

# Curriculum Vitae

## KAROLA MÉSZÁROS

Work Address: Department of Mathematics  
Cornell University  
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### 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, Linus Setiabrata and Avery St. Dizier, *An orthodontia formula for Grothendieck polynomials*, [arXiv:2011.13855](#)
  2. Karola Mészáros and Linus Setiabrata, *Lorentzian polynomials from polytope projections*, [arXiv:1912.01651](#)
  3. June Huh, Jacob Matherne, Karola Mészáros and Avery St. Dizier, *Logarithmic concavity of Schur and related polynomials*, [arXiv:1906.09633](#)

4. Kabir Kapoor, Karola Mészáros and Linus Setiabrata, *Counting integer points of flow polytopes*, [arXiv:1906.05592](#)
5. Ricky I. Liu, Karola Mészáros and Avery St. Dizier, *Schubert polynomials as projections of Minkowski sums of Gelfand-Tsetlin polytopes*. [arXiv:1903.05548](#)
6. Samuel C. Gutekunst, Karola Mészáros and T. Kyle Petersen, *Root cones and the resonance arrangement*. [arXiv:1903.06595](#)
- 2020 7. Alex Fink, Karola Mészáros and Avery St. Dizier, *Zero-one Schubert polynomials*. Math. Z. accepted.
8. Karola Mészáros and Avery St. Dizier, *From generalized permutahedra to Grothendieck polynomials via flow polytopes*. Algebr. Comb. 3 (2020), no. 5, 1197–1230.
- 2019 9. 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.
10. Karola Mészáros and Alejandro H. Morales, *Volumes and Ehrhart polynomials of flow polytopes*. Math. Z. 293 (2019), no. 3-4, 1369–1401.
11. 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.
12. Sylvie Corteel, Jang Soo Kim and Karola Mészáros, *Volumes of generalized Chan-Robbins-Yuen polytopes*. Discrete Comput. Geom. accepted.
13. 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.
14. Karola Mészáros, Connor Simpson and Zoe Wellner, *Flow polytopes of partitions*. Electron. J. Combin. 26 (2019), no. 1, Paper 1.47, 12 pp.
- 2018 15. Alex Fink, Karola Mészáros and Avery St. Dizier, *Schubert polynomials as integer point transforms of generalized permutahedra*. Adv. Math. 332 (2018), 465–475.
16. Laura Escobar and Karola Mészáros, *Subword complexes via triangulations of root polytopes*. Algebr. Comb. 1 (2018), no. 3, 395–414.
- 2017 17. 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.
18. 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.
19. Karola Mészáros, Alejandro H. Morales and Brendon Rhoades, *The polytope of Tesler matrices*. Selecta Math. (N.S.), 23 (2017), no. 1, 425–454.
20. Karola Mészáros, *Calculating Greene’s function via root polytopes and subdivision algebras*. Pacific J. Math., 286 (2017), no. 2, 385–400.
- 2016 21. Laura Escobar and Karola Mészáros, *Toric matrix Schubert varieties and their polytopes*. Proc. Amer. Math. Soc., 144 (2016), no. 12, 5081–5096.
22. Karola Mészáros, *Pipe dream complexes and triangulations of root polytopes belong together*. SIAM J. Disc. Math., 30 (2016), no. 1, 100–111.
23. Karola Mészáros, *h-Polynomials of Reduction Trees*. SIAM J. Disc. Math., 30 (2016), no. 2, 736–762.
24. Jonah Blasiak, Ricky I. Liu and Karola Mészáros, *Subalgebras of the Fomin-Kirillov algebra*, J. Algebraic Combin., 44 (2016), no. 3, 785–829.

- 2015 25. 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.
26. 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.
27. Karola Mészáros, *Product formulas for volumes of flow polytopes*. Proc. Amer. Math. Soc. 143 (2015), no. 3, 937–954.
28. Karola Mészáros,  *$h$ -Polynomials via Reduced Forms*. Electron. J. Combin. 21. 22(4) (2015), #P4.18
- 2014 29. 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.
30. 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 31. Karola Mészáros and Alexander Postnikov, *Branched polymers and hyperplane arrangements*. Discrete Comput. Geom. 50, Issue 1 (2013), Page 22-38.
32. Karola Mészáros, *Labeling the regions of the type  $C_n$  Shi arrangement*, Electron. J. Combin. 20, Issue 2 (2013), P31.
- 2012 33. Karola Mészáros, *Demystifying a divisibility property of the Kostant partition function*. Pacific J. Math. 260-1 (2012) 215-225.
- 2011 34. Karola Mészáros, *Root polytopes, triangulations, and the subdivision algebra, II*. Trans. Amer. Math. Soc. **363**: # 11, 6111–6141, 2011.
35. Karola Mészáros, *Root polytopes, triangulations, and the subdivision algebra, I*. Trans. Amer. Math. Soc. **363**: # 8, 4359–4382, 2011.
- 2008 36. 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.
37. Karola Mészáros, *On low degree  $k$ -ordered graphs*. Discrete Math. 308, Issue 12 (2008), 2418-2426.
38. Karola Mészáros, *On 3-regular 4-ordered graphs*. Discrete Math. 308, Issue 11 (2008), 2149-2155.
39. Karola Mészáros, *Latin squares and their defining sets*. Discrete Math. 308, Issue 12 (2008), 2366-2378.
- 2007 40. Karola Mészáros, *On the number of genus one labeled circle trees*, Electron. J. Combin. 14 (2007), #R68.

### Invited and Seminar talks

- 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, Mottréal, Canada
- Apr. Combinatorics Seminar, Georgia Tech, Atlanta, 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 Combinatorics 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

- 2020 Fall 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- mentoring undergraduate student Arthur Tanyaja on a research project (start date May 2020)  
 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

### Service at the Cornell Department of Mathematics

- 2015-2016, 2017-2018, 2019-2021 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)