Pavel Galashin

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RESEARCH INTERESTS

- Algebraic combinatorics
  - Total positivity
  - Cluster algebras

EDUCATION

Massachusetts Institute of Technology, Cambridge, MA, USA

- Ph.D. in Mathematics — Sep 2014 – Jun 2019
  - Advisor: Alexander Postnikov
  - Thesis title: "Totally positive spaces: topology and applications"

St. Petersburg State University, St. Petersburg, Russia

- M.S. in Mathematics — Sep 2009 – Jun 2014
  - Advisor: Gaiane Panina
  - Diploma with distinction

EMPLOYMENT

Cornell University, Ithaca, NY, USA

- Associate Professor — Jul 2025 – present

University of California, Los Angeles, Los Angeles, CA, USA

- Associate Professor — Jul 2023 – Jun 2025
- Assistant Professor — Jul 2019 – Jun 2023

FELLOWSHIPS AND AWARDS

- Alfred P. Sloan Research Fellowship — 2021–2023
- NSF CAREER Grant DMS-2046915 — 2021–2026
  Statistical mechanics and knot theory in algebraic combinatorics
- NSF Grant DMS-1954121 — 2020–2023
  Totally positive spaces and cluster algebras
- Best Student Paper — 2018
  30th International Conference on Formal Power Series and Algebraic Combinatorics
- MIT Presidential Fellowship — 2014 – 2015
- V. A. Rokhlin Grant — 2014 – 2015
- St. Petersburg Mathematical Society prize for students — 2013

SUBMITTED PAPERS

42. Amplituhedra and origami, II: loop level. arXiv:2606.03439.
41. Amplituhedra and origami, I: tree level. arXiv:2410.09574.
40. (with R. Casals, M. Gorsky, L. Shen, M. Sherman-Bennett, and J. Simental) Comparing cluster algebras on braid varieties. arXiv:2508.03816
39. (with T. Lam) Monotone links in DAHA and EHA. arXiv:2307.16794.
38. (with T. Lam, M. Sherman-Bennett, and D. Speyer) Braid variety cluster structures, I: 3D plabic graphs. arXiv:2210.04778.

ACCEPTED PAPERS

37. (with T. Lam and M. Sherman-Bennett) Braid variety cluster structures, II: general type.
    Invent. Math., available online.
36. (with T. Lam) The twist for Richardson varieties.
    Rep. Theory, to appear. arXiv:2204.05935.
35. (with T. Lam) Positroids, knots, and q,t-Catalan numbers.
    Duke Math. J., 173(11): 2117–2195, 2024.
34. (with T. Lam) Positroid Catalan numbers.
    Comm. AMS, 4: 357–386, 2024.
33. (with T. George) Move-reduced graphs on a torus.
    Trans. AMS, 377(6): 4055–4099, 2024.
32. (with T. Lam) Plabic links, quivers, and skein relations.
    Algebr. Comb., 7(2): 431–474, 2024.
31. (with T. Lam, M.-T. Trinh, and N. Williams) Rational noncrossing Coxeter–Catalan combinatorics.
    Proc. Lond. Math. Soc., 129(4): e12643, 2024.
30. Poset associahedra.
    Selecta Math. (N.S.), 30(6), 2024.

[*Last updated: 2026-10-04*]

