

# Danilo Ferreira da Rocha

*per aspera ad astra*

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Links: [ORCID iD](#) - [CV Lattes](#) - [Personal Website](#)



## Profile Summary

Degree in Physics from the Federal University of Alagoas (2019), a Master's Degree in Physics from the State University of Rio Grande do Norte (2021), and a PhD in Astronomy from the National Observatory (2025), with an internship at the Paris Observatory (2024). I am a Postdoctoral Researcher at the National Astrophysics Laboratory, working on the study of massive stars, focusing on Be stars and stars in multiple (hierarchical) systems, in addition to participating in observation projects (National/International) of stars and exoplanets, in the optical and near-infrared, and in the processing of photometry, spectroscopy, and interferometry data. I have carried out several scientific outreach and training activities throughout Brazil, mainly with the Brazilian Astronomy and Astronautics Olympiad (OBA). I was a juror at the IOAA 2024. My main areas of expertise are: Stellar and Observational Astrophysics, Exoplanets, and Astronomy Education/Outreach. I am part of international scientific group BLOeM, and of the organization of the Alagoas Rocket Olympiad.

## Education

Aug 2021 – Oct 2025	PhD., Astronomy, Observatório Nacional, Brazil Thesis Title: Be stars in binary Systems Supervisor: Dr. Marcelo Emilio
Aug 2019 – jul 2021	M.Sc., Physics, Universidade Estadual do Rio Grande do Norte, Brazil
Aug 2013 – jul 2019	Degree in Physics, Universidade Federal de Alagoas, Brazil

## Expertise

My expertise covers all observational domains of massive-star physics, from their cores to their environments, as well as space instrumentation:

- **Massive stars:** Seismology (pulsations), rotation, mixing, and internal structure.
- **Be phenomenon:** mass ejections, circumstellar disks and clouds, angular momentum transport
- **Techniques:** spectroscopy and photometry across all wavelengths (IR, optical, UV, and X-ray), observations and modelling

## Positions

### Postdoctoral Position

nov 2025 - now      Laboratório Nacional de Astrofísica

### Selected Honours and Awards

- 2023, PhD 10 award, FAPERJ
- 2013, Silver Medal, MOBFOG/SAB and OAF OG
- 2012, Honorable Mention, OBMEP/SBM

### Academic Appointments and Teaching Experience

- 2014 to 2025 High School, Scientific Olympics Teaching
- 2022 to 2024 Student Representative, Astronomy, Observatório Nacional
- 2014 to 2019 Teaching Assistant, Physics, University Federal de Alagoas
- 2016 to 2018 Teaching Assistant, Physics, Secretaria de Educação de Estado de Alagoas

### Publication List (Google Scholar - Feb 2026 | Citations: 123 | H-index=6)

- [8] **Rocha, D. F.**, ... (2026). The Triple System V1371 Tau: An Eclipsing Binary with an Outer Be Star. *The Astrophysical Journal*, 996 61. DOI: [10.3847/1538-4357/ae1d57](https://doi.org/10.3847/1538-4357/ae1d57)
- [7] A. Kokori, A. Tsiaras, ..., **Rocha, D. F.**, ... (2026). ExoClock Project IV: A homogeneous catalogue of 620 updated exoplanet ephemerides. *The Astrophysical Journal Supplement Series*, 283 5. DOI: [10.3847/1538-4365/ae3238](https://doi.org/10.3847/1538-4365/ae3238)
- [6] Sana, H., ..., **Rocha, D. F.**, ... (2025). A high fraction of close massive binary stars at low metallicity. *Nature Astronomy*, 9, pages 1337–1346. DOI: [10.1038/s41550-025-02610-x](https://doi.org/10.1038/s41550-025-02610-x)
- [5] J. Bodensteiner, T. Shenar, H. Sana, ..., **Rocha, D. F.**, ... (2025). Binarity at Low Metallicity (BLOeM) – Multiplicity properties of Oe and Be stars. *Astronomy & Astrophysics*, 698, A38. DOI: [10.1051/0004-6361/202452623](https://doi.org/10.1051/0004-6361/202452623)
- [4] J. I. Villaseñor, ..., **Rocha, D. F.**, ... (2025). Binarity at Low Metallicity (BLOeM) – Enhanced multiplicity of early B-type dwarfs and giants at  $Z = 0.2Z_{\odot}$ . *Astronomy & Astrophysics*, 698, A41. DOI: [10.1051/0004-6361/202453166](https://doi.org/10.1051/0004-6361/202453166)
- [3] Shenar, T., Bodensteiner, J., Sana, H., Crowther, P. A., Lennon, D. J., Abdul-Masih, M., ..., **D.F. Rocha**,... & Willcox, R. (2024). Binarity at LOw Metallicity (BLOeM)-A spectroscopic VLT monitoring survey of massive stars in the SMC. *Astronomy & Astrophysics*, 690, A289. DOI: [10.1051/0004-6361/202451586](https://doi.org/10.1051/0004-6361/202451586)
- [2] Navarete, F., Damineli, A., Ramirez, A. E., **Rocha, D. F.**, & Almeida, L. A. (2022). Distance and age of the massive stellar cluster Westerlund 1. I. Parallax method using Gaia-EDR3. *Monthly Notices of the Royal Astronomical Society*, 516(1), 1289-1301. DOI: [10.1093/mnras/stac2374](https://doi.org/10.1093/mnras/stac2374)

