

Curriculum Vitae - Harry Petyt

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Contact Details

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Employment

2022–Present Titchmarsh Research Fellow, University of Oxford.
2023 CRM Postdoctoral Fellow, McGill University.

Education

2018–2022 PhD in Mathematics, University of Bristol. Supervised by Mark Hagen.
2014–2018 MMath, University of Warwick.

Research Interests

Geometric group theory: mapping class groups, $\text{CAT}(0)$ spaces, injective metric spaces, hierarchical hyperbolicity, coarse medians, and other generalisations of hyperbolic groups.

Papers

- [1] Mapping class groups are quasicubical.
To appear in Amer. J. Math., Preprint arXiv:2112.10681.
- [2] (With Davide Spriano and Abdul Zalloum) Hyperbolic models for $\text{CAT}(0)$ spaces.
Adv. Math., 450:1–66, 2024.
- [3] (With Radhika Gupta) Appendix to: “Hierarchically hyperbolic groups and uniform exponential growth” by Carolyn Abbott, Thomas Ng, and Davide Spriano.
Math. Z., 306(18):1–33, 2024.
- [4] (With Thomas Haettel and Nima Hoda) Coarse injectivity, hierarchical hyperbolicity, and semihyperbolicity.
Geom. Topol., 27(4):1587–1633, 2023.
- [5] (With Davide Spriano) Unbounded domains in hierarchically hyperbolic groups.
Groups Geom. Dyn., 17(2):479–500, 2023.
- [6] (With Mark Hagen) Projection complexes and quasimedians maps.
Algebr. Geom. Topol., 22(7):3277–3304, 2022.
- [7] The special linear group for nonassociative rings.
J. Group Theory, 23(2):327–335, 2020.
- [8] Derivations of octonion matrix algebras.
Comm. Algebra, 47(10):4216–4223, 2019.

Preprints

- [1] *(With Zachary Munro)* Coarse obstructions to cocompact cubulation.
Preprint arxiv:2407.09275.
- [2] *(With Abdul Zalloum)* Constructing metric spaces from systems of walls.
Preprint arXiv:2404.12057.
- [3] *(With Antoine Goldsborough, Mark Hagen, and Alessandro Sisto)* Induced quasi-isometries of hyperbolic spaces, Markov chains, and acylindrical hyperbolicity.
Preprint arXiv:2309.07013.
- [4] *(With Carolyn Abbott, Mark Hagen, and Abdul Zalloum)* Uniform undistortion from barycentres, and applications to hierarchically hyperbolic groups.
Preprint arXiv:2305.09742.
- [5] *(With Thomas Haettel and Nima Hoda)* ℓ^p metrics on cell complexes.
Preprint arXiv:2302.03801.

Selected Talks

- June 2024 *Spaces with walls, and group actions on nonpositively curved spaces*, Group theory seminar, Université Catholique de Louvain.
- June 2024 *Wallspaces and actions on hyperbolic spaces*, Randomness and geometry, Fields Institute, Toronto.
- May 2024 *Wallspaces and fine structures for HHSs*, Advances in hierarchical hyperbolicity, Banff International Research Station.
- Mar. 2024 *Spaces with walls, and group actions on nonpositively curved spaces*, Topology seminar, University of Wisconsin-Milwaukee.
- Nov. 2023 *Coarse obstructions to cubulation*, Geometry seminar, ETH Zürich.
- July 2023 *Obstructions to coarse cubulation*, GAGTA, Erwin Schrödinger Institute, Vienna.
- June 2023 *Hyperbolicity from walls*, Cube complexes and combinatorial geometry, CRM Montréal.
- June 2023 *Cell complexes and ℓ^p metrics*, Canadian Mathematical Society summer meeting, University of Ottawa.
- May 2023 *Cubical groups and uniform exponential growth*, Zlil Sela Aisenstadt Chair lecture series, Université de Montréal.
- Mar. 2023 *Introduction to coarse medians*, CRM thematic program seminar series, Université de Montréal.
- Feb. 2023 *Introduction to coarse medians*, Geometry and topology seminar, University of Toronto.
- Jan. 2023 *Large-scale geometry of mapping class groups*, KTGU mathematics workshop, Kyoto University.
- Jan. 2023 *Extracting hyperbolicity from $CAT(0)$ geometry*, Geometric group theory seminar, McGill University.
- Nov. 2022 *Hyperbolic models for $CAT(0)$ spaces*, Pure mathematics colloquium, University of Southampton.
- Oct. 2022 *Hyperbolic models for $CAT(0)$ spaces*, Geometry–topology seminar, University of California, Riverside.
- Sep. 2022 *Rank-one isometries of $CAT(0)$ spaces*, Modern advances in geometric group theory, University of Manchester.
- Aug. 2022 *The top of an HHG structure*, Quotients of HHGs, University of Bristol.
- June 2022 *Hyperbolic models for $CAT(0)$ spaces*, Hyperbolic groups and their generalisations, Institut Henri Poincaré, Paris.

