

ALEXIS MARCHAND

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RESEARCH INTERESTS

My research is in *geometric group theory*, a field concerned with understanding groups — algebraic structures encoding the symmetries of mathematical objects — by studying their actions on geometric spaces. I am generally interested in understanding connections between group-theoretical structure and *non-positive curvature*.

Keywords: *stable commutator length, bounded cohomology, quasimorphisms, topology of surfaces, hyperbolicity, CAT(0) cube complexes, group rings, free group automorphisms.*

EMPLOYMENT

2024-25 JSPS Postdoctoral Fellow for Research in Japan · *Kyoto University*

Mentor: KOJI FUJIWARA

EDUCATION

2021-24 Ph.D. in Pure Mathematics · *University of Cambridge*

Thesis: Computations and lower bounds for scl and the relative Gromov seminorm

Defended on July 15, 2024

Supervisor: HENRY WILTON

2017-21 Dipl. ENS · *École Normale Supérieure de Lyon*

2020-21 M.Sc. in Mathematics · *Université Grenoble Alpes*

Mention Très Bien

Thesis: Automorphismes extérieurs de produits libres : revêtements abéliens caractéristiques et représentations libres

Supervisor: FRANÇOIS DAHMANI

2019-20 M.A.St. in Mathematics · *University of Cambridge*

Pass with Merit

Essay: Rigidity Theorems for Hyperbolic Groups

Supervisor: HENRY WILTON

2017-19 B.Sc. in Mathematics · *École Normale Supérieure de Lyon*

Research internships:

- Topology of complex affine varieties, with HOSSEIN MOVASATI in IMPA, Rio de Janeiro (2019)
- Geometry of Coxeter groups, with CATERINA CAMPAGNOLO in KIT, Karlsruhe (2018)

RESEARCH PAPERS (PUBLISHED / ACCEPTED IN PEER-REVIEWED JOURNALS)

- [1] ALEXIS MARCHAND, From letter-quasimorphisms to angle structures and spectral gaps for scl. *Israel J. Math.* (to appear). arXiv:2402.13856
- [2] ALEXIS MARCHAND, Isometric embeddings of surfaces for scl. *Groups Geom. Dyn.* (online first). DOI:10.4171/ggd/845 · arXiv:2302.04133
- [3] ALEXIS MARCHAND, Bavard duality for the relative Gromov seminorm. *Enseign. Math.* (online first). DOI:10.4171/lem/1087 · arXiv:2305.02149
- [4] ALEXIS MARCHAND, Free representations of outer automorphism groups of free products via characteristic abelian coverings, *J. Group Theory* **26** (2023), no. 2, 399-420. DOI:10.1515/jgth-2021-0154 · arXiv:2107.11230

EXPOSITORY ARTICLES

- [5] RÉMI COULON AND ALEXIS MARCHAND, Growth and co-growth in negatively curved groups, in DAHMANI, ERSCHLER, HORBEZ, WISE (eds.), Groups acting on fractals, hyperbolicity and auto-similarity, *Panoramas et Synthèses* **63** (2024).
- [6] ALEXIS MARCHAND, Makers of patterns: from Escher to Coxeter, *Eureka* **66** (2020).
- [7] ALEXIS MARCHAND, Géométrie des groupes et courbure négative, *Journal de Mathématiques des Élèves de l'ENS de Lyon* **IV** (2020).

TEACHING EXPERIENCE

2021-24 Undergraduate supervisions · Trinity College & Peterhouse College, Cambridge

- Analysis & Topology (IB) — 46 contact hours
- Linear Algebra (IB) — 16 contact hours
- Geometry (IB) — 34 contact hours
- Riemann Surfaces (II) — 31 contact hours

2024 Part III examples classes · University of Cambridge

Teaching assistant for Geometric Group Theory — 8 contact hours

2023-24 High school research project supervision · Rusanivskyi Lyceum, Kyiv (online)

Supervisor of the project of Olha Mykhailuk on inversions and Möbius transformations, who won the second place at the city stage in the Junior Academy of Sciences of Ukraine research competition

