

MANUEL LECHA

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SUMMARY

I have a background in mathematics and computer science, and I'm currently an ELLIS PhD student supervised by Alessio Del Bue and Michael Bronstein. My research focuses on designing machine learning methods from first principles, with an emphasis on geometric deep learning, including equivariant architectures, and graph foundation models.

EDUCATION

ELLIS PhD Program in Machine Learning *Nov 2024 – Nov 2027*
Italian Institute of Technology,
University of Oxford

Supervisors: Alessio Del Bue and Michael Bronstein.

Master of Advanced Mathematics and Mathematical Engineering *Sep 2021 – Dec 2022*
Polytechnic University of Catalonia

Specialization: Algebra, Geometry, and Discrete Mathematics.

Thesis: *Towards Multiparameter Persistence Homology.*

Bachelor of Computer Science and Software Engineering *Sep 2015 – Feb 2021*
University of Barcelona

Bachelor of Mathematics *Sep 2015 – Feb 2021*
University of Barcelona,
University of Warwick

Exchange: Third year completed at the University of Warwick.

Thesis: *Functional Summaries of Persistence Diagrams for Time Series Analysis.*

Postgraduate Diploma in Financial Mathematics *Oct 2020 – Jun 2021*
Polytechnic University of Catalonia

ADDITIONAL RESEARCH EXPERIENCE

Fellow Researcher *May 2024 – Nov 2024*
Italian Institute of Technology

Fellow Researcher *April 2023 – Mar 2024*
University of Barcelona

PUBLICATIONS

Directed Semi-Simplicial Learning with Applications to Brain Activity Decoding. **ICLR, 2026**
First author.

Higher-Order Topological Directionality and Directed Simplicial Neural Networks. **ICASSP, 2025**
First author.

Topobench: A Framework for Benchmarking Topological Deep Learning. **DMLR, 2025**
Co-author.

TopoX: A Suite of Python Packages for Machine Learning on Topological Domains. **JMLR, 2025**
Co-author.

Co-author.

AWARDS AND HONORS

G-Research Grant*Jan, 2026*

G-Research early career researches grant.

ELLIS PhD Program Admission

Admitted to ELLIS PhD program (acceptance rate <5%).

First Place - 2nd Topological Deep Learning Challenge**ICML, 2024**

Topological lifting for graphs into combinatorial abstract spaces.

First Place - 1st Topological Deep Learning Challenge**ICML, 2023**

Higher-Order Attention Neural Networks for Mesh Classification.

Matrícula de Honor Award*Sep, 2015*

Spanish merit-based award for exceptional academic performance; full coverage of first-year university tuition.

WORKSHOPS, TALKS, AND COMMUNITY ORGANIZATION

Workshop Organizer, Geometry-grounded Representation Learning and Generative Modeling**ICLR, 2026****Invited seminar**, Applied Algebraic Topology Research Network (ATTNR)*Feb 2026**Directed Topological Deep Learning and Brain Networks.***Invited seminar**, Topological Machine Learning Seminar, University of Barcelona*Oct 2023**Laplacians and Network Sheaves.***RESEARCH SUMMER SCHOOLS**

G-Research Spring Week

Aug 2026

Oxford Machine Learning Summer School — Representation Learning and Generative AI

Aug 2025

Cambridge ELLIS Summer School on Probabilistic Machine Learning

*Aug 2024***INDUSTRY EXPERIENCE**

Data Analyst*Mar 2021 – Sep 2021**KPMG Spain*

Development and validation of risk and forecasting models for financial services.

Data Analyst Intern*Dec 2020 – Mar 2021**IMath Sherpa*

Developed machine learning models for stock market analysis and financial product modeling, supporting investment decision-making and portfolio management.