

Sean Eberhard

Employment

- 2024– **Royal Society University Research Fellow**, *University of Warwick*, Associate Professor proleptic
- 2022–2024 **Royal Society University Research Fellow**, *Queen's University Belfast*
- 2019–2022 **Research Associate**, *University of Cambridge*, advised by Péter Varjú
- 2018–2019 **Senior Quantitative Researcher**, *G-Research*
- 2016–2018 **Quantitative Researcher**, *G-Research*

Education

- 2012–2016 **DPhil**, *University of Oxford*
Thesis: Some combinatorial problems in group theory. Advisor: Professor Ben Green
- 2011–2012 **MMath**, *University of Cambridge*, *distinction*
- 2008–2011 **BA in Mathematics**, *University of Cambridge*, ranked first in year

Scholarships and awards

- 2025 LMS and Heilbronn support for 2026 Research School (£19 000)
- 2022 Royal Society Enhanced Research Expenses (£335 000)
- 2022 Royal Society University Research Fellowship (£530 469)
- 2022 LMS travel grant for the ICM in Saint Petersburg (cancelled)
- 2014 LMS travel grant for the ICM in Seoul, South Korea
- 2013 Departmental studentship, Mathematical Institute, Oxford
- 2012 Cambridge International Scholarship, Cambridge Trusts
- 2012 Schuldham Plate for academic excellence, Gonville & Caius College, Cambridge
- 2011 Undegraduate summer research scholarship, University of Cambridge
- 2011 Ryan Prize for Higher Mathematics, Gonville & Caius College, Cambridge
- 2010 Simon Jagger Prize for Mathematics, Gonville & Caius College, Cambridge
- 2009 Michael Latham Prize for Mathematics, Gonville & Caius College, Cambridge

Invited talks

- Jun 2026 *Diameter bounds for arbitrary finite groups and applications*, Modern flavours of finite groups, Warwick
- Mar 2026 *Diameter bounds for arbitrary finite groups and applications*, Birmingham algebra seminar
- Jan 2026 *Infinite families of diameter-2 graphs with no triangle or $K_{2,t}$* , Cambridge combinatorics seminar
- Dec 2025 *Game Theory from First Principles to Poker and Bluffing*, Warwick Maths Society
- Nov 2025 *Growth gap of residually soluble groups*, Vienna Geometry and Analysis on Groups research seminar
- Sep 2025 *Avoidance density for linear equations and a transference conjecture*, Bristol University Summer School in Ergodic Theory, University of Bristol
- Jun 2025 *Diameter of soluble permutation groups*, WOMBL (Warwick)
- Jun 2025 *Diameter of soluble permutation groups*, Oberwolfach
- Mar 2025 *Normal covering numbers and additive combinatorics*, Birmingham–OU–Warwick combinatorics meeting

Mar 2025 *Normal covering numbers and additive combinatorics*, Bristol combinatorics seminar

Feb 2025 *Normal covering numbers and additive combinatorics*, Oxford combinatorics seminar

Jan 2025 *Diameter bounds for finite classical groups generated by transvections*, Groups and Topological Groups conference, Ljubljana, Slovenia

Jan 2025 *Intersective polynomials and normal covering numbers*, Warwick number theory seminar

Sep 2024 *Diameter bounds for finite classical groups generated by transvections*, Combinatorics, Arithmetic and Geometry working group, Sorbonne Université

Apr 2024 *Growth for special generating sets in high rank*, Oberwolfach mini-course

Mar 2024 *Diameter bounds for finite classical groups generated by special elements*, PGGT Online Seminar

Feb 2024 *Diameter bounds for finite classical groups generated by transvections*, USC algebra seminar

Aug 2023 *Babai's conjecture in high rank*, Durham spectral gap symposium

Jun 2023 *Group theory without groups*, Bristol one-day meeting in Combinatorics

Oct 2022 *The Boston–Shalev conjecture for conjugacy classes*, Warwick algebra seminar

Mar 2022 *Transversals in quasirandom latin squares*, Cambridge combinatorics seminar

Feb 2022 *Nonschurian primitive association schemes with many automorphisms*, Discrete algebraic structures and isomorphism problem (Novosibirsk)

Feb 2022 *Sidon sets $\approx$ projective planes?*, Oxford University

Feb 2022 *Sidon sets $\approx$ projective planes?*, Bristol University

Nov 2021 *Probabilistically nilpotent groups of class two*, Amitsur centennial symposium

May 2021 *The apparent structure of dense Sidon sets*, CANT 2021

May 2021 *Diameter of high-rank classical groups with random generators*, Copenhagen–Jerusalem

Mar 2021 *Irreducibility of the characteristic polynomial of a random integer matrix*, Montreal QVNTS

Feb 2021 *Diameter of high-rank classical groups with random generators*, Bristol University

Nov 2020 *Diameter of high-rank classical groups with random generators*, Tel Aviv University

Oct 2020 *The characteristic polynomial of a random matrix*, Ohio State University

Apr 2020 *An asymptotic for the Hall–Paige conjecture*, Webinar in additive combinatorics

