

# 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

2025-27 · **IM PAN, Warszawa** · *Adiunkt (Assistant Professor)*

Two-year position funded by the NCN Maestro Project *Analysis on Groups*  
Mentor: PIOTR NOWAK

2024-25 · **Kyōto University** · *JSPS Postdoctoral Fellow*

One-year fellowship awarded by the Japan Society for the Promotion of Science  
Mentor: KŌJI FUJIWARA

## EDUCATION

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

Thesis: *Computations and lower bounds for scl and the relative Gromov seminorm*  
Defended on July 15, 2024  
Funding: EPSRC PhD studentship  
Supervisor: HENRY WILTON

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

Funding: ENS studentship awarded by national competitive examination (rank: 16)

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

Mention Très Bien  
Thesis: *Automorphismes extérieurs de produits libres : revêtements abéliens caractéristiques et représentations libres*  
Supervisor: FRANÇOIS DAHMANI

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

Pass with Merit  
Essay: *Rigidity Theorems for Hyperbolic Groups*  
Supervisor: HENRY WILTON

2017-19 · **École Normale Supérieure de Lyon / Université Lyon 1** · *B.Sc. in Mathematics*

## RESEARCH PAPERS (PUBLISHED OR 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, Bavard duality for the relative Gromov seminorm. **Enseign. Math.** (online first). DOI:10.4171/lem/1087 · arXiv:2305.02149
- [3] ALEXIS MARCHAND, Isometric embeddings of surfaces for scl, **Groups Geom. Dyn.** **19** (2025), no. 4, 1445-1478. DOI:10.4171/ggd/845 · arXiv:2302.04133
- [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** (2025).
- [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).

## AWARDS

- 2025 · Humboldt research fellowship for postdoctoral researchers · Humboldt-Stiftung  
Fellowship of up to two years, hosted by CLARA LÖH at Universität Regensburg  
Project: *Invariants of groups and non-positive curvature*
- 2024 · JSPS postdoctoral fellowship for research in Japan · JSPS  
Fellowship of up to one year, hosted by KOJI FUJIWARA at Kyōto University  
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*

## RESEARCH VISITS

- 2025 · **INI, Cambridge** · Three-week visit (programme participant)  
Programme: *Operators, graphs, groups*
- 2025 · **RIMS, Kyōto** · Two-week small-group workshop (co-organiser)  
Programme: *Spectrum problems for scl via S-machines*
- 2025 · **KIAS, Seoul** · One-week visit (invited by SANG-HYUN KIM)
- 2025 · **University of Hawai'i at Mānoa** · Ten-day visit (invited by YASH LODHA)
- 2022 · **IHP, Paris** · One two-week visit and one three-week visit (programme participant)  
Programme: *Groups acting on fractals*
- 2019 · **IMPA, Rio de Janeiro** · Two-month M.Sc. internship (supervisor: HOSSEIN MOVASATI)  
Topic: *Topology of complex affine varieties*
- 2018 · **KIT, Karlsruhe** · Six-week B.Sc. internship (supervisor: CATERINA CAMPAGNOLO)  
Topic: *Geometry of Coxeter groups*

## HIGHER-EDUCATION TEACHING EXPERIENCE

- 2023-24 · Part III examples classes · University of Cambridge  
Teaching assistant for Geometric Group Theory — 8 contact hours
- 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
- 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
- 2018-19 · Colles · Lycée Aux Lazaristes, Lyon  
Oral examiner in mathematics for first-year students in a preparatory class — 44 contact hours

## SCHOOL TEACHING EXPERIENCE AND VOLUNTEER TEACHING

- 2025 · JSPS science dialogue · Koshi High School, Fukui  
Lecture in English and Japanese for a high school science club
- 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
- 2019-20 · Tutoring (Stimulus) · Coleridge Community College & St Faith's School, Cambridge  
Volunteer tutor in mathematics in secondary schools
- 2017-21 · French as a foreign language · ItinérENS, Lyon  
Volunteer teacher of French classes for refugees — more than 100 contact hours

## SERVICE

- Refereeing for *Trans. Amer. Math. Soc.*, *Algebr. Geom. Topol.*, *KIAS Springer Ser. Math.*
- 2025 · World of GroupCraft V · Online  
Co-organiser of the 2025 edition
- 2024-25 · Reading seminar · Kyōto University  
Organiser of a reading seminar on  $L^2$ -Betti numbers
- 2023-24 · Junior geometry seminar · University of Cambridge  
Co-organiser of the graduate students' seminar in geometry
- 2023-24 · MCR committee · Trinity College, Cambridge  
MCR (Middle Combination Room) committee member in charge of: the MCR's website, mailing list, elections, lunchtime seminars, etc.
- 2022-23 · Reading seminar · University of Cambridge  
Organiser of a reading seminar on generalisations of hyperbolic groups

## INVITED TALKS

- Jul. 2025 · Tuesday seminar on topology · **University of Tōkyō**
- Jul. 2025 · Tōhoku University geometry seminar · **Tōhoku University**
- Jun. 2025 · KIAS topology seminar · **KIAS, Seoul**

*May 2025* · Kyōto differential topology seminar · **Kyōto University**  
*Apr. 2025* · Mathematics department colloquium · **University of Hawai'i at Mānoa**  
*Apr. 2025* · Kanazawa topology seminar · **Kanazawa University**  
*Nov. 2024* · First MMS workshop for young researchers · **Kyōto 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 Tōkyō**  
 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	JAPANESE	Advanced (B1/B2)
GERMAN	Advanced (B2)	RUSSIAN	Intermediate (B1)

October 27, 2025