# Daniela Grandón

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## Personal information

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Nationality: Chilean
Language: Spanish, advanced English

## Research Interest

Cosmology, machine learning, computational astrophysics.

## Education

2019 - Present **Ph.D. in Physics**, Universidad de Chile, Santiago, Chile.

2014 - 2017 **BSc (Distinction) Physics and Astronomy**, *qualified first in the generation, 5.8 (on a scale from 1 to 7)*, Universidad de Valparaiso, Chile.
- **Thesis:** Ultra slow-roll in Higgs inflation. **Supervisor:** Víctor Cárdenas Vera.

## Work Experience

March 2015 - December 2017 **Undergraduate Researcher**.
- Statistic study of the long-period and low amplitude variability of stars from ASAS catalogue. I designed all the computational programs in Python to analyze the data and classify the stars in the HR diagram, using statistical methods and machine learning. Supervised by Dr. Nikolaus Vogt and Dr. Amelia Bayo.

September 2015 - October 2017 **Undergraduate Researcher**
- Observational constraints on the interaction between dark matter and dark energy. I contributed in developing Mathematica and Python notebooks to constraint parameters of the model by using different datasets and combinations between them. Supervised by Dr. Víctor Cárdenas.

January 2018 - March 2019 **Undergraduate Researcher**
- Study of the Lamb Shift in hydrogen-like ions and muonic atoms to test fractal extra dimensions. I contributed to the theoretical work of analyzing the theory involved and to obtain all the results of the article supervised by Dr. Alfredo Vega.

March 2015 - December 2017 **Teaching Assistant**
Courses: Introduction to physics - Calculus - Introduction to astronomy - Computational physics - Waves and Optics

### Miscellaneous

May 2018 - October 2018 **Teacher** Programa de Acompañamiento y Acceso efectivo a la Educación Superior, PACE USM, Universidad Técnica Federico Santa María, Casa Central.

- I taught math to high school students submitted to the PACE program. This is a government program whose main goal is to prepare high school students in social risk to improve their background in math, science and language, and to improve their soft skills by working in teams and learning how to present their projects in front of others, so they can achieve a good performance at university.

June 2018 and September 2018 **High School Teacher**. Colegio Nacional Limache, Limache, Chile.
Teaching Math for high school students.

## Publications

[1] V. H. Cárdenas, D. Grandón, S. Lepe. Dark energy and Dark matter interaction in light of the second law of thermodynamics. Eur.Phys.J. C79 (2019) no.4, 357

[2] D. Grandón, V. H. Cárdenas. Exploring evidence of interaction between dark energy and dark matter. Gen.Rel.Grav. 51 (2019) no.42

### Preprint

[1] D. Grandón, A. Vega. Lamb shift in hydrogen-like muonic atoms to test fractal extra dimensions. 2019. arXiv:1903.00587 [hep-ph].

### Conference Proceedings

[1] D. Grandón, V. H. Cárdenas (2018). Observational constraints on the interaction between dark matter and dark energy. J.Phys.Conf.Ser. 1043 (2018) no.1, 012025

## Scientific Activities

August 2017 **Observation** I supported the observing run by Dr. Amelia Bayo with Magellan/Clay (Las Campanas Observatory). IV región, Chile.

### Conference Participation

2018 XXII Chilean Physics Symposium, Antofagasta, Chile.
**Talk** *"Lamb shift in hydrogen-like muonic atoms to test fractal extra dimensions"*
**Poster** *"Ultra slow-roll in Higgs Inflation"*

2018 1st Workshop of Astronomy and Physics Students. Pontificia Universidad Católica de Chile, Campus San Joaquín.
**Talk** *"Ultra slow-roll in Higgs Inflation"*

2017 III Conference of Astronomy and Physics Students. La Serena, Chile.
**Poster** *Observational constraints on the interaction between dark matter and dark energy*

2016 XX Chilean Physics Symposium. Santiago, Chile.
**Poster** *Observational constraints on the interaction between dark matter and dark energy*

2014 II Conference of Astronomy and Physics Students. Valparaíso, Chile.

### Schools

2018 4th School in Radio-Astrophysics, Summer 2018 (TNT), Instituto Nacional Astrofísica, Óptica y Electrónica INAOE. Puebla, México.

2017 La Serena School for Data Science: Applied Tools for Data-driven Sciences. AURA Observatory, La Serena, Chile.

## Outreach

2018 Participated together with Dr. Alfredo Vega and other physics students in the play "A Story of Quarks" for primary school students. My character was a proton.

November 2018 Participated together with Millennium Nucleus for Planet Formation, NPF in activities for children and night observations. Pocuro Observatory, Los Andes, Chile.

2015 - 2017 Participated in Feria de la Ciencia 2015, 2016 and 2017 organized by Universidad de Valparaíso.

2015-2017 Gave public talks about the Milky Way during my undergraduate courses in different schools such as Colegio San Vicente and Colegio Maria Auxiliadora.

## Programming skills

- Python, IDL, R, C, Mathematica. Others: IRAF, DS9, Aladin and TOPCAT.

## Awards

2019 Awarded CONICYT Ph.D. Fellowship (2019-2022)

2018 Scholarship to attend the conference: "XXII Chilean Physics Symposium". Antofagasta, Chile.

2018 Scholarship to attend the school: 4th School in Radio-Astrophysics, Summer 2018 (TNT), INAOE, Puebla, México.

2016 Scholarship to attend the conference: "XX Chilean Physics Symposium". Santiago, Chile.

2016 Student Scholarship for young scientific researchers (DIUV-REG 50/2013). Dirección de investigación, Universidad de Valparaíso.

2015 Student Scholarship for young scientific researchers (DIUV-REG 38/2011). Dirección de investigación, Universidad de Valparaíso.