

# 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 particularly 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

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, Bavard duality for the relative Gromov seminorm, 2023. *Enseign. Math.* (to appear). [arXiv:2305.02149](https://arxiv.org/abs/2305.02149)

- [2] ALEXIS MARCHAND, Isometric embeddings of surfaces for scl, 2023. *Groups Geom. Dyn.* (to appear). arXiv:2302.04133
- [3] 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

#### PREPRINTS

- [4] ALEXIS MARCHAND, From letter-quasimorphisms to angle structures and spectral gaps for scl, 2024. arXiv:2402.13856

#### 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 Éléves 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 and migrants — more than 100 contact hours

#### ORGANISATIONAL EXPERIENCE

2023-24 Junior geometry seminar · University of Cambridge

Co-organiser of the graduate students' seminar in geometry

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*
- 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*
- Jan. 2023 International young seminar on bounded cohomology & simplicial volume · *Online*
- Jun. 2022 Séminaire compréhensible · *Université Grenoble Alpes*
- Apr. 2022 Séminaire des doctorants de St-Charles · *Aix-Marseille Université*

## CONFERENCES ATTENDED

- Apr. 2024 Groups, topology, & applications Gran Bilbao · *Euskal Herriko Unibertsitatea*
- 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)

July 25, 2024