

Shoham Letzter

Curriculum Vitae

Contact Information

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Research Interests

Extremal and probabilistic combinatorics, Ramsey theory.

Employment

- 2020– **Royal Society University Research Fellow and Lecturer**, *University College London*.
- 2020 **Royal Society University Research Fellow**, *University of Cambridge*.
- 2016–19 **Junior Fellow**, *ETH Institute for Theoretical Studies*, ETH Zürich.
- 2015–18 **Junior Research Fellow**, *Murray Edwards College*, University of Cambridge.

Education

- 2012–15 **PhD in Mathematics**, *University of Cambridge*.
Supervisor: Prof. Béla Bollobás
- 2011–12 **MASt in Pure Mathematics with Distinction**, *University of Cambridge*.
Ranked 4th, average of 95%
- 2008–10 **MSc in Mathematics Cum Laude**, *Hebrew University of Jerusalem*.
Supervisor: Prof. Ehud Friedgut
Average of 97.9%
- 2006–08 **BA in Mathematics with Computer Science Summa Cum Laude**, *Technion – Israel Institute of Technology*.
Average of 96.7%

Teaching

- 2012–20 **Supervisor**, *Analysis, Coding and Cryptography, Graph Theory, Probability*, University of Cambridge.
- Winter 2018 **Teaching Assistant**, *Probabilistic Methods in Combinatorics*, ETH Zürich.
- Winter 2017 **Teaching Assistant**, *Algebraic Methods in Combinatorics*, ETH Zürich.

Fall 2009 **Teaching Assistant**, *Linear Algebra II*, Hebrew University.
 Winter 2009 **Teaching Assistant**, *Linear Algebra for Physicists*, Hebrew University.
 2007–08 **Tutor**, Unit for Advancement of Students, Technion.

Honours and Awards

2014 *First Smith-Knight Prize*, University of Cambridge.
 2014 *Everard Verheyden Dutch Prize*, Trinity College.
 2012 *Leslie Walshaw Award*, Trinity College.
 2012–15 *CHESS Award*, University of Cambridge.
 2012–15 *EPSRC Research Studentship*.
 2012–15 *Research Scholar*, Trinity College.
 2011–15 *Studentship in Mathematics*, Trinity College.
 2009, 10 *Gold Medals*, Internet Mathematical Olympiad for Students, Ariel University Center.
 2009 *Klein Award*, Hebrew University.
 2009 *Yuval Levy Award*, Technion.
 2008, 09 *Bronze and Silver Medals*, International Mathematics Competition for University Students.
 2008 *Suzy Modrian Lieberman Award*, Technion.
 2006–08 *President's List*, Technion.
 2006–08 *Chais Excellence Program*, Technion.

Research Grants

2020– *Royal Society University Research Fellow*.

Publications

- [1] S. Letzter, *the property of having a k -regular subgraph has a sharp threshold*, Random Structures & Algorithms 42 (2012), 509–519.
- [2] V. Falgas-Ravry, T. Kittipassorn, D. Korándi, S. Letzter, and B. Narayanan, *Separating path systems*, Journal of Combinatorics 5 (2014), 335–354.
- [3] S. Letzter, *Large monochromatic triple stars in edge colourings*, Journal of Graph Theory 80 (2015), 323–328.
- [4] S. Letzter, *Path Ramsey number for random graphs*, Combinatorics, Probability and Computing 25 (2016), 612–622.
- [5] S. Letzter, *Radon numbers for trees*, Journal of Discrete Mathematics 340 (2017), 333–344.
- [6] B. Bollobás and S. Letzter, *Longest common extension*, European Journal of Combinatorics 68 (2018), 242–248.
- [7] B. Bollobás, J. Lee, and S. Letzter, *Eigenvalues of subgraphs of the cube*, European Journal of Combinatorics 70 (2018), 125–148.
- [8] V. Gruslys and S. Letzter, *Minimizing the number of triangular edges*, Combinatorics, Probability and Computing 27 (2018), 580–622.

