Sam Hopkins

Department of Mathematics, Howard University, Washington, D.C.
Office: Annex III (Graduate School Building) - #220

samuelfhopkins@gmail.com
sam.hopkins@howard.edu
http://www.samuelfhopkins.com

Academic appointments

Howard University, Department of Mathematics   Washington, D.C.
Associate Professor   August 2025-
    Director of Undergraduate Studies   January 2026-
Assistant Professor   August 2021-July 2025
University of Minnesota, School of Mathematics   Minneapolis, MN
NSF Postdoctoral Fellow; Mentor: Victor Reiner   September 2018-May 2021

Education

Massachusetts Institute of Technology   Cambridge, MA
PhD in Mathematics; Advisor: Alexander Postnikov   June 2018
Reed College   Portland, OR
B.A. in Mathematics   January 2013

Academic interests

My research is in algebraic and enumerative combinatorics and related areas.

Publications

'Upho lattices I: examples and non-examples of cores.' *Combinatorial Theory*, 3(2), 2025.

'Restricted Birkhoff polytopes and Ehrhart period collapse,' with Per Alexandersson and Gjergji Zaimi. *Discrete & Computational Geometry*, 73(1), 2025.

'Order polynomial product formulas and poset dynamics.' In *Open Problems in Algebraic Combinatorics*, Proceedings of Symposia in Pure Mathematics, 110, 2024.

'Homomesy via toggleability statistics,' with Colin Defant, Svetlana Poznanović, and James Propp. *Combinatorial Theory*, 3(2), 2023.

'On the q-enumeration of barely set-valued tableaux and plane partitions,' with Alexander Lazar and Svante Linusson. *European Journal of Combinatorics*, 113, 2023.

'Combinatorial reciprocity for non-intersecting paths,' with Gjergji Zaimi. *Enumerative Combinatorics and Applications*, 3(2), 2023.

'Minuscule doppelgängers, the coincidental down-degree expectations property, and rowmotion.' *Experimental Mathematics*, 31(3), 2022.

'A note on Möbius functions of upho posets.' *Electronic Journal of Combinatorics*, 29(2), 2022.

'The birational Lalanne-Kreweras involution,' with Michael Joseph. *Algebraic Combinatorics*, 5(2), 2022.

'Promotion of Kreweras words,' with Martin Rubey. *Selecta Mathematica*, 28(1), 2022.

'The Last Problem: Demystified.' *Crux Mathematicorum*, 8(2), 2022.

'Symmetry of Narayana numbers and rowvacuation of root posets,' with Colin Defant. *Forum of Mathematics, Sigma*, 9, 2021.

'Root system chip-firing II: Central-firing,' with Pavel Galashin, Thomas McConville, and Alexander Postnikov. *International Mathematics Research Notices*, 2021, no. 13.

'Plane partitions of shifted double staircase shape,' with Tri Lai. *Journal of Combinatorial Theory, Series A*, 183, 2021.

'Cyclic sieving for plane partitions and symmetry.' *Symmetry, Integrability and Geometry: Methods and Applications (SIGMA)*, 16, 2020.

'A positive formula for the Ehrhart-like polynomials from root system chip-firing,' with Alexander Postnikov. *Algebraic Combinatorics*, 2(6), 2019.

'Root system chip-firing I: Interval-firing,' with Pavel Galashin, Thomas McConville, and Alexander Postnikov. *Mathematische Zeitschrift*, 292(3-4), 2019.

'The CDE property for skew vexillary permutations.' *Journal of Combinatorial Theory, Series A*, 168, 2019.

'Fourientation activities and the Tutte polynomial,' with Spencer Backman and Lorenzo Traldi. *European Journal of Combinatorics*, 67, 2018.

'Fourientations and the Tutte polynomial,' with Spencer Backman. *Research in the Mathematical Sciences*, 4, 2017.

'Sorting via chip-firing,' with Thomas McConville and James Propp. *Electronic Journal of Combinatorics*, 24(3), 2017.

'The CDE property for minuscule lattices.' *Journal of Combinatorial Theory, Series A*, 152, 2017.

'The expected jaggedness of order ideals,' with Melody Chan, Shahrzad Haddadan, and Luca Moci. *Forum of Mathematics, Sigma*, 5, 2017.

'Quantum integer-valued polynomials,' with Nate Harman. *Journal of Algebraic Combinatorics*, 45(2), 2017.

'Parking functions and tree inversions revisited,' with Petar Gaydarov. *Advances in Applied Mathematics*, 80, 2016.

'Pattern avoidance in poset permutations,' with Morgan Weiler. *Order*, 33(2), 2016.

'Bigraphical arrangements,' with David Perkinson. *Transactions of the American Mathematical Society*, 368(1), 2016.

'A note on statistical averages for oscillating tableaux,' with Ingrid Zhang. *Electronic Journal of Combinatorics*, 22(2), 2015.

