Shoham Letzter

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Research interests

Extremal and probabilistic combinatorics, Ramsey theory, graph theory.

Positions

2023–	**Royal Society University Research Fellow** and **Associate Professor**, University College London.
2020–2023	**Royal Society University Research Fellow** and **Lecturer**, University College London.
2020	**Royal Society University Research Fellow**, University of Cambridge.
2016–2019	**Junior Fellow**, ETH Institute for Theoretical Studies, ETH Zürich.
2015–2018	**Junior Research Fellow**, Murray Edwards College, University of Cambridge.

Education

2012–2015	**PhD in Mathematics**, University of Cambridge. Supervisor: Prof. Béla Bollobás.
2011–2012	**MASt in Pure Mathematics**, University of Cambridge. With Distinction, average of 95%, Ranked 4th.
2008–2010	**MSc in Mathematics**, Hebrew University of Jerusalem. Cum Laude, average of 97.9%. Supervisor: Prof. Ehud Friedgut.
2006–2008	**BA in Mathematics with Computer Science**, Technion – Israel Institute of Technology. Summa Cum Laude, average of 96.7%.

Awards

2014	**First Smith-Knight Prize**, University of Cambridge.
	Everard Verheyden Dutch Prize, Trinity College.
2012	**Leslie Walshaw Award**, Trinity College.
2012–2015	**CHESS Award** and **EPSRC Research Studentship**, University of Cambridge.
	Research Scholar, Trinity College.
2011–2015	**Studentship in Mathematics**, Trinity College.
2009	**Klein Award**, Hebrew University.

Yuval Levy Award, Technion.

2008, 2009   **Bronze and Silver Medals**, International Mathematics Competition for University Students.

2008   **Suzy Mondrian Lieberman Award**, Technion.

2006–2008   **President's List**, Technion.

2006–2008   **Chais Excellence Program**, Technion.

Teaching

2023   **Probabilistic Methods in Combinatorics**, Lecturer, University College London.

2020–2021   **Algebra 1 and 2**, Tutor, University College London.

2012–2020   **Analysis, Coding and Cryptography, Graph theory, Numbers and Sets, Probability**, Supervisor, University of Cambridge.

2018   **Probabilistic Methods in Combinatorics**, Teaching Assistant, ETH Zürich.

2017   **Algebraic Methods in Combinatorics**, Teaching Assistant, ETH Zürich.

2009–2010   **Linear Algebra II**, Hebrew University.

2009   **Linear Algebra for Physicists**, Hebrew University.

Mentoring

2022–   Amedeo Sgueglia, Postdoctoral Fellow, UCL.

2021–   Kyriakos Katsamaktsis, PhD student, UCL.

2021–2022   Fangyan Ge, MSci project, UCL.

2018   Sven Heberle (with Benny Sudakov), Master's thesis project, ETH Zürich.

2017   Mancho Clemens (with Benny Sudakov), Master's thesis project, ETH Zürich.

Grants

2020–2028   **Royal Society University Research Fellow**.

2021–2023   **Research Fellows Enhanced Research Expenses**, Royal Society.

Organisation and community service

2020–   **Associate Editor**, Discrete Mathematics.

2016   **Co-organiser** of Minisymposium on Extremal Problems Involving Cycles and Trees, SIAM Conference on Discrete Mathematics, Denver.

Refereeing: Advances in Mathematics
Bulletin of the London Mathematical Society

Combinatorica
Combinatorics, Probability and Computing
Discrete Mathematics
Discrete & Computational Geometry
European Journal of Combinatorics
Graphs and Combinatorics
Israel Journal of Mathematics
Journal of Combinatorial Theory B
Journal of the American Mathematical Society
Journal of the London Mathematical Society
Journal of Graph Theory
Random Structures & Algorithms
SIAM Journal on Discrete Mathematics
The Electronic Journal of Combinatorics.

Languages

Hebrew, native speaker.

