

Rose McCarty

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Employment

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| Georgia Institute of Technology
School of Mathematics and School of Computer Science
<i>Assistant Professor</i> | 2024 - PRESENT |
| Princeton University
Department of Mathematics
<i>Instructor and NSF Postdoctoral Fellow</i> (Sponsoring Scientist: Maria Chudnovsky) | 2022 - 2023 |
| University of Warsaw
Institute of Informatics
<i>Postdoc in ERC project</i> (Principal Investigator: Marcin Pilipczuk) | 2022 |

Education

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| University of Waterloo
<i>Ph.D. in Combinatorics and Optimization</i> (Supervisor: Jim Geelen) | 2022 |
| Georgia Institute of Technology
<i>B.Sc. in Discrete Mathematics</i> , highest honors | 2017 |

Papers

Submitted

27. *Girth in $GF(q)$ -representable matroids*, with James Davies, Meike Hatzel, Kolja Knauer, and Torsten Ueckerdt. arXiv: 2504.21797, 2025.
26. *The Structural Complexity of Matrix-Vector Multiplication*, with Emile Anand and Jan van den Brand. arXiv: 2502.21240, 2025.
25. *Fat minors cannot be thinned (by quasi-isometries)*, with James Davies, Robert Hickingbotham, and Freddie Illingworth. arXiv: 2405.09383, 2024.
24. *Universality for graphs with bounded density*, with Noga Alon, Natalie Dodson, Carmen Jackson, Rajko Nenadov, and Lani Southern. arXiv: 2311.05500, 2023.

Accepted

23. *Strongly sublinear separators and bounded asymptotic dimension for sphere intersection graphs*, with James Davies, Agelos Georgakopoulos, and Meike Hatzel. Accepted to the Symposium on Computational Geometry (SoCG), 2025.
22. *Excluding a clique or a biclique in graphs of bounded induced matching treewidth*, with Tara Abrishami, Marcin Briński, Jadwiga Czyżewska, Martin Milanič, Paweł Rzażewski, and Bartosz Walczak. arXiv: 2405.04617, 2024. Accepted to SIAM Journal on Discrete Math (SIDMA).
21. *A survey of degree-boundedness*, with Xiying Du. arXiv: 2403.05737, 2024. Accepted to European Journal of Combinatorics.
20. *Prime and polynomial distances in colourings of the plane*, with James Davies and Michał Pilipczuk. arXiv: 2308.02483, 2023. Accepted to Israel Journal of Mathematics.

Published

19. *Induced C_4 -free subgraphs with high average degree*, with Xiying Du, António Girão, Zach Hunter, and Alex Scott. Journal of Combinatorial Theory, Series B (JCTB), 2025.
18. *Decomposing a signed graph into rooted circuits*. Advances in Combinatorics, 2024.
17. *First-order model checking on monadically stable graph classes*, with Jan Dreier, Ioannis Eleftheriadis, Nikolas Mählmann, Michał Pilipczuk, and Szymon Toruńczyk. Symposium on Foundations of Computer Science (FOCS), 2024.
16. *On classes of bounded tree rank, their interpretations, and efficient sparsification*, with Jakub Gajarský. International Colloquium on Automata, Languages, and Programming (ICALP), Track B, 2024.
15. *On tree decompositions whose trees are minors*, with Pablo Blanco, Linda Cook, Meike Hatzel, Claire Hilaire, and Freddie Illingworth. Journal of Graph Theory (JGT) 2024.
14. *Sparse induced subgraphs in P_6 -free graphs*, with Maria Chudnovsky, Marcin Pilipczuk, Michał Pilipczuk, and Paweł Rzażewski. Symposium on Discrete Algorithms (SODA) 2024.
13. *Grounded L -graphs are polynomially χ -bounded*, with James Davies, Tomasz Krawczyk, and Bartosz Walczak. Discrete & Computational Geometry, 2023.
12. *Geometric graphs with unbounded flip-width*, with David Eppstein. Conference version: Canadian Conference on Computational Geometry (CCCG).
11. *Flipper games for monadically stable graph classes*, with Jakub Gajarský, Nikolas Mählmann, Pierre Ohlmann, Michał Pilipczuk, Wojciech Przybyszewski,

