

Zach Walsh

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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

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