

# Alejandro García Castellanos

Ph.D. Candidate Machine Learning  
AMLab, University of Amsterdam

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Google Scholar: [Alejandro García-Castellanos](https://scholar.google.com/citations?user=HgXzrQIAAAJ&hl=en)

## RESEARCH INTERESTS

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Applying topology, geometry, and algebra to the representation learning and generative modeling of shapes for enhanced human-AI collaboration.

## EXPERIENCE

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### Ph.D. Candidate

*AMLab (Amsterdam Machine Learning Lab), UvA*

Feb. 2024 – Present

Amsterdam, Netherlands

- Under the supervision of Erik Bekkers (UvA) and co-supervision of Daniël Pelt (ULEI)
- Sponsored by [The Hybrid Intelligence Centre](#)
- Geometry-informed machine learning techniques for collaborative human-computer image annotation

### Research Engineer

*RPL (Division of Robotics, Perception and Learning), KTH*

Mar. 2023 – Feb. 2024

Stockholm, Sweden

- Under the supervision of Danica Kragic
- Metric learning in generative models
- Hierarchy discovery in Hyperbolic geometry

### Trainee Internship

*MEDAL laboratory, CTB (Center of Biomedical Technology)*

Sep. 2020 – Jan. 2021

Madrid, Spain

- Under the supervision of Ernestina Menasalvas
- Development of new techniques for information recognition in medical corpus
- Fine-tuning an LLM in breast and lung cancer's clinical notes

## EDUCATION

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### MSc in Machine Learning

*KTH Royal Institute of Technology*

Sep. 2021 – Oct. 2023

Stockholm, Sweden

- Average grade: 4.00 GPA
- Applied Mathematics elective track: Topological Data Analysis, Regression Analysis, Time Series Analysis
- Thesis in “*Topological regularization and relative latent representations*”

### B.S. in Mathematics and Computer Science

*Universidad Politécnica de Madrid*

Sep. 2017 – Jul. 2021

Madrid, Spain

- Average grade: 9.78/10.0 (4.00 GPA)
- Best academic record amongst all programs at the ETSIINF (Higher Technical School of Computer Engineers) of the promotion 2020/2021
- Honours granted by UPM in 29 courses
- Three Scholarships for Academic Excellence granted by the Community of Madrid
- Thesis in “*Robustness of Persistent Homology: the Stability Theorem*”

## SKILLS

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**Programming:** Python, Java, C, R, SQL, MATLAB, Maple, Prolog, Bash

**ML Frameworks:** PyTorch, PyTorch Lightning, JAX, TensorFlow

**Tools:** L<sup>A</sup>T<sub>E</sub>X, Git, Microsoft Office, Keynote, Pages, Adobe Photoshop, Adobe Lightroom

**Soft Skills:** public speaking, written communication, teamwork, project and time management, critical thinking, analytical skills, research skills, creativity, strategic thinking

## TEACHING & SUPERVISION

### Reinforcement Learning

Teaching assistant

2025, 2026

Master In Artificial Intelligence, UvA

### Deep Learning 2

Teaching assistant and project supervisor

2024, 2025

Master In Artificial Intelligence, UvA

### Master Thesis Supervisor

Thesis: "Persistent Homology Go Combinatorial"

2025

Master In Artificial Intelligence, UvA

## RESEARCH PUBLICATIONS

(\* := EQUAL CONTRIBUTION)

NeurIPS '25

**A. García-Castellanos**, D. R. Wessels, N. J. Berg, R. Duits, D. M. Pelt, E. J. Bekkers (2025). "*Equivariant Eikonal Neural Networks: Grid-Free, Scalable Travel-Time Prediction on Homogeneous Spaces*". In: *Advances in Neural Information Processing Systems (NeurIPS)*.

ALENEX '25

**A. García-Castellanos\***, A. A. Medbouhi\*, G. L. Marchetti, E. J. Bekkers, D. Krasic (2025). "*Hypersteiner: Computing heuristic hyperbolic steiner minimal trees*". In: *2025 Proceedings of the Symposium on Algorithm Engineering and Experiments (ALENEX)*.

TAG-DS '25

Oral

O. Boufalis\*, J. Carrasco-Pollo\*, J. Rosenthal\*, E. Terres-Caballero\*, **A. García-Castellanos** (2025). "*Symmetry-Aware Graph Metanetwork Autoencoders: Model Merging through Parameter Canonicalization*". In: *Proceedings of the 1st Conference on Topology, Algebra, and Geometry in Data Science (TAG-DS). Oral presentation*.

UniReps '24

**A. García-Castellanos**, G. L. Marchetti, D. Krasic, M. Scolamiero (2024). "*Relative representations: Topological and geometric perspectives*". In: *Proceedings of the II edition of the Workshop on Unifying Representations in Neural Models (UniReps)*.

## PREPRINTS & MANUSCRIPTS

(\* := EQUAL CONTRIBUTION)

UniReps '25  
(Ext. Abs.)

B. Kuipers\*, F. Byrman\*, D. Uyterlinde\* **A. García-Castellanos** (2025). "*Symmetry-Aware Fully-Amortized Optimization with Scale Equivariant Graph Metanetworks*". In: *Extended Abstract track of the III edition of the Workshop on Unifying Representations in Neural Models (UniReps)*.

ArXiv '25  
(Preprint)

**A. García-Castellanos\***, A. A. Medbouhi\*, G. L. Marchetti, D. M. Pelt, E. J. Bekkers, D. Krasic (2025). "*Randomized HyperSteiner: A Stochastic Delaunay Triangulation Heuristic for the Hyperbolic Steiner Minimal Tree*".

GRaM '24  
(Blog post)

D. Canez\*, N. Midavaine\*, T. Stessen\*, J. Fan\*, S. Arias\*, **A. García-Castellanos** (2024). "*Effect of equivariance on training dynamics*". In: *Blog post track of the I edition of the Workshop on Geometry-grounded Representation Learning and Generative Modeling (GRaM)*.

GRaM '24  
(Blog post)

M. Carrasco\*, A. Berentzen\*, **A. García-Castellanos** (2024). "*Applications of TopoX to Equivariant Topological Networks*". In: *Blog post track of the I edition of the Workshop on Geometry-grounded Representation Learning and Generative Modeling (GRaM)*.

## INVITED TALKS

4th workshop on Mathematics and AI  
Tilburg, Netherlands

June 2025

Learning on Graphs Conference  
Amsterdam, Netherlands

November 2024

## COMMUNITY SERVICE

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<b>Reviewer</b>	2025
<i>NeurIPS Proceedings</i>	
<b>Reviewer</b>	2025
<i>NeurReps Workshop</i>	
<b>Reviewer</b>	2024
<i>UniReps Workshop</i>	
<b>Reviewer</b>	2024
<i>ICML Proceedings</i>	

## LANGUAGES

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**English:** Advanced level (C1), CAE by Cambridge English

**Spanish:** Native language

**German:** Low Beginner Level