

federico ardila

1600 holloway avenue san francisco, ca 94132 1.415.338.7720
federico@sfsu.edu http://math.sfsu.edu/federico

- Research interests** The investigation of objects in algebra, geometry, topology, phylogenetics, and optimization by understanding their underlying combinatorial structure.
- Education** Ph.D. in Mathematics, Massachusetts Institute of Technology, Cambridge, MA, USA, 2003.
Thesis: Enumerative and algebraic aspects of matroids and hyperplane arrangements.
Advisor: Richard P. Stanley
B.Sc. in Mathematics, Massachusetts Institute of Technology, Cambridge, MA, USA, 1998.
- Awards and honors** Fellow of the American Mathematical Society, USA, 18.
Simons Research Professor, Mathematical Sciences Research Institute, Berkeley, CA, 17.
Premio Nacional de Ciencias Alejandro Ángel Escobar, Colombia, 15.
National Science Foundation CAREER Award, USA, 10-16.
Diverse Issues in Higher Education, Emerging Scholar Award, 11.
MIT-Harvard Club de Colombia, Award for Outstanding Achievement and Service, 10.
Clay Mathematics Institute, Affiliate Scholar, 04-06.
Mathematical Sciences Research Institute/Microsoft Postdoctoral Fellowship, 03-05.
American Institute of Mathematics, Five-Year Fellowship, runner up, 03.
SFSU Distinguished Faculty Award for Excellence in Teaching, 16-17.
SFSU Presidential Award, 09-10.
SFSU Faculty Diversity Support Award, 06-07.
MIT Department of Mathematics, Housman Award for Excellence in Teaching, 01.
William Lowell Putnam Mathematics Competition, top 10, 96.
International Mathematical Olympiad, silver medal, 94; bronze medal, 93.
Iberoamerican Mathematical Olympiad, gold medal, 93; bronze medal, 91.
- Experience** Professor, San Francisco State University, San Francisco, CA, 16-current.
Adjunct Professor, Universidad de Los Andes, Bogotá, Colombia, Fall 06-current.
Simons Research Professor, Mathematical Sciences Research Institute, Berkeley, CA, 17.
Associate Professor, San Francisco State University, San Francisco, CA, 11-16.
Visiting Professor, University of California at Berkeley, Berkeley, CA, 12-13.
Research Member, Mathematical Sciences Research Institute, Berkeley, CA, Fall 09.
Assistant Professor, San Francisco State University, San Francisco, CA, 05-11.
Assistant Professor, University of Washington, Seattle, WA, USA, 05.
Postdoctoral Fellow, Microsoft Theory Group, Redmond, WA, USA, 04-05.
Postdoctoral Fellow, Mathematical Sciences Research Institute, Berkeley, CA, 03-04.
Assistant Professor, Universidad de los Andes, Bogotá, Colombia, Fall 03.
- Professional activities** Editor-in-Chief, Journal of Combinatorial Theory Ser. A, 14-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, Underrep. Students in Topology + Algebra (USTARS), 15-current.
 Robbins Prize Committee, Mathematical Association of America, 18-24.
 Chairman of the Problem Selection Committee, International Mathematical Olympiad, 13.
 Advisory Board Member, International Mathematical Olympiads, 03-06.

Grants

National Science Foundation Grant, Combinatorics, 16-19.
 National Science Foundation CAREER Grant, 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.
 National Security Agency Grant (MSRI-UP), 15, 16, 18.
 NSF and NSA Grants, Conferences and Workshops in Math (FPSAC) 10-11.

Preprints

(At math.sfsu.edu/federico)

1. *Hopf monoids and generalized permutohedra*, with M. Aguiar, 17.

