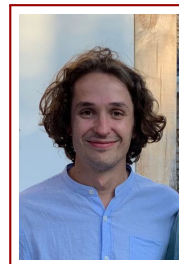# Simon MACHADO

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▬▬▬ Employment

2023-2026 **Hermann-Weyl Instructor**,
ETH, Zurich.
Mentor: Prof. Manfred Einsiedler

2022-2023 **Member at the Institute for Advanced Studies**,
IAS, Princeton.
Special year on Dynamics, Additive Number Theory and Algebraic Geometry.

▬▬▬ Education

2018-2022 **PhD candidate in Pure Mathematics**,
University of Cambridge.
Supervisor: Prof. Emmanuel Breuillard.

▬▬▬ Publications & Preprints

12. 2024 Simon Machado, *Minimal doubling for small subsets in compact Lie groups*. *Arxiv preprint, https://arxiv.org/abs/2401.14062*.

11. 2024 Chevalier *et al.*, *Language Models as Science Tutors*. *ICML 2024*.

10. 2023 Simon Machado, *The definitions of approximate lattices*. *Arxiv preprint, https://arxiv.org/abs/2310.10256*.

9. 2023 Simon Machado, *Approximate lattices and S-adic linear groups*. *Arxiv preprint, https://arxiv.org/abs/2310.10246*.

8. 2023 Cyril Letrouit, Simon Machado, *Maximal multiplicities of eigenvalues in negatively curved surfaces*. *Geometric and Functional Analysis 34 (5), 1609-1645, https://doi.org/10.1007/s00039-024-00691-w*.

7. 2023 Simon Machado, *The structure of approximate lattices in linear groups*. *Arxiv preprint, https://arxiv.org/abs/2306.09899*.

6. 2023 Simon Machado, *Small doubling for discrete subsets of non-commutative groups and a theorem of Lagarias*. *Arxiv preprint, https://arxiv.org/abs/2304.12509*.

5. 2022 Simon Machado, Appendix to "Foundations of geometric approximate group theory" by Cordes, Hartnick and Tonić. *Arxiv preprint, https://arxiv.org/abs/2012.15303*.

4. 2021 Simon Machado, *Approximate Lattices in Higher-Rank Semi-Simple Groups*. *Geom. Funct. Anal. Vol. 33 (2023) 1101–1140, https://doi.org/10.1007/s00039-023-00643-w*.

3. 2020 Simon Machado, *Closed approximate subgroups: compactness, amenability and approximate lattices*. *to appear in Forum of Math., Sigma, https://arxiv.org/abs/2011.01829*.

2. 2019 Simon Machado, *Infinite approximate subgroups of soluble Lie groups*. *Math. Ann. (2021). https://doi.org/10.1007/s00208-021-02258-8*.

1. 2018   Simon Machado, *Approximate lattices and Meyer sets in nilpotent Lie groups*. Discrete *Analysis 2020:1, 18 pp. https://doi.org/10.19086/da.11886* .

Research talks

2024   **New perspectives on approximate lattices and applications**, *Workshop on "Aperiodic order and approximate groups 2024".*

2024   **Minimal doubling and Brunn-Minkowski in compact Lie groups**, *Universite de Neuchatel.*

2024   **Minimal doubling and Brunn-Minkowski in compact Lie groups**, *University of Bristol.*

2024   **The structure of approximate lattices**, *Workshop "Point Sets: Dynamics, sampling, and operator algebras".*

2024   **Minimal doubling and Brunn-Minkowski in compact Lie groups**, *Number theory, Oxford.*

2024   **The structure of approximate lattices**, *Geometric group theory seminar, Oxford.*

2024   **Minimal doubling and Brunn-Minkowski in compact Lie groups**, *Jagiellonian university, Krakow.*

2024   **Minimal doubling and Brunn-Minkowski in compact Lie groups**, *Seminaire virtuel francophone de groupes et geometrie.*

2024   **Minimal doubling and Brunn-Minkowski in compact Lie groups**, *Seminaire algèbres d'opérateurs, Paris 7.*

2023   **When are discrete subsets of Lie groups approximate subgroups?**, *"Ergodic Theory and Applications" online seminar.*

2023   **Between additive combinatorics and bounded cohomology**, *International seminar on bounded cohomology.*

2023   **Approximate lattices**, *Colloquium talk, University of Bern.*

2023   **Minimal doubling in compact Lie groups**, *NUS combinatorics seminar.*

2023   **The structure of approximate lattices**, *Geometry seminar, IHES.*

2023   **The structure of approximate lattices**, *Geometry seminar, ETH Zurich.*

