Zach Walsh

zwalsh6@gatech.edu
https://zachwalsh.math.gatech.edu

Employment

2022 -	Hale Visiting Assistant Professor, Georgia Institute of Technology
2020 - 2022	Postdoctoral Researcher, Louisiana State University

Education

2016 - 2020	Ph.D. in Combinatorics and Optimization, University of Waterloo Thesis: Quadratically Dense Matroids Supervisor: Peter Nelson
2015 - 2016	MMath in Combinatorics and Optimization, University of Waterloo Thesis: On the Density of Binary Matroids Without a Given Minor Supervisor: Peter Nelson
2011 - 2015	B.A. in Mathematics, *summa cum laude*, Carleton College

Preprints and Publications

Preprints

12. M. Baker, O. Lorscheid, Z. Walsh, T. Zhang. The foundation of generalized parallel connections, 2-sums, and segment-cosegment exchanges of matroids. arXiv:2404.10656, 2024.

11. J. Paat, Z. Walsh, L. Xu. Extended formulations for a class of polyhedra with bimodular cographic constraint matrices. arXiv:2311.06017, 2023.

10. R. Shi, Z. Walsh, X. Yu. Dense circuit graphs and the planar Turán number of a cycle. arXiv:2310.06631, submitted to *J. Graph Theory*, 2023.

9. R. Shi, Z. Walsh, X. Yu. Planar Turán number of the 7-cycle. arXiv:2306.13594, submitted to *European J. Combin.*, 2023.

Publications

8. J. Geelen, P. Nelson, Z. Walsh. Excluding a line from complex-representable matroids. arXiv:2101.12000, to appear in *Mem. Amer. Math. Soc.*

7. D. I. Bernstein, Z. Walsh. Matroid lifts and representability. *Electron. J. Combin.* **31**, Paper 1.15, 2024.

6. J. Paat, I. Stallknecht, Z. Walsh, L. Xu. On the column number and forbidden submatrices for Δ-modular matrices. *SIAM J. Disc. Math.*, **38**:1-18, 2024.

5. J. Oxley, Z. Walsh. Small cocircuits in minimally vertically 4-connected matroids. *SIAM J. Disc. Math.* **36**:2822-2829, 2022.

4. P. Nelson, Z. Walsh. The extremal function for geometry minors of matroids over prime fields. *SIAM J. Disc. Math.* **36**:2100–2120, 2022.

3. J. Oxley, Z. Walsh. 2-Modular matrices. *SIAM J. Disc. Math.* **36**:1231–1248, 2022.

2. Z. Walsh. A new matroid lift construction and an application to group-labeled graphs. *Electron. J. Combin.* **29**, Paper 1.6, 2022.

1. A. Khodkar, A.L. Peterson, C.J. Wahl, Z. Walsh. Uniquely bipancyclic graphs on more than 30 vertices. *J. Combin. Math. and Combin. Computing* **98**:327–342, 2016.

Invited Conference Presentations

Nov. 2023	*The Planar Turán number of the 7-cycle*, Atlanta Lecture Series XXVII, Atlanta, GA.
Oct. 2023	*The Planar Turán number of the 7-cycle*, AMS Fall Southeastern Section Meeting, Mobile, AL.
Mar. 2023	*Excluding a Line from Complex-representable Matroids*, Workshop on Algebraic Aspects of Matroid Theory, Banff, Alberta.
Oct. 2022	*Graphs and Matroids with Bounded Circumference*, AMS Fall Southeastern Sectional Meeting, Chattanooga, TN.
Mar. 2022	*A New Matroid Lift Construction*, 53rd Southeastern Combinatorics Conference (virtual).
May 2019	*Quadratically Dense Matroids*, CanaDAM, Vancouver, British Columbia.
Jul. 2017	*Density of PG(t+1,p)-Minor-Free Matroids,* SiGMA, Waterloo, Ontario.
Jul. 2016	*Density of PG(t+2,2)-Minor-Free Matroids*, International Workshop on Structure in Graphs and Matroids, Eindhoven, Netherlands.
Oct. 2014	*Uniquely Bipancyclic Graphs on More Than 30 Vertices*, 28th Midwest Conference on Combinatorics and Combinatorial Computing, Las Vegas, NV.

Teaching

	Lead Instructor at Georgia Institute of Technology
Spring 2024	Math 2603 - Introduction to Discrete Mathematics
Fall 2023	Math 3012 - Introduction to Applied Combinatorics (two sections).
Spring 2023	Math 3012 - Introduction to Applied Combinatorics.
Fall 2022	Math 3012 - Introduction to Applied Combinatorics.
	Lead Instructor at Louisiana State University
Spring 2022	Math 1552 - Analytic Geometry and Calculus II.
Fall 2021	Math 2085 - Linear Algebra.
Spring 2021	Math 1550 - Differential and Integral Calculus.
	Lead Instructor at University of Waterloo
Winter 2020	CO 370 - Deterministic Operations Research Models.
	TA at University of Waterloo
Fall 2019	CO 342 - Graph Theory.
Spring 2019	CO 446 - Matroid Theory.
Winter 2019	Math 239 - Introduction to Combinatorics.
Fall 2018	Math 239 - Introduction to Combinatorics.
Spring 2018	CO 250 - Introduction to Optimization.
Winter 2018	CO 331 - Coding Theory.
Fall 2017	CO 250 - Introduction to Optimization.
Spring 2017	ECE 103 - Discrete Mathematics for Engineers.
Winter 2017	Math 138 - Calculus 2 for Honours Mathematics.
Fall 2016	Math 127 - Calculus 1 for the Sciences.
Spring 2016	ECE 103 - Discrete Mathematics for Engineers.
Winter 2016	Math 239 - Introduction to Combinatorics.
Fall 2015	Math 103 - Introductory Algebra for the Arts and Social Sciences.

Awards

2023	Georgia Tech Student Recognition of Excellence in Teaching: Fall Semester 2023 Course/Instructor Opinion Survey Honor Roll.
2023	Georgia Tech Student Recognition of Excellence in Teaching: Spring Semester 2023 Course/Instructor Opinion Survey Honor Roll.
2021 - 2023	AMS-Simons Travel Grant.
2020	Nominated for the Canadian Mathematical Society Blair Spearman Doctoral Prize.

Service

2024	Co-organizer of the 28th Atlanta Lecture Series in Graph Theory and Combinatorics.
2023 - present	Co-editor of the Matroid Union blog.
2023 - present	Co-organizer of the online Graphs and Matroids seminar hosted by the Matroid Union blog.
2023	Co-organizer of a Graphs and Matroids minimsymposium for the CanaDAM 2023 conference in Winnipeg, Manitoba.
2023	Co-organizer of a graduate student and postdoc session for the ACORN 2023 conference in Atlanta, Georgia.
2021	Mentor for the Student Research Mentorship program at Kenilworth Science and Technology Middle School in Baton Rouge, Louisiana.
2018 - 2020	Co-organizer of the C&O and Pure Math Joint Colloquium series at University of Waterloo.