Publications

1. *Positively oriented matroids are representable*, with F. Rincón and L. Williams. Journal of the European Math. Society. **19** (2017) 815–833.
2. *The double Gromov-Witten invariants of Hirzebruch surfaces are piecewise polynomial*, with E. Brugallé. Int. Math. Research Notices. **2017** (2017) 614–641.
3. *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.
4. *Positroids and non-crossing partitions*, with F. Rincón and L. Williams. Transactions of the American Math. Society. **368** (2016) 337–363.
5. *The closure of a linear space in a product of lines*, with A. Boocher. Journal of Algebraic Combinatorics. **43** (2016) 199-235.
6. *The topology of the external activity complex of a matroid*, with F. Castillo and J. Samper, Electronic Journal of Combinatorics. **23** (2016) #P3.8.
7. *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.
8. *The arithmetic Tutte polynomials of the classical root systems*, with F. Castillo and M. Henley. Int. Math. Research Notices. **2015** (2015) 3830-3877
9. *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.
10. *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.
11. *Universal polynomials for Severi degrees of toric surfaces*, with F. Block. Advances in Mathematics. **237** (2013) 165-193.
12. *Lifted generalized permutahedra and composition polynomials*, with J. Doker. Advances in Applied Mathematics **50** (2013) 607-633.
13. *Acyclic systems of permutations and fine mixed subdivisions of simplices*, with C. Ceballos. Discrete and Computational Geometry. **49** (2013) 485-510.
14. *Geodesics in $CAT(0)$ cubical complexes*, with M. Owen and S. Sullivant. Advances in Applied Mathematics **48** (2012) 142-163.

15. *Staircase Schur functions are P-Schur positive*, with L. Serrano. J. of Algebraic Combinatorics **36** (2012) 409-423.
16. *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.
17. *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.
18. *Combinatorics and geometry of power ideals*, with A. Postnikov, Transactions of the American Mathematical Society **362** (2010), 4357-4384.
19. *Matroid polytopes and their volumes*, with C. Benedetti and J. Doker, Discrete and Computational Geometry **43** (2010) 841-854.
20. *When do two planted graphs have the same cotransversal matroid?*, with A. Ruiz. Boletín de la Sociedad Mexicana de Matemáticas. **16** (2010) 63-73.
21. *Valuations for matroid polytope subdivisions*, with A. Fink and F. Rincón. Canadian Journal of Mathematics **62** (2010) 1228-1245.
22. *Tropical hyperplane arrangements and oriented matroids*, with M. Develin, Mathematische Zeitschrift. **262** (2009) 795-816.
23. *Pruning processes and a new characterization of convex geometries*, with E. Maneva, Discrete Mathematics. **309** (2009) 3083-3091.
24. *Flag arrangements and triangulations of products of simplices*, with S. Billey, Advances in Mathematics. **214** (2007) 495-524.
25. *Transversal and cotransversal matroids via the Lindström lemma*, Electronic Journal of Combinatorics **14** (2007) N6.
26. *Computing the Tutte polynomial of a hyperplane arrangement*, Pacific J. Math. **230** (2007) 1-26.
27. *Semimatroids and their Tutte polynomials*, Revista Colombiana de Matemáticas. **41** (2007) 39-66.
28. *Bergman complexes, Coxeter arrangements, and graph associahedra*, with V. Reiner and L. Williams, Seminaire Lotharingien de Combinatoire **54A** (2006) B54Aj.
29. *The positive Bergman complex of an oriented matroid*, with Carly Klivans and Lauren Williams, European J. Combin. **27** (2006) 577-591.
30. *The Bergman complex of a matroid and phylogenetic trees*, with Carly Klivans, J. Combin. Th. Ser. B. **96** (2006) 38-49.
31. *Subdominant matroid ultrametrics*, Ann. Comb. **8** (2004) 379-389.
32. *The number of halving circles*, Amer. Math. Monthly **111** (2004) 586-592.
33. *The Catalan matroid*, J. Combin. Theory Ser. A **104** (2003) 43-62.
34. *The coefficients of a Fibonacci power series*, Fibonacci Quart. **42** (2003) 202-204.
35. *A generalization of Euler's $R \geq 2r$* , Crux Math. **21** (1995) p.1-2.
36. *Enumerative and algebraic aspects of matroids and hyperplane arrangements*, Ph.D. thesis, Massachusetts Institute of Technology, 2003.

Expository

1. *Algebraic structures on polytopes*, Notices of the American Math. Society, to appear.
2. *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.
3. *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.
4. *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.
5. *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.
6. *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

1. *Todos cuentan. Cultivating diversity in combinatorics*. Notices of the American Math. 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. *54th International Mathematical Olympiad, Problem Shortlist with Solutions*, with I. Bogdanov, G. Kós, C. Moreira, and C. Reiher. Santa Marta, Colombia, 2013.
2. *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

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, current.

