

Joan Alcaide-Núñez

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[Website](#) — [LinkedIn](#) — [GitHub](#)

Languages: English, German, Spanish, Catalan (basic Italian)

Last updated: January 2026

Research Interests

Physics student at LMU Munich specializing in multi-messenger cosmology and observational astrophysics. Primary focus on combining electromagnetic and gravitational-wave observations to constrain cosmological parameters and address the Hubble tension.

Recent work includes applying gamma-ray burst (GRB) empirical relations and binary neutron star merger simulations to cosmological parameter estimation. Extending methodologies beyond χ^2 minimization toward Bayesian inference with Monte Carlo methods. Developing proficiency in data analysis pipelines and theoretical frameworks for dark energy models beyond Λ CDM.

Research Experience

GRB Cosmography with Empirical Energy Relations

Summer 2025

Osservatorio Astronomico di Brera (OAB-INAF), Italy

5 weeks

Supervisors: Dr. Giancarlo Ghirlanda, Dr. Om Sharan Salafia

Applied GRB empirical relations to constrain cosmological parameters via chi-squared minimization. Combined GRB results with binary neutron star simulated populations from Einstein Telescope predictions. Received mentoring on relativistic effects and theoretical foundations of GRB cosmology. Participated in weekly journal clubs and research seminars. [Code repository available](#).

CAPIBARA Collaboration

2024–Present

Principal Investigator

Student research collaboration developing instrumentation and analysis tools for high-energy astrophysics. Cosmic ray detector development and GRB cosmological parameter estimation. Partnerships with PLD Space and OBA Space. [Project website](#).

Student Internship at German Space Agency

Autumn 2024

Institute for Remote Sensing (DLR-IMF)

2 weeks

Worked with experimental methods and photogrammetry departments on hyperspectral imaging and satellite data analysis. Applied QGIS and GDAL Python libraries to Landsat 8 thermal imaging data. Conducted field measurements and visited German Space Operations Center.

Type Ia Supernovae Distance Measurements

Summer 2024

Institute of Space Sciences (ICE-CSIC-IEEC), Barcelona

2 months

Supervisor: Dr. Lluís Galbany

Computed Type Ia SNe distances using infrared and optical photometry from ESO, ATLAS, and ZTF. Fitted cosmological parameters including Hubble constant. Developed proficiency in aperture photometry and astronomical data analysis pipelines. Participated in journal clubs and group meetings.

Cepheid Variable Stars Research

Winter 2023

Youth and Science Programme

Supervisors: Dr. Ignasi Pérez-Ràfols, Dr. Laia Casamiquela

Computed Hubble constant using Cepheid data from NASA-IPAC NED Database and Konkoly Observatory. First experience with astronomical data analysis, paper reading, and scientific writing. [Code repository available](#).

Education

Ludwig-Maximilians-Universität (LMU) Munich September 2025 – Present
B.Sc. in Physics

German School of Barcelona September 2017 - May 2025
Dual High School Diploma (Germany + Spain), GPA: 1.0/1.0

Awards

International Astronomy & Astrophysics Competition (IAAC): Silver Honour and National Award Spain (2025), Silver Honour Final Round (2024), Bronze Honour and National Award Spain (2023)

Jugend Forscht: First Prize Iberia 2025 ("Cosmological distance measurements with Type Ia Supernovae"), First Prize and Special Award Scientific Photography NRW 2025, First Prize Iberia 2024 ("Recomputing the Hubble constant"), DLR Internship Award NRW 2024

German Physical Society (DPG): Physics Distinction for Academic Achievement

Technical Skills

Programming Languages: Python, C++, HTML/CSS/JavaScript

Scientific Libraries: numpy, scipy, pandas, matplotlib, astropy, emcee

Tools: Git, GitHub, L^AT_EX, Markdown

Methods: data analysis, parameter estimation, Bayesian inference, Monte Carlo methods

Formal Training:

- *Gravity and Black Holes* — Perimeter Institute (GoPhysics!), 2025
- Mathematics, Statistics, and Data Science — Universitat Autònoma de Barcelona (UAB), 2022
- Algorithms and Programming (C++) — Universitat Politècnica de Catalunya (UPC), 2022
- League of Codes (C++) — Harbour Space, 2022–2023

Selected Projects & Outputs

Gen10: Education Tool for Genomics ([website](#)) 2023–2025
Python package and tutorials for basic genomics education. *Python, package development, Jupyter notebooks*

28M: Live Local Elections Statistics ([GitHub](#)) Apr–May 2022
Real-time data collection and visualization for regional radio station election coverage. *Python, HTML/CSS, NumPy, xlwings*

Outreach

De l'aula a l'espai: joves, ions i fotons per entendre l'univers d'altres energies March 2025

CosmoXarxa, CosmoCaixa Barcelona

Presented CAPIBARA collaboration to science museum outreach community. [slides](#)

Introduction to Astrophysics

May/June 2024

German School of Barcelona

Two-session introduction to astronomy and astrophysics for 11th grade students. Cosmology, stellar evolution, galaxy morphology, compact objects. [slides](#)

L'Exploració Espacial

October 2023

Escola Canigó

Space exploration presentation for pre-school students. [slides](#)

Explainers at CosmoCaixa Museum

2022–2023

Science museum volunteer explaining demonstrations to visitors.

Volunteering & Socials

Cycling Without Age

2024–2025

Cycling with elderly residents.

Music

2021–Present

Piano in school ensembles, competitions, charity performances.