

# Ximena Paniagua Sánchez

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## About me

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I am Ximena Paniagua, a PhD student at the University of Chile. My research focuses on developing computational tools to enhance data acquisition in astrophysical contexts, with a particular interest in the integration of statistical and physical processes in observational cosmology.

## Education

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**University of Chile**, PhD student Aug 2025 – Ongoing

- **Field of investigation:** Observational cosmology.
- **PhD supervisor:** Domenico Sapone.

**University of Chile**, BS in Astronomy Mar 2021 – Jul 2025

- **Coursework:** General Astronomy, Experimental Astronomy, Astrophysics of Stars, Astroinformatics, Astrophysics of galaxies
- **Ranking:** 1 / 9
- **GPA:** 6.2/7, A (Graduated with Honors)

**University of Chile**, BS in Physics Mar 2021 – Jul 2025

- **Coursework:** Electrodynamics, Classical Mechanics, Quantum Mechanics, General Relativity, Cosmology
- **Ranking:** 4 / 16
- **GPA:** 6.1/7, A (Graduated with Honors)

## Research Experience

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**Physics Research Assistantship**, University of Chile – Santiago, Chile Mar 2024 – Ongoing

- Designed a Fisher matrix to constrain cosmological parameters and enhance the utilization of the Euclid space telescope.
- Gained experience in generating data using CAMB (Code for Anisotropies in the Microwave Background).
- Github link

**Astronomy Research Assistantship**, University of Chile – Santiago, Chile Mar 2025 – Jul 2025

- Simulated TeV halos emitted by blazars using the CRPropa library.
- Studied particle interactions influenced by the intergalactic magnetic field.

**Physics Internship**, University of Chile – Santiago, Chile Jan 2024

- Developed and implemented a genetic algorithm to optimize function fitting for the Hubble expansion rate,  $H(z)$ , in the context of modern cosmological models.
- Gained in-depth understanding of the logic behind genetic algorithms.
- Investigated various cosmological models to further my understanding of the field.
- Github link

**Astronomy Internship**, University of Chile – Santiago, Chile Jan 2024

- Refined fiber profiles in the Local Volume Mapper (LVM) data reduction pipeline.
- Extracted spectra using non-Gaussian profiles to improve data accuracy.
- Optimized pipeline execution time to enhance overall efficiency.

## Teaching Experience

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| Teaching Assistant, <b>Cosmology</b> , University of Chile – Santiago, Chile                     | Aug 2025 – Ongoing  |
| Teaching Assistant, <b>Numerical Methods for Physics</b> , University of Chile – Santiago, Chile | Mar 2025 – Ongoing  |
| Teaching Assistant, <b>Thermodynamics</b> , University of Chile – Santiago, Chile                | Aug 2024 – Dec 2024 |

## Research schools

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|---|---------------------|
| CECs-USS School of Theoretical Physics – Valdivia, Chile  | Jan 2024            |
| <ul style="list-style-type: none"><li>• Acquired hands-on knowledge in Physics-Informed Neural Networks (PINNs), Lie algebra, black holes, and gauge system analysis.</li><li>• Participated in discussions on the latest developments in theoretical physics.</li><li>• Link to school Website</li></ul> |                     |
| Perimeter-SAIFR-IFT Journeys into Theoretical Physics – São Paulo, Brazil   | Jul 2024 – Aug 2024 |
| <ul style="list-style-type: none"><li>• Attended a theoretical physics school, where I gained knowledge in quantum mechanics, cosmology, De Sitter space-time, and quantum computing.</li></ul>   |                     |

## Awards, Scholarships and Fellowships

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|---|-------------------|
| Outstanding student, University of Chile – Santiago, Chile  | 2021, 2022 & 2024 |
| CECs-USS Schools of Theoretical Physics Full Scholarship , San Sebastian University – Valdivia, Chile | 2024              |
| Perimeter-SAIFR-IFT Journeys into Theoretical Physics Local Expenses, IFT-UNESP, Brazil               | 2024              |

## Skills

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### Languages:

Python - Proficient

Mathematica - Basic

LATEX- Proficient

Cosmology and data analysis packages: CAMB, CLASS

## Languages

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Spanish (Native)

English (B2)