English, full professional proficiency.

Dutch, French, German, Italian, Spanish, limited working proficiency.

Talks

Invited talks

2024	New Frontiers in Probabilistic and Extremal Combinatorics, University of Oxford.
	British Combinatorial Conference, Queen Mary University of London.
	One-Day Meeting in Combinatorics, University of Oxford.
	Warwick-Oxbridge-Manchester-Bristol-London (WOMBL) 1-day meeting, Cambridge.
2023	European Conference on Combinatorics, Graph Theory and Applications (EUROCOMB'23), Prague, Czech Republic.
	Trinity 200, Cambridge.
	Postgraduate Combinatorial Conference, University of Birmingham.
	New Perspectives in Pure Mathematics Conference, University of Bristol.
2022	Workshop on Combinatorics, Oberwolfach.
	Minisymposium on Extremal and Probabilistic Combinatorics, DMV meeting, Berlin (online).
	Recent Advances in Probabilistic and Extremal Combinatorics, Ascona, Switzerland.
	Armenian Workshop On Graphs, Combinatorics, Probability, and their application to machine learning, Yenokavan, Armenia.
	Workshop on Combinatorics, Probability and Computing, Oberwolfach.

Workshop on Directed minors and digraph structure theory, online.

2021   British Early Career Mathematicians' Colloquium, University of Birmingham (online).

Minisymposium on randomness and order in geometric, extremal and structural graph theory, Moscow Conference on Combinatorics and Applications (online).

Minisymposium on Extremal Combinatorics, The Canadian Discrete and Algorithmic Mathematics Conference (CanaDAM), online.

2020   Minisymposium on Extremal and Probabilistic Combinatorics mini symposium, DMV Annual meeting, TU Chemnitz (online).

Young Researchers in Combinatorics online primer, International Centre for Mathematical Studies, Edinburgh.

2019   Workshop on Probabilistic and Extremal Combinatorics, Banff International Research Station.

Minisymposium on Extremal Combinatorics, British Combinatorial Conference, University of Birmingham.

2018   Workshop on Recent Advances in Extremal Combinatorics, University of Oxford.

ICM Satellite meeting on Combinatorics: Extremal, Probabilistic and Additive, University of São Paulo.

Workshop on Probabilistic and Extremal Combinatorics, Harvard University.

2017   Colloquia in Combinatorics, LSE.

2016   Workshop on the polynomial method, Hebrew University.

Workshop on Combinatorics and Probability, Oberwolfach.

Combinatorics session, British Mathematical Colloquium, University of Bristol.

Seminars

2023   University of Victoria Discrete Math Seminar.
Oxford Combinaotiral Theory Seminar.
Research seminar in Discrete Mathematics, Tsinghua University, Beijing (online).
Umeå Discrete Mathematics Seminar (online).
Bar-Ilan Combinatorics Seminar (online).

2022   Hebrew University Combinatorics Seminar.
Tel Aviv Research Seminar in Combinatorics.
Bristol Combinatorics Seminar.

2022   Warwick Combinatorics Seminar.
Combinatorial Mathematics Society of Australasia (online).
TU Ilmenau Combinatorics seminar (online).
TU Graz Combinatorics Seminar (online).

2021   LSE Seminar on Combinatorics, Games and Optimisation.
Ariel University CS Colloquium (online).
Tel Aviv Research Seminar in Combinatorics.

Copenhagen-Jerusalem Combinatorics Seminar (online).
Illinois Graph Theory and Combinatorics Seminar (online).
Princeton Discrete Mathematics Seminar (online).
Warwick DIMAP Seminar (online).
University of Victoria Discrete Math Seminar (online).
Hebrew University Combinatorics Seminar (online).

2020   Karlsruhe Discrete Mathematics Seminar (online).
Oxford Discrete Mathematics and Probability Seminar (online).
Queen Mary Combinatorics Study Group (online).
Extremal and Probabilistic Combinatorics Webinar (online).