2023   **Algebraic and dynamical perspective on approximate lattices**, *Workshop on "Aperiodic order and approximate groups 2023".*

2023   **When are discrete subsets of Lie groups approximate subgroups?**, *KIT.*

2022   **Approximate lattices in linear groups**, *Yale university.*

2022   **Approximate lattices in linear groups**, *Workshop on additive combinatorics and algebraic connections, Institute for Advanced Study.*

2022   **When are discrete subsets of Lie groups approximate subgroups? Around a theorem of Lagarias**, *Copenhagen–Jerusalem Combinatorics seminar.*

2022   **Superrigidity and arithmeticity for some aperiodic subsets in higher-rank simple Lie groups**, *New England seminar of Ergodic Theory.*

2022   **Arithméticité et superrigidité de certains ensembles apériodiques en rang supérieur.**, *Séminaire de théorie ergodique, Université de Rennes.*

2022   **Commensurator superrigidity for approximate lattices**, *Kazhdan's seminar.*

2021   **Approximate lattices in higher rank simple Lie groups**, *Ergodic Theory and Dynamical Systems seminar, Zurich.*

2021   **Approximate Subgroups, Meyer Sets and Arithmeticity**, *CanaDAM 2021.*

2021 **Discrete approximate subgroups of linear algebraic groups**, *KTH Wednesday Zoom seminar, Stockholm.*

2021 **Sous-groupes approximatifs discrets des groupes de Lie**, *Seminaire virtuel francophone Groupes et Geometrie.*

2021 **Approximate lattices and Meyer sets: structure of certain infinite approximate groups**, *Oxford logic seminar.*

2021 **Meyer-type theorems for approximate lattices**, *Seminaire de logique Lyon-Paris.*

2020 **Approximate lattices in amenable groups**, *Geometric Group Theory seminar, University of Cambridge.*

2020 **On some classes of infinite approximate subgroups**, *MFO Workshop "Model Theory: Groups, Geometries and Combinatorics".*

2019 **Good models for infinite approximate subgroups**, *MFO Workshop "Groups, Dynamics and Approximation".*

Teaching & Outreach

Teaching

Autumn 2024	Growth in groups, *ETH Zurich.*
	Master's level course (Curriculum design, teaching, exercise sessions and grading): 45 students
Spring 2024	Furstenberg's correspondence principle, *ETH Zurich.*
	Running a student seminar with 11 students at Bachelor/Master's level
2020-2021	Supervisions in Part IIA Groups, Rings and Modules, *University of Cambridge.*
2018-2019	Supervisions in Part IIB Number Theory, *University of Cambridge.*
2015-2018	Colles in mathematics in classes préparatoires, *Lycée Louis-Le-Grand, Paris, France.*
	Teaching Assistant at undergraduate level (year 1 & 2 of undergraduate studies).

Outreach

2018-2019	Volunteering for the International Tournament of Young Mathematicians (ITYM).
	Organising committee, public relations and scientific committee of an international mathematical tournament at highschool/sixth form level.
July 2017	Teaching at the summer camp in Bethlehem held by the Al-Khwarizmi–Noether Institute, *Bethlehem, West Bank, Palestine.*
	Teaching Olympiad-oriented problem solving to year 12 to 14 children.
2016-2017	Volunteering at Parimaths, *Paris, France.*
	Lectures about current trends in mathematics to highschool/sixth form students. Organisation and teaching roles.
2015-current	Volunteering for the French Tournament of Young Mathematicians (TFJM), *Association Animaths, Paris, France.*
	Organisation committee and scientific committee of a nationwide mathematical tournament at highschool/sixth form level.

Services

2021-2022	Organisation of a discussion group, *University of Cambridge.*
	Organization of a discussion group on various topics related to the interests of researchers within Prof. Varju's group.
2021	Organization, The Informal Seminar, *University of Cambridge.*
	Organization of a seminar meant for some PhD candidates, post-docs and academic staff that arrived at the University of Cambridge during the pandemic.

2020	Chair part III seminars, *University of Cambridge*.
	Chairing and providing feedback to Master's student about talks on their dissertation subject.
2020	Talk at the open days of the CMI PhD program, *University of Cambridge*.

Languages

o French: Mother tongue   o English: Fluent

Interests

Cinema - Climbing - Skiing.

References - available upon request