Roberto Varas González

PhD researcher

Instituto de Astrofísica de Andalucía (IAA-CSIC)

Glorieta de la Astronomía S/N, 18008, Granada (Spain)

rvaras@iaa.es 0000-0002-6946-0342 https://rvarasg.github.io/

EDUCATION

2022 - present — **Ph.D. Astrophysics, University of Granada** (Granada, Spain)
Supervised by Pedro J. Amado (IAA) and Francisco J. Pozuelos (IAA)

Enhancing the radial velocity precision of high-resolution near-infrared spectrographs for detecting exoplanets around ultracool dwarfs. Improvement of the CARMENES-NIR channel thermal stability. Obtained a better radial velocity precision, below 1 m/s. Worked with CARMENES data of the ultra cool stars of the sample. Computation of the projected rotational velocity of the CARMENES sample including limb darkening. Estimation of rotational periods using photometric data (from TESS, OSN, ...). Participated in the SPECULOOS-3 b discovery.

Sept 2020 - March 2022 — **M.Sc. Space Science and Technology, EHU/UPV** (Bilabo, Spain), *first class*
Thesis supervised by Nicholas Devaney (University of Galway) and Alberto Ortega (EHU)

Thesis project for developing the GLIP, a polarimeter for the NRT (ORM, La Palma). Measurement of polarimetric parameters of astronomical sources in three color bands, without moving parts, resulting in a high stability.

Specific subjects: planet atmospheres, astronomy and astrophysics, space weather, interferometry, solar system

Sept 2016 - Sept 2020 — **B.Sc. Aerospace Engeneering, UPM** (Madrid, Spain), *first class*
Thesis supervised by Pablo Salgado (UPM) and Jeff Porter (UPM)

Thesis project at the E-USOC - Spanish User Support and Operations Centre. Analysis and CFM simulation of PCM systems under microgravity conditions. Lead to two peer-reviewed articles as first author.

RESEATCH EXPERIENCE AND EMPLOYEMENT

Nov - Dic 2023 — **Research stay,** Institut für Astrophysik und Geophysik, University of Göttingen (Germany). Suepervised by M. Zechmeister and A. Reiners

2022 - present — **PhD in Astrophysics,** Instituto de Astrofísica de Andalucía (Granada, Spain) Supervised by Pedro J. Amado and Francisco J. Pozuelos

2021 - present — **Instrumentation Engineer,** Instituto de Astrofísica de Andalucía Main projects: CARMENES (CAHA), TARSIS (CAHA), and ANDES (ELT)

July 2021 - Oct 2021 — **Internship,** Instituto de Astrofísica de Canarias, IAC (Tenerife, Spain) Development and testing of cryogenics in astrophysical detectors

June 2019 - Nov 2021 — **Project engineer,** Gravity-On global s.l. (Madrid, Spain) - Renewable energy start-up

AWARDS

2022 — Academic excellence, elected by the masters committee (top of the class)

2020 — Best project of *CERN IdeaSquare Workshop "Design the Future" 2020*

2020 — Academic excellence, elected by the School of Aerospace engeneering

RESEARCH INTERESTS

- Detection of exoplanets around ultracool dwarfs using the radial velocity technique in the visible and near-infrared
- Characterization of ultracool dwarfs using spectroscopy in the visible and near-infrared
- Instrumentation/telescope development and maintenance, specially spectrographs
- Spectroscopy and photometry of ultracool dwarfs and exoplanets around them

SKILLS

Astronomical techniques

- CARMENES data reduction and analysis
- Photometry data reduction and analysis (TESS, Obervatory of Sierra Nevada, ...)
- Megara (GTC) data reduction and analysis
- Spectroscopic data analysis (serval, dice, ...)

