

JOSEPH PAUL MACMANUS

N0.27, The Andrew Wiles Building \diamond Oxford, OX2 6GG

RESEARCH INTERESTS

I am broadly interested in combinatorial and geometric group theory. More specifically, I think about questions relating to hyperbolicity, coarse geometry, splittings, and computability.

EDUCATION

- Exp. 2025 St Anne's College, University of Oxford
DPhil in Mathematics
Thesis: *Splittings, Tiles, and Planarity: A Trio of Problems in Geometric Group Theory*, with Panagiotis Papazoglou.
- 2021 Balliol College, University of Oxford
MSc in Mathematics and Foundations of Computer Science, with Distinction
Diss.: *Splitting Theory of Groups*, with Panagiotis Papazoglou.
- 2020 University of Bristol
BSc in Mathematics and Computer Science, with First Class Honours
Thesis: *Decision Problems within Combinatorial Group Theory*, with Philipp Schlicht.
- 2017 Ysgol Aberconwy Sixth Form
- 2017 Coleg Llandrillo

SCHOLARSHIPS, GRANTS, AND PRIZES

- 2023 – 2025 Graduate Development Scholarship in Pure Mathematics — St Anne's College, University of Oxford
- 2021 – 2025 HDP Scholarship — Heilbronn Institute for Mathematical Research
- 2020 Postgraduate Grant — The James Pantyfedwen Foundation
- 2020 Graphcore Prize — University of Bristol
- 2019 Top Student in 2nd Year Maths and Comp Sci. — University of Bristol
- 2019 Undergraduate Summer Research Bursary — University of Bristol

TEACHING EXPERIENCE

- 2023 – 2025 Graduate Development Scholar — St Anne's College, Oxford
- Subjects taught:*
- Analysis I, II,
 - Linear Algebra I, II.
 - Groups and Group Actions,
 - A5 Topology,
 - ASO Group Theory.

2022 – 2023 Class Tutor — University of Oxford

Subjects taught:

- C2.4 Infinite Groups;
- ASO Group Theory,
- A3 Rings and Modules (Revisions),
- M4 Geometry (Revisions).

The Queen's & Merton Colleges, and Intercollegiate.

2021 – 2023 Teaching Assistant — University of Oxford

Subjects taught:

- B3.5 Topology & Groups,
- C3.2 Geometric Group Theory,
- B1.2 Set Theory;
- M4 Geometry,
- A3 Rings and Modules,
- A5 Topology.

The Queen's College, and Intercollegiate.

2019 – 2020 Teaching Assistant — University of Bristol

Subjects taught:

- Algorithms,
- Data Structures & Algorithms,
- Combinatorics.

2018 – 2023 Private Tutor — Metatutor; Tutorful; Blue Education

OUTREACH TEACHING

2024 Fibonacci Programme — Balliol College, Oxford

Topics:

- Symmetry Groups,
- Theory of Computation,
- MAT Workshop,
- Eigenvalues and Linear Algebra,
- Hamming Codes.

2023 Monday Maths — Balliol College, Oxford

2021 UNIQ Summer School — University of Oxford

PREPRINTS

- [1] MacManus, J. (2024). Fat minors in finitely presented groups. *Preprint*.
- [2] MacManus, J. (2024). A note on quasi-transitive graphs quasi-isometric to planar (Cayley) graphs. *Preprint*.
- [3] Baligács, J., MacManus, J. (2024). The metric Menger problem. *Preprint*.
- [4] MacManus, J., Mineh, L. (2024). Tiling in some nonpositively curved groups. *Submitted*.
- [5] MacManus, J. (2023). Accessibility, planar graphs, and quasi-isometries. *Preprint*.

PUBLICATIONS

- [1] MacManus, J. (2024). Deciding if a hyperbolic group splits over a given quasiconvex subgroup. *Groups, Geometry, and Dynamics*.
- [2] Alexandru, C. -M., Bridgett-Tomkinson, E., Linden, N., MacManus, J., Montanaro, A., & Morris, H. (2020). Quantum speedups of some general-purpose numerical optimisation algorithms. *Quantum Science and Technology*, 5(4), 045014.

INVITED TALKS

- 1. *Coarsely characterising planarity in Cayley graphs* — World of Geometric Group Theory, Groupcraft IV (Upcoming, September 2024).

CONTRIBUTED TALKS

- 1. *Tilings in groups* — ITMAIA, University of Exeter (February 2024).
- 2. *Characterising surface groups* — ECSTASy, University of Southampton (August 2023).
- 3. *Understanding limit sets via finite automata* — PGTC, Heriot-Watt University (July 2023).

SEMINAR TALKS

Key: † = External.

- 1. † *Groups quasi-isometric to planar graphs* — Geometry and Topology Seminar, University of Warwick (February 2024).
- 2. *Reasons to be accessible* — Junior Topology and Group Theory Seminar, University of Oxford (October 2023).
- 3. *Planar Cayley graphs and accessibility* — Junior Topology and Group Theory Seminar, University of Oxford (May 2023).
- 4. † *Splitting detection, and limit set complements* — Junior Geometry Seminar, University of Cambridge (April 2023).
- 5. † *Will it split? Recognising edge groups in hyperbolic groups* — BRIJGeS, University of Bristol (February 2023).
- 6. *Detecting topological features of the Gromov boundary* — Junior Topology and Group Theory Seminar, University of Oxford (March 2022).

OTHER ACTIVITIES

2022 – 2023 Seminar Organiser — University of Oxford
Junior Topology and Group Theory

2022 – 2023 Admissions Interviewer — University of Oxford
Colleges:
- St Anne's College,
- St Edmund Hall.

2021 Maths Admissions Test (MAT) Marker — University of Oxford

2019 Quantum Information Research Internship — University of Bristol
With Ashley Montanaro and Noah Linden.