29. Critical varieties in the Grassmannian.
Comm. Math. Phys., 401: 3277–3333, 2023.
28. (with T. Lam) Positroid varieties and cluster algebras.
Ann. Sci. Éc. Norm. Supér., 56(3): 859–884, 2023.
27. (with A. Postnikov) Purity and separation for oriented matroids.
Mem. Amer. Math. Soc., 289, 2023.
26. Totally nonnegative critical varieties.
Int. Math. Res. Not. IMRN, 2024(5): 3649–3689, 2024.
25. (with G. Nenashev and A. Postnikov) Trianguloids and triangulations of root polytopes.
J. Combin. Theory Ser. A, 201: 105802, 2024.
24. (with A. Postnikov and L. Williams) Higher secondary polytopes and regular plabic graphs.
Adv. Math., 407: 108549, 2022.
23. A formula for boundary correlations of the critical Ising model.
Probab. Theory Related Fields, 182: 615–640, 2022.
22. (with S. Karp and T. Lam) The totally nonnegative Grassmannian is a ball.
Adv. Math., 397: 108123, 2022.
21. (with S. Karp and T. Lam) Regularity theorem for totally nonnegative flag varieties.
J. Amer. Math. Soc., 35(2): 513–579, 2021.
20. Symmetries of stochastic colored vertex models.
Ann. Probab., 49(5): 2175–2219, 2021.
19. (with S. Hopkins, T. McConville, and A. Postnikov) Root system chip-firing II: Central-firing.
Int. Math. Res. Not. IMRN, 2021(13): 10037–10072, 2021.
18. (with T. Lam) Parity duality for the amplituhedron.
Compos. Math., 156(11): 2207–2262, 2020.
17. (with P. Pylyavskyy) Ising model and the positive orthogonal Grassmannian.
Duke Math. J., 169(10): 1877–1942, 2020.
16. (with P. Pylyavskyy) Quivers with subadditive labelings: classification and integrability.
Math. Z., 295: 945–992, 2020.
15. (with S. Karp and T. Lam) The totally nonnegative part of G/P is a ball.
Adv. Math., 351: 614–620, 2019.
14. (with P. Pylyavskyy) The classification of Zamolodchikov periodic quivers.
Amer. J. Math., 141(2): 447–484, 2019.
13. (with P. Pylyavskyy) Quivers with additive labelings: classification and algebraic entropy.
Doc. Math., 24: 2057–2135, 2019.
12. (with S. Hopkins, T. McConville, and A. Postnikov) Root system chip-firing I: Interval-firing.
Math. Z., 292: 1337–1385, 2019.
11. Periodicity and integrability for the cube recurrence.
Math. Z., 299: 1533–1563, 2021.
10. (with P. Pylyavskyy) Linear recurrences for cylindrical networks.
Int. Math. Res. Not. IMRN, 2019(13): 4047–4080, 2019.
9. (with P. Pylyavskyy) R-systems.
Selecta Math. (N.S.), 25(22), 2019.
8. (with P. Blagojević, N. Palić, and G. Ziegler) Some more amplituhedra are contractible.
Selecta Math. (N.S.), 25(8), 2019.
7. (with M. Farber) Weak separation, pure domains and cluster distance.
Selecta Math. (N.S.), 24(3): 2093–2127, 2018.
6. Plabic graphs and zonotopal tilings.
Proc. Lond. Math. Soc., 117(4): 661–681, 2018.
5. A Littlewood-Richardson rule for dual stable Grothendieck polynomials.
J. Combin. Theory Ser. A, 151: 23–35, 2017.
4. (with D. Grinberg and G. Liu) Refined dual stable Grothendieck polynomials and generalized Bender-Knuth involutions.
Electron. J. Combin., 23(3): Paper 3.14, 28, 2016.
3. (with V. Zolotov) Extensions of isometric embeddings of pseudo-Euclidean metric polyhedra.
Electron. Res. Announc. Math. Sci., 23: 1–7, 2016.
2. (with G. Panina) Manifolds associated to simple games.
J. Knot Theory Ramifications, 25(12): 1642003, 14, 2016.
1. Existence of a persistent hub in the convex preferential attachment model.
Probab. Math. Statist., 36(1):59–74, 2016.

TALKS

- Amplituhedra and Origami — Fall 2024-2026
  KOI Combinatorics Lectures
  MIT/Harvard Combinatorics Seminar
  Combinatorics at the Confluence (ICM 2026 Satellite)
  Université de Genève Mathematics Colloquium
  UC Berkeley Mathematics Colloquium
  Stanford Mathematics Colloquium
  Michigan Interdisciplinary Meeting on Amplitudes
  Yale Mathematics Colloquium
  Solvable Lattice Models & Interacting Particle Systems. Simons symposium in Krün, Germany
  The Amplituhedron: Structure, Combinatorics, and Positive Geometry. Les Diablerets, Switzerland
  Perfectly matched perspectives on statistical mechanics, combinatorics and geometry. A conference in honor of Richard Kenyon. Marseille, France
  Cornell Discrete Geometry and Combinatorics Seminar
  IAS Combinatorics of Fundamental Physics Workshop
- Move-reduced graphs on a torus vs positroid Catalan numbers — Spring 2024
  IPAM Workshop II: Integrability and Algebraic Combinatorics
- Geometric objects associated to planar bipartite graphs — Spring 2024
  IPAM Workshop I: Statistical Mechanics and Discrete Geometry
- Introduction to cluster algebras — Spring 2024
  IPAM: Geometry, Statistical Mechanics, and Integrability Tutorials
- Monotone links in DAHA and EHA — Spring–Summer 2023
  AIM Workshop "Algebra, geometry, and combinatorics of link homology"
  UC Davis Combinatorics Seminar
- Parity duality for the amplituhedron — Spring 2023
  Simons Center for Geometry and Physics Workshop "Combinatorics and Geometry of Convex Polyhedra"
- Braid variety cluster structures and 3D plabic graphs — Winter 2023
  USC Combinatorics Seminar
  AIM workshop "Cluster algebras and braid varieties"
- Positroids, knots, and q, t-Catalan numbers — 2021–2023
  MIT Applied Mathematics Seminar
  Cornell Oliver Club
  Duke Mathematics Department Colloquium
  Canada-Mexico-USA Conference in Representation Theory, Noncommutative Algebra, and Categorification
  Open Problems in Algebraic Combinatorics 2022
  Stanford Mathematics Department Colloquium
  AIM link homology group, cluster structures seminar (Zoom)
  AlCoVE conference (Zoom)
  Torus Knots Seminar (Zoom)
  ICERM workshop, Brown University (Zoom)
- Ising model, total positivity, and criticality — 2021–2022
  FPSAC 2021 (Zoom)
  Oberwolfach Mini-Workshop: Scattering Amplitudes, Cluster Algebras, and Positive Geometries (Zoom)
  Harvard CMSA, Combinatorics, Physics and Probability Seminar (Zoom)
  CCNY Math Colloquium (Zoom)
  Séminaire Dimers (Zoom)
  Positive Geometries in Scattering Amplitudes and Beyond Workshop (Zoom)
  Yale University Clusters and Geometry Seminar (Zoom)
  University of Michigan Combinatorics seminar (Zoom)
- Symmetries of stochastic colored vertex models — Summer 2020
  Dimers in Combinatorics and Cluster Algebras conference (Zoom)
  Russian Integrable Probability Seminar (Zoom)
- Totally positive spaces: topology and applications — 2019–2020
  St. Petersburg Geometry and Combinatorics Seminar (Zoom)
  MIT Thesis Defense
- Higher secondary polytopes and regular plabic graphs — 2019–2020
  Southern California Discrete Mathematics Symposium 2020
  10h Discrete Geometry and Algebraic Combinatorics Conference, South Padre Island, TX
- Regularity theorem for totally nonnegative flag varieties — Spring 2019
  MIT Infinite Dimensional Algebra Seminar
- Ising model and total positivity — Fall 2018
  University of Toronto Special Colloquium
  University of Illinois Integrability and Representation Theory seminar
  MIT Integrable Probability seminar
  University of California, Los Angeles Math Department Colloquium
  University of Michigan combinatorics seminar