Mario Sánchez, Ph.D. student, U. of California, Berkeley, with Lauren Williams, current.

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.

Andrés Rodríguez, M.Sc. student, San Francisco State University, current.

Nicole Yamzon, M.Sc. student, San José State University, with Elizabeth Gross, current.

John Guo, M.Sc. student, San Francisco State University, 17.

Anna Schindler, M.Sc. student, San Francisco State University, 17.

Andrés Vindas, M.Sc. student, San Francisco State University, 17.

Maxime Pouokam, M.Sc. student, San Francisco State University, with J. Arsuaga, 16.
 Sandra Zuñiga, M.Sc. student, San Francisco State University, with Matt Beck, 16.
 Juan Auli. M.Sc. student, San Francisco State University, with Matt Beck, 15.
 Crista Moreno, M.Sc. student, San Francisco State University, with M. Vázquez, 15.
 Servando Pineda. M.Sc. student, San Francisco State University, 14.
 Hannah Winkler. M.Sc. student, San Francisco State University, with Matt Beck, 14.
 Zach Bowen. M.Sc. student, San Francisco State University, 13.
 Michael Henley. M.Sc. student, San Francisco State University, 12.
 Rika Yatchak. M.Sc. student, San Francisco State University, 12.
 Tia Baker. M.Sc. student, San Francisco State University, 11.
 Dido Salazar. M.Sc. student, San Francisco State University, with T. Bliem, 11.
 Benjamín Iriarte. M.Sc. student, San Francisco State University, 10.
 Laura Escobar. M.Sc. student, San Francisco State University, 10.
 Amanda Ruiz. M.Sc. student, San Francisco State University, 09.
 Jupei Hsiao. M.Sc. student, San Francisco State University, 09.
 Kristen Freeman. M.Sc. Student, San Francisco State University, 09.
 Carolina Benedetti. M.Sc. student, Universidad de los Andes, 08.
 César Ceballos. M.Sc. student, Universidad de los Andes, 08.
 Kim Seashore. M.Sc. student, San Francisco State University, w/ M. Beck, S. Hoşten, 08.
 Anna Brown. M.Sc. student, San Francisco State University, 07.
 Felipe Rincón. M. Sc. student, Universidad de los Andes, 07.

Andrés Saldaña. Undergraduate thesis. Universidad del Valle, 16.
 Hanner Bastidas. Undergraduate thesis. Universidad del Valle, 16.
 John Guo. Undergraduate independent research, San Francisco State University, 15.
 David Arcila. Undergraduate thesis. Universidad Nacional de Colombia, 14.
 Diego Cifuentes. 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 independent 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.

Igor Kortchemski. High school research, Clay Research Academy, 05, with Richard Stanley.

**Selected talks
(invited intnatl.)**

Formal Power Series + Algebraic Combinatorics, Plenary Speaker, Vancouver, Canada, 16.
 Congreso Latinoamericano de Matemáticos, Invited Speaker, Barranquilla, Colombia, 16.
 Discrete Models in Geometry and Topology, FU Berlin, Germany 15.
 Pacific Rim Mathematical Association Congress, Plenary Speaker, Sydney, Australia, 09.
 NIMS Hot Topics Workshop on Algebraic Combinatorics, Daejeon, Korea, 09.
 MSRI Tropical Geometry Program, Connections for Women Mini-course, Berkeley, USA, 09.

- (invited national)** Joint Mathematics Meetings, AMS Plenary Speaker, San Diego, CA, 18.
 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.
 Congreso Mexicano de Matemáticas, Plenary Speaker, San Luis Potosí, México, 11.
 Congreso Colombiano de Matemáticas, Plenary Speaker, B/manga, Colombia, 11.
 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.
 Congreso Colombiano de Matemáticas, Plenary Speaker, Bogotá, Colombia, 05.
 Combinatoria Algebraica y Topológica, Mini-course, Bogotá, Colombia, 03.
- (international)** MSRI Workshop: Geom+Topological Combinatorics: Modern Techniques, Berkeley, CA 17.
 MSRI Intro. Workshop: Geometric and Topological Combinatorics, Berkeley, CA, 17.
 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.
 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.
 FPSAC International Conference, 16, 14, 13, 12, 11, 09, 07, 06, 05, 04, 03, 02
 Topology and Combinatorics Session, Math. Congress of the Americas, Guan., México, 13.
 Enumerative Combinatorics Session, Math. Congress of the Americas, Guan., México, 13.
 Matroids, Oriented Matroids, and Applications, CIRM, Marseille, France, 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)** AMS-MAA Session, Posets in alg., top., and enumerative combinatorics, Atlanta, GA, 17.
- SIAM Sessstion 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 Sessstion 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.

