Asaf Ferber

Contact Information

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Research Interests

My current research mainly focuses (but not restricted) to the following topics: Extremal and probabilistic combinatorics, random graphs and hypergraphs, random discrete matrices, additive combinatorics, and applications to theoretical computer science.

Education

University of California, Irvine

Assistant Professor, 2019-current.

Massachusetts Institute of Technology (MIT)

Instructor, Applied Mathematics, 2016-2019.

Yale University

Gibbs Assistant Professor, July 2015-2016.
Postdoc, Mathematics, January 2015 up to July 2015.
- Mentor: Van Vu.

Tel Aviv University

Postdoc, Mathematics, December 2014 (one month position before moving to the US).

ETH Zürich.

Postdoc, Institute of Theoretical Computer Science, 2013-2014
- Mentor: Angelika Steger.

Tel Aviv University

PhD, Mathematics, 2014
- Advisor: Michael Krivelevich.

M.Sc, Mathematics, 2009
- Advisor: Moti Gitik

B.Sc., Mathematics, 2006

Honors and Awards

Sloan's fellowship 2022.
NSF CAREER award DMS-2146406 (434,998USD, to be started in July 2022).
NSF grant DMS-1953799 (210,000USD for three years, started in June 2020).
NSF grant DMS-6935855 (170,000USD for three years, started in June 2017).
NSF travel award for participating in an Oberwolfach workshop, 2017.
Excellent teacher, School of Mathematical Sciences, Tel Aviv University, 2013.
Best teacher, Faculty of Engineering, Tel Aviv University, 2013.
Excellent PhD student's scholarship, Faculty of Exact Sciences, Tel Aviv University, 2012.
Prize for excellence in PhD studies, School of Mathematical Sciences, Tel Aviv University, 2011.

Articles

Two of my results have been featured as articles in Quanta magazine:
- Lower bounds for multicolor Ramsey numbers.
- Every graph contains a linearly sized induced subgraph with all degrees odd.

PUBLICATIONS

Published papers

1. Moti Gitik and Asaf Ferber, On almost precipitous ideals, Archive for Mathematical Logic: Volume 49, Issue 3 (2010), Page 301–328.
2. Sonny Ben-Shimon, Asaf Ferber, Dan Hefetz and Michael Krivelevich, Hitting time results for Maker-Breaker games, Random Structures and Algorithms, 41 (2012), 23–46. An extended abstract appeared in the Proceedings of the 22nd ACM-SIAM Symposium on Discrete Algorithms (SODA'11), 900–912, 2011.
3. Asaf Ferber, Dan Hefetz and Michael Krivelevich, Fast embedding of spanning trees in biased Maker-Breaker games, European Journal of Combinatorics, 33 (2012), 1086-–1099.
4. Asaf Ferber and Dan Hefetz, Winning strong games through fast strategies for weak games, The Electronic Journal of Combinatorics, 18(1) 2011, P144.
5. Dennis Clemens, Asaf Ferber, Michael Krivelevich and Anita Liebenau, Fast winning strategies in Maker-Breaker games on sparse random boards, Combinatorics, Probability and Computing, 21 (2012), 897–915.
6. Asaf Ferber and Dan Hefetz, Weak and strong k-connectivity games, European Journal of Combinatorics (2014), 169–183.
7. Asaf Ferber, Roman Glebov, Michael Krivelevich, Hong Liu, Cory Palmer, Tomas Valla and Mate Vizer, The biased odd cycle game, Electronic Journal of Combinatorics, 20(2) (2013), P9.
8. Asaf Ferber, Michael Krivelevich and Alon Naor, Avoider-Enforcer games played on edge disjoint hypergraphs, Discrete Mathematics, 313 (2013), 2932–2941.
9. A. Ferber, R. Hod, M. Krivelevich and B. Sudakov, Almost k-Steiner systems exist, Journal of Combinatorial Designs 22 (2014), 488–494.
10. Asaf Ferber, Rajko Nenadov, Andreas Noever, Ueli Peter, Nemanja Škorić, Robust hamiltonicity of random directed graphs, SODA'15.
11. Asaf Ferber, Closing gaps in problems related to Hamilton cycles in random graphs and hypergraphs, Electronic Journal of Combinatorics, Vol. 21, Issue 2 (2015), P1.61.
12. Michelle Delcourt and Asaf Ferber, On a conjecture of Thomassen, Electronic Journal of Combinatorics, Volume 22, Issue 3 (2015), 1–8.
13. Asaf Ferber, Michael Krivelevich and Humberto Naves, Generating random graphs in biased Maker-Breaker games, Random Structures and Algorithms, Volume 47, Issue 4 (2015), 615—634.
14. Asaf Ferber, Roman Glebov, Michael Krivelevich and Alon Naor, Biased games on random boards, Random Structures and Algorithms, 46 (2015), 651–676.
15. Dennis Clemens, Asaf Ferber, Roman Glebov, Dan Hefetz and Anita Liebenau, Building spanning trees quickly in Maker-Breaker games, SIAM J. Discrete Math. 29–3 (2015), pp. 1683–1705.
16. Asaf Ferber, Michael Krivelevich and Benny Sudakov, Counting and packing Hamilton l-cycles in dense hypergraphs, Journal of Combinatorics, 7 (2016), 135–157.
17. Asaf Ferber, Michael Krivelevich and Benny Sudakov, Counting and packing Hamilton cycles in dense graphs and oriented graphs, Journal of Combinatorial Theory Series B 122 (2017), 196-220.
18. Asaf Ferber, Rajko Nenadov and Ueli Peter, Universality of random graphs and rainbow embedding, Random Structures and Algorithms 48 (2016), 546-564.
19. Asaf Ferber and Michael Krivelevich, Rainbow Hamilton cycles in random graphs and hypergraphs, Recent trends in combinatorics, IMA Volumes in Mathematics and its applications, A. Beveridge, J. R. Griggs, L. Hogben, G. Musiker and P. Tetali, Eds., Springer 2016, 167-189.