- Feb. 2022 *The large-scale geometry of mapping class groups*, Algebra and geometry seminar, Stockholms Universitet.
- Feb. 2022 *Hyperbolic models for $CAT(0)$ spaces*, Geometric group theory and topology seminar, Ohio State University.
- Jan. 2022 *Injective metric spaces and group actions*, Geometry seminar, Universität Münster.
- Dec. 2021 *Mapping class groups and $CAT(0)$ cube complexes*, Metric graph theory and related topics, CIRM.
- Nov. 2021 *Finding quasiisometries to $CAT(0)$ cube complexes*, Algebra seminar, Heriot-Watt University.
- Oct. 2021 *Finding quasiisometries to $CAT(0)$ cube complexes*, Dynamics, geometry and groups seminar, Queen's University.
- June 2021 *Mapping class groups and injective spaces*, GAGTA, University of Edinburgh.
- June 2021 *Uniform exponential growth for cubical groups*, Young researchers in mathematics, University of Bristol.
- Mar. 2021 *Bicombing the mapping class group*, Geometry and topology seminar, CUNY.
- Jan. 2021 *Uniform exponential growth for cubical groups*, Postgraduate group theory conference 2020, University of Southampton.
- Nov. 2020 *Injective metric spaces and groups acting on them*, Dynamics and group geometry early researchers seminar, University of Warwick.
- Oct. 2020 *Bicombing the mapping class group*, Algebra seminar, University of the Basque Country.
- July 2020 *Mapping class groups in geometric group theory*, Pure postgraduate seminar, University of Southampton.
- Apr. 2020 *Mapping class groups in geometric group theory*, Geometry graduate colloquium, ETH Zürich.
- Nov. 2019 *The envelope trick*, Women and non-binary people in maths, University of Bristol.
- Oct. 2019 *An introduction to the Masur–Minsky machinery*, Junior topology and group theory seminar, University of Oxford.
- Oct. 2019 *What are hierarchically hyperbolic groups?*, Dynamics and group geometry early researchers seminar, University of Warwick.
- Mar. 2019 *What is a relatively hyperbolic group?*, Junior geometry seminar, University of Cambridge.
- Dec. 2018 *Introduction to tropical geometry*, Warwick-Imperial Autumn meeting, University of Warwick.
- June 2018 *Sphere packings, kissing numbers, and integers*, Junior geometry and topology seminar, University of Warwick.

Awards

- 2022 University of Bristol Mathematical and Environmental Sciences thesis prize.
- 2022 LMS–EPSRC travel grant to attend the International Congress of Mathematicians.
- 2022 Kovalevskaya ICM grant.
- 2018 Undergraduate Research Scholarship Scheme funding award.

Teaching

- 2024–2025 · Lecturer: created and taught a graduate course “ $CAT(0)$ cube complexes and beyond” for PhD students at Bath, Bristol, Imperial, Oxford, Swansea, and Warwick.
- Hertford College tutor, University of Oxford: small-group supervisions covering a range of courses.

- 2023–2024 · Master’s supervisor, University of Oxford: two students.
 · Tutor, University of Oxford: problem classes and marking for master’s-level course “Analytic Topology”.
 · Teaching assistant, University of Oxford: problem classes and marking for master’s-level course “Geometric Group Theory”.
- 2022–2023 · Project supervisor, University of Oxford: three undergraduate summer research projects, jointly with Davide Spriano.
- 2020–2021 · Demonstrator, University of Bristol: 3rd year undergraduate course “Perspectives in Mathematics”.
 · Teaching assistant, University of Bristol: problem classes for master’s-level course “Topics in Discrete Mathematics”.
- 2019–2020 · Teaching assistant, University of Bristol: problem classes for master’s-level course “Topics in Modern Geometry”.
- 2018–2019 · Class teacher, University of Bristol: training sessions for Bristol’s *International Mathematics Competition* team.
- 2017–2018 · Leader of “Maths Café”, University of Warwick: covering all 1st – 3rd year courses.
 · Supervisor, University of Warwick: twice-weekly meetings with a group of five first year undergraduates.
- 2016–2017 · “Maths Café” assistant, University of Warwick.