- Sebastian Siebertz, Marek Sokołowski, and Szymon Toruńczyk. Conference version: International Colloquium on Automata, Languages and Programming (ICALP), Track B, 2023.
10. *Colouring polygon visibility graphs and their generalizations*, with James Davies, Tomasz Krawczyk, and Bartosz Walczak. Conference version: Symposium on Computational Geometry (SoCG), 2021. Full version: Journal of Combinatorial Theory, Series B (JCTB), 2023.
 9. *Dense induced subgraphs of dense bipartite graphs*. SIAM Journal on Discrete Math (SIDMA), 2021.
 8. *Obstructions for bounded shrub-depth and rank-depth*, with O-joung Kwon, Sang-il Oum, and Paul Wollan. Journal of Combinatorial Theory, Series B (JCTB), 2021.
 7. *Sublinear separators in intersection graphs of convex shapes*, with Zdeněk Dvořák and Sergey Norin. SIAM Journal on Discrete Math (SIDMA), 2021.
 6. *Circle graphs are quadratically χ -bounded*, with James Davies. Bulletin of the London Mathematical Society, 2020.
 5. *The grid theorem for vertex-minors*, with Jim Geelen, O-joung Kwon, and Paul Wollan. Journal of Combinatorial Theory, Series B (JCTB), 2020.
 4. *7-Connected graphs are 4-ordered*, with Yan Wang and Xingxing Yu. Journal of Combinatorial Theory, Series B (JCTB), 2020.
 3. *The extremal function for bipartite linklessly embeddable graphs*, with Robin Thomas. Combinatorica, 2019.
 2. *The extremal function and Colin de Verdière graph parameter*. The Electronic Journal of Combinatorics, 2018.

Thesis

1. *Local structure for vertex-minors*, University of Waterloo, 2021.

Selected talks

Plenary talks

International Workshop on Graph-Theoretic Concepts in Computer Science (WG), Belgium	JUNE 2026 (UPCOMING)
Bertinoro Workshop on Algorithms and Graphs, Italy	OCT 2025 (UPCOMING)
Lake Michigan Workshop on Combinatorics and Graph Theory, Chicago	2025
European Conference on Combinatorics, Graph Theory and Applications (EUROCOMB), Czech Republic	2023

Invited conference and workshop talks

Workshop on Quantum Graph States, Arlington	2025
Barbados Graph Theory Workshop, Barbados	2025
Very Informal Gathering of Logicians (VIG), Los Angeles	2025
Oberwolfach Graph Theory workshop, Germany	2025
BIRS Workshop on New Perspectives in Colouring and Structure, Banff	2024
Shanks Workshop on Combinatorics and Graph Theory, Nashville	2024
Barbados Graph Theory Workshop, Barbados	2024
Structural Graph Theory Bootcamp, Warsaw	2023
MATRIX-IBS Workshop: Structural Graph Theory Downunder, Australia	2023
AMS Special Session on Logic, Combinatorics, and their Interactions, Atlanta	2023
Tenth Annual Workshop on Geometry and Graphs, Barbados	2023
Workshop on Graph Theory and Combinatorics in Memory of Robin Thomas, Atlanta	2022
Structural Graph Theory Workshop at Gułtowy	2022
Banff Graph Product Structure Theory Workshop, online	2021
Dagstuhl Seminar on Sparsity, online	2021
Canadian Discrete and Algorithmic Math Conference (CanaDAM), online	2021
Width Parameters Workshop (JCRAALMA), online	2021
CMS Winter Meeting, Toronto	2019
Canadian Discrete and Algorithmic Math Conference (CanaDAM), Vancouver	2019
Oberwolfach Meeting on Graph Theory, Oberwolfach	2019
SIAM Conference on Discrete Math, Denver	2018
Workshop on Structure in Graphs and Matroids (SiGMa), Waterloo	2017

Invited seminar talks

University of Warsaw, Algorithms Seminar, Warsaw	2025
Combinatorial Mathematics Society of Australasia Seminar, online	2024
Willamette University Mathematics Colloquium, online	2024
Shanghai Center for Mathematical Sciences Combinatorics Seminar, online	2023
Te Herenga Waka (Victoria University of Wellington), Wellington	2023
Rutgers University, Discrete Math Seminar, New Brunswick	2023
Oxford, Discrete Math and Probability Seminar, online	2022
Tulane University, Algebra and Combinatorics Seminar, New Orleans	2022
Louisiana State University, Combinatorics Seminar, Baton Rouge	2022
Jagiellonian University, Theoretical Computer Science Seminar, Kraków	2022