2019   Cambridge Combinatorics Seminar.
ETH Zürich Mittagsseminar.
Birmingham Combinatorics Seminar.

2018   ETH Zürich Mittagsseminar.
Warwick DIMAP Seminar.
Warwick Combinatorics Seminar.

2017   Bar-Ilan Combinatorics Seminar.
Tel Aviv Research Seminar in Combinatorics.
ETH Zürich Mittagsseminar.
Cambridge Combinatorics Seminar.
ETH Zürich Mittagsseminar.

2016   ETH–ITS Fellows Seminar.

2015   Queen Mary Combinatorics Study Group.
Birmingham Combinatorics Seminar.
Cambridge Combinatorics Seminar.
Oxford Combinatorial Theory Seminar.
Bristol Combinatorics Seminar.

2014   Cambridge Combinatorics Seminar.

2010   Hebrew University Combinatorics Seminar.

Contributed talks

2022   International Colloquium on Automata, Languages and Programming (ICALP), Paris (online).

2021   SIAM Conference on Discrete Mathematics, Minisymposium on Extremal Graph Theory and Combinatorics (online).

2019   Random Structures & Algorithms, ETH Zürich.

2018   Minisymposium on Extremal Problems Involving Cycles and Trees, SIAM Conference on Discrete Mathematics, Denver.

2017   Random Structures & Algorithms, Gniezno, Poland.

European Conference on Combinatorics, Graph Theory and Applications (Eurocomb), Vienna.

2016	Minisymposium on Monochromatic Covering and Ramsey-Type Problems, SIAM Conference on Discrete Mathematics, Atlanta, Georgia.
2014	International Conference on Probability Theory and Mathematical Statistics, Vilnius, Lithuania.
	Erdős Research Students' Day, Memphis University.

Publications

Preprints

[1] K. Katsamaktsis and S. Letzter, *Building graphs with high minimum degree on a budget*, arXiv:2401.15812 (2024).

[2] N. Behague, R. Hancock, J. Hyde, S. Letzter, and N. Morrison, *Thresholds for constrained Ramsey and anti-Ramsey problems*, arXiv:2401.06881 (2024).

[3] K. Katsamaktsis, S. Letzter, and A. Sgueglia, *Rainbow subgraphs of uniformly coloured randomly perturbed graphs*, arXiv:2310.18284 (2023).

[4] K. Katsamaktsis, S. Letzter, A. Pokrovskiy, and B. Sudakov, *Ascending subgraph decomposition*, arXiv:2308.11613 (2023).

[5] S. Letzter, *Pancyclicity of highly connected graphs*, arXiv:2306.12579 (2023).

[6] G. Kronenberg, S. Letzter, A. Pokrovskiy, and L. Yepremyan, *Decomposing cubic graphs into isomorphic linear forests*, arXiv:2210.11458 (2022).

[7] J. Lee, S. Letzter, and A. Pokrovskiy, *Chi-boundedness of graphs containing no cycles with k chords*, arXiv:2208.14860 (2022).

[8] S. Letzter, A. Pokrovskiy, and L. Yepremyan, *Size-Ramsey numbers of powers of hypergraph trees and long subdivisions*, arXiv:2103.01942 (2021).

[9] V. Gruslys and S. Letzter, *Fractional triangle decompositions in almost complete graphs*, arXiv:2008.05313 (2020).

[10] V. Gruslys and S. Letzter, *Monochromatic triangle packings in red-blue graphs*, arXiv:2008.05311 (2020).

[11] V. Gruslys and S. Letzter, *Almost partitioning the hypercube into copies of a graph*, arXiv:1612.04603 (2016).

Accepted

[12] A. Girão and S. Letzter, *Partitioning a tournament into sub-tournaments of high connectivity*, **Combinatorica** (2024), to appear.

[13] S. Letzter and A. Sgueglia, *On a problem of Brown, Erdős and Sós*, **Proceedings of the American Mathematical Society** (2024), to appear.