- [9] M. Bucić, S. Letzter, B. Sudakov, and T. Tran, *Minimum saturated families of sets*, Bulletin of the London Mathematical Society 50 (2018), 725–732.
- [10] M. Bucić, S. Letzter, and B. Sudakov, *Monochromatic paths in random tournaments*, Random Structures & Algorithms 54 (2019), 69–81.
- [11] S. Letzter and R. Snyder, *The homomorphism threshold of $\{C_3, C_5\}$ -free graphs*, Journal of Graph Theory 90 (2019), 83–106.
- [12] S. Letzter, *Monochromatic cycle partitions of 2-coloured graphs with minimum degree $3n/4$* , The Electronic Journal of Combinatorics 26 (2019), P1.19.
- [13] M. Bucić, S. Letzter, and B. Sudakov, *Directed Ramsey number for trees*, Journal of Combinatorial Theory, Series B 137 (2019), 145–177.
- [14] A. Girão, S. Letzter, and J. Sahasrabudhe, *Partitioning a graph into monochromatic connected subgraphs*, Journal of Graph Theory 91 (2019), 353–364.
- [15] M. Bucić, S. Letzter, and B. Sudakov, *3-colour bipartite Ramsey number of cycles and paths*, Journal of Graph Theory 92 (2019), 445–459.
- [16] M. Bucić, S. Letzter, and B. Sudakov, *Multicolour bipartite Ramsey number of paths*, Electronic Journal of Combinatorics 26 (2019), P3.60.
- [17] O. Ben-Eliezer, C. Canonne, S. Letzter, and E. Waingarten, *Finding monotone patterns in sublinear time*, FOCS, (2019).
- [18] S. Letzter, *Many H -copies in graphs with a forbidden tree*, SIAM J. Discrete Math. 33, (2020), 2360–2368.
- [19] I. Leader, S. Letzter, B. Narayanan, and M. Walters, *Product-free sets in the free semigroup*, European Journal of Combinatorics 83, (2020), 103003.
- [20] V. Gruslys, S. Letzter, and N. Morrison, *Hypergraph Lagrangians I: the Frankl-Füredi conjecture is false*, Advances in Mathematics 365, (2020), 107063.
- [21] M. Kwan, S. Letzter, B. Sudakov, and T. Tran, *Dense induced bipartite subgraphs in triangle-free graphs*, Combinatorica 40, (2020), 283–305.
- [22] S. Letzter and J. Sahasrabudhe, *On existentially complete triangle-free graphs*, Israel Journal of Mathematics 236, (2020), 591–601.
- [23] M. Bucić, S. Heberle, S. Letzter, and B. Sudakov, *Monochromatic trees in random tournaments*, Combinatorics, Probability and Computing 29, (2020), 318–345.
- [24] S. Letzter and B. Sudakov, *The oriented size Ramsey number of directed paths*, European Journal of Combinatorics 88, (2020), 103013.
- [25] D. Korándi, R. Lang, S. Letzter, and A. Pokrovskiy, *Minimum degree conditions for monochromatic cycle partitioning*, Journal of Combinatorial Theory, Series B 146, (2021), 96–123.
- [26] I. Balla, S. Letzter, and B. Sudakov, *Orthonormal representations of H -free graphs*, Discrete & Computational Geometry, doi.org/10.1007/s00454-020-00185-0.
- [27] V. Gruslys, S. Letzter, and N. Morrison, *Hypergraph Lagrangians II: when colex is best*, Israel Journal of Mathematics, accepted.
- [28] V. Gruslys and S. Letzter, *Cycle partitions of regular graphs*, Combinatorics, Probability and Computing, accepted.

- [29] V. Gruslys and S. Letzter, *Almost partitioning the hypercube into copies of a graph*, submitted.
- [30] O. Ben-Eliezer, S. Letzter, and E. Waingarten, *Optimal adaptive detection of monotone patterns*, submitted.
- [31] J. Han, Y. Kohayakawa, S. Letzter, G. O. Mota, and O. Parczyk, *The size-Ramsey number of 3-uniform tight paths*, submitted.
- [32] E. Aigner-Horev, O. Danon, D. Hefetz, and S. Letzter, *Large rainbow cliques in randomly perturbed dense graphs*, submitted.
- [33] E. Aigner-Horev, O. Danon, D. Hefetz, and S. Letzter, *Small rainbow cliques in randomly perturbed dense graphs*, submitted.
- [34] V. Gruslys and S. Letzter, *Monochromatic triangle packings in red-blue graphs*, submitted.
- [35] V. Gruslys and S. Letzter, *Fractional triangle decompositions in almost complete graphs*, submitted.
- [36] S. Letzter, *Monochromatic connected matchings in almost complete graphs*, submitted.