Instrumentation projects

- **ANDES** (ELT), optomechanics design, 2021-2025
- **TARSIS** (CAHA, Granada), optomechanics design, 2021-present
- **CARMENES-PLUS** (CAHA), cryo-vacuum and software developement, 2021-present
- **OSN**, optomechanics design, 2021-2023
- **GLIP** (ORM, La Palma), optics design, 2021-2022
- **Observatory of Tenerife**, cryo-vacuum and optomechanics, 2021

Computer skills

- Lenguages: Python, Matlab, Latex, Fortran
- Astronomical sofware: serval, DS9, DACE, lightkurve, exostriker, prose
- Engeneering software: Zemax OpticStudio, 3d-Experience, Catia, CREO, Ansys, comsol
- Operating systems: GNU/Linux, Windows

On-site observing

- **Obervatorio de Sierra Nevada** (Granada, Spain). Visitor astronomer, 2025 (4 nights)
- **Gran Telescopio Canarias** (La Palma, Spain). Visitor astronomer, Megara, 2024 (3 nights)

Proposals and instruments

- **OSN** (Granada, Spain), *photometric rotational periods of ucds*, PI: R. Varas, 118h awarded (2025)
- **Neo-Narval** (Pic du Midi, France), ZDI mapping of GJ-436, PI: D. Revilla, 17.4h awarded (2025)
- **CARMENES** (CAHA 3.5m), *SPECULOOS-3 radial velocity survey*, PI: P. J. Amado, 18h awarded (2024)
- **CARMENES** (CAHA 3.5m), *Giant planets orbiting M-dwarfs*, PI: F. J. Pozuelos, 4h awarded (2024)

Workshops and training

- SO training Introduction to Github, IAA, 2024 (Granada, Spain)
- PySnack 10: PROSE, IAA, 2024 (Granada, Spain)
- SO IAA Writing & Communicating your science workshop, 2024 (Granada, Spain)
- HI and optical IFU data synergy workshop at IAA, 2023 (Granada, Spain)
- English for Academic Purposes: a workshop series for young researchers, IAA, 2022 (Granada, Spain)
- Infrared optomechanic systems and instrumentation, IAA, 2022 (Granada, Spain)

Memberships

- CARMENES consortium
- European Astronomical Society (EAS)
- Sociedad Española de Astronomía (SEA)

Organizing roles

- LOC of the Spanish Astronomical Society 2024 meeting (Granada, Spain)
- SOC of An Intersectional Approach to EDI Strategies (SS51) at EAS 2025 (Cork, Ireland)

TALKS AND POSTERS

2024 **Selected poster**, XVI Reunión Científica de la SEA: *Hunting exoplanets around ultracool dwarfs with RV NIR-spectrographs* (Granada, Spain)

2024 **Selected poster**, Exoplanets 5: *Hunting exoplanets around ultracool dwarfs with RV NIR-spectrographs* (Leiden, Netherlands)

2024 **Talk**, 19th CARMENES scientific meeting: *CARMENES-PLUS* (Tenerife, Spain)

2023 **Selected poster**, The Extreme Precision Radial Velocity (EPRV) 5 Conference: *MARCOT: A new concept of a large aperture telescope to feed CARMENES*

2023 **Talk**, 18th CARMENES scientific meeting: *NIR spectrograph's stability Update* (Heidelberg, Germany)

2023 **Seminar**, Instituto de Astrofísica de Andalucía: *CARMENES-PLUS: Towards an optimization of the NIR spectrograph cooling system* (Granada, Spain)

2022 **Selected poster**, IAA Severo Ochoa Meeting: Addressing key astrophysical questions from Granada: *Towards an optimization of the CARMENES-NIR channel: A continuous flow feeding of the cooling system* (Granada, Spain)

2022 **Talk**, 17th CARMENES scientific meeting: *Upgrades & performance of the CARMENES-NIR cooling system* (Almería, Spain)

2021 **Seminar**, Instituto de Astrofísica de Canarias: P*uesta en marcha del sistema termoeléctrico de enfriamiento para criogenia de detectores* (Tenerife, Spain)

