Curriculum Vitae
Karola Mészáros

Work Address:	Department of Mathematics Cornell University Ithaca, NY 14853	Home Address:	115 Midway Rd Ithaca, NY 14850
Homepage:	http://www.math.cornell.edu/~karola	Email Address:	karola@math.cornell.edu

Employment

2020 – **Associate Professor of Mathematics**, Cornell University.
2014 – 2020 **Assistant Professor of Mathematics**, Cornell University.
2012 – 2014 **H.C.Wang Assistant Professor**, Department of Mathematics, Cornell University.
2011 – 2012 **NSF Fellow**, Department of Mathematics, University of Michigan, Ann Arbor.
2010 – 2011 **Lecturer**, Department of Mathematics, MIT.

Short-term Positions

Summer 2019 **Visiting Assistant Professor**, Department of Mathematics, MIT.
2018 – 2019 **von Neumann Fellow**, Institute for Advanced Study.
Winter 2016 **Invitée Paris 7**, Invited Scholar at Université Paris 7 Diderot.

Education

2005 – 2010 **Ph. D. in Mathematics**, Massachusetts Institute of Technology.
Thesis: *Root polytopes, triangulations, and subdivision algebras*,
advised by Richard P. Stanley

2001 – 2005 **B.S. in Mathematics**, Massachusetts Institute of Technology.

Scientific/Academic Honors

2019 – 2024 CAREER National Science Foundation Grant, DMS-1847284
2018 – 2019 von Neumann Fellowship at the Institute for Advanced Study
2015 – 2019 National Science Foundation Grant DMS-1501059
2011 – 2014 National Science Foundation Postdoctoral Research Fellowship
2009 – 2010 MIT Department of Mathematics Graduate Student Appreciation Fellowship
2005 – 2006 AKAMAI Fellowship
2005 AMITA (Association of MIT Alumnae) Senior Academic Award
2005 MIT Jon A. Bucsela Prize in Mathematics

Research Interests

Algebraic combinatorics, discrete geometry.

Publications and Preprints

preprints

1. Karola Mészáros, Avery St. Dizier and Arthur Tanjaya, *Principal specialization of dual characters of flagged Weyl modules*, arXiv:2105.06531
2. Karola Mészáros and Arthur Tanjaya, *Inclusion-exclusion on Schubert polynomials*, arXiv:2102.11179
3. Karola Mészáros, Linus Setiabrata and Avery St. Dizier, *An orthodontia formula for Grothendieck polynomials*, arXiv:2011.13855
4. June Huh, Jacob Matherne, Karola Mészáros and Avery St. Dizier, *Logarithmic concavity of Schur and related polynomials*, arXiv:1906.09633

5. Ricky I. Liu, Karola Mészáros and Avery St. Dizier, *Schubert polynomials as projections of Minkowski sums of Gelfand-Tsetlin polytopes.* arXiv:1903.05548

2021 6. Karola Mészáros and Linus Setiabrata, *Lorentzian polynomials from polytope projections*, Algebr. Comb., accepted.

7. Kabir Kapoor, Karola Mészáros and Linus Setiabrata, *Counting integer points of flow polytopes*, Discrete Comput. Geom., accepted.

8. Sylvie Corteel, Jang Soo Kim and Karola Mészáros, *Volumes of generalized Chan-Robbins-Yuen polytopes.* Discrete Comput. Geom. 65 (2021), no. 2, 510-530.

2020 9. Alex Fink, Karola Mészáros and Avery St. Dizier, *Zero-one Schubert polynomials.* Math. Z. accepted.

10. Karola Mészáros and Avery St. Dizier, *From generalized permutahedra to Grothendieck polynomials via flow polytopes.* Algebr. Comb. 3 (2020), no. 5, 1197–1230.

11. Samuel C. Gutekunst, Karola Mészáros and T. Kyle Petersen, *Root cones and the resonance arrangement.* Electron. J. Combin. accepted.

2019 12. Ricky I. Liu, Karola Mészáros and Avery St. Dizier, *Gelfand-Tsetlin polytopes: a story of flow and order polytopes.* SIAM J. Disc. Math. 33 (2019), no. 4, 2394–2415.

13. Karola Mészáros and Alejandro H. Morales, *Volumes and Ehrhart polynomials of flow polytopes.* Math. Z. 293 (2019), no. 3-4, 1369–1401.

14. Karola Mészáros, Alejandro H. Morales and Jessica Striker, *On flow polytopes, order polytopes, and a certain face of the alternating sign matrix polytope.* Discrete Comput. Geom. 62 (2019), no. 1, 128–163.

