harry Kieval Lecturer, Humboldt State University, Arcata, CA, USA, 15.
 José Adem Memorial Lecture Series, Cinvestav, México, 07.
 Martha Davenport Heard Lecture, Wellesley College, Wellesley, MA, TBD.
 Endowed Lecture, Macalester College, St Paul, MN, TBD.
 Turfe Lecture, University of Michigan, Dearborn, MI, TBD.

(international)

Algebraic Aspects of Matroids, Banff International Research Station, 21.
 Polytopics: Recent advances on polytopes, Max Planck Institute, Leipzig, 21.
 Lecture Series for African Women in Mathematics, The Internet, 20.
 Matroid Union Seminar, The Internet, 20.
 Algebraic Combinatorics Virtual Expedition, The Internet, 20.
 Institut Mittag-Leffler Workshop on Unimodality, Log-concavity, and Beyond, 20.
 Oberwolfach Workshop on Tropical Geometry, 19.
 Oberwolfach Workshop on Geometric, Algebraic, and Topological Combinatorics, 19.
 Dagstuhl Seminar on Graph Polynomials, 19
 Combin. and Algs. in Decision and Reason, SIAM Appl Alg Geom Conf, Switzerland, 19.
 New Developments in Matroid Theory, SIAM Appl Alg Geom Conf, Switzerland, 19.
 Matroids, Oriented Matroids, and Applications, CIRM, Marseille, France, 18, 13.
 Positivity Questions in Geometric Combinatorics, MSRI, Berkeley, CA, 17.
 Algebraic Combinatorics, Pacific Rim Mathematical Assoc. Congress, Oaxaca, México, 17.
 Matroid Theory, Pacific Rim Mathematical Association Congress, Oaxaca, México, 17.
 Discrete Geometry, Pacific Rim Mathematical Association Congress, Oaxaca, México, 17.
 Geom.+Combin. of Cell Complexes, Math Congress of the Americas, Montreal, Canada, 17.
 Hyperplane Arrangements, Math Congress of the Americas, Montreal, Canada, 17.
 Curr. Trends in Combinatorics, Math Congress of the Americas, Montreal, Canada, 17.
 Coloquio Latinoamericano de Álgebra, 17, 16, 14, 07, 05.
 FPSAC International Conference, 16, 14, 13, 12, 11, 09, 07, 06, 05, 04, 03, 02.
 Matroid Theory, European Congress of Mathematics, Berlin, Germany, 16.
 Positivity in Algebraic Combinatorics, Seoul, Korea, 16.
 Borel Seminar, Les Diablerets, Switzerland, 16.
 Dagstuhl Seminar on Graph Polynomials, Saarbrücken, Germany, 16.
 Perspectives in Lie Theory, Centro di Rec. Mat. De Giorgi, Pisa, Italy 15.
 Oberwolfach Workshop on Tropical Aspects in Geometry, Topology and Physics, 14.
 Structure in Graphs and Matroids, Princeton, NJ, USA, 14.
 Geometric and Enumerative Combinatorics, Inst. for Math. + Apps., Minneapolis, MN, 14.
 Topology and Combinatorics Session, Math. Congress of the Americas, Guan., México, 13.
 Enumerative Combinatorics Session, Math. Congress of the Americas, Guan., México, 13.
 Combinatorial Methods in Topology and Algebra, Cortona, Italy, 13.
 Geometría Tropical en el Pacífico, Oaxaca, Mexico, 13.
 Coxeter Groups meet Convex Geometry, Montreal, QC, Canada, 12.
 SIAM Minisymposium on Algebraic Combinatorics, Halifax, NS, Canada, 12.
 Combinatorial Algebra meets Algebraic Combinatorics, Montreal, QC, Canada, 12.
 Perspectives in Tropical Geometry, Arolla, Switzerland, 11.
 Workshop on Tropical Geometry, Castro Urdiales, Spain, 11.

