

# Carlos Payá – Curriculum Vitae

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<b>Full Name</b>	Carlos Payá Herrero	<b>Email</b>	carlos.paya@csic.es
<b>Birthdate</b>	20 <sup>th</sup> January 1999	<b>Website</b>	carlosp24.github.io
<b>Birthplace</b>	Madrid, Spain	<b>ORCID</b>	0000-0001-5709-2290
<b>Nationality</b>	Spanish	<b>Github</b>	Carlosp24
<b>Latest update</b>	December 30, 2023		

## Personal Profile

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## Education

<b>2023-Present</b>	PhD in Condensed Matter Physics - Universidad Autónoma de Madrid, Madrid, Spain
	<i>Tentative completion date</i> February 2027
	<i>Topic</i> <i>Topological superconductors with hybrid materials: full-shell Majorana nanowires</i>
	<i>Supervisors</i> Elsa Prada and Ramón Aguado
<b>2021-2022</b>	Master in Physics of Condensed Matter - Universidad Autónoma de Madrid, Madrid, Spain
	<i>Grade</i> 9.45/10
	<i>Master's Thesis</i> <i>Topological phase and Majorana zero modes in full-shell nanowires</i>
	<i>Supervisor</i> Elsa Prada
<b>2017-2021</b>	Bachelor in Physics - Universidad Autónoma de Madrid, Madrid, Spain
	<i>Grade</i> 8.44/10
	<i>Bachelor's Thesis</i> <i>Josephson junctions based on full-shell Majorana nanowires</i>
	<i>Supervisor</i> Elsa Prada

## Employment History

**March 2023 - Present** Instituto de Ciencia de Materiales de Madrid (ICMM), CSIC, Madrid, Spain

*PhD Candidate, FPI grant*

Theory of Quantum Materials and Solid State Quantum Technologies group.

**Nov 2021 - Sep 2022** Instituto de Ciencia de Materiales de Madrid (ICMM), CSIC, Madrid, Spain

*Research Assistant*

Theory of Quantum Materials and Solid State Quantum Technologies group.

## Publications

### Preprints

- [P2] **C. Payá**, S. D. Escribano, A. Vezzosi, F. Peñaranda, R. Aguado, P. San-Jose, and E. Prada. *Phenomenology of Majorana zero modes in full-shell hybrid nanowires*. Dec. 2023. arXiv: 2312 . 11613 [cond-mat.mes-hall]. URL: <https://arxiv.org/abs/2312.11613>.

## Journals

- [P1] P. San-Jose, **C. Payá**, C. M. Marcus, S. Vaitiekėnas, and E. Prada. *Theory of Caroli-de Gennes-Matricon analogs in full-shell hybrid nanowires*. In: *Phys. Rev. B* 107 (15 Apr. 2023), p. 155423. doi: 10.1103/PhysRevB.107.155423. URL: <https://link.aps.org/doi/10.1103/PhysRevB.107.155423>.

## Conferences

### Poster contributions

- [C6] **Sept. 2023.** “Emergence of Quantum Phases in Novel Materials” (Instituto de Ciencia de Materiales de Madrid (ICMM), CSIC, Madrid, Spain). Poster title: *Majorana zero modes in full-shell hybrid nanowires*. URL: [https://carlosp24.github.io/files/Poster2023\\_09.pdf](https://carlosp24.github.io/files/Poster2023_09.pdf).
- [C5] **June 2023.** “Bound States in Superconducting Nanodevices” (TopSquad and AndQC collaborations, Budapest, Hungary). Poster title: *Theory of Caroli-de Gennes-Matricon analogs in full-shell hybrid nanowires*. URL: [https://carlosp24.github.io/files/Poster2023\\_04.pdf](https://carlosp24.github.io/files/Poster2023_04.pdf).
- [C4] **May 2023.** “QuantumMatter 2023” (Phantoms Foundation, Madrid, Spain). Poster title: *Theory of Caroli-de Gennes-Matricon analogs in full-shell hybrid nanowires*. URL: [https://carlosp24.github.io/files/Poster2023\\_04.pdf](https://carlosp24.github.io/files/Poster2023_04.pdf).
- [C3] **May 2023.** “YouMat2023” (Instituto de Ciencia de Materiales de Madrid (ICMM), CSIC, Madrid, Spain). Poster title: *Theory of Caroli-de Gennes-Matricon analogs in full-shell hybrid nanowires*. URL: [https://carlosp24.github.io/files/Poster2023\\_04.pdf](https://carlosp24.github.io/files/Poster2023_04.pdf).
- [C2] **July 2022.** “Frontiers in Condensed Matter Physics” (Niels Bohr Institute, University of Copenhagen, Copenhagen, Denmark). Poster title: *Theory of Caroli-de Gennes-Matricon analogs in full-shell hybrid nanowires*. URL: [https://carlosp24.github.io/files/Poster2023\\_04.pdf](https://carlosp24.github.io/files/Poster2023_04.pdf).