15. Ricky I. Liu, Karola Mészáros and Alejandro H. Morales, *Flow polytopes and the space of diagonal harmonics.* Canad. J. Math., 71 (2019), no. 6, 1495–1521.

16. Karola Mészáros, Connor Simpson and Zoe Wellner, *Flow polytopes of partitions.* Electron. J. Combin. 26 (2019), no. 1, Paper 1.47, 12 pp.

2018 17. Alex Fink, Karola Mészáros and Avery St. Dizier, *Schubert polynomials as integer point transforms of generalized permutahedra.* Adv. Math. 332 (2018), 465–475.

18. Laura Escobar and Karola Mészáros, *Subword complexes via triangulations of root polytopes.* Algebr. Comb. 1 (2018), no. 3, 395–414.

2017 19. Sylvie Corteel, Jang Soo Kim and Karola Mészáros, *Flow polytopes with Catalan volumes.* C. R. Math. Acad. Sci. Paris 355 (2017), no. 3, 248–259.

20. Patricia Hersh and Karola Mészáros, *SB-labelings and posets with each interval homotopy equivalent to a sphere or a ball.* J. Combin. Theory Ser. A, (2017), 152, 104–120.

21. Karola Mészáros, Alejandro H. Morales and Brendon Rhoades, *The polytope of Tesler matrices.* Selecta Math. (N.S.), 23 (2017), no. 1, 425–454.

22. Karola Mészáros, *Calculating Greene's function via root polytopes and subdivision algebras.* Pacific J. Math., 286 (2017), no. 2, 385–400.

2016 23. Laura Escobar and Karola Mészáros, *Toric matrix Schubert varieties and their polytopes.* Proc. Amer. Math. Soc., 144 (2016), no. 12, 5081–5096.

24. Karola Mészáros, *Pipe dream complexes and triangulations of root polytopes belong together.* SIAM J. Disc. Math., 30 (2016), no. 1, 100–111.

25. Karola Mészáros, *h-Polynomials of Reduction Trees.* SIAM J. Disc. Math., 30 (2016), no. 2, 736–762.

26. Jonah Blasiak, Ricky I. Liu and Karola Mészáros, *Subalgebras of the Fomin-Kirillov algebra*, J. Algebraic Combin., 44 (2016), no. 3, 785–829.

2015 27. Karola Mészáros and Alejandro H. Morales, *Flow polytopes of signed graphs and the Kostant partition function*. Int. Math. Res. Notices (2015) no. 3: 830–871.

28. Louis J. Billera, Lionel Levine and Karola Mészáros, *How to decompose a permutation into a pair of labeled Dyck paths by playing a game*. Proc. Amer. Math. Soc. 143 (2015), no. 5, 1865–1873.

29. Karola Mészáros, *Product formulas for volumes of flow polytopes*. Proc. Amer. Math. Soc. 143 (2015), no. 3, 937–954.

30. Karola Mészáros, *h-Polynomials via Reduced Forms*. Electron. J. Combin. 21. 22(4) (2015), #P4.18

2014 31. Karola Mészáros, Greta Panova and Alexander Postnikov, *Schur times Schubert via the Fomin-Kirillov algebra*. Electron. J. Combin. 21 (2014), no. 1, Paper 1.39, 22 pp.

32. Jang Soo Kim, Karola Mészáros, Greta Panova and David B. Wilson, *Dyck tilings, increasing trees, descents, and inversions*. J. Combin. Theory Ser. A 122 (2014), 9–27.

2013 33. Karola Mészáros and Alexander Postnikov, *Branched polymers and hyperplane arrangements*. Discrete Comput. Geom. 50, Issue 1 (2013), Page 22-38.

34. Karola Mészáros, *Labeling the regions of the type C_n Shi arrangement*, Electron. J. Combin. 20, Issue 2 (2013), P31.

2012 35. Karola Mészáros, *Demystifying a divisibility property of the Kostant partition function.* Pacific J. Math. 260-1 (2012) 215-225.

2011 36. Karola Mészáros, *Root polytopes, triangulations, and the subdivision algebra, II*. Trans. Amer. Math. Soc. **363**: # 11, 6111–6141, 2011.

37. Karola Mészáros, *Root polytopes, triangulations, and the subdivision algebra, I*. Trans. Amer. Math. Soc. **363**: # 8, 4359–4382, 2011.