Published

[14] S. Letzter and N. Morrison, *Directed cycles with zero weight in $\mathbb{Z}_p^k$*, **Journal of Combinatorial Theory, Series B** 168 (2024), 192–207.

[15] S. Letzter, *Separating paths systems of almost linear size*, **Transactions of the American Mathematical Society** 377 (2024), 5583–5615.

[16] S. Letzter, *Sublinear expanders and their applications*, Surveys in Combinatorics 2024 (F. Fischer and R. Johnson, eds.), London Mathematical Society Lecture Note Series, Cambridge University Press, 2024, pp. 89–130.

[17] K. Katsamaktsis, S. Letzter, and A. Sgueglia, *Rainbow Hamiltonicity in uniformly coloured perturbed digraphs*, **Combinatorics, Probability and Computing** 33 (2024), 624–642.

[18] N. Behague, T. Johnston, S. Letzter, N. Morrison, and S. Ogden, *The rainbow saturation number is linear*, **SIAM Journal on Discrete Mathematics** 38 (2024), 1239–1249.

[19] N. Kamčev, S. Letzter, and A. Pokrovskiy, *The Turán density of tight cycles in three-uniform hypergraphs*, **International Mathematics Research Notices** 2024 (2023), 4804–4841.

[20] T. Jiang, S. Letzter, A. Methuku, and L. Yepremyan, *Rainbow subdivisions of cliques*, **Random Structures & Algorithms** 64 (2024), 625–644.

[21] A. Girão and S. Letzter, *Immersion of complete digraphs in Eulerian digraphs*, **Israel Journal of Mathematics** 260 (2023), 401–425.

[22] S. Letzter, *Hypergraphs with no tight cycles*, **Proceedings of the American Mathematical Society** 151 (2023), 455–462.

[23] E. Aigner-Horev, O. Danon, D. Hefetz, and S. Letzter, *Large rainbow cliques in randomly perturbed dense graphs*, **SIAM Journal on Discrete Mathematics** 36 (2022), 2975–2994.

[24] O. Ben-Eliezer, S. Letzter, and E. Waingarten, *Finding monotone patterns in sublinear time, adaptively*, **ICALP** (2022), 17:1–17:19.

[25] S. Letzter, *An improvement on Luczak's connected matchings method*, **Bulletin of the London Mathematical Society** 54 (2022), 609–623.

[26] E. Aigner-Horev, O. Danon, D. Hefetz, and S. Letzter, *Small rainbow cliques in randomly perturbed dense graphs*, **European Journal of Combinatorics** 101 (2022), 103452.

[27] J. Han, Y. Kohayakawa, S. Letzter, G. O. Mota, and O. Parczyk, *The size-Ramsey number of 3-uniform tight paths*, **Advances in Combinatorics** (2021).

[28] V. Gruslys and S. Letzter, *Cycle partitions of regular graphs*, **Combinatorics, Probability and Computing** 30 (2021), 526–549.

[29] V. Gruslys, S. Letzter, and N. Morrison, *Hypergraph Lagrangians II: when colex is best*, **Israel Journal of Mathematics** 242 (2021), 637–662.

[30] D. Korándi, R. Lang, S. Letzter, and A. Pokrovskiy, *Minimum degree conditions for monochromatic cycle partitions*, **Journal of Combinatorial Theory, Series B** 146 (2021), 96–123.

[31] I. Balla, S. Letzter, and B. Sudakov, *Orthonormal representations of H-free graphs*, **Discrete & Computational Geometry** 64 (2020), 654–670.

[32]   S. Letzter and B. Sudakov, *The oriented size Ramsey number of directed paths*, **European Journal of Combinatorics** 88 (2020), 103103.

[33]   M. Bucić, S. Heberle, S. Letzter, and B. Sudakov, *Monochromatic trees in random tournaments*, **Combinatorics, Probability and Computing** 29 (2020), 318–345.