### Attended

- [C1] **Sept. 2021.** “Emergence of Quantum Phases in Novel Materials” (Instituto de Ciencia de Materiales de Madrid (ICMM), CSIC, Madrid, Spain).

## Outreach

**March 2023 - ICMM Superconductivity Outreach Team**

**Present**      *Lecturer and workshopper*

Regular activities: monthly talks and demonstrations for high-school students.

## Events

- [O4] **Nov. 2023.** “Semana de la Ciencia (Science Week)” (CSIC, Madrid, Spain). Role: *workshopper*. URL: <https://www.semanadelaciencia.csic.es/>.
- [O3] **Sept. 2023.** “European Researchers’ Night 2023” (Instituto de Ciencia de Materiales de Madrid (ICMM), CSIC, Madrid, Spain). Role: *workshopper*. URL: <https://lanochedelosinvestigadores.es/>.
- [O2] **June 2023.** “Ciencia en la Calle” (Casa de la Ciencia, Ciudad Real, Spain). Role: *workshopper*. URL: <https://casadelaciencia.es/>.
- [O1] **Sept. 2022.** “European Researchers’ Nighth” (Instituto de Ciencia de Materiales de Madrid (ICMM), CSIC, Madrid, Spain). Role: *logistics*. URL: <https://lanochedelosinvestigadores.es/>.

## Funding

### Student grants

- [F3] *PhD Grant* at ICMM (CSIC) (AEI, PRE2022-101362 for the period 2023-2027). Ammount: 111.758,00€ (including salary, tuition fees and a foregin research stay).

## Participation in funded projects

- [F2] *Correlations, Superconductivity and Topology in Quantum Materials and Technologies* at ICMM (CSIC) ( AEI, PID2021-125343NB-I00 for the period 2022-2025 ). Principal investigators: Ramón Aguado and Elena Bascones.
- [F1] *Topology and Correlations in Quantum Materials and Solid State Quantum Technologies* at ICMM (CSIC) ( AEI, PGC2018-097018-B-I00 for the period 2021-2022 ). Principal investigators: María José Calderón and Ramón Aguado.

## Awards

- [A4] *Max Mazín Award*. Max Mazín Foundation and CEIM Foundation, 2021. Received during the period 2018-2021. Awarded each year of my undergraduate studies, 5th to 8th editions.
- [A3] *GEFES Research Award for Students*. Condensed Matter Physics Division, Spanish Royal Society of Physics (GEFES-RSEF), 2020. For the work entitled *Josephson Junctions in Full-shell Majorana Nanowires*.
- [A2] *Excellence Fellowship*. Comunidad de Madrid, 2018.
- [A1] *Premio Extraordinario de Bachillerato*. Comunidad de Madrid, 2017. Top 10 academic records of the region.

## Skills

### Languages

<b>Spanish</b>	Native
<b>English</b>	Fluent
<b>French</b>	Fluent

### Programming

<b>OS</b>	MacOs, Linux (Debian and Ubuntu), Windows
<b>Programming Languages</b>	Python (advanced), Julia (advanced), C/C++ (basic), MySQL (basic)
<b>Web Development</b>	HTML5, CSS, JavaScript (basic)
<b>Scientific computing</b>	Mathematica (advanced), Quantica (Julia package, advanced), Numpy, Scipy
<b>Miscellaneous</b>	Makie (Julia package, advanced), matplotlib, Git, L <sup>A</sup> T <sub>E</sub> X, Office