2008 38. Alexander Holroyd, Lionel Levine, Karola Mészáros, Yuval Peres, James Propp, and David Wilson, *Chip-firing and rotor-routing on finite digraphs*. In and out of Equilibrium II, "Progress in Probability," Birkhäuser (2008), 331-364.

39. Karola Mészáros, *On low degree k-ordered graphs*. Discrete Math. 308, Issue 12 (2008), 2418-2426.

40. Karola Mészáros, *On 3-regular 4-ordered graphs*. Discrete Math. 308, Issue 11 (2008), 2149-2155.

41. Karola Mészáros, *Latin squares and their defining sets*. Discrete Math. 308, Issue 12 (2008), 2366-2378.

2007 42. Karola Mészáros, *On the number of genus one labeled circle trees*, Electron. J. Combin. 14 (2007), #R68.

Invited and Seminar talks

2021 June Algebra and Discrete Mathematics Seminar, UC Davis, CA
May CANADAM, Session on Flow polytopes on graphs.
May Combinatorics Seminar, UW, Seattle, WA
May Workshop on Degeneracy Loci, Columbus, OH
Apr. Algebra, Geometry, and Combinatorics Online Seminar
Apr. Invited Speaker, Workshop on Algebraic Geometry and Polyhedra, ICERM, Providence, RI

Apr. Invited Speaker, (Polytop)ics: Recent advances on polytopes, Max Planck Institute for Mathematics in the Sciences, Leipzig, Germany

2020 July (postponed) Plenary Speaker, FPSAC (Formal Power Series and Algebraic Combinatorics), Ramat-Gan, Israel

July (postponed) Invited Speaker, Algebraic Combinatorics in Cetraro, Cetraro, Italy

Apr. (postponed) Invited Speaker, Geometric Combinatorics meets Nonlinear Algebra Workshop, NYC, NY.

Apr. (postponed) Geometry, Combinatorics, and Integrable Systems Seminar, The Ohio State University, Columbus, OH

Mar. (postponed) Colloquium, Washington University, St. Louis, MO

2019 Nov Research Seminar in Combinatorics, Freie Universität, Berlin, Germany

May Invited Speaker, Mid-Atlantic Algebra, Geometry & Combinatorics Workshop, Drexel University, Philadelphia, PA

Apr. Colloquium, UIUC, Urbana-Champaign, IL

Apr. MIT Combinatorics Seminar, Cambridge, MA

Apr. Computer Science/Discrete Mathematics Seminar, Institute for Advanced Study, Princeton, NJ

Mar. University of Szeged Combinatorics Seminar, Szeged, Hungary

Mar. LaCIM Combinatorics Seminar, Montréal, Canada

2018 Dec. IAS Members' Seminar, Institute for Advanced Study, Princeton, NJ

Nov. Invited Speaker, Subtraction-Free combinatorics, a conference in honor of Sergey Fomin's 60th birthday, Ann Arbor, MI

Nov. Colloquium, Haverford College, Haverford, PA

Apr. Invited Speaker, Graduate Student Combinatorics Conference, University of Texas, Dallas, TX

Mar. Invited Speaker, Triangle Lectures in Combinatorics, NCSU, Raleigh, NC

2017 Oct Colloquium, George Mason University, Fairfax, VA

Sept. AMS Sectional Meeting, Polynomials in enumerative, algebraic and geometric combinatorics, University at Buffalo, SUNY, Buffalo, NY

Jun. Invited speaker, Algebraic and Geometric Combinatorics of Reflection Groups, CRM/LaCIM, Motréal, Canada

Apr. Combinatorics Seminar, Georgia Tech, Altanta, GA

Feb. Cornell Discrete Geometry and Combinatorics Seminar, Ithaca, NY

Jan. Colloquium, Technische Universität, Berlin, Germany

2016 Nov. UC Berkeley Combinatorics Seminar, Berkeley, CA

Nov. Invited Speaker, AIM Workshop on Polyhedral geometry and partition theory, San Jose, CA

Nov. Combinatorics Seminar, University of Washington, Seattle, WA

Jan. LIAFA: Enumerative and analytic combinatorics seminar, Université Paris 7, Paris, France

2015 Nov. Combinatorics Seminar, University of California, San Diego, CA

Nov. Combinatorics Seminar, University of Washington, Seattle, WA

Oct. Enumerative, algebraic and geometric combinatorics, AMS Sectional Meeting at Loyola University, Chicago, IL