Encuentro de Geometría Tropical, Guanajuato, Mexico, 10.
 Joint Meeting of the American and Mexican Math. Societies, Berkeley, CA, USA, 10.
 SIAM Minisymposium on Combinatorial Hopf Algebras, Austin, TX, USA, 10.
 AIM Wkshp. on Localiz. Techn. in Equivariant Cohomology, Palo Alto CA, USA, 10.
 Combinatorial Algebra meets Algebraic Combinatorics, Kingston, ON, Canada, 10.
 Joint Meeting of the Korean and American Mathematical Societies, Seoul, Korea, 09.
 Inst. Pure Appl. Math., Workshop on Combin. Geometry, Los Angeles, CA, USA, 09.
 Mathematical Society of Japan, Seasonal Institute, Sapporo, Japan, 09.
 AIM Workshop on Combin. Challenges in Toric Varieties, Palo Alto, CA, USA, 09.
 Oberwolfach Workshop on Tropical Geometry, Germany, 07.
 Interactions of Alg. Combinatorics and Alg. Geometry, CRM, Montréal, Canada, 07.
 Combin. Hopf Algebras and Macdonald Polynomials, CRM, Montréal, Canada, 07.
 Combinatorial Geometries and Applications, CIRM, Marseille, France, 05.
 Arrangements of Hyperplanes, Ascona, Switzerland, 05.
 MSRI Workshop on Hyperplane Arrangements, Berkeley, CA, USA, 04.
 PCMI Research Program in Geometric Combinatorics, Park City, UT, USA, 04.
 MSRI Workshop on Applicable Real Algebraic Geometry, Berkeley, CA, USA, 04.
 AIM Workshop on Amoebas and Tropical Geometry, Palo Alto, CA, USA, Oct. 03.

(national) Algebra, Geometry, Combinatorics Colloquium, The Internet, 20.
 AMS-MAA Session, Geometric and Topological Combinatorics, Baltimore, MD, 19.
 AMS Session, Algebraic and Geometric Combinatorics, Manoa, HI, 19.
 Mathematics Workshop for Excellence and Diversity, Riverside, CA, 18.
 AMS-MAA Session, Posets in Alg., Top., and Enumerative Combinatorics, Atlanta, GA, 17.
 SIAM Session on Matroid Theory, Pittsburgh, PA, 17.
 AMS-MAA Session, Algebraic and Topological Methods in Combinatorics, Seattle, WA, 16.
 AMS Session, Combin. at the crossroads of Alg., Geom., Top., Brunswick, ME, 16.
 AMS Session, Combin. and Comp. Comm. Alg. and Alg. Geom., Salt Lake City, UT, 16.
 AMS Session, Combinatorial Ideals and Applications, Fargo, ND, 16.
 SIAM Session on Tropical Mathematics, Atlanta, GA, 16.
 Positivity in Combinatorial Algebraic Geometry, Eugene, OR, 15.
 AMS Session, Hopf Algebraic Combinatorics, Chicago, IL, 15.
 AMS Session, Applications of CAT(0) Cube Complexes, Rutgers, NJ, 15.
 AMS Session, Algebraic and Enumerative Combinatorics, Las Vegas, NV, 15.
 Richard Stanley's Birthday Conference, MIT, Cambridge, MA, USA, 14.
 AMS Session, Toric Varieties, Eau-Claire, WI, 14.
 AMS Session, Algebraic and Topological Combinatorics, San Francisco, CA, 14.
 MAA MathFest, Portland, OR, 14.
 SACNAS Conference, 14, 11, 09.
 ALTENCOA, Pasto, Colombia, 14.
 Western Algebraic Geometry Seminar, Claremont, CA, 13.
 Séminaire de Combinatoire Philippe Flajolet, Paris, France, 13.
 AMS-MAA Session, Algebraic Combinatorics and Representation Th., San Diego, CA, 13.
 AMS-MAA Session, Topological Combinatorics, San Diego, CA, 13.
 AMS-MAA Session, Tropical Geometry, San Diego, CA, 13.
 AMS Session, Combinatorial Commutative Algebra, Philadelphia, PA, 13.