Service

- Since 2023 MathSciNet reviewer.
- 2018–2022 Founder and organiser of Bristol Junior Geometry Seminar.
- 2017–2018 Head of academic support, Warwick Mathematics Society.
- Refereeing Algebraic and Geometric Topology (3); Bulletin of the London Mathematical Society (2); Contemporary Mathematics; European Journal of Combinatorics; Groups, Geometry, and Dynamics; Journal of Group Theory; Journal of Topology; Journal of Topology and Analysis; Mathematische Zeitschrift; Proceedings of the American Mathematical Society (3); Transactions of the American Mathematical Society.

Conferences Attended

- Aug. 2024 *Geometry in groups* – ICTS, Bangalore.
- June 2024 *Thematic program on randomness and geometry* – Fields Institute, Toronto.
- May 2024 *Advances in hierarchical hyperbolicity* – BIRS, Banff.
- Apr. 2024 *Groups, topology, and applications in Gran Bilbao* – UPV/EHU, Bilbao.
- Apr. 2024 *Young geometric group theory XII* – University of Bristol.
- Sep. 2023 *Groups and rigidity around the Zimmer program* – Ventotene.
- July 2023 *GAGTA: Groups and dynamics* – Erwin Schrödinger institute, Vienna.
- June 2023 *Cube complexes and combinatorial geometry* – CRM, Montreal.
- June 2023 *Groups around 3-manifolds* – CRM, Montreal.
- June 2023 *Canadian mathematical society summer meeting* – University of Ottawa.
- May 2023 *Geometry of subgroups* – CRM, Montreal.
- Apr. 2023 *Orderable groups* – CRM, Montreal.
- Apr. 2023 *Huge groups* – CRM, Montreal.
- Mar. 2023 *Measured group theory* – CRM, Montreal.
- Jan. 2023 *KTGU mathematics workshop for young researchers* – Kyoto University.
- Sep. 2022 *Modern advances in geometric group theory* – University of Manchester.

Aug. 2022 *Quotients of HHGs* – University of Bristol.
 July 2022 *International congress of mathematicians 2022* – Cancelled.
 June 2022 *GAGTA: Modern group theory and related subjects* – Stevens Institute, New Jersey (Online).
 June 2022 *Hyperbolic groups and their generalisations* – IHP, Paris.
 Apr. 2022 *Mapping class groups and $\text{Out}(F_n)$* – IHP, Paris (Online).
 Apr. 2022 *Groups acting on fractals* – CIRM, Luminy.
 Mar. 2022 *Week at infinity* – (Online).
 Dec. 2021 *Metric graph theory and related topics (Victor Chepoi conference)* – CIRM, Luminy.
 Sep. 2021 *The unity of mathematics: a conference in honour of Sir Michael Atiyah* – Isaac Newton Institute, Cambridge.
 Aug. 2021 *Geometry in non-positive curvature and Kähler groups* – IHES, Paris (Online).
 Aug. 2021 *World of groupcraft* – (Online).
 July 2021 *Young geometric group theory X* – Newcastle University (Online).
 July 2021 *Artin groups, $\text{CAT}(0)$ geometry, and related topics* – Ohio State University (Online).
 June 2021 *Beyond hyperbolicity* – Ohio State University (Online).
 June 2021 *Geometric group theory without boundaries II* – (Online).
 June 2021 *GAGTA 2021* – University of Edinburgh (Online).
 June 2021 *Young researchers in mathematics 2021* – University of Bristol (Online).
 Jan. 2021 *Postgraduate group theory conference 2020* – University of Southampton (Online).
 Nov. 2020 *Masterclass in condensed mathematics* – University of Copenhagen (Online).
 July 2020 *Geometric group theory without boundaries* – (Online).
 July 2020 *Groups with geometrical and topological flavours* – (Online).
 June 2020 *Virtual geometric group theory conference* – CIRM, Luminy (Online).
 May 2020 *Workshop on polyhedral products in geometric group theory* – Fields Institute, Toronto (Online).
 May 2020 *Spring graduate school on polyhedral products in geometric group theory* – Fields Institute, Toronto (Online).
 Jan. 2020 *Interactions between geometry, dynamics and group theory* – University of Bristol.
 Sep. 2019 *Bielefeld–Southampton geometric group theory meeting* – University of Southampton.
 Sep. 2019 *Heilbronn annual conference* – University of Bristol.
 July 2019 *Aspects of geometric group theory* – IHES, Paris.
 July 2019 *Young geometric group theory VIII* – UPV/EHU, Bilbao.
 May 2019 *Non-positive curvature* – IMPAN, Warsaw.
 Jan. 2019 *Master class on groups and geometries* – CIRM, Luminy.
 July 2018 *Graphs, surfaces, and cube complexes* – University of Warwick.
 Apr. 2018 *Geometry of Teichmüller space and mapping class groups* – University of Warwick.