20. Asaf Ferber, Michael Krivelevich, Benny Sudakov and Pedro Vieira, Finding Hamilton cycles in random graphs with few queries, Random Structures and Algorithms 49 (2016), 535-668.
21. Asaf Ferber, Michael Krivelevich, Benny Sudakov and Pedro Vieira, Finding paths in sparse random graphs requires many queries, Random Structures and Algorithms 50 (2017), 71-85.
22. David Conlon, Asaf Ferber, Rajko Nenadov and Nemanja Skorić, Almost-spanning universality in random graphs, Random Structures and Algorithms, 50 (3) (2017), 380–393.
23. Asaf Ferber, Michael Krivelevich and Gal Kronenberg, Efficient winning strategies in random-turn Maker-Breaker games. Journal of Graph Theory 85 (2017), 446–465.
24. Asaf Ferber, Gal Kronenberg and Eoin Long, Packing, Counting and Covering Hamilton cycles in random directed graphs, Israel Journal of Mathematics, 220 (1) (2017), 57–87.
25. Asaf Ferber, Choongbum Lee and Frank Mousset, Packing bounded-degree spanning graphs from separable families, Israel Journal of Mathematics, 219 (2), (2017), 959–982.
26. Asaf Ferber, Kyle Luh, Daniel Montealegre and Oanh Nguyen, Packing loose Hamilton cycles in random hypergraphs, Combinatorics, Probability and Computation, 26 (6) (2017), 839–849.
27. Asaf Ferber, Kyle Luh and Oanh Nguyen, Bulletin of the London Mathematical Society, 49 (5) (2017), 784–797.
28. Afonso S. Bandeira, Asaf Ferber and Matthew Kwan, Resilience for the Littlewood-Offord problem, Advances in Mathematics, 319 (2017), 292–312.
29. Asaf Ferber and Van Vu, Packing perfect matchings in random hypergraphs, Random Structures and Algorithms, 52 (3) (2018), 367–378
30. Asaf Ferber, Eoin Long and Benny Sudakov, Counting Hamilton decomposition in oriented graphs, International Mathematics Research Notices, 22 (2018), 6908–6933.
31. Asaf Ferber, Matthew Kwan and Benny Sudakov, Counting Hamilton cycles in sparse random directed graphs, Random structures & algorithms, 53 (4) (2018), 592–603.
32. Asaf Ferber and Rajko Nenadov, Spanning universality in random graphs, Random Structures & Algorithms, 53(4) (2018), 604–637.
33. Asaf Ferber and Eoin Long, Packing and Counting arbitrary Hamilton cycles in random directed graphs, Random Structures & Algorithms 54.3 (2019): 499–514.
34. Asaf Ferber and Wojtek Samotij, Packing trees of unbounded degrees in random graphs, Journal of the London Mathematical Society 99.3 (2019): 653-677.
35. Asaf Ferber, Daniel Montealegre and Van Vu, Law of the Iterated Logarithm for various graph parameters, Random Structures and Algorithms, 54 (1) (2019), 3–38.
36. Asaf Ferber, Gweneth McKinley, and Wojtek Samotij, Supersaturated sparse graphs and hypergraphs, International Mathematics Research Notices 2020 (2), 378–402.
37. Asaf Ferber and Vishesh Jain, 1-factorizations of pseudorandom graphs, Random Structures & Algorithms, 57 (2020), 259–278. Also appeared in FOCS 2018.
38. Asaf Ferber, Gal Kronenberg and Kyle Luh, Optimal Threshold for a Random Graph to be 2-Universal, Transactions of the American mathematical Society 372 (6) (2019), 4239–4262.
39. Asaf Ferber and Vishesh Jain, Singularity of random symmetric matrices—- a combinatorial approach to improved bounds, Forum of Mathematics, Sigma, 7, (2019) E22.
40. Asaf Ferber, Vishesh Jain and Benny Sudakov, Number of 1-factorizations of regular high degree graphs, Combinatorica (2020), 1–30.
41. Omer Angel, Asaf Ferber, Benny Sudakov, and Vincent Tassion, Long Monotone Trails in Random Edge-Labellings of Random Graphs, Combinatorics, Probability and Computing 29 (1) (2020), 22–30.