AMS Session, Graphs, Polytopes, and Algebraic Combinatorics, Akron, OH, 12.
 AMS-MAA Session, Enumerative and Algebraic Combinatorics, Boston, MA, 12.
 AMS Session, Enumerative and Geometric Combinatorics, Lawrence, KS, 12.
 SIAM Session, Combinatorial Algebraic Geometry, Minneapolis, MN, 12.
 PURE Math, University of Hawaii, Hilo, HI, 12.
 AMS Session, Species and Hopf Algebraic Combinatorics, Ithaca, NY, USA, 11.
 AMS Session, Alg. and Geom. Aspects of Matroids, Winston-Salem, NC, USA, 11.
 CMS Session, Discrete Mathematics, Vancouver, BC, Canada, 10.
 AMS Session, Geometric Combinatorics, Albuquerque, NM, USA, 10.
 AMS-MAA Session, Zonotopal Algebra and Applications, San Francisco, CA, USA, 10.
 SACNAS Conference, Math Institutes Modern Math Workshop, Dallas, TX, USA, 09.
 Saturday in Discrete Mathematics, Emmy-Noether-Zentrum, Erlangen, Germany, 09.
 AMS Session, Representation Th. and Topolog. Combin., Bloomington, IN, USA, 08.
 AMS Session, Geometric Combinatorics, Chicago, IL, USA, 07.
 Congreso Colombiano de Matemáticas, Semiplenary Speaker, Medellín, Colombia, 07.
 AMS Session, Geometric Combinatorics, Cincinnati, OH, USA, 06.
 Discrete Mathematics Days in New England, USA, 05, 02.
 AMS-MAA Session, Tropical Geometry, Atlanta, GA, USA, 05.
 Jornadas de Matemática Discreta y Algorítmica, Madrid, Spain, 04.
 Richard Stanley's Birthday Conference, MIT, Cambridge, MA, USA, 04.
 Bay Area Discrete Mathematics Day, Stanford University, Palo Alto, CA, USA, 04.
 AMS Session, Topological Combinatorics, Binghamton, NY, USA, 03.
 AMS Session, Algebraic and Enumerative Combinatorics, Orlando, FL, USA, 02.
 AMS Session, Algebraic and Topological Combinatorics, Williamstown, MA, USA, 01.
 Dan Kleitman's Birthday Conference, MIT, Cambridge, MA, USA, 99.

(invited colloquia and seminars)

Institut für Mathematik der Universität Potsdam, Colloquium, Potsdam, Germany, 22.
 University of California, Santa Cruz, Colloquium, Santa Cruz, CA, 22.
 University of Wisconsin, Colloquium, Madison, WI, USA, 20.
 Georgia Institute of Technology, Colloquium, Atlanta, GA, USA, 20.
 Universidad Distrital, Jornada de Matemáticas, Bogotá, Colombia, 21.
 Universidad Nacional, Colloquium, Bogotá, Colombia, 20, 08.
 Universidad de Los Andes Colloquium, Bogotá, Colombia, 20, 13, 12, 08, 05, 03, 01.
 University of California, Los Angeles, Colloquium, Los Angeles, CA, USA, 19.
 Sonoma State University, Colloquium, Sonoma, CA, USA, 18, 11.
 University of California, Berkeley, Colloquium, Berkeley, CA, USA, 17.
 University of Illinois, Colloquium, Urbana-Champaign, IL, USA, 17.
 University of San Francisco, Colloquium, San Francisco, CA, USA, 16, 10.
 Reed College Colloquium, Portland, OR, 14.
 Universidad del Valle Colloquium, Cali, Colombia, 14, 12.
 University of Southern California Colloquium, Los Angeles, CA, USA, 13.
 Dartmouth University, Colloquium, Hanover, NH, USA, 12.
 University of Puerto Rico, Colloquium, Río Piedras, PR, USA, 11.
 San Francisco State University, Colloquium, San Francisco, CA, USA, 11, 05.
 Santa Clara University, Colloquium, Santa Clara, CA, USA, 08.
 University of California, Colloquium, San Diego, CA, USA, 04.

MIT Combinatorics Seminar, Cambridge, MA, USA, 21, 15, 10, 09, 07, 03.
 Fellowship of the Ring Seminar, University of California, Berkeley, CA, USA, 20.
 Arrangements at Home Seminar, Online, 20.
 Geometry Seminar, University of Oslo, Norway, 20.
 Seminario Sabanero de Combinatoria, Bogotá, Colombia, 20.
 Institut Henri Poincaré, Séminaire Francilien de Géom. Alg. et Combin., Paris, France, 19.
 Università di Genoa, Seminario d'Algebra e Geometria, Genoa, Italy, 19.
 University of California, Comm. Alg. + Alg. Geom. Seminar, Berkeley, CA, USA, 19, 08.
 Stanford University, Combinatorics Seminar, Palo Alto, CA, USA, 18.
 University of Michigan, Combinatorics Seminar, Ann Arbor, MI, USA, 17, 11, 08.
 York University Applied Algebra Seminar, Toronto, Canada, 17, 16.
 University of California, Combinatorics Seminar, Berkeley, USA, 16, 11, 06, 04.
 Princeton Combinatorics Seminar, Princeton, NJ, USA, 15.
 Universidad Distrital Combinatorics Seminar, Bogotá, Colombia, 14.
 Cornell University Combinatorics Seminar, Ithaca, NY, 13, 11, 04.
 Cornell University Topology Seminar, Ithaca, NY, 13.
 Institut Mathématiques de Jussieu Tropical Geometry Seminar, Paris, France, 13.
 Royal Institute of Technology (KTH) Combinatorics Seminar, Stockholm, Sweden, 13.
 Brown University Discrete Math Seminar, Providence, RI, USA, 12.
 University of California, Discrete Mathematics Seminar, Davis, CA, USA, 12, 09, 03.
 UCLA Combinatorics Seminar, Los Angeles, CA, USA, 11.
 Northeastern University, Geometry, Algebra, Sing. and Combin. Seminar, Boston, MA, 10.
 University of Washington, Combinatorics Seminar, Seattle, USA, 09, 06, 04.
 Stanford University, Combinatorics and Geometry Seminar, Palo Alto, CA, USA, 08.
 University of Texas, Number Theory Seminar, Austin, TX, USA, 08.
 Texas A&M, Algebra and Combinatorics Seminar, College Station, TX, USA, 08.
 Stanford University, Combinatorics and Geometry Seminar, Palo Alto, CA, USA, 08.
 Technische Universität, Seminar der AG Gitterpolytope, Berlin, Germany, 07.
 University of British Columbia, Discrete Mathematics Seminar, Vancouver, BC, Canada, 05.
 University of Minnesota, Combinatorics Seminar, Minneapolis, MN, USA, 04.
 University of California, Seminar on Phylogenetics, Berkeley, CA, USA, 03.
 Universidad de Los Andes, Combinatorics Seminar, Bogotá, Colombia, 03.