SCIENTIFIC PUBLICATIONS

Refereed publications

- **R. Varas**, R. Calvo Ortega, P. J. Amado, *et al.*, "Improving radial velocity precision with CARMENES-PLUS: An upgrade of the near-infrared spectrograph cooling system", *submitted to Experimental Astronomy*, 2025

- M. Gillon *et al.* (including **R. Varas**), "Detection of an Earth-sized exoplanet orbiting the nearby ultracool dwarf star SPECULOOS 3", Nature Astronomy, vol. 8, 865-878, May 2024. DOI: 10.1038/s41550-024-02271-2

- **R. Varas**, Ú. Martínez, Karl Olfe, *et al.*, "Effects of Thermocapillary and Natural Convection During the Melting of PCMs with a Liquid Bridge Geometry", *Microgravity Science and Technology*, vol. 35, A17, March 2023. DOI: 10.1007/s12217-023-10040-5

- **R. Varas**, P. Salgado Sánchez, J. Porter, *et al.*, "Thermocapillary effects during the melting in microgravity of phase change materials with a liquid bridge geometry", *International Journal of Heat and Mass Transfer*, vol. 178, 121586, October 2021. DOI: 10.1016/j.ijheatmasstransfer.2021.121586

- H. L. Ruh *et al.* (including **R. Varas**), "The CARMENES search for exoplanets around M dwarfs - The impact of rotation and magnetic fields on the radial velocity jitter in cool stars", *A&A*, vol. 692, A138, December 2024. DOI: 10.1051/0004-6361/202450836

Proceedings

- **R. Varas**, P. J. Amado, R. Calvo-Ortega, and M. Centenera, "Hunting exoplanets around latest M dwarfs with RV NIR-spectrographs", *XVI Scientific Meeting of the Spanish Astronomical Society*, July 2024. DOI: 10.5281/zenodo.14012840
- A. Marconi *et al.* (including **R. Varas**), "ANDES, the high resolution spectrograph for the ELT: science case, baseline design and path to construction", *Ground-based and Airborne Instrumentation for Astronomy IX (SPIE)*, August 2022. DOI: 10.1117/12.2628689
- E. G. P. O'Connor, É. J. Harvey, I. A. Steele, N. Devaney, & **R. Varas**, "Galway Liverpool Imaging Polarimeter – GLIP: design and prototype status", *Ground-based and Airborne Instrumentation for Astronomy IX (SPIE)*, August 2022. DOI: 10.1117/12.2629283

OUTREACH AND SOCIAL INVOLVEMENT

2024 - present	Member of the Diversity, Equity and Inclusion committee at the IAA
2024 - present	Member of the Sustainability committee at the IAA
2024 - present	Member of the editorial board of the outreach journal of the IAA
2024	Volunteer in PIIISA project (Granada, Spain)
2023 - 2024	Volunteer at Espacio 3 (Granada, Spain)
2023	Volunteer at the 100 x Ciencia.7 conference (Granada, Spain)
2023	Talk at Espacio 3 (Granada, Spain)
2023	Talk at European Researcher Night (Granada, Spain)
2023	Volunteer at the European Researcher Night (Granada, Spain)
2023	Talk at Pint of Science (Granada, Spain)
2022	Volunteer at the IAA Severo Ochoa Meeting (Granada, Spain)

REFERENCES

- Dr. Pedro José Amado, Instituto de Astrofísica de Andalucía-CSIC, *pja@iaa.es*
- Dr. Francisco José Pozuelos, Instituto de Astrofísica de Andalucía-CSIC, *pozuelos@iaa.es*
- Dr. José Antonio Caballero, Centro de Astrobiología-CSIC, *caballero@cab.inta-csic.es*
- Dr. Mathias Zechmeister, Institut für Astrophysik Göttingen, *zechmeister@astro.physik.uni-goettingen.de*