# CELIA RUBIO-MADRIGAL

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I am a PhD candidate at CISPA. My work addresses generalization challenges in GNNs by studying the dual role of graphs as both data and computation structures. I hold two degrees in Mathematics and Computer Science from Universidad Complutense de Madrid, and a master's from Strathclyde with a "la Caixa" Foundation Fellowship.

## EXPERIENCE 💼

**Doctoral researcher** • *CISPA Helmholtz Center for Information Security*                      **2023-now**
– 🔗 Relational Machine Learning Lab     – Supervisor: Dr. Rebekka Burkholz

**TA: Laboratory demonstrator (6h/week)** • *University of Strathclyde*                      **2023**
– "CS310 Foundations of AI" for Year 3 BSc Computer Science     – Lecturer: Dr. Andrew Abel

**Consultant Developer Intern** • *Guidewire Software*                      **2021**

## EDUCATION 🎓

**PhD in Computer Science** • *Universität des Saarlandes (Saarbrücken, Germany)*                      **2023-now**

**MSc in Advanced CS with AI** • *University of Strathclyde (Glasgow, UK)* – 8.57/10 (with Distinction)     **2022-23**
– 🔗 Fully funded by "la Caixa" Foundation Fellowship     – Earned the Department's Best Overall Prize

**BSc in Computer Science** • *Universidad Complutense de Madrid (Spain)* – 9.16/10                      **2017-22**
– Secretary of the Student Council 2021-22     – Member of the Faculty Board 2020-22

**BSc in Mathematics** • *Universidad Complutense de Madrid (Spain)* – 9.08/10                      **2017-22**

## PUBLICATIONS 📄

Legend:     ★ First author at A* conference (NeurIPS, ICLR, ICML).     – Preprint.     * Equal contribution.

– HAM: A hyperbolic step to regulate implicit bias. T. Jacobs, A. Gadhikar, <u>C.R.M.</u>, R. Burkholz. arXiv, 2025. 📄

– When shift happens-Confounding is to blame. A.G. Reddy, <u>C.R.M.</u>, R. Burkholz, K. Muandet. arXiv, 2025. 📄

★ GNNs getting ComFy: Community and feature similarity guided rewiring. <u>C.R.M.*</u>, A. Jamadandi*, R. Burkholz. 13th International Conference on Learning Representations (ICLR), 2025. 📄

★ Spectral graph pruning against over-squashing and over-smoothing. A. Jamadandi*, <u>C.R.M.*</u>, R. Burkholz. 38th Conference on Neural Information Processing Systems (NeurIPS), 2024. 📄

– Rendering string diagrams recursively. <u>C.R.M.</u>, J. Hedges. arXiv, 2024. 📄

– Serialismo y matemáticas (I) 📄, (II) 📄, (III) 📄, (IV) 📄. <u>C.R.M.</u> DivulgaMAT: Música y Matemáticas, 2019.

## TALKS 🎙

– Lightning talk: Geometry, Topology, and Machine Learning Workshop (GTML): *Leipzig, Germany.*  **Nov 2025**

– 🔗 Lightning talk: International Conference on Network Science (NetSci): *Maastricht, Netherlands.*  **Jun 2025**

– 🔗 Invited talk & visit: Seminar of the TUWien ML Research Unit: *Vienna, Austria.*  **May 2025**

– 🔗 Online talk: Cohere Labs / Cohere For AI - Open Science Community: ▶️  **Feb 2025**

– 🔗 Contributed talk: Helmholtz AI Conference: AI for Science (HAICON): *Düsseldorf, Germany.*  **Jun 2024**

## AWARDS 🏅

– Best Overall Performance Prize: *University of Strathclyde's top student in MSc Advanced CS.*  **Oct 2023**

– 🔗 Nova 111 Student List: *Spain's top 10 talents under 25 in Computer Science.*  **Mar 2023**

– 9th Heidelberg Laureate Forum: 📰 *HLFF Spotlight,* 📰 *Tribuna Complutense.*  **Sep 2022**

– 🔗 ''la Caixa'' Foundation Postgraduate Fellowship: 📰 *El País,* 📰 *El Plural,* 🖥 *TeleMadrid.*  **Jun 2022**

– 🔗 Aula de Verano ''Blas Cabrera'' for Spain's top undergrads: *International Univ. Menéndez Pelayo.*  **2022**

– Becas de Excelencia: *Excellence Grants for undergrads with >9/10 in Madrid (2100€).*  **2018-22**

– 🔗 Premio Extraordinario de Bachillerato: *Madrid's top 25 in general-content exam (1000€).*  **2017**

– ▶️ Leading Program ''la Caixa'': *Madrid's top 20 university admission scores.*  **2017**

– 10/10 with Honours at IES San Mateo: *Top 5 students at Spain's only public High School of Excellence.*  **2017**

## OTHER PROJECTS 💡

**European Girls' Mathematical Olympiad (EGMO)** • *Organization and participation.* 🔗  **2017-now**
– Permanent member of IT with Joseph Myers: at 2025 Kosovo, 2024 Georgia, and 2023 Slovenia.
– Deputy Leader of Spain: at EGMO 2022 Hungary and PAGMO 2021.
– Contestant representing Spain: at EGMO 2017 Switzerland.

**Departmental collaboration grant** • *Ministerio de Educación, Universidad Complutense de Madrid*  **2021-22**
– Grant: Beca de colaboración from Ministerio de Educación at Dept. Software Systems and Computation.
– Identification of boolean functions that need big circuits to be computed, with Ismael Rodríguez Laguna. 📄

**Introduction to research ICMAT-Severo Ochoa grant** • *Instituto de Ciencias Matemáticas (ICMAT)*  **2021**
– Grant: Ayudas de introducción a la investigación ICMAT-Severo Ochoa. ▶️
– Differential geometry methods in Machine Learning applications, with David Martín de Diego.

**LaTeX package: ddphonism** • *Contained in MiKTeX and TeXLive music bundles.* </>  **2019**

**Professional Music Degree in Baroque Recorder** • *Conservatorio Profesional de Música Arturo Soria*  **2006-16**