42. Jacob Fox, Asaf Ferber and Vishesh Jain, On the linear arboricity of graphs, Journal of Combinatorial Theory, Series B 142 (2020), 56–79.
43. Asaf Ferber and Lior Hirschfeld, Co-degrees Resilience for Perfect Matchings in Random Hypergraphs, The Electronic Journal of Combinatorics (2020): P1–40.
44. Asaf Ferber, Kyle Luh, and Gweneth McKinley, Resilience of the Rank of Random Matrices, Combinatorics, Probability, and Computing, 30(2), 163–174.
45. Asaf Ferber and Matthew Kwan, Almost all Steiner triple systems are almost resolvable, Forum of Mathematics, Sigma, accepted.
46. Asaf Ferber, Vishesh Jain, Kyle Luh and Wojtek Samotij, On the counting problem in inverse Littlewood-Offord theory, Journal of the London Mathematical Society, accepted.
47. Asaf Ferber and Asaf Shapira, A quantitative Lovász criterion for Property B, Combinatorics, Probability, and Computing, 29, no. 6 (2020): 956–960.
48. David Conlon and Asaf Ferber, Lower bounds for multicolor Ramsey numbers, Advances in Mathematics 378, 107528.
49. Asaf Ferber, Singularity of random symmetric matrices – simple proof, Comptes Rendus. Mathématique 359 (6), 743–747.
50. Asaf Ferber, Matthew Kwan, and Lisa Sauermann, Singularity of sparse random matrices: simple proofs, Combinatorics, Probability and Computing 31 (1), 21–28.
51. Asaf Ferber, Vishesh Jain and Yufei Zhao, On the number of Hadamard matrices via anti-concentration, Combinatorics, Probability, and Computing, accepted.
52. Asaf Ferber, Matthew Kwan, and Lisa Sauermann, List-decodability with large radius for Reed–Solomon codes, FOCS 2022.
53. Asaf Ferber and Matthew Kwan, Dirac-type theorems in random hypergraphs, JCTB, accepted.

Submitted papers

1. Asaf Ferber, Liam Hardiman, and Adva Mond, The number of ℓ-hamiltonian cycles in dense hypergraphs, submitted.
2. Asaf Ferber, Michael Krivelevich, Every graph contains a linearly sized induced subgraph with all degrees odd, submitted.
3. Asaf Ferber, Vishesh Jain, Ashwin Sah, and Mehtaab Sawhney, Random symmetric matrices: rank distribution and irreducibility of the characteristic polynomial, submitted.
4. Asaf Ferber, Matthew Kwan, Ashwin Sah, and Mehtaab Sawhney, Singularity of the k-core of a random graph, submitted.
5. Asaf Ferber, Matthew Kwan, Bhargav Narayanan, Ashwin Sah, and Mehtaab Sawhney, Friendly bisections of random graphs, submitted.
6. Asaf Ferber, Ashwin Sah, Mehtaab Sawhney, and Yizhe Zhu, Sparse recovery properties of discrete random matrices, submitted.

TEACHING

In UCI, I have so far taught the following courses:

- Math 130A Intro to probability (winter 2020).
- Math 175 Intro to combinatorics (winter 2020).
- Math 130B Intro to probability II (spring 2020).
- Math 199 Guided reading (spring 2020).
- Math 180A Intro to Number Theory (summer session II 2020).
- Math 130A Intro to probability (winter 2021).
- Math 274 Topics class in discrete math (winter 2021).
- Math 120A Intro to group theory (spring 2021).
- Math 130A Intro to probability (summer 2021).
- Math 121B Linear Algebra 2 (fall 2021, winter 2022).

In MIT I lectured Principles of Discrete Applied Mathematics, and Algebraic Methods in Combinatroics. I was also the instructor of the Undergrads Combinatorics Seminar few times.

I served as a lecturer in the following courses at Yale University:
- Random Graphs (spring 2015).
- Introduction to functions of several variables MATH S118 (summer 2015).
- Discrete Math MATH 244 (fall 2015).
- Linear Algebra and its Applications (spring 2016).
- Introduction to random structures (spring 2016).

I served as a lecturer in the following courses at ETH, Zürich:
- Randomized algorithms and the probabilistic methods (fall 2014).
- Graphs and algorithms (spring 2014).

