

Sam Spiro

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Positions

2022– **NSF Research Fellow**, *Rutgers University*.
Supervisor: Bhargav Narayanan

Education

2017–2022 **Ph.D. in Mathematics**, *UC San Diego (UCSD)*.
Adviser: Jacques Verstraëte

2013–2017 **B.S. in Mathematics and Computer Science**, *University of Miami*.

2016 (Fall) Budapest Semesters in Mathematics.

Research Interests

Extremal combinatorics, probabilistic combinatorics, spectral graph theory, enumerative combinatorics, elementary number theory, game theory.

List of Papers

1. **The Random Turán Problem for Theta Graphs** (with Gwen McKinley).
Submitted, 2022.
2. **Triangle Percolation on the Grid** (with Igor Araujo, Bryce Frederickson, Robert Krueger, Bernard Lidicky, Tyrrell McAllister, Forian Pfender, and Eric Stucky).
Submitted, 2022.
3. **Antichain Codes** (with Benjamin Gunby, Xiaoyu He, and Bhargav Narayanan).
Bulletin of the London Mathematical Society (Accepted), 2022.
4. **Random Polynomial Graphs for Random Turán Problems**.
Journal of Graph Theory (Accepted), 2022.
5. **Incidence-free sets and edge domination in incidence graphs** (with Sam Adriaensen and Sam Mattheus).
Submitted, 2022.
6. **New Eigenvalue Bound for the Fractional Chromatic Number** (with Krystal Guo).
Submitted, 2022.
7. **Counting Deranged Matchings** (with Erlang Surya).
Submitted, 2022.
8. **Zero Forcing with Random Sets** (with Bryan Curtis, Luyining Gan, Jamie Haddock, and Rachel Lawrence).
Submitted, 2022.
9. **Semi-restricted Rock, Paper, Scissors** (with Erlang Surya and Ji Zeng).
Submitted, 2022.

10. **Complementary Vanishing Graphs** (with Craig Erickson, Luyining Gan, Jurgen Kristchgau, and Jephian C.-H. Lin).
Submitted, 2022.
11. **On t -intersecting Hypergraphs with Minimum Positive Codegrees.**
SIAM Journal of Discrete Mathematics, Volume 37-2, 2021.
12. **Continuously Increasing Subsequences of Random Multiset Permutations** (with Alexander Clifton, Bishal Deb, Yifeng Huang, and Semin Yoo).
European Journal of Combinatorics, Volume 110, 2021.
13. **Saturation Problems in Convex Geometric Hypergraphs** (with Jason O'Neill).
European Journal of Combinatorics, Volume 110, 2021.
14. **Maximal Independent Sets in Clique-free Graphs** (with Xiaoyu He and Jiaxi Nie).
European Journal of Combinatorics, Volume 106, 2021.
15. **Linear Bounds for Cycle-free Saturation Games** (with Sean English, Tomas Masarik, Grace McCourt, Erin Meger, and Michael S. Ross).
The Electronic Journal of Combinatorics 29(3), 2021.
16. **A Smoother Notion of Spread Hypergraphs.**
Combinatorics Probability and Computing, Volume 32-5, 2021.
17. **The Wiener Index of Signed Graphs.**
Applied Mathematics and Computation, Volume 416, 2021.
18. **Online Card Games.**
Electronic Journal of Probability, Volume 27, 2021.
19. **The Maximum Number of Appearances of a Word in a Grid** (with Gregory Patchell).
The American Mathematical Monthly, Volume 129 Issue 5, 2021.
20. **Relative Turán Numbers for Hypergraph Cycles** (with Jacques Verstraëte).
Discrete Mathematics 344 (10), 112542, 2020.
21. **Practical Strategies for Card Guessing with Feedback** (with Persi Diaconis and Ron Graham).
The American Mathematical Monthly, Volume 129 Issue 7, 2021.
22. **Card Guessing with Partial Feedback** (with Persi Diaconis, Ron Graham, and Xiaoyu He).
Combinatorics, Probability and Computing, 1–20, 2021.
23. **Counting Hypergraphs with Large Girth** (with Jacques Verstraëte).
Journal of Graph Theory, Volume 100 Issue 3, 2020.
24. **Relative Turán Problems for Uniform Hypergraphs** (with Jacques Verstraëte).
SIAM Journal on Discrete Mathematics 35 (3), 2170–2191, 2020.
25. **Forbidding $K_{2,t}$ -traces in Triple Systems** (with Ruth Luo).
The Electronic Journal of Combinatorics P2–4, 2021.
26. **An Averaging Process on Hypergraphs.**
Journal of Applied Probability 1–10, 2020.
27. **Triangle-Free Subgraphs of Hypergraphs** (with Jiaxi Nie and Jacques Verstraëte).