(public)

Represent: STEM Voices, University of Utah, USA, 23.
 Mathematical Explorations, Museum of Mathematics, New York, NY, USA, 22.
 International Day of Mathematics, African Institute of Mathematical Sciences, 21.
 Charla Pública ECCO, Universidad del Norte, Barranquilla, Colombia, 18.
 Conexiones Matemáticas, Universidad Konrad Lorenz, Bogotá, Colombia, 18.
 MSRI Not On The Test Lecture Series, Invited Speaker, Berkeley, CA, 17.
 Ciencia en Bicicleta, Invited Speaker, Parque Explora, Medellín, Colombia, 16.
 Bay Area Mathematical Adventures, Invited Speaker, Santa Clara, CA, USA 10, 15.
 TEDx Teusaquillo, Invited Speaker, Bogotá, Colombia, 12.
 José Adem Memorial Lecture Series, Public Lecture, Cinvestav, México, 07.
 Bay Area Mathematical Olympiad, Awards Ceremony Speaker, Berkeley, CA, USA 07.
 Olimpiadas Colombianas Matem., Closing Ceremony Speaker, Bogotá, Colombia, 05.

- (panels)**
- ParaDIGMS, Institute for Mathematical and Statistical Innovation, 21
 - Project NExT, Math. Association of America, 20.
 - Data for Black Lives Conference, MIT Media Lab, 19.
 - Association of Women in Mathematics, Joint Math Meetings, 18.
 - Joint Committee on Women in Mathematics, Joint Math Meetings, 17.
 - Transforming Post-Secondary Education in Math, AAAS, Washington, DC, 16.
 - American Math Society Committee on Education, Washington, DC, 15.
 - American Institute of Mathematics, Careers in Academia Panel, Palo Alto, CA, USA 11.
- Math and society**
- Plenary Speaker, Field of Dreams Conference, USA, 22.
 - Mathematics and Social Justice, Swarthmore College, Swarthmore, CA, USA, 21.
 - Equity Forum, University of Toronto, Canada, 21.
 - Derivando, canal de YouTube, 20.
 - Cátedra de Ingenio, Ciencia, Tecnología y Sociedad, U. Nacional, Bogotá, Colombia, 20.
 - Data for Black Lives Conference, MIT Media Lab, 19.
 - Loeb Lecture, Washington University in St. Louis, MO, 19.
 - Oliver Lecturer and Class of 1960 Speaker, Williams College, Williamstown, MA, USA, 17.
 - Diversity Speaker Series, Michigan State University, East Lansing, MI, USA, 17.
 - TEDx Teusaquillo, Invited Speaker, Bogotá, Colombia, 12.
 - Ministerio de Educación, Foro de Ed. Matem., Invited Speaker, Bogotá, Colombia, 06.
- Outreach**
- Colombian Team Leader / Deputy Leader, International Math. Olympiads, 99-08 / 95-98.
 - Academic Coordinator, Central American and Caribbean Math. Olympiad, 01.
 - The Joy of x Podcast, Quanta Magazine, 21.
 - Guest Lecturer, Mathroots at MIT, USA, 20.
 - Panelist, Bridge to Enter Advanced Mathematics (BEAM), USA, 20.
 - Derivando YouTube channel, 20.
 - Meet a Mathematician, 20.
 - Numberphile YouTube channel, 15-18.
 - My Favorite Theorem Podcast, 18.
 - Lathisms Podcast, 18.
 - MSRI Undergraduate Program Colloquium, 15.
 - NightLife at the California Academy of Sciences, San Francisco, 14.
 - Guest Lecturer, DaVinci Camp, Berkeley, USA, 14.
 - Guest Lecturer, Berkeley Math Circle, Berkeley, USA, 07.
 - Lecturer, San Francisco Math Circle, San Francisco, USA, 06-07.
 - Academy Fellow, Clay Mathematics Research Academy, Cambridge, USA, 03-05.
- Conference organization**
- Organizer, Latinx in Math, IPAM, UCLA, Los Angeles, USA, 18, 15.
 - Organizer, XXII FPSAC International Conference, San Francisco, USA, 10.
 - Organizer, Tropical Geometry in Combin. and Alg. Workshop, MSRI, Berkeley, USA, 09.
 - Organizer, Combinatorics Session, Latin American Congress of Mathematicians, Chile, 09.
 - Org. Comm., Algebraic Geometry and Polyhedra, ICERM, Providence, 21.
 - Scientific Committee, Coloquio Latinoamericano de Algebra 17.
 - Org. Comm., Conn. for Women in Geom. and Top. Combin., MSRI, Berkeley, 17.
 - Scientific Committee, Congreso Colombiano de Matemáticas, Colombia, 15, 13, 09, 07.