In Tel Aviv University, during my PhD, I was lecturing the following courses:
- Calculus I for engineers.
- Calculus II for engineers.
- Linear Algebra for engineers.
- Math for Biologists.

Teaching assistant:
- Introduction to Combinatorics and Graph Theory.
- Calculus II for mathematicians.
- Linear Algebra II for mathematicians.
- Topology.
- Calculus I for engineers.
- Calculus II for engineers.

Talks

Invinted talks

- Combinatorics and number theory seminar, Claremont, 2021.
- Combinatorics seminar, TU Ilmenau, 2021.
- Combinatorics and Probability seminar, UCI,2021.
- Combinatorics seminar, Bristol 2021.
- Joint Israeli probability seminar, 2021.
- Combinatorics and probability seminar, Oxford, 2021.
- Math colloquium, GSU, 2021.
- Combinatorics seminar, UIC, 2021.
- Guest lecturer in an undergrad graph theory class, Sydney, 2020.
- Combinatorics seminar, UIUC, 2020.
- Combinatorics seminar, Krakow, 2020.
- Combinatorics seminar, Bristol, 2020.
- Online webinar in Discrete math, 2020.
- SoCal DM, University of Southern California, 2020.
- Logic seminar, UCI, 2020.
- Stanford Probability seminar, 2020.
- Combinatorics and probability seminar, UCI, 2019.
- Combinatorics seminar, University of Rhode Island, 2019.
- BIRS, Banff workshop 2019.
- Combinatorics seminar, Stanford, 2019.
- Combinatorics seminar, UCSD, 2019.
- Combinatorics seminar, UCLA, 2019.
- Probability seminar, Yale, 2018.
- Probability seminar, Brown University, 2018.
- Oberwolfach workshop, 2018.
- Workshop on probabilistic and extremal combinatorics, Harvard, 2018.
- Probability seminar, NUS, Singapore, 2018.

- Combinatorics seminar, Stanford,2018.
- Topics in Probability seminar, Princeton, 2017.
- Additive Combinatorics' workshop, Harvard, 2017.
- Mittagseminar, ETH, Zürich, 2017.
- Oberwolfach, 2017.
- Combinatorics Seminar, MIT, 2016.
- Atlanta Lecture Series in Combinatorics and Graph Theory, Emory University, 2016.
- Combinatorics Seminar, Rutgers, 2016.
- Mittagseminar, ETH, Zürich, 2016.
- Combinatorics Seminar, Tel Aviv University, 2016.
- Combinatorics Seminar, Hebrew University, 2016.
- Geometric Functional Analysis and Probability Seminar, Weizmann Institute, 2016.
- Algorithms, Combinatorics and Optimization Seminar, Carnegie Mellon University, 2015.
- Combinatorics Seminar, Yale, fall 2015.
- Combinatorics Seminar, MIT, fall 2015.
- A workshop in Combinatorics, Birmingham, England, 2015.
- Methods and Challenges in Extremal and Probabilistic Combinatorics, BIRS, Banff, 2015.
- Combinatorics Seminar, Yale, Spring 2015.
- Combinatorics Seminar, MIT, 2014.
- SIAM, Minneapolis, 2014.
- Combinatorics Seminar, Cambridge, 2014.
- Combinatorics Seminar, Tel Aviv University, 2014.
- Combinatorics Seminar, Szeged, Hungary, 2014.
- Combinatorics Seminar, Bar-Ilan University, 2014.
- Workshop "Probability and Graphs", Eindhoven, 2014.
- RSA conference, Poznan, 2013.
- Combinatorics Seminar, Tel Aviv University, 2013.
- Mittagsseminar, ETH, 2013.
- Combinatorial Theory Seminar, University of Oxford, 2012.
- Combinatorics Seminar, University of Birmingham, 2012.
- 4th Emléktábla workshop, Hungary, 2012.
- CS colloquium, Ben-Gurion University, 2012.
- Algorithms, Combinatorics and Optimization Seminar, Carnegie Mellon University, 2012.
- Combinatorics Seminar, Bar-Ilan University, 2012.
- Combinatorics Seminar, Free University of Berlin, 2012.
- Combinatorics Seminar, Tel Aviv University, 2012.
- Workshop on Discrete Mathematics: Methods, Challenges and Applications, Eilat, 2012.

Professional service

Organizing Southern California Discrete Math symposium 2021.

Referee JAMS, Duke Mathematical Journal, Probability Theory and Related Fields, European Journal of Combinatorics, Combinatorics, Probability and Computing, Journal of Combinatorial Theory, Series A, Journal of Combinatorial Theory, Series B, Random structures & algorithms, SODA, International Mathematics Research Notices, Israel Journal of Mathematics, Journal of Graph Theory, CPC, and more.