- Plabic graphs and zonotopal tilings — 2017–2018
  30th International Conference on Formal Power Series and Algebraic Combinatorics
  University of California, Berkeley, Math 270 "Hot topics in algebra" (guest lecture)
- The totally nonnegative Grassmannian is a ball — Spring 2018
  MIT, 18.218 "Topics in combinatorics" (guest lecture)
- R-systems — Fall 2017
  AMS Joint Meeting, Special Session on Dynamical Algebraic Combinatorics, San Diego, CA
  Université du Québec à Montréal, LaCIM seminar
- Zamolodchikov periodicity and integrability — 2017–2018
  University of California, Los Angeles algebra seminar
  Infinite Analysis 17, Osaka, Japan (two lectures)
  University of California, Berkeley combinatorics seminar
  University of Michigan combinatorics seminar
  AMS Sectional Meeting at Hunter College
  Brandeis University combinatorics seminar
  University of Minnesota combinatorics seminar
  AMS Sectional Meeting at Bowdoin College
  MIT combinatorics seminar
- The symmetry and Schur expansion of dual stable Grothendieck polynomials — Fall 2015
  MIT combinatorics seminar
- Existence of a persistent hub in the convex preferential attachment model — Summer 2014
  11th International Vilnius Conference on Probability and Mathematical Statistics
- Manifolds associated to simple games — Spring 2014
  Algebraic topology and its applications seminar at Moscow State University
  St. Petersburg A. D. Aleksandrov geometry seminar

TEACHING EXPERIENCE

- UCLA Math 61: Introduction to Discrete Structures — Spring 2025
  Undergraduate class
  Lecturer. Evaluation score: 8.0 (max $= 9.0$)
- UCLA Math 206A: Combinatorial Theory — Fall 2022
  Graduate class on Symmetric Functions
  Lecturer. Evaluation score: 8.8 (max $= 9.0$)
- UCLA Math 180: Graph Theory — Spring 2022
  Undergraduate class
  Lecturer. Evaluation score: 8.23 (max $= 9.0$)
- UCLA Math 206A: Combinatorial Theory — Fall 2021
  Graduate class on Geometric Combinatorics
  Lecturer. Evaluation score: 9.0 (max $= 9.0$)
- UCLA Math 184: Enumerative Combinatorics — Spring 2021
  Undergraduate class
  Lecturer. Evaluation score: 8.14 (max $= 9.0$)
- UCLA Math 206B: Combinatorial Theory — Winter 2021
  Graduate topics class on cluster algebras
  Lecturer. Evaluation score: 8.57 (max $= 9.0$)
- UCLA Math 180: Graph Theory — Spring 2020
  Undergraduate class
  Lecturer. Evaluation score: 8.21 (max $= 9.0$)
- UCLA Math 206B: Combinatorial Theory — Winter 2020
  Graduate topics class on total positivity
  Lecturer. Evaluation score: 9.0 (max $= 9.0$)
- MIT IAP 18.01 Calculus make-up class — January 2018
  Lecturer and recitation leader
- MIT 18.02 Multivariable calculus — Fall 2016
  Recitation leader. Evaluation score: 6.2 (max $= 7.0$)
- PRIMES, SPUR, RSI, and DRP programs at MIT — 2015–2016
  Undergraduate and high school student mentor
- Differential and convex geometry — Fall 2013
  Recitation leader (St. Petersburg State University)
- Differential geometry — Spring 2012
  Recitation leader (St. Petersburg State University)