(seminars)

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.
 University of California, Berkeley, Mathematics Colloquium, Berkeley, CA, USA, 17.
 University of San Francisco, Mathematics Colloquium, San Francisco, CA, USA, 16, 10.
 Reed College Mathematics Colloquium, Portland, OR, 14.
 Universidad del Valle Colloquium, Cali, Colombia, 14, 12.
 Universidad de Los Andes Colloquium, Bogotá, Colombia, 13, 12, 08, 05, 03, 01.
 University of Southern California Colloquium, Los Angeles, CA, USA, 13.
 Dartmouth Mathematics Colloquium, Hanover, NH, USA, 12.
 University of Puerto Rico, Mathematics Colloquium, Río Piedras, PR, USA, 11.
 San Francisco State University Colloquium, San Francisco, CA, USA, 11, 05.
 Sonoma State University Colloquium, Sonoma, CA, USA, 11.
 Santa Clara University, Mathematics Colloquium, Santa Clara, CA, USA, 08.
 Universidad Nacional, Mathematics Colloquium, Bogotá, Colombia, 08.
 University of California, Colloquium, San Diego, CA, USA, 04.
 MIT Combinatorics Seminar, Cambridge, MA, USA, 18, 15, 10, 09, 07, 03.
 Stanford University, Combinatorics and Geometry Seminar, Palo Alto, CA, USA, 17, 08.
 University of Southern California, Combinatorics Seminar, Pasadena, CA, USA, 17.
 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.
 University of Texas, Number Theory Seminar, Austin, TX, USA, 08.
 Texas A&M, Algebra and Combinatorics Seminar, College Station, TX, USA, 08.
 University of California, Comm. Algebra and Alg. Geometry Sem., Berkeley, CA, 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)

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.
 Ministerio de Educación, Foro de Ed. Matem., Invited Speaker, Bogotá, Colombia, 06.
 Olimpiadas Colombianas Matem., Closing Ceremony Speaker, Bogotá, Colombia, 05.

(panels)

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.

Outreach

Colombian Team Leader / Deputy Leader, International Math. Olympiads, 99-08 / 95-98.
 Academic Coordinator, Central American and Caribbean Math. Olympiad, 01.
 My Favorite Theorem Podcast, 17.
 MSRI Undergraduate Program Colloquium, 15.
 Numberphile YouTube channel, 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.
 Scientific Committee, Coloquio Latinoamericano de Algebra 17.
 Org. Comm. Member, Conn. for Women in Geom. and Top. Combin., MSRI, Berkeley, 17.
 Scientific Committee, Congreso Colombiano de Matemáticas, Colombia, 15, 13, 09, 07.
 Steering Committee Member, 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, 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**

National Science Foundation (USA), National Security Agency (USA), Alliance for Faculty Diversity in the Math. Sciences (USA), Isaac Newton Institute (UK), Natural Sciences and Engineering Research Council (Canada), Comisión Nal de Ciencia y Tecnología (Chile)

Acta Mathematica, Advances in Applied Mathematics, Advances in Mathematics, American Mathematical Monthly, Annals of Combinatorics, Applied Mathematics Letters, Combinatorica, Comptes Rendus Mathématique, CRC Handbooks, Crelle's Journal, Discrete and Computational Geometry, Discrete Mathematics, Electronic Journal of Combinatorics, European Journal of Combinatorics, European Journal of Mathematics, 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 Combinatorial Theory Series A, Journal of Combinatorial Theory Series B, Journal of Number Theory, Journal of Statistical Planning and Inference, Journal of Symbolic Computation, Mathematica Scandinavica, Mathematics in Computer Science, 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.