2022-23 Admissions interviews · Christ's College, Cambridge

Co-interviewer for undergraduate admissions in mathematics

2021-23 Part III drop-in sessions · University of Cambridge

Drop-in session leader for Group Cohomology, Mapping Class Groups

2019-20 School tutoring · Stimulus, Cambridge

Volunteer tutor in mathematics in secondary schools

2018-19 Colles · Lycée Aux Lazaristes, Lyon

Oral examiner in mathematics for first-year students in a preparatory class — 44 contact hours

2017-21 French as a foreign language · *ItinérENS, Lyon*

Volunteer teacher of French classes for refugees — more than 100 contact hours

MISCELLANEOUS EXPERIENCE

2023-24 Junior geometry seminar · *University of Cambridge*

Co-organiser of the graduate students' seminar in geometry

2023-24 BA computing · *Trinity College, Cambridge*

MCR committee member in charge of: the MCR's website, mailing list, elections, lunchtime seminars, etc.

2022 Reading seminar · *University of Cambridge*

Organiser of a reading seminar on generalisations of hyperbolic groups

AWARDS & FUNDING

2024 Postdoctoral fellowship for research in Japan · *Japan Society for the Promotion of Science*

One-year fellowship for the project *Stable commutator length in finitely presented groups*

2023 Smith–Knight & Rayleigh–Knight prize · *University of Cambridge*

Grade 3, for the essay *Isometric embeddings of surfaces for scl*

2021 PhD studentship · *Engineering & Physical Sciences Research Council*

Three-year studentship at the University of Cambridge

2017 ENS studentship · *École Normale Supérieure de Lyon*

Four-year studentship with civil servant status awarded by competitive exam (rank: 16)

INVITED TALKS

Nov. 2024 First MMS workshop for young researchers · *Kyoto University*

Nov. 2024 Séminaire virtuel francophone groupes et géométrie · *Online*

May 2024 Seminari dei baby geometri · *Università di Pisa / Scuola Normale Superiore*

Apr. 2024 International young seminar on bounded cohomology & simplicial volume · *Online*

Apr. 2024 Geometry and geometric analysis seminar · *Purdue University (online)*

Mar. 2024 Geometric group theory seminar · *University of Oxford*

Dec. 2023 Bristol junior geometry seminar · *University of Bristol*

Jun. 2023 International young seminar on bounded cohomology & simplicial volume · *Online*

Apr. 2023 Methusalem junior seminar · *KU Leuven*

Mar. 2023 Geometry graduate colloquium · *ETH Zürich*

Feb. 2023 Junior topology & group theory seminar · *University of Oxford*

Feb. 2023 Geometric group theory seminar · *University of Cambridge*
 Jun. 2022 Séminaire compréhensible · *Université Grenoble Alpes*
 Apr. 2022 Séminaire des doctorants de St-Charles · *Aix-Marseille Université*

CONFERENCES ATTENDED

Feb. 2025 20th East Asian conference on geometric topology · *University of Tokyo*
 Contributed talk
 Jan. 2025 Geometry and dynamics in low dimensions · *VAST, Hanoi*
 Contributed talk
 Apr. 2024 Groups, topology, & applications Gran Bilbao · *UPV / EHU, Bilbao*
 Mar. 2024 Topological & homological methods in group theory · *Universität Bielefeld*
 Feb. 2024 GAGTA · *CIRM, Marseille*
 Contributed talk & poster
 Jul. 2023 Postgraduate group theory conference · *Heriot-Watt University, Edinburgh*
 Contributed talk
 May 2023 Geometry of subgroups · *CRM, Montréal*
 Jan. 2023 LMS regional meeting · *University of Southampton*
 Contributed poster
 Sep. 2022 Recent advances in bounded cohomology · *Universität Regensburg*
 Jun. 2022 Hyperbolic groups and their generalisations · *IHP, Paris*
 Apr. 2022 Mapping class groups and $\text{Out}(F_n)$ · *IHP, Paris*
 Apr. 2022 Groups acting on fractals · *CIRM, Marseille*
 Feb. 2022 Workshop on finiteness properties · *KIT, Karlsruhe*

LANGUAGES

FRENCH	Native speaker	PORTUGUESE	Advanced (B2)
ENGLISH	Fluent (C2). Passed the CAE	RUSSIAN	Intermediate (B1)
GERMAN	Advanced (B2)	JAPANESE	Intermediate (B1)

January 17, 2025