

Alvaro Martinez

martinez@math.columbia.edu +1 646 922 2856 New York, NY [Website](#) [Github](#)

EXPERIENCE

Columbia University Department of Mathematics

August 2019 – Present

PhD Candidate

- Published research in representation theory and presented papers at international conferences
- Developed a **Python package** introducing topological classes and novel coloring algorithms, achieving an over **2.5x expansion in computational range** over existing methods.
- Developed liftings between data domains in **topological deep learning** using **PyTorch**.
- Was awarded an **Honorable Mention at ICML 2024** and publication in PMLR Proceedings.

Instructor

- Created a **linear algebra** course, integrating active learning and software tools (**MATLAB**)
- Co-directed an undergraduate research program on **quantum error-correcting codes**.

Science Honors Program

January 2020 – May 2023

Course Developer

- Developed courses and interactive **JavaScript** tools for high-achieving high school students, focused on graduate topics and problem-solving.

EDUCATION

Columbia University

(May 2025)

PhD in Mathematics

New York, NY

- MPhil (2023), Peter and Katherine Klein Fellowship (2022), MA (2021)

University of Cambridge

May 2019

Master of Advanced Study (Part III) in Mathematics

Cambridge, UK

Imperial College London

June 2018

BSc in Mathematics

London, UK

- Ken Allen Prize (awarded to top five graduating students)
- Winton Capital Prize (awarded to best team project)

SELECTED RESEARCH

- **Topological Deep Learning: going beyond the graph domain** (to appear in PMLR Proceedings)
Contributions: [ProbabilisticCliqueLifting](#), [StrictUniversalLifting](#) (**Honorable Mention at ICML 2024**)
- **A new modular plethystic $SL(2)$ -isomorphism** (2024) [arXiv](#)
- **Foams Python Package** (2023, to appear in PhD thesis) [Demo](#)
- **Deep Learning Representations** (in preparation) [Github](#)
Deep learning algorithm for the discovery of symmetries in labeled datasets via representation theory

SKILLS

- **Programming:** Python (PyTorch, NumPy, SQLite), SageMath, MATLAB, Mathematica, HTML/CSS/JS, Git
- **Languages:** English (fluent), Spanish (fluent), Catalan (fluent), French (conversational)

INTERESTS

- Classically trained jazz guitarist (led a jazz quintet, co-organized a big band), vegan cooking, pickleball