May 2019 *Random generation without CFSG*, University of Cambridge

Mar 2016 *Product-free sets in the alternating group*, Queen Mary University of London

Feb 2016 *Product-free sets in the alternating group*, University of Cambridge

Feb 2016 *Product-free sets in the alternating group*, University of Oxford

Jan 2016 *Permutations fixing a k -set*, Imperial College London

Dec 2015 *Invariable generation of the symmetric group*, Université de Montréal

Nov 2015 *Invariable generation of the symmetric group*, Dresden University of Technology

Nov 2015 *Permutations fixing a k -set*, Royal Holloway, University of London

Nov 2015 *Invariable generation of the symmetric group*, University of Bristol

Feb 2015 *Commuting probabilities of finite groups*, University of Bristol

Jan 2015 *Commuting probabilities of finite groups*, Queen Mary University of London

Nov 2014 *Commuting probabilities of finite groups*, University of Oxford

Oct 2014 *Følner sequences and sum-free sets*, Université de Montréal

May 2013 *Sets of integers with no large sum-free subset*, University of Cambridge

Teaching

2026 Spring **Algebraic Number Theory**, University of Warwick

2023 Autumn **Rings and Modules**, Queen's University Belfast (teaching evaluation: 5.0/5)

2023 Spring **Discrete Mathematics**, Queen's University Belfast (teaching evaluation: 4.3/5)

2012–2015 **Tutor/supervisor**, Cambridge and Oxford

Mentorship

2026	Jessica Anzanello	visiting PhD student
2025–	Engun Bayasgalan	PhD student
2024–	Elena Maini	PhD student
2023–	Luca Sabatini	postdoctoral research assistant
2025	Fletcher Thompson	summer undergraduate student
2025	Mahdee Tava	summer undergraduate student
2023	Conor Mellon	summer undergraduate student
2022	Lucy Krajcoviechova	summer undergraduate student
2022	Charles Li	summer undergraduate student
2021	George Clements	summer undergraduate student
2013	Jack Bartley	summer undergraduate student

Other activities

Summer 2026	Organizer of LMS Graduate School on <i>Growth and Expansion in Groups</i>
2025–	Co-organizer of the Warwick algebra seminar
2025–	Editor for <i>Discrete Analysis</i>
	Reviewer for MathSciNet (45) and zbMath (10)
	Referee for numerous journals
	Contributor at mathoverflow.net and math.stackexchange.com
2020–2022	Joint organizer for the Webinar in Additive Combinatorics

Publications

- [1] Jessica Anzanello and Sean Eberhard. Fixed-point-free elements in two-orbit permutation groups, 2026. <https://arxiv.org/abs/2607.11543>, *in preparation*.
- [2] Sean Eberhard, Elena Maini, Luca Sabatini, and Gareth Tracey. Diameter bounds for arbitrary finite groups and applications, 2026. <https://arxiv.org/abs/2604.15303>, *submitted*.
- [3] Sean Eberhard and Luca Sabatini. Expanding groups with large diameter, 2026. <https://arxiv.org/abs/2602.13582>, *submitted*.
- [4] Sean Eberhard and Elena Maini. The growth of residually soluble groups, 2025. <https://arxiv.org/abs/2511.07018>, *submitted*.
- [5] Sean Eberhard. Ratios of consecutive values of the divisor function. *J. Number Theory*, 281:426–428, 2026.
- [6] Sean Eberhard, Vladislav Taranchuk, and Craig Timmons. Examples of diameter-2 graphs with no triangle or $K_{2,t}$. *Australas. J. Combin.*, 94:235–242, 2026.
- [7] Sean Eberhard. Intersections of Sylow 2-subgroups in symmetric groups. *J. Group Theory*, 29(2):237–241, 2026.
- [8] Sean Eberhard and Connor Mellon. Normal covering numbers for S_n and A_n and additive combinatorics. *Bull. Lond. Math. Soc.*, 57(11):3307–3325, 2025.
- [9] Sean Eberhard and Luca Sabatini. Probabilistic construction of some extremal p -groups. *J. Algebra*, 682:463–480, 2025.
- [10] Sean Eberhard. Diameter of classical groups generated by transvections. *J. Algebra*, 653:220–256, 2024.
- [11] (*) Sean Eberhard, Brendan Murphy, László Pyber, and Endre Szabó. Growth in linear groups. *Duke Math. J.*, 174(3):403–448, 2025.
- [12] Sean Eberhard and Daniele Garzoni. Conjugacy classes of derangements in finite groups of Lie type. *Trans. Amer. Math. Soc. Ser. B*, 12:536–575, 2025.
- [13] Sean Eberhard. Dixon’s asymptotic without the classification of finite simple groups. *Random Structures Algorithms*, 64(4):1016–1019, 2024.
- [14] Sean Eberhard, Freddie Manners, and Rudi Mrazović. Transversals in quasirandom latin squares. *Proc. Lond. Math. Soc. (3)*, 127(1):84–115, 2023.
- [15] Sean Eberhard and Freddie Manners. The apparent structure of dense Sidon sets. *Electron. J. Combin.*, 30(1):Paper No. 1.33, 19, 2023.
- [16] Sean Eberhard and Mikhail Muzychuk. Fusions of tensor powers of Johnson schemes. *Algebr. Comb.*, 6(2):533–538, 2023.
- [17] Sean Eberhard. Hamming sandwiches. *Combinatorica*, 43(2):233–256, 2023.
- [18] Sean Eberhard and Daniele Garzoni. Probability of generation by random permutations of given cycle type. *arXiv e-prints*, May 2022. [arXiv:2205.07573](https://arxiv.org/abs/2205.07573).
- [19] (*) Sean Eberhard, Freddie Manners, and Rudi Mrazović. An asymptotic for the Hall-Paige conjecture. *Adv. Math.*, 404(part A):Paper No. 108423, 73, 2022.
- [20] Sean Eberhard. The characteristic polynomial of a random matrix. *Combinatorica*, 42(4):491–527, 2022.
- [21] Sean Eberhard and Pavel Shumyatsky. Probabilistically nilpotent groups of class two. *Mathematische Annalen*, January 2023.

