DANIEL GALÁN DIÉGUEZ

Curriculum Vitae

PERSONAL INFORMATION

Name: Daniel
Family Name: Galán Diéguez
Birth date: 1998/05/21
Gender: Male

CONTACT INFORMATION

Physical Properties and Evolution of Massive Stars group
Instituto de Astrofísica de Canarias (IAC)
C/ Vía Láctea, E-38205
La Laguna, Tenerife, Spain

e-mail: daniel.galan@iac.es
phone number: +34 663544512
Personal website: dgalandieguez.com
LinkedIn: linkedin.com/in/dgalandieguez
ORCID: https://orcid.org/0000-0001-6191-8251

RESEARCH INTERESTS

Massive star systems • Stellar rotation • Photometric and spectroscopic analysis • Astronomical observations

SKILLS

Programming Skills	Linux shell scripting • Python • HTML • CSS
Massive stars related Programs	`PHOEBE` • `SPAMMS` • `FASTWIND` • `TLUSTY` • `iacob-broad` • `MGB`
Observation related Programs	`PyRAF` • `PypeIt`
Other Programs	Aladdin • Topcat

EDUCATION

3) PhD in Astrophysics
Instituto de Astrofísica de Canarias (IAC), Spain **Nov 2023 - Current**

- Title: *Life channels and fate of the most massive star*
- Funded by a "FPI" fellowship from the Agencia Estatal de Investigación, Gobierno de España
- Supervisors: M. Abdul-Masih & S. Rodríguez Berlanas & A. Herrero Davó
- Description: Investigation of the impact of three-dimensional geometry on the determination of physical parameters in rapidly rotating massive stars.
- Tools: `MGB`, `iacob-broad`, `FASTWIND`, `SPAMMS`

2) MSc in Astrophysics
Universidad de La Laguna (ULL), La Laguna, Spain **Sep 2021 - Jul 2023**

- MSc thesis: *Physical parameters of the low-mass eclipsing binary system ASAS J052919-1617.3*
- Supervisors: M.J. Arévalo Morales & R. Iglesias Marzoa
- Description: This work focused on refining and automating custom software for modeling eclipsing binary light curves, developing robust tools for photometric analysis&calibration, and applying `PHOEBE` to extract the physical parameters of binary systems.
- Tools: Python, `PyIRAF` & `PHOEBE`
- Obtained the best possible mark for a thesis in Spain

1) BSc in Physics
Universidade de Santiago de Compostela (USC), Santiago de Compostela, Spain **Sep 2016 - Jun 2021**

- BSc thesis: *Photometric observations of eclipsing binary star systems*
- Supervisors: J.P. Garzón Heydt & R. Iglesias Marzoa
- Description: Development of astronomical software to support the preparation and analysis of eclipsing binary observations, including tools for computing eclipsing binaries light curves.
- Tools: Python & `PyRAF`
- Obtained the best mark in a Physics thesis at Universidade de Santiago de Compostela in 2021

PROFESSIONAL APPOINTMENTS

Universidad de La Laguna (ULL), La Laguna, Spain
3) *Teacher - BSc level* **Jan 2025 - Current**
2) *Assistant teacher - MSc level* **Nov 2023 - Jan 2024**

Instituto de Astrofísica de Canarias (IAC), La Laguna, Spain
1) *Observer in the MuSCAT2 research team* **Jan 2022 - Dec 2024**

HONORARIA AND PRIZES

5) *Formación de Personal Investigador (FPI) fellowship* **2023**
from the Agencia Estatal de Investigación, Gobierno de España

4) *Residente PhD fellowship* **2023**
from the Instituto de Astrofísica de Canarias, Spain*

3) *Special distinction in the MSc thesis* **2023**
MSc in Astrophysics at Universidad de La Laguna, Spain

2) *Special distinction in two MSc subjects* **2021-2023**
MSc in Astrophysicsat Universidad de La Laguna, Spain

1) *Best mark in a BSc physics thesis* **2021**
BSc in Physics at Universidade de Santiago de Compostela, Spain

∗ PhD fellowship waived in order to accept the FPI fellowship

EVENT ORGANISATION

4) I Congreso Galego de Investigación en Astronomía e Astrofísica **17/07/2025 - 18/07/2025**

- LOC chair

3) Open days of the Teide Observatory 2025 **21/06/2025 - 22/06/2025**

- Member of the divulgation team

2) Munichfest2025: celebrating 40 years of research on hot luminous stars **07/04/2025 - 11/04/2025**

- LOC member

1) Open days of the Teide Observatory 2024 **22/06/2024 - 23/06/2024**

- Member of the divulgation team

CONFERENCES ATTENDED

11) I Congreso Galego de Investigación en Astronomía e Astrofísica **17/07/2025 - 18/07/2025**
Comunidade Galega de Astronomía e Astrofísica, Vigo, Spain

- Oral presentation: *Decoding the lack of fast rotators in Cygnus OB2: 3D modelling of non-spherical massive stars*

10) Día de Nuestra Ciencia 2025 **06/06/2025**
Instituto de Astrofísica de Canarias, La Laguna, Spain

9) COEFIS XVII **24/04/2025 - 25/04/2025**
Congreso de Estudiantes de Física, Universidad de La Laguna (ULL), La Laguna, Spain

