Postdoctoral Position in Geometric Deep Learning

► **Research theme:** Geometric deep learning, topological deep learning, graph signal processing, graph machine learning

► **Research groups:** Télécom Paris, LTCI

► **Advisor:** Jhony H. Giraldo (jhony.giraldo@telecom-paris.fr)

► **Starting date and duration**: 1 year renewable starting in Spring/Summer 2026 (May/June)

Context

Deep learning has revolutionized perception and language processing with models tailored to data on regular grids or sequences (images, audio, text), building on decades of work in machine learning, optimization, and signal processing, among other fields. However, many problems involve data that do not lie on regular grids, but instead have *relational* or *higher-order* structure (*e.g.*, graphs, hypergraphs, simplicial/cellular complexes) with applications in computational chemistry, recommender systems, and social networks, among others. Deep learning has been extended to these domains using geometric representations. Graphs (*a.k.a* networks), for example, capture *pairwise* relations (*e.g.*, social links or user–item interactions). When pairwise connections are insufficient, one might use higher-order topological structures—hypergraphs and simplicial/cellular complexes—to model *multi-way* interactions (*e.g.*, joint co-authorship, and group dynamics in biological and social systems). Our team develops **robust, scalable, and theoretically grounded learning and signal processing models for graphs and higher-order structures with explicit attention to stability and efficiency**. Concretely, we design neural network architectures and signal processing systems for graphs/higher-order structures, generative models for geometric data, and evaluate them in domain applications.

This position is part of a research program focused on understanding why and when geometric inductive biases improve learning, and on designing continuous and higher-order models with theoretical guarantees.

Research directions (indicative)

The postdoc will contribute to some of the following directions:

- Scalable formulations of geometric/topological deep learning models.

- Continuous formulations of geometric/topological deep learning models.
- Stability, expressivity, and generalization properties of geometric/topological deep learning models.
- Over-smoothing/over-squashing understanding and mitigation strategies for geometric/topological deep learning models.

Candidate profile

We are looking for candidates with the following background:

- Currently holding or finishing a PhD in applied mathematics, computer science, electrical and computer engineering, or a closely related field.
- Strong knowledge of machine learning and interest in theoretical aspects of learning models.
- Experience or strong interest in geometric deep learning and graph signal processing, including graph neural networks and/or higher-order neural network models.
- Have strong programming skills in Python (including PyTorch).
- Motivation to work on research that combines theoretical analysis and practical implementations.
- A strong publication record in machine learning, graph signal processing, or related fields is expected.
- Ability to work independently and propose original research directions.
- Have good communication skills.

Team and location

The postdoc will work in close collaboration with Jhony H. Giraldo, with regular research discussions and an emphasis on theory-informed model design and publication-quality results. The position offers intellectual freedom to shape the research direction while contributing to a coherent and growing research program in geometric deep learning. The expected outcome of the postdoc is the development of new theoretical and computational results extending recent work on continuous simplicial and product graph neural networks [1, 2], with the goal of producing high-quality publications. The postdoctoral researcher will also have opportunities for close scientific interaction and collaboration with **Antonio Ortega** (USC), **Fragkiskos Malliaros** (Université Paris-Saclay), and **Dorina Thanou** (EPFL) on specific aspects related to graph signal processing and geometric learning.

Télécom Paris is a premier engineering school in France and a constituent member of Institut Polytechnique de Paris. IP Paris is consistently ranked among the best universities worldwide (QS Ranking, THE Ranking). Télécom Paris is located on the outskirts of Paris (around 45 minutes by train from the center of Paris) at the center of the Paris-Saclay cluster—a fast-growing research and industrial ecosystem. The postdoc position is funded by the ANR JCJC project DeSNAP. The postdoc will be integrated within the MM Team at the LTCI lab.

How to apply

Please send your application material (PDF format; in English) by email to Jhony H. Giraldo, including the following:

- A full CV.
- A brief research statement (1–2 pages) describing research interests and how they relate to geometric deep learning and/or graph signal processing.
- Names and contact information of 2–3 referees.

The applications will be reviewed on a rolling basis until the position is filled.

References

[1] A. Einizade, F. Malliaros, and J. H. Giraldo, "Continuous product graph neural networks," *NeurIPS*, 2024.

[2] A. Einizade, D. Thanou, F. D. Malliaros, and J. H. Giraldo, "Continuous simplicial neural networks," *NeurIPS*, 2025.