Invited Talks

- July 2020 *Size-Ramsey numbers of hypergraphs*, Young Researchers in Combinatorics online primer.
- July 2020 *Monochromatic triangle packings in 2-coloured complete graphs*, Extremal and Probabilistic Combinatorics Webinar.
- Feb 2020 *Dense induced bipartite subgraphs in triangle-free graphs*, Combinatorics seminar, University of Cambridge.
- Dec 2019 *Finding monotone patterns*, Mittagsemnar, ETH Zürich.
- Sep 2019 *Saturated families*, Workshop on Probabilistic and Extremal Combinatorics, BIRS, Banff, Canada.
- Aug 2019 *Lagrangians of hypergraphs*, British Combinatorial Conference, University of Birmingham.
- Mar 2019 *Lagrangians of hypergraphs*, Combinatorics Seminar, University of Birmingham.
- Dec 2018 *Dense induced bipartite subgraphs in triangle-free graphs*, Recent Advances in Extremal Combinatorics, University of Oxford.
- Oct 2018 *Lagrangians of hypergraphs*, Mittagsemnar, ETH Zürich.
- July 2018 *Lagrangians of hypergraphs*, ICM 2018 Satellite meeting, Combinatorics: Extremal, Probabilistic and Additive, University of São Paulo.
- April 2018 *Lagrangians of hypergraphs*, DIMAP Seminar, University of Warwick.
- Feb 2018 *Path partitions of regular graphs*, Workshop on Probabilistic and Extremal Combinatorics, Harvard University.
- Jan 2018 *Path partitions of regular graphs*, Combinatorics Seminar, University of Warwick.
- Dec 2017 *Path partitions of regular graphs*, Combinatorics Seminar, Bar Ilan University.

- Dec 2017 *Path partitions of regular graphs*, Research Seminar in Combinatorics, Tel Aviv University.
- Dec 2017 *Path partitions of regular graphs*, Mittagsseminar, ETH Zürich.
- May 2017 *Ramsey problems in directed graphs*, Colloquia in Combinatorics, London School of Economics and Political Science.
- March 2017 *Ramsey problems in directed graphs*, Combinatorics Seminar, University of Cambridge.
- March 2017 *Monochromatic paths in random tournaments*, Mittagsseminar, ETH Zürich.
- Dec 2016 *Minimising the number of triangular edges*, Workshop on the polynomial method, The Hebrew University of Jerusalem.
- Nov 2016 *Minimising the number of triangular edges*, ETH-ITS Fellows Seminar.
- April 2016 *Minimising the number of triangular edges*, Oberwolfach Workshop: Combinatorics and Probability.
- March 2016 *Minimising the number of triangular edges*, British Mathematical Colloquium, University of Bristol.
- Nov 2015 *Eigenvalues of subgraphs of the cube*, Combinatorics Seminar, Queen Mary University of London.
- Nov 2015 *Monochromatic cycle partitions*, Combinatorics Seminar, University of Birmingham.
- March 2015 *Monochromatic cycle partitions*, Combinatorics Seminar, University of Cambridge.
- Feb 2015 *Monochromatic cycle partitions*, Combinatorial Theory Seminar, University of Oxford.
- Feb 2015 *Monochromatic cycle partitions — an exact result*, Combinatorics Seminar, University of Bristol.
- March 2014 *Radon numbers for trees*, Combinatorics Seminar, University of Cambridge.
- Nov 2010 *The property of having a k -regular subgraph has a sharp threshold*, Combinatorics Seminar, Hebrew University.

Supervision

- 2018 *Sven Heberle* (with Benny Sudakov), Master, ETH Zürich.
- 2017 *Macho Clemens* (with Benny Sudakov), Master, ETH Zürich.

Organisational Work

- June 2018 Co-organiser of the mini-symposium: *Extremal Problems Involving Cycles and Trees*, SIAM Conference on Discrete Mathematics, University of Colorado, Denver.

Refereeing

Referee for the journals: *Applicable Analysis and Discrete Mathematics*, *Combinatorica*, *Combinatorics*, *Probability and Computing*, *Discrete Mathematics*, *European Journal of Combinatorics*, *Journal of Combinatorial Theory B*, *SIAM Journal on Discrete Mathematics*, *Journal of Graph Theory*, *Random Structures & Algorithms*, *The Electronic Journal of Combinatorics*.

Languages

Hebrew, mother tongue.

English, Dutch, fluent.

French, German, Italian, Spanish, advanced.