[34]   S. Letzter and J. Sahasrabudhe, *On existentially complete triangle-free graphs*, **Israel Journal of Mathematics** 236 (2020), 591–601.

[35]   M. Kwan, S. Letzter, B. Sudakov, and T. Tran, *Dense induced bipartite subgraphs in triangle-free graphs*, **Combinatorica** 40 (2020), 283–305.

[36]   V. Gruslys, S. Letzter, and N. Morrison, *Hypergraph Lagrangians I: the Frankl-Füredi conjecture is false*, **Advances in Mathematics** 365 (2020), 107063.

[37]   I. Leader, S. Letzter, B. Narayanan, and M. Walters, *Product-free sets in the free semigroup*, **European Journal of Combinatorics** 83 (2020), 103003.

[38]   S. Letzter, *Many H-copies in graphs with a forbidden tree*, **SIAM Journal on Discrete Mathematics** 33 (2020), 2360–2368.

[39]   O. Ben-Eliezer, C. Canonne, S. Letzter, and E. Waingarten, *Finding monotone patterns in sublinear time*, **FOCS** (2019).

[40]   M. Bucić, S. Letzter, and B. Sudakov, *Multicolour bipartite Ramsey number of paths*, **The Electronic Journal of Combinatorics** 26 (2019), P3.60.

[41]   M. Bucić, S. Letzter, and B. Sudakov, *3-colour bipartite Ramsey number of cycles and paths*, **Journal of Graph Theory** 92 (2019), 445–459.

[42]   A. Girão, S. Letzter, and J. Sahasrabudhe, *Partitioning a graph into monochromatic connected subgraphs*, **Journal of Graph Theory** 91 (2019), 353–364.

[43]   M. Bucić, S. Letzter, and B. Sudakov, *Directed Ramsey number for trees*, **Journal of Combinatorial Theory, Series B** 137 (2019), 145–177.

[44]   S. Letzter, *Monochromatic cycle partitions of 2-coloured graphs with minimum degree $3n/4$*, **The Electronic Journal of Combinatorics** 26 (2019), P1.19.

[45]   S. Letzter and R. Snyder, *The homomorphism threshold of $\{C_3, C_5\}$-free graphs*, **Journal of Graph Theory** 90 (2019), 83–106.

[46]   M. Bucić, S. Letzter, and B. Sudakov, *Monochromatic paths in random tournaments*, **Random Structures & Algorithms** 54 (2019), 69–81.

[47]   M. Bucić, S. Letzter, B. Sudakov, and T. Tran, *Minimum saturated families of sets*, **Bulletin of the London Mathematical Society** 50 (2018), 725–732.

[48]   V. Gruslys and S. Letzter, *Minimizing the number of triangular edges*, **Combinatorics, Probability and Computing** 27 (2018), 580–622.

[49]   B. Bollobás, J. Lee, and S. Letzter, *Eigenvalues of subgraphs of the cube*, **European Journal of Combinatorics** 70 (2018), 125–148.

[50]   B. Bollobás and S. Letzter, *Longest common extension*, **European Journal of Combinatorics** 68 (2018), 242–248.

[51]   S. Letzter, *Radon numbers for trees*, **Journal of Discrete Mathematics** 340 (2017), 333–344.

[52]   S. Letzter, *Path Ramsey number for random graphs*, **Combinatorics, Probability and Computing** 25 (2016), 612–622.

[53]   S. Letzter, *Large monochromatic triple stars in edge colourings*, **Journal of Graph Theory** 80 (2015), 323–328.

[54]   V. Falgas-Ravry, T. Kittipassorn, D. Korándi, S. Letzter, and B. Narayanan, *Separating path systems*, **Journal of Combinatorics** 5 (2014), 335–354.

[55]   S. Letzter, *The property of having a k–regular subgraph has a sharp threshold*, **Random Structures & Algorithms** 42 (2012), 509–519.