

# Alejandro García Castellanos

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

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## 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

Feb. 2024 – Present

*AMLab (Amsterdam Machine Learning Lab), UvA*

*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

Mar. 2023 – Feb. 2024

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

*Stockholm, Sweden*

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

### Trainee Internship

Sep. 2020 – Jan. 2021

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

*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

Sep. 2021 – Oct. 2023

*KTH Royal Institute of Technology*

*Stockholm, Sweden*

- Average grade: 4.00 GPA
- Thesis in “*Topological regularization and relative latent representations*”

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

Sep. 2017 – Jul. 2021

*Universidad Politécnica de Madrid*

*Madrid, Spain*

- Average grade: 9.78/10.0 (4.00 GPA)
- Best academic record amongst all programs at the ETSINF (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

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### Reinforcement Learning

2025, 2026

Teaching assistant

Master In Artificial Intelligence, UvA

### Deep Learning 2

2024, 2025

Teaching assistant and project supervisor

Master In Artificial Intelligence, UvA

### Master Thesis Supervisor

2025

Thesis: “Persistent Homology Go Combinatorial”

Master In Artificial Intelligence, UvA

## RESEARCH PUBLICATIONS

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- 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)*.
- ALLENEX '25     **A. García-Castellanos\***, A. A. Medbouhi\*, G. L. Marchetti, E. J. Bekkers, D. Kragic (2025). “*Hypersteiner: Computing heuristic hyperbolic steiner minimal trees*”. In: *2025 Proceedings of the Symposium on Algorithm Engineering and Experiments (ALLENEX)*.
- TAG-DS '25     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**.
- Oral
- UniReps '24     **A. García-Castellanos**, G. L. Marchetti, D. Kragic, 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

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- UniReps '25     B. Kuipers\*, F. Byrman\*, D. Uytterlinde\* **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)*.  
(Ext. Abs.)
- ArXiv '25     **A. García-Castellanos\***, A. A. Medbouhi\*, G. L. Marchetti, D. M. Pelt, E. J. Bekkers, D. Kragic (2025). “*Randomized HyperSteiner: A Stochastic Delaunay Triangulation Heuristic for the Hyperbolic Steiner Minimal Tree*”.  
(Preprint)
- GRaM '24     D. Canez\*, N. Midavaine\*, T. Stessen\*, J. Fan\*, S. Arias\*, **A. García-Castellanos** (2024). “*Effect of equivariance on training dynamics*”. In: *Workshop Blog track at the I edition of the Workshop on Geometry-grounded Representation Learning and Generative Modeling (GRaM)*.  
(Blog Post)
- GRaM '24     M. Carrasco\*, A. Berentzen\*, **A. García-Castellanos** (2024). “*Applications of TopoX to Equivariant Topological Networks*”. In: *Workshop Blog track at the I edition of the Workshop on Geometry-grounded Representation Learning and Generative Modeling (GRaM)*.  
(Blog Post)

## INVITED TALKS

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### 4th workshop on Mathematics and AI

June 2025

Tilburg, Netherlands

### Learning on Graphs Conference

November 2024

Amsterdam, Netherlands

COMMUNITY SERVICE

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

LANGUAGES

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- English:** Advanced level (C1), CAE by Cambridge English
- Spanish:** Native language
- German:** Low Beginner Level