May University of Szeged Combinatorics Seminar, Szeged, Hungary

Apr. MIT Combinatorics Seminar, Cambridge, MA

Mar. Kempner Colloquium, University of Colorado, Boulder, CO

Mar. Applied Algebra Seminar, York University, Toronto, CA

Feb. Cornell Discrete Geometry and Combinatorics Seminar, Ithaca, NY

Feb. Invited speaker, Perspectives in Lie Theory, Pisa, Italy

2014 June Invited speaker, Stanley's 70th birthday conference, Cambridge, MA
June Discrete Geometry Seminar, Freie Universität, Berlin, Germany
May Plenary speaker, ALGECOM, Urbana-Champaign, IL
Apr. University of Szeged Combinatorics Seminar, Szeged, Hungary
Feb. NCSU Algebra and Combinatorics seminar, Raleigh, NC
Jan. Invited speaker, AMS joint meetings, Session on Geometric applications of Algebraic Combinatorics, Baltimore, MD
2013 Oct. LACIM Combinatorics Seminar, Montreal, Canada
Oct. Cornell Discrete Geometry and Combinatorics Seminar, Ithaca, NY
Sep. UMN Combinatorics Seminar, Minneapolis, MN
Sep. Invited speaker, COMETA, Cortona, Italy
2012 Nov. Cornell Discrete Geometry and Combinatorics Seminar, Ithaca, NY
Apr. UM Combinatorics Seminar, Ann Arbor, MI
2011 Aug. Invited speaker, Cluster Algebras and Statistical Physics, ICERM, Providence, RI
Feb. UBC Mathematics Colloquium, Vancouver, Canada
Feb. UBC Combinatorics Seminar, Vancouver, Canada
Jan. UMN Combinatorics Seminar, Minneapolis, MN
2010 Sep. Cornell Discrete Geometry and Combinatorics Seminar, Ithaca, NY
May. Plenary speaker, Discrete Math Day, Worcester, MA.
2009 Dec. UM Combinatorics Seminar, Ann Arbor, MI
Nov. Dartmouth Combinatoricsq Seminar, Hanover, NH
Oct UW Combinatorics Seminar, Seattle, WA
Oct. Brown University Discrete Mathematics Seminar, Providence, RI
May SFSU Algebra-Geometry-Combinatorics Seminar, San Francisco, CA
Apr. UC Berkeley Discrete Mathematics Seminar, Berkeley, CA
Apr. AMS Special Session on Matroids in algebra and geometry, San Francisco, CA
Apr. UC Davis Algebra and Discrete Mathematics Seminar, Davis, CA
Feb. MIT Combinatorics Seminar, Cambridge, MA
2008 Dec. ELTE Egerváry Seminar, Budapest, Hungary
Dec. University of Szeged Combinatorics Seminar, Szeged, Hungary
Nov. Dartmouth Combinatorics Seminar, Hanover, NH

Teaching

2020 Fall MATH 4410: Introduction to Combinatorics I, Cornell undergraduate course
2020 Spring MATH 6410: Enumerative Combinatorics, Cornell graduate course
2020 Spring MATH 3340: Abstract Algebra, Cornell undergraduate course
2019 Fall MATH 4370: Computational Algebra, Cornell undergraduate course
2018 Spring MATH 6410: Enumerative Combinatorics, Cornell graduate course
2017 Spring MATH 2310: Linear Algebra with Applications, Cornell undergraduate course
2016 Spring MATH 6410: Enumerative Combinatorics, Cornell graduate course
2015 Fall MATH 4410: Introduction to Combinatorics I, Cornell undergraduate course
2015 Spring MATH 4550: Applicable Geometry, Cornell undergraduate course
2014 Fall MATH 4410: Introduction to Combinatorics I, Cornell undergraduate course
2014 Spring MATH 6410: Enumerative Combinatorics, Cornell graduate course
2013 Spring MATH 4550: Applicable Geometry, Cornell undergraduate course

Supervised Reading and Research

2021	Spring	MATH 4900: Supervised Research, Cornell undergraduates
2020	Spring	MATH 4900: Supervised Research, Cornell undergraduates
2019	Fall	MATH 4900: Supervised Research, Cornell undergraduates
2019	Fall	MATH 7900: Supervised Reading & Research, Cornell graduates
2019	Spring	MATH 4900: Supervised Research, Cornell undergraduates
2019	Spring	MATH 7900: Supervised Reading & Research, Cornell graduates
2018	Fall	MATH 4900: Supervised Research, Cornell undergraduates
2018	Fall	MATH 7900: Supervised Reading & Research, Cornell graduates
2018	Spring	MATH 4900: Supervised Research, Cornell undergraduates
2017	Fall	MATH 4900: Supervised Research, Cornell undergraduates
2017	Fall	MATH 7900: Supervised Reading & Research, Cornell graduates
2017	Spring	MATH 4900: Supervised Research, Cornell undergraduates
2017	Spring	MATH 7900: Supervised Reading & Research, Cornell graduates
2016	Fall	MATH 4900: Supervised Research, Cornell undergraduates
2013	Fall	MATH 4901: Supervised Reading, Cornell undergraduates