- [1] **Rocha, D. F.**, Almeida, L. A., Daminieli, A., ..., & Mace, G. N. (2022). Distance and age of the massive stellar cluster Westerlund 1–II. The eclipsing binary W36. Monthly Notices of the Royal Astronomical Society, 517(3), 3749-3762. DOI: [10.1093/mnras/stac2927](https://doi.org/10.1093/mnras/stac2927)

## Telescope time

Observing as Principal Investigator:

- 2 nights at 4-m SOAR telescope with Goodman Spec. [SO2026A-018]
- 2 nights at 4-m SOAR telescope with TripleSpec [SO2024A-024]
- TESS Investigator program Cycle 7 [Proposal ID: G07166]

Over 10 additional projects obtained as co-I at TESS, OPD, SOAR, Gemini telescopes.

## Selected Main Conferences & Talks

- [1] 2025 - XLVIII Annual Meeting of the Brazilian Astronomical Society. Hotel Glória, Caxambu, Minas Gerais, Brazil. Presentation in a parallel session.
- [2] 2024 - Cesam2k20 workshop II: Transport Processes. Observatoire de Paris-Meudon, OBSPM, Paris, France.
- [3] 2024 - VLTI Interferometry School. Observatoire de la Côte d’Azur. Porquerolles, France.
- [4] 2023 - XLVI Annual Meeting of the Brazilian Astronomical Society. Planetary of Rio de Janeiro, Brazil, 2023. Presentation in plenary session.

## Posters

- [1] 2024 - Poster session presented at the Binary and Multiple Stars in the Era of Big Sky Surveys. Czech Republic.

## Professional Activities

- Reviewer, Astrophysical Journal, 2023-now.

## Event Organization

- 2012 to 2016 and 2025 - Organizing committee member of the Alagoas Rocketry Olympiad, responsible for the coordination of scientific outreach activities, logistical planning, and student engagement in experimental rocketry, promoting STEM education across the state of Alagoas, Brazil.

## Technical Skills

### Programming Languages

- Fortran, Python, C++ and HTML5

## Open-Source Software

- [WDwrap](#): a Python wrapper for the Wilson–Devinney (WD) code, designed to streamline the modeling and parameter inference of binary star systems. It provides a modern, Pythonic interface to the original Fortran-based WD engine, enabling efficient execution, automation, and statistical analysis of light curves and radial velocity data.
- [specROTIN-edu](#): an interactive educational tool in Python for teaching the effects of stellar rotation on spectral profiles. Inspired by the IRAF's ROTIN routine, it allows for the estimation of vsini, visualizing in real time the effects of rotational and instrumental broadening on the stellar spectrum, making it ideal for educational activities.

## Teaching and Supervision

In construction...

## Outreach

- **Organizer**, Alagoas Rocketry Olympiad (Olimpíada Alagoana de Foguetes) – Coordinator of a state-level STEM competition, responsible for technical guidelines, safety protocols, and teacher training.
- **Collaborator**, Brazilian Astronomy and Astronautics Olympiad (OBA) – Conducted teacher training workshops and supported regional coordination in northeastern Brazil.
- **Judge**, International Olympiad on Astronomy and Astrophysics (IOAA 2024) – Evaluated theoretical and observational problems as part of the international academic committee.
- **Science Outreach Lecturer** – Delivered public lectures and workshops on stellar astrophysics, exoplanets, and cosmology for high school students and teachers across Brazil.
- **Science Outreach Presenter**, Usina Ciência – Federal University of Alagoas (UFAL) Presented hands-on physics experiments in public schools across all municipalities of the state of Alagoas, Brazil, including underserved and low-income communities. Engaged students through interactive demonstrations in mechanics, optics, electricity, and astronomy, promoting scientific literacy and STEM access throughout the region.

## Media and Public Engagement

- Invited Talks and Public Lectures:  
[Sistemas Binários: Vida e Morte de Estrelas Irmãs / IFBA](#)
- Press Release:  
[Tese de doutorado do ON gera artigo que será publicado na Astrophysical Journal / ON](#)