Graphs and Combinatorics, 1–16, 2020.

28. **Ballot Permutations and Odd Order Permutations.**
Discrete Mathematics 343 (6), 111869, 2020.
29. **Subset Parking Functions.**
Journal of Integer Sequences 22(7), 2019.
30. **Slow Recurrences.**
Journal of Number Theory 218, 370–401, 2020.
31. **Counting Labeled Threshold Graphs with Eulerian Numbers.**
Australasian Journal of Combinatorics, 2020.
32. **Slow Fibonacci Walks** (with Fan Chung and Ron Graham).
Journal of Number Theory 210, 142–170, 2019.
33. **Random Graphs Induced by Catalan Pairs** (with Daniël Kroes).
Journal of Combinatorics 12(4), 2021.
34. **Saturation Games for Odd Cycles.**
The Electronic Journal of Combinatorics P4–11, 2019.
35. **Polynomial Relations Between Matrices of Graphs.**
Journal of Graph Theory 90 (3), 288–303, 2018.
36. **Forbidden Families of Minimal Quadratic and Cubic Configurations** (with Attila Sali).
The Electronic Journal of Combinatorics 24(2), 2017.

Honors and Awards

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| 2022– | NSF Mathematical Sciences Postdoctoral Research Fellowship. |
| 2019–2022 | NSF Graduate Research Fellowship. |
| 2016, 2017 | James McKnight Outstanding Mathematics Major (University of Miami). An award given to one math major each year. |

Service

Refereeing:

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| 2017– | Served as a referee or mathematical reviewer for over 61 articles. |
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Organization:

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| 2024 | Co-organizer of AMS Special Session at JMM. |
| 2022–2023 | Co-organizer of the Combinatorics-Related Open Problem Seminar. Virtual. |
| 2022 | Co-organizer of AMS Special Session at JMM. |
| 2018–2022 | Co-organizer of the Graduate Student Combinatorics Conference 2022. UCSD. |
| 2019–2022 | Co-organizer of the Graduate Student Seminar. UCSD. |
| 2018–2022 | Co-organizer of the Graduate Student Combinatorics Seminar. UCSD. |
| 2017–2022 | Co-organizer of Banach Barski (weekly graduate student social event). UCSD. |

Mentorship:

- 2023 Postdoc Mentor for the Graduate Research Workshop in Combinatorics.
- 2022 Mentor for Directed Reading Program. Rutgers University.
- 2021–2022 Association for Women in Mathematics mentor. UCSD.
- 2020–2022 GradAMP mentor (helped undergraduates apply to graduate school). UCSD.

Experiences

- 2022 AMS MRC program: Models and Methods for Sparse (Hyper)Network Science.
- 2021 AMS MRC program: Approaches to Inverse Problems using Combinatorics and Linear Algebra (participant and organizer of special section at JMM 2022).
- 2019 MSRI Graduate Summer School: The Polynomial Method.
- 2019, 2022 Graduate Research Workshop in Combinatorics.
- 2016 University of Chicago REU Program.

Invited Talks

- Jan 2024 AMS Special Session on Thresholds in Random Structures, JMM.
- June 2023 Minisymposium on Extremal Combinatorics and Beyond, CANADAM.
- April 2022 Special Session on Extremal Graph Theory, AMS Spring Central Sectional Meeting.
- Feb 2023 Workshop on Ramsey Theory, UC San Diego.
- Jan 2023 ILAS - AIM Special Session on The Inverse Eigenvalue Problem for a Graph and Zero Forcing, JMM.
- Jan 2023 AMS Special Session on Research from Graduate Research Workshop in Combinatorics, JMM.
- Oct 2022 Combinatorics Seminar, University of South Carolina.
- Oct 2022 Combinatorics Seminar, University of Delaware.
- Oct 2022 Special Session on Graphs, Hypergraphs, and Set Systems; AMS Fall Western Sectional Meeting.
- May 2022 Combinatorics Seminar, Iowa State University.
- Oct 2021 Combinatorics Seminar, UC Riverside.
- Sept 2021 Graph Theory and Combinatorics Seminar, UIUC.
- July 2021 Minisymposium on Extremal Graph Theory and Combinatorics, SIAM Conference on Discrete Mathematics.
- Oct 2020 Combinatorics Seminar, University of Delaware.

Teaching Experience**Instructor:**

- Fall 20223 Introduction to Topology. Rutgers

TA Experience:

Spring 2019 Combinatorics. UCSD
Winter 2019 Complex Analysis. UCSD
Fall 2018 Partial Differential Equations. UCSD
Fall 2018 Graduate Linear Algebra. UCSD
Spring 2018 Game Theory. UCSD
Fall 2017 Calculus III. UCSD