Steering Committee, Pacific Rim Mathematical Association, 13, 09.
 Programme and Organizing Committees, XX FPSAC International Conference, Chile, 08.
 Scientific Committee, XVII Coloquio Latinoamericano de Algebra, Medellín, Colombia, 07.
 Scientific Committee, ALTENCOA National Conference, Popayán, Colombia, 06.
 Organizer, AMS Special Session, Alg. and Comb. of Polytopes, SFSU, USA 21.
 Organizer, AMS Special Session, Social Change, Math. + Education, SFSU, USA 21, 18.
 Organizer, Encuentro Colombiano de Combinatoria (ECCO), Colombia, 14, 12, 08, 03.
 Organizer, 14th Bay Area Discrete Math Day, San Francisco, USA, 15, 07.
 Organizer, AMS Special Session, Combinatorics and Geometry, San Diego, CA, USA 17.
 Organizer, AMS Special Session, Algebraic Combinatorics, Honolulu, HI, USA 12.
 Organizer, AMS Special Session, Matroids in Algebra and Geom., San Francisco, USA, 09.
 Organizer, Combinatorics Session, Coloquio Latinoamericano de Algebra, Colombia, 07.
 Organizing Committee, Bay Area Discrete Math Days, San Francisco, USA, 06-current.
 Organizer, AMS Special Session, Enumeration in Polytopes, San Francisco, USA, 06.
 Organizer, SFSU Mathematics Colloquium, San Francisco, USA, 06-09.
 Organizer, SFSU Alg. Geom. Combinatorics Seminar, San Francisco, USA, 06-current.

Refereeing and reviewing

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Acta Mathematica, Advances in Applied Mathematics, Advances in Mathematics, American Mathematical Monthly, Annals of Combinatorics, Applied Mathematics Letters, Autonomous Robots, Combinatorica, Comptes Rendus Mathématique, Contributions to Discrete Mathematics, CRC Handbooks, Crelle's Journal, Discrete and Computational Geometry, Discrete Mathematics, Duke Mathematical Journal, Educational Studies in Mathematics, Electronic Journal of Combinatorics, European Journal of Combinatorics, European Journal of Mathematics, Forum of Mathematics – Pi, Gokova Geometry–Topology Journal, Graphs and Combinatorics, International Conference on Formal Power Series and Algebraic Combinatorics (FPSAC), Information Processing Letters, International Mathematics Research Notices, Journal of Algebra and its Applications, Journal of Algebraic Combinatorics, Journal of the American Mathematical Society, Journal of Combinatorial Theory Series A, Journal of Combinatorial Theory Series B, Journal of the European Mathematical Society, Journal of the London Mathematical Society, Journal of Number Theory, Journal of Statistical Planning and Inference, Journal of Symbolic Computation, Linear Algebra and its Applications, Mathematica Scandinavica, Mathematics in Computer Science, Pacific Journal of Mathematics, Revista Colombiana de Matemáticas, Revista de la Escuela Regional de Matemáticas, Rocky Mountain Journal of Mathematics, Selecta Mathematica, SIAM Journal on Discrete Mathematics, SIAM Review, Transactions of the American Mathematical Society, Transformation Groups, Theoretical Computer Science.