

# 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)

## ACCEPTED PAPERS

- [1] ALEXIS MARCHAND, From letter-quasimorphisms to angle structures and spectral gaps for scl, 2024. *Israel J. Math.* (to appear). arXiv:2402.13856
- [2] ALEXIS MARCHAND, Isometric embeddings of surfaces for scl, 2023. *Groups Geom. Dyn.* (to appear). arXiv:2302.04133
- [3] ALEXIS MARCHAND, Bavard duality for the relative Gromov seminorm, 2023. *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] ALEXIS MARCHAND, Makers of patterns: from Escher to Coxeter, *Eureka* **66** (2020).
- [6] 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

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 Note taker for a mini-course · *CIRM, Marseille*

Wrote notes for Growth and co-growth in negatively curved groups, by RÉMI COULON. To appear in DAHMANI, ERSCHLER, HORBEZ, WISE (eds.), Groups acting on fractals, hyperbolicity and auto-similarity, Panoramas et Synthèses, Société Mathématique de France

2022 Reading seminar · *University of Cambridge*

Organiser of a reading seminar on generalisations of hyperbolic groups

#### AWARDS

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

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

2021 EPSRC PhD studentship · *University of Cambridge*

Three-year studentship funded by the Engineering & Physical Sciences Research Council

2017 ENS studentship · *École Normale Supérieure de Lyon*

Four-year studentship with civil servant status funded by the French government

#### 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

- Jan. 2025* Geometry and dynamics in low dimensions · *VAST, Hanoi*
- 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	Elementary (A2)

October 31, 2024