Georgia Tech, Graph Theory Seminar, Atlanta	2022
Georgia Tech, Combinatorics Seminar, Atlanta	2021
University of Birmingham, Combinatorics Seminar, online	2021
Princeton University, Discrete Math Seminar, online	2021
Korean Institute for Basic Science, Virtual Discrete Math Colloquium, online	2021
Matroid Union, Graphs and Matroids Seminar, online	2020
Louisiana State University, Combinatorics Seminar, online	2020
LaBRI, Graphs and Optimization Seminar, online	2020
Georgia Tech, Graph Theory Seminar, online	2020
Iowa State University, Discrete Zoominar, online	2020
Incheon National University, Combinatorics Seminar, Incheon	2019
IBS/KAIST, Joint Discrete Math Seminar, Daejon	2019
LaBRI, Graphs and Optimization Seminar, Bordeaux	2019
Georgia Tech, Graph Theory Seminar, Atlanta	2018

Teaching

Instructor, School of Mathematics, Georgia Institute of Technology

Structure for Dense Graphs (MATH 8803) (Instructor overall: 4.9/5)	FALL 2024
Combinatorial Analysis (MATH 4032) (Instructor overall: 4.61/5)	SPRING 2024
<i>Thank-a-Teacher Certificate</i>	SPRING 2024

Instructor, Department of Mathematics, Princeton University

Calculus I	FALL 2023
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Instructor, Dept. Combinatorics and Optimization, U. Waterloo

Network Flow Theory	FALL 2018
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Teaching Assistant, Dept. Combinatorics and Optimization, U. Waterloo

<i>Outstanding TA Award</i> (awarded once a semester)	SPRING 2020
Combinatorial Optimization (graduate level)	FALL 2020
Graph Theory (graduate level)	FALL 2019
Intro to Graph Theory	SPRING 2020, SPRING 2019
Intro to Combinatorics	WINTER 2020, SUMMER 2018
Intro to Optimization (advanced level)	WINTER 2018
Linear Algebra for Engineering	FALL 2017

Supervising

PhD students

James Anderson, co-supervised with Anton Bernshteyn	GRADUATED FALL 2024
Xiying Du, co-supervised with Xingxing Yu	SPRING 2024 - PRESENT
Caleb McFarland	FALL 2024 - PRESENT

Undergraduate research

Georgia Tech REU on Mathematics	JUN - JUL 2024
REU on Combinatorics and Coding Theory	JUN - JUL 2023
PACM summer fellowship at Princeton University	JUN - JUL 2023
Senior thesis at Princeton University	SEP 2022 - APR 2023
REU on Combinatorics and Coding Theory	JUN - JUL 2020

Service

Editorial board member

Annals of Combinatorics	FEB 2024 - PRESENT
European Journal of Combinatorics	OCT 2021 - PRESENT
Matroid Union (online math blog – see posts [1, 2, 3])	APR 2020 - PRESENT

Co-organizer

Barbados Graph Theory Workshop	2026 (UPCOMING)
School of Mathematics Colloquium	JAN 2024 - PRESENT
Graph Theory Seminar	JUNE 2024 - PRESENT
Matroid Union Seminar (weekly online seminar)	APR 2020 - APR 2021
Graphs and Matroids Seminar (weekly local seminar)	SEP 2019 - APR 2020

Speaker

Panel member on navigating graduate student life in MATH 6001	2024
REU on Combinatorics and Coding Theory	2023
Noetherian Ring Seminar at Princeton University	2023
Magnet Alumni Speaker Series at Wheeler High School	2020
Waterloo Math Undergrad Research Conference	2019
Undergrad Research Program in Combinatorics and Optimization	2019

Committees

ARC-ACO Fellowship Committee	FALL 2024
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Computer, Development, and Outreach Committee
Colloquium Committee

JUNE 2024 – PRESENT
JAN 2024 – PRESENT

External support

NSF Postdoctoral Research Fellowship, \$150,000

2022–2025