'Interlacing networks: birational RSK, the octahedron recurrence, and Schur function identities,' with Miriam Farber and Wuttisak Trongsiriwat. *Journal of Combinatorial Theory, Series A*, 133, 2015.

'Another proof of Wilmes' conjecture.' *Discrete Mathematics*, 323, 2014.

'Orientations, semiorders, arrangements, and parking functions,' with David Perkinson. *Electronic Journal of Combinatorics*, 19(4), 2012.

Preprints and unpublished notes

'Upho lattices II: ways of realizing a core,' with Joel Lewis. Preprint, 2025, `arXiv:2506.03343`.

'Two t-analogues of the inversion enumerator of trees.' Unpublished note, 2025, `arXiv:2510.22385`.

'RSK via local transformations.' Unpublished note, 2014. `arXiv:2510.22082`.

Teaching and mentorship experience

Teaching at Howard University:

- Math 156 (Calculus I), Fall 2022, Fall 2023, and Fall 2024.
- Math 157 (Calculus II), Spring 2023, Spring 2024, Spring 2025, and Fall 2025.
- Math 181 (Discrete structures), Fall 2022, Spring 2023, and Spring 2024.
- Math 210 (Graduate algebra I), Fall 2024 and Fall 2025.
- Math 211 (Graduate algebra II), Spring 2025 and Spring 2026.
- Math 273 (Graduate combinatorics I), Fall 2021 and Fall 2023.
- Math 274 (Graduate combinatorics II), Spring 2022.

Graduate student advising at Howard University:

- Caleb DeBose (PhD expected 2027)

Teaching at the University of Minnesota (UMN):

- Math 4707 (Combinatorics and graph theory), Spring 2021 and Spring 2020.
- Math 4990 (UMTYMP Advanced Topics – Combinatorics), Fall 2020.
- Math 8668 (Graduate combinatorics I), Fall 2019.

Other teaching and mentorship experience:

- Faculty at Bridge to Enter Advanced Mathematics (BEAM) Summer Away SoCal, 2023, at BEAM Discovery Los Angeles, Summers 2020 and 2021, and at BEAM Saturday schools, 2020–2022.
- Mentor for Research Experiences for Undergraduates (REU) program at UMN, Summer 2019.
- Mentor for Research Science Institute (RSI) program at MIT, Summer 2014.

Grants, awards, and honors

Simons Foundation Travel Support for Mathematicians grant, August 2024.

NSF Mathematical Sciences Postdoctoral Research Fellowship, January 2018.

National Science Foundation (NSF) Graduate Research Fellowship, April 2015.

Phi Beta Kappa, May 2013.

Selected presentations

JMM, Washington, DC, January 2026. AMS Special Session on Algebraic and Geometric Combinatorics. 'Cyclic sieving for staircase plane partitions via the space of electrical networks.'

JMM, Washington, DC, January 2026. AMS Special Session on Howard & POSTECH Collaborative Mathematical Research and Applications. 'Some thoughts on using mathematics to benchmark artificial intelligence.'

AMS Fall Central Sectional Special Session on Parking Functions and their Generalizations, Saint Louis University, St. Louis, MO, October 2025. 'Parking functions and tree inversions.'

AMS Spring Eastern Sectional Special Session on Dynamical Algebraic Combinatorics, Hartford, CT, April 2025. 'Catalan objects, lattices, and dynamics.'

AMS Spring Southeastern Sectional Special Session on Enumerative and Dynamical Combinatorics, Clemson University, Clemson, SC, March 2025. 'Catalan objects, lattices, and dynamics.'

BIRS workshop on Lattice Theory, Banff, Canada, January 2025. 'Back to the Fuss-er: Catalan objects, lattices, and dynamics.'

Mid-Atlantic Algebra, Geometry, and Combinatorics Workshop (MAAGC), George Washington University, Washington, DC, October 2024. 'Upho posets.'

FPSAC, Bochum, Germany, July 2024. 'Upho lattices and their cores' (poster).

Statistical and Dynamical Combinatorics: a celebration of Jim Propp's $2^{\binom{4}{2}}$-th Birthday, MIT, Cambridge, MA, July 2024. 'Order polynomial product formulas and poset dynamics.'

AlCoVE: an Algebraic Combinatorics Virtual Expedition, online, July 2024. 'Upho posets.'

CombinaTexas, Texas A&M University, College Station, TX, March 2024. 'Upho posets.'

CMS Winter Meeting, Session and Algebraic and Enumerative Combinatorics, Montréal, Canada, December 2023. 'Combinatorial reciprocity for non-intersecting paths.'

AMS Fall Central Sectional Special Session on Enumerative Combinatorics, Creighton University, Omaha, NE, October 2023. 'Combinatorial reciprocity for non-intersecting paths.'

Algebraic and Combinatorial Perspectives in the Mathematical Sciences (ACPMS) 1-day seminar on Birational Combinatorics, online, June 2022. 'Involutions on Dyck paths and piecewise-linear and birational lifts.'