- [22] Sean Eberhard. Biased multilinear maps of abelian groups. *arXiv e-prints*, page arXiv:2108.01580, August 2021.
- [23] (*) Sean Eberhard and Urban Jezernik. Babai’s conjecture for high-rank classical groups with random generators. *Invent. Math.*, 227(1):149–210, 2022.
- [24] Sean Eberhard. Sharply transitive sets in $\mathrm{PGL}_2(K)$. *Adv. Geom.*, 21(4):611–612, 2021.
- [25] Huseyin Acan, Charles Burnette, Sean Eberhard, Eric Schmutz, and James Thomas. Permutations with equal orders. *Combin. Probab. Comput.*, 30(5):800–810, 2021.
- [26] Sean Eberhard and Péter P. Varjú. Mixing time of the Chung-Diaconis-Graham random process. *Probab. Theory Related Fields*, 179(1-2):317–344, 2021.
- [27] Sean Eberhard, Jeff Kahn, Bhargav Narayanan, and Sophie Spirkl. On symmetric intersecting families of vectors. *Combin. Probab. Comput.*, 30(6):899–904, 2021.
- [28] Sean Eberhard and Daniele Garzoni. Random generation with cycle type restrictions. *Algebr. Comb.*, 4(1):1–25, 2021.
- [29] Sean Eberhard and Stefan-C. Virchow. Random generation of the special linear group. *Trans. Amer. Math. Soc.*, 373(6):3995–4011, 2020.
- [30] Sean Eberhard. Random generation under the Ewens distribution. *arXiv e-prints*, page arXiv:1808.08892, Aug 2018.
- [31] Sean Eberhard. The trivial lower bound for the girth of S_n . *arXiv e-prints*, page arXiv:1706.09972, Jun 2017.
- [32] József Balogh, Sean Eberhard, Bhargav Narayanan, Andrew Treglown, and Adam Zsolt Wagner. An improved lower bound for Folkman’s theorem. *Bull. Lond. Math. Soc.*, 49(4):745–747, 2017.
- [33] Sean Eberhard. More on additive triples of bijections. *arXiv e-prints*, page arXiv:1704.02407, Apr 2017.
- [34] Sean Eberhard. Product mixing in the alternating group. *Discrete Anal.*, pages Paper No. 2, 19, 2016.
- [35] Sean Eberhard and Stefan-Christoph Virchow. The probability of generating the symmetric group. *Combinatorica*, 39(2):273–288, 2019.
- [36] Sean Eberhard, Kevin Ford, and Dimitris Koukoulopoulos. Permutations contained in transitive subgroups. *Discrete Anal.*, pages Paper No. 12, 34, 2016.
- [37] Sean Eberhard, Kevin Ford, and Ben Green. Invariable generation of the symmetric group. *Duke Math. J.*, 166(8):1573–1590, 2017.
- [38] Sean Eberhard. The abelian arithmetic regularity lemma. *arXiv e-prints*, page arXiv:1606.09303, Jun 2016.
- [39] Sean Eberhard, Freddie Manners, and Rudi Mrazović. Additive triples of bijections, or the toroidal semiqueens problem. *J. Eur. Math. Soc. (JEMS)*, 21(2):441–463, 2019.
- [40] Sean Eberhard. A note on nonabelian Freiman-Ruzsa. *arXiv e-prints*, page arXiv:1511.06758, Nov 2015.
- [41] Sean Eberhard, Kevin Ford, and Ben Green. Permutations fixing a k -set. *International Mathematics Research Notices*, 2015.
- [42] Sean Eberhard. Commuting probabilities of finite groups. *Bulletin of the London Mathematical Society*, 47(5):796–808, 2015.
- [43] Sean Eberhard. Følner sequences and sum-free sets. *Bulletin of the London Mathematical Society*, 47(1):21–28, 2015.
- [44] (*) Sean Eberhard, Ben Green, and Freddie Manners. Sets of integers with no large sum-free subset. *Ann. of Math. (2)*, 180(2):621–652, 2014.

- [45] Sean Eberhard. Almost all sets of $d + 2$ points on the $(d - 1)$ -sphere are not subtransitive. *Mathematika*, 59(2):267–268, 2013.