Thesis Committees

2020	Summer	Joseph Fluegemann, Cornell Department of Mathematics A-exam committee member
2020	Spring	Sam Gutekunst, Cornell ORIE Department B-exam committee member
2020	Spring	Avery St. Dizier, Cornell Department of Mathematics B-exam committee chair
2019	Spring	Swee Hong Chan, Cornell Department of Mathematics B-exam committee member
2019	Spring	Sagar Jha, Cornell Department of Computer Science A-exam committee member
2018	Spring	Connor Simpson, Cornell Mathematics Undergraduate Honors Thesis Advisor
2018	Spring	Avery St. Dizier, Cornell Department of Mathematics A-exam committee chair
2018	Spring	Sam Gutekunst, Cornell ORIE Department A-exam committee member
2017	Spring	Matvey Soloviev, Cornell Department of Computer Science A-exam committee member
2016	Spring	Swee Hong Chan, Cornell Department of Mathematics A-exam committee member

Mentoring and Outreach

2020-	supervising the research of mathematics graduate student Elena Hafner
2020-2021	mentored undergraduate student Matthew Dreyer on a research project
2020-2021	mentored undergraduate student Arthur Tanjaya on a research project
2018-2020	mentored undergraduate student Linus Setiabrata on a research project
2018	mentored undergraduate student Kabir Kapoor on a research project
2017	mentored Amherst College undergraduate student Sylvia Frank on a reading and research project
2017-2020	mentored ORIE graduate student Samuel Gutekunst on a research project
2016-2018	mentored undergraduate students Connor Simpson and Zoe Wellner on a research project
2016-2020	supervised the research of mathematics graduate student Avery St. Dizier
2014-2016	Involved graduate students Kai Fong Ernest Chong and Laura Escobar and undergraduates Ethan Koenig and Aravind Gollakota in research
2016	Presented on *Combinatorial Enumeration* to interested non-math majors in the Totally Awesome Math Course at Cornell (MATH 1600)
2016	Presented on *Ehrhart polynomials of integer polytopes* in the Cornell Undergraduate Math Club

2016	Presented on *Catalan numbers* to an audience of Central NY high school teachers (MATH 5080)
2014	Presented on *Fibonacci numbers* to an audience of Central NY high school teachers (MATH 5080)
2014	Presented on *Enumerative Combinatorics* to interested non-math majors in the Totally Awesome Math Course at Cornell (MATH 1600)
2013	Designed a reading course on *Combinatorics and Polytopes* for Cornell undergraduate Bradford Aymes
2013	Presented on *Polytopes and Magic Squares* in the Cornell Undergraduate Math Club

Postdocs Mentored

2022- Christian Gaetz, Klarman Fellow.

Service at the Cornell Department of Mathematics

2015-2016, 2017-2018, 2019-2020 Graduate Admissions Committee
2012-2016, 2019-2021 Math Club Committee
2014-2015, 2016-2018 Computer Committee

Professional Activities

2017 – 2018	Program Committee member for FPSAC 2018 (Formal Power Series and Algebraic Combinatorics)
2017	Organized lecture series by Luca Moci at Cornell "A survey on vector partition functions: quasi-polynomiality and beyond"
2014 – 2018	Co-organizer of the Cornell Discrete Geometry and Combinatorics seminar since Fall 2014
2006 –	Reviewer for mathematics journals (International Mathematical Research Notices; Compositio Mathematica; Mathematische Zeitschrift; Comptes Rendus Mathématique Acad. Sci. Paris; Transformation Groups; Proceedings of the American Mathematical Society; Transactions of the American Mathematical Society; Symmetry, Integrability and Geometry: Methods and Applications; Discrete & Computational Geometry; Journal of Combinatorial Theory Series A; Journal of Algebraic Combinatorics; Combinatorics, Probability and Computing; SIAM Journal of Discrete Mathematics; European Journal of Combinatorics; Discrete Mathematics; Electronic Journal of Combinatorics) and for conferences FPSAC (Formal Power Series and Algebraic Combinatorics) and SODA (Symposium on Discrete Algorithms)