BIRS – University of British Columbia, Okanagan (UBCO) workshop on Dynamical Algebraic Combinatorics, online and in Kelowna, Canada, November 2021. 'Promotion, webs, and plabic graphs.'

Canadian Mathematical Society (CMS) Winter Meeting, Session on Enumerative Combinatorics, online, December 2020. 'Promotion of Kreweras words.'

Banff International Research Stations (BIRS) workshop on Dynamical Algebraic Combinatorics, online, October 2020. 'Symmetry of Narayana numbers and rowvacuation of root posets.'

JMM, Denver, CO, January 2020. AMS Special Session on Combinatorial Structures and Integrable Systems. 'Cyclic sieving for plane partitions and symmetry.'

FPSAC, Ljubljana, Slovenia, July 2019. 'The CDE property for skew vexillary permutations' (poster).

AMS Spring Central and Western Sectional Special Session on Dynamical Systems and Algebraic Combinatorics, University of Hawai'i at Mānoa, Honolulu, HI, March 2019. 'The CDE property and Dyn. Alg. Combinatorics.'

FPSAC, Hanover, NH, July 2018. 'Root system chip-firing.'

JMM, San Diego, CA, January 2018. AMS Special Session on Dynamical Algebraic Combinatorics. 'The CDE property for posets and homomesy.'

AMS Fall Central Sectional Special Session on Geometric Combinatorics and Combinatorial Commutative Algebra, University of North Texas, Denton, TX, September 2017. 'Root system chip-firing.'

FPSAC, London, U.K., July 2017. 'Sorting via chip-firing' (poster).

AMS Fall Central Sectional Special Session on Chip-Firing and Divisors on Graphs and Complexes, University of St. Thomas, Minneapolis, MN, October 2016. 'Sorting via chip-firing.'

AMS Fall Eastern Sectional Special Session on Algebraic and Enumerative Combinatorics, Bowdoin College, Brunswick, ME, September 2016. 'The coincidental down-degree expectations (CDE) property for posets.'

FPSAC, Vancouver, Canada, July 2016. 'Fourientation activities and the Tutte polynomial' (poster).

Joint Mathematics Meetings (JMM), Seattle, WA, January 2016. American Mathematical Society (AMS) Special Session on Algebraic and Topological Methods in Combinatorics. 'The expected jaggedness of order ideals.'

Workshop on New Directions for the Tutte Polynomial, Royal Holloway University of London, U.K., July 2015. 'Fourientations and the Tutte polynomial' (poster).

Formal Power Series and Algebraic Combinatorics (FPSAC), Chicago, IL, July 2014. 'Bigraphical arrangements.'

Permutation Patterns Conference, Paris, France, July 2013. 'Pattern avoidance in poset permutations.'

Professional activities

Production editor and editorial board member at *Algebraic Combinatorics*, 2023-.

Co-organizer of the joint George Washington & Howard combinatorics and algebra seminar, 2025-.

Co-organizer of the Howard math department colloquium, 2024-.

Grader for the 2024 Putnam Competition.

Member of the Organizing Committee for the Spring 2024 AMS Eastern Sectional Meeting at Howard University, and co-organizer of the Special Session on Algebraic and Enumerative Combinatorics at this meeting.

Member of the Program Committee for the FPSAC 2023 conference in Davis, CA.

Website manager for the Open Problems in Algebraic Combinatorics 2022 conference at UMN, and moderator for the associated Open Problems in Algebraic Combinatorics blog (realopacblog.wordpress.com).

Co-organizer of the University of Minnesota combinatorics seminar, academic year 2018-2019.

Co-organizer of the Pure Math Grad Student Seminar (PuMaGraSS) at MIT, academic year 2014–2015.

Referee for: *Advances in Applied Mathematics*; *Algebraic Combinatorics*; *Annals of Combinatorics*; *Australasian Journal of Combinatorics*; *Combinatorial Theory*; *CRC Monographs and Research Notes in Mathematics*; *Discrete & Computational Geometry*; *Discrete Mathematics*; *Electronic Journal of Combinatorics*; *Enumerative Combinatorics and Applications*; *European Journal of Combinatorics*; *Forum of Mathematics, Sigma*; *Journal of Algebraic Combinatorics*; *Journal of Combinatorial Theory: Series A*; *Journal of Combinatorics*; *Journal of Integer Sequences*; *Mathematische Zeitschrift*; *Proceedings of the American Mathematics Society*; *Ramanujan Journal*; *Selecta Mathematica*; *Springer books*; *Symmetry, Integrability and Geometry: Methods & Applications*.

Reviewer for Mathematical Reviews/MathSciNet.

Member of the American Mathematical Society, 2013-.

Moderator on MathOverflow (mathoverflow.net) and member of the MathOverflow board, 2025-.