

Alba Carballo Castro

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About me

I am a 2nd-year PhD student of the Doctoral School in Computer and Communication Sciences at EPFL, under the supervision of Prof. Pascal Frossard. I am also part of the **ELLIS PhD Program**, co-advised by Prof. Mihaela van der Schaar at the University of Cambridge. My research focuses on **discrete generative modeling** (diffusion and flow-matching methods for graphs and sequences) with an emphasis on **scalable, efficient architectures** and biomedical applications.

Education

- Nov 24 – Pres. **PhD in Computer Science, EPFL**, Lausanne, Switzerland
Research area: *Generative models for discrete data (diffusion, flow matching, scalability)*.
Signal Processing Laboratory 4 (LTS4), supervised by Prof. Pascal Frossard.
ELLIS PhD Fellow, co-advised by Prof. Mihaela van der Schaar (Univ. of Cambridge).
- Sep 22 – Sep 24 **MSc in Statistics, ETH Zürich**, Switzerland
Thesis: *Exploiting Interpretable Capabilities with Concept-Enhanced Methods*.
GPA: 5.62/6. Thesis: 6/6.
- Sep 21 – Feb 22 **National Exchange, Polytechnic University of Catalonia**, Barcelona, Spain
National Mobility Grant Awardee (top 5 STEM students of the University of Seville).
- Sep 10 – Jun 21 **Erasmus + Exchange, Sorbonne University**, Paris, France
Santander Bank Erasmus Scholarship (top 6 students of the University of Seville).
- Sep 17 – Jun 22 **BSc in Mathematics & BSc in Statistics, University of Seville**, Spain
Thesis: *Explainability and Causality in Machine Learning through Shapley values*.
GPA: 9.52/10 (Statistics) & 9.03/10 (Mathematics). Ranked 2nd. Thesis: 10/10.

Research Experience

- Feb 26 – May 26 **Visiting PhD Student**, University of Cambridge, *Cambridge, UK*.
Prof. Mihaela van der Schaar Visit as part of the ELLIS PhD Program.
- Sep 23 – Mar 24 **Research Intern**, Roche pRED, *Schlieren, Switzerland*.
Supervisor: Said Aktas. Analysis and visualization of immuno-pharmacodynamics as part of the Data Analytics team in Pharma Research and Early Development.
- Feb 22 – Jun 22 **Research Fellow**, University of Seville, *Seville, Spain*.
Supervisor: Prof. Emilio Carrizosa. Research on Explainable Machine Learning and causality at the Department of Statistics and Operational Research.
- Aug 21 – Feb 22 **JAE Intro CSIC Fellow**, National Centre for Biotechnology (CNB), *Madrid, Spain*.
Supervisors: Dr. Susanna Manrubia, Dr. Luis F. Seoane. Fellowship awarded to top undergraduate students by the Spanish Ministry of Science and the National Research Council (CSIC). Research on modeling brain reorganization after stroke with Deep Learning techniques.
- Jun 21 – Sep 21 **Erasmus + Trainee**, Institut Gustave Roussy, *Paris, France*.
Supervisor: Dr. Damien Drubay. Uncertainty quantification in Bayesian Neural Networks for time-to-event predictions on cancer data using numerical simulations and variational inference.
- Jun 20 – Sep 20 **Maths4Life Fellow**, Institute for Research in Biomedicine, *Barcelona, Spain*.
Supervisor: Dr. Patrick Aloy. Development of a web-based tool to facilitate drug discovery as part of the Maths4Life 2020 Programme.

Publications

- 1 **A. Carballo-Castro**, M. Madeira, Y. Qin, D. Thanou, and P. Frossard, "Generating directed graphs with dual attention and asymmetric encoding," *International Conference on Learning Representations (ICLR)*, 2026. [URL: https://arxiv.org/abs/2506.16404](https://arxiv.org/abs/2506.16404).
- 2 **A. Carballo-Castro**, J. Piskorz, P. Rauba, M. van der Schaar, and P. Frossard, "Recursive scaling in masked diffusion models," *ICML Workshop on Foundations of Deep Generative Models*, 2026. [URL: https://arxiv.org/abs/2606.18022](https://arxiv.org/abs/2606.18022).
- 3 B. Honoré, **A. Carballo-Castro**, Y. Qin, and P. Frossard, "Balancing symmetry and efficiency in graph flow matching," *ICLR Workshop on Deep Generative Model in Machine Learning*, 2026. [URL: https://arxiv.org/abs/2602.18084](https://arxiv.org/abs/2602.18084).
- 4 V. Jung*, **A. Carballo-Castro***, Y. Qin*, L. van der Plas, and P. Frossard, "Efficient edge-aware attention network for graph generation," *ICML Workshop on Graph Foundation Models*, 2026. [URL: https://openreview.net/forum?id=zJf5SIq74D](https://openreview.net/forum?id=zJf5SIq74D).
- 5 A. Miele, Y. Qin, **A. Carballo-Castro**, J. Deschenaux, and P. Frossard, "Fixed-point masked generative modeling," *arXiv preprint (Submitted to NeurIPS)*, 2026. [URL: https://arxiv.org/abs/2605.31215v1](https://arxiv.org/abs/2605.31215v1).
- 6 **A. Carballo-Castro**, S. Laguna, M. Vandenhirtz, and J. E. Vogt, "Exploiting interpretable capabilities with concept-enhanced diffusion and prototype networks," *NeurIPS Workshop on Interpretable AI*, 2024. [URL: https://arxiv.org/abs/2410.18705](https://arxiv.org/abs/2410.18705).
- 7 **A. Carballo-Castro** and L. F. Seoane, "Phase transitions in a simple model of focal stroke imitate recovery and suggest neurorehabilitation strategies," *bioRxiv preprint*, 2022. [DOI: 10.1101/2022.12.14.520421](https://doi.org/10.1101/2022.12.14.520421).

Additional Information

Awards and Achievements

- 2024 **ELLIS PhD Fellowship** - Academic Track.
- 2023 **XX Arquímedes Research Contest**, Spanish Ministry for Science and Innovation.
- 2022 **Postgraduate Fellowship Abroad**, "La Caixa" Foundation.
- 2021 **IV Mathematical Modelling Contest**, Complutense University of Madrid.
- 2013 **Special Prize**, 24th National Spanish Mathematics Olympiads.
1st Prize, 29th Thales Mathematics Olympiads - Local (Seville) and Regional (Andalusia).

Further training

- Jul 2025 **Eastern European Machine Learning Summer School**, Sarajevo. *Best Poster Award*.
- Jul 2015 **4th International Mathematics Summer School**, Saint Petersburg State University.
- 2013 – 2017 **ESTALMAT Program** - Advanced Math. courses at University for High School students.

Language and software skills

- Languages **Spanish** (native); English, French, Catalan (proficient); Italian, German (basic)
- Software **Python** (PyTorch, JAX), R, SQL, MatLab, Unix, Git, Docker

Other activities

- Current **Women+ in IC Treasurer** Fostering EPFL community of women in Computer Science.
Professional Degree in Music Member of *Lausanne Symphonic University Orchestra*.