8) Munichfest2025: celebrating 40 years of research on hot luminous stars **07/04/2025 - 11/04/2025**
La Palma, Spain

7) XV Reunión de Jóvenes Investigadores en el Extranjero 2024 **27/12/2024**
IYI Meeting, La Coruña, Spain

- Oral presentation: *The Rotational Puzzle of Cygnus OB2: 3D modelling of non-spherical massive stars*

6) AstroGalicia24: a festa galega das estrelas **21/12/2024 - 22/12/2024**
Ceos Galegos, Arzúa, Spain

- Oral presentation: *Luz, sombra y ciencia: midiendo el Universo con binarias eclipsantes*

5) XVI Reunión Científica de la SEA **15/07/2024 - 19/07/2024**
Sociedad Española de Astronomía, Granada, Spain

- Oral presentation: *Very first approach to the lack of fast rotators in Cygnus OB2*
- Poster contribution: *Unraveling post-binary evolutionary channels in Cygnus OB2 using WEAVE*
- Poster contribution: *The NAVOO Project: photometry for AM CVn candidates*

4) Día de Nuestra Ciencia 2024 **07/04/2024**
Instituto de Astrofísica de Canarias, La Laguna, Spain

3) COEFIS XVI **11/04/2024 - 12/04/2024**
Congreso de Estudiantes de Física, Universidad de La Laguna (ULL), La Laguna, Spain

2) Two in a Million - The interplay of binaries and star clusters **11/09/2023 - 15/09/2023**
European Southern Observatory (ESO), Garching, Germany

1) COEFIS XV **13/04/2023 - 14/04/2023**
Congreso de Estudiantes de Física, Universidad de La Laguna (ULL), La Laguna, Spain

- Oral presentation: *Eclipsing binary systems: A fancy way to study stars*

TALKS

5) Decoding the lack of fast rotators in Cygnus OB2: 3D modelling of non-spherical massive stars **17/07/2025**
Congreso Galego de Investigación en Astronomía e Astrofísica, Vigo, Spain

- This presentation investigates the impact of stellar rotation on the structure of massive stars, emphasizing three-dimensional effects such as gravity darkening and temperature gradients. Using the observed deficit of fast rotators in Cygnus OB2, we highlight the necessity of 3D modeling for precise stellar parameter estimation.

4) The Rotational Puzzle of Cygnus OB2: 3D modelling of non-spherical massive stars **27/12/2024**
XV Reunión de Jóvenes Investigadores en el Extranjero 2024, La Coruña, Spain

- The observed absence of fast rotators in Cygnus OB2 contrasts with trends observed in other massive star-forming regions. In this talk, we examine several hypotheses to explain this discrepancy, including environmental factors, the impact of runaway stars, and projection effects linked to spin-axis alignment.

3) Luz, sombra y ciencia: Midiendo el Universo con binarias eclipsantes **21/12/2024**
AstroGalicia24: a festa galega das estrelas, Arzúa, Spain

- Eclipsing binaries act as fundamental benchmarks for determining stellar and orbital properties with high precision. Light curves are constructed via differential photometry using `BinaPhot`, a custom Python script optimized for precise and efficient magnitude computation, facilitating reliable modeling of these systems.

2) Very first approach to the lack of fast rotators in Cygnus OB2 **19/07/2024**
XVI Reunión Científica de la SEA, Granada, Spain

- A detailed discussion of our main results, confirming the deficit of fast rotators in Cygnus OB2, and following a comprehensive study of the effects of rotation in spectral types for late-O and B0 stars.

1) Eclipsing binary systems: A fancy way to study stars **14/04/2023**
COEFIS (Congreso de Estudiantes de Física), Universidad de La Laguna (ULL), La Laguna, Spain

- Introduction to eclipsing binaries, showcasing their utility in determining system and stellar parameters through their light curves and radial velocities.

POSTERS

2) Unraveling post-binary evolutionary channels in Cygnus OB2 using WEAVE **15/07/2024 - 19/07/2024**
XVI Reunión Científica de la SEA, Granada, Spain

- Research initiatives using WEAVE data to investigate evolutionary channels resulting from binary interactions in Cygnus OB2. This includes phenomena such as mergers, runaway stars, and the presence of compact objects.

1) The NAVOO Project: photometry for AM CVn candidates **15/07/2024 - 19/07/2024**
XVI Reunión Científica de la SEA, Granada, Spain

- A study combining spectroscopy and photometry to investigate the AM CVn candidate ASASSN-14mv, marking the initiation of a project focused on exploring previously unexamined AM CVn variables.

SCHOOLS ORGANISATION

1) Positional astronomy and basics of astronomical observation **Oct 2024 - Nov 2024**
Universidad de La Laguna, Spain

SCHOOLS ATTENDED

4) Summer School in statistics for astronomers **03/06/2024 - 07/06/2024**
Penn State's Center for Astrostatistics. The Pennsylvania State University, USA

3) Stellar spectroscopy workshop **27/09/2023 - 28/09/2023**
University of Tartu, Estonia

2) ERASMUS+ School on Eclipsing Binaries and Asteroseismology **26/09/2022 - 30/09/2022**
Instituto de Astrofísica de Canarias, Spain

1) Introduction to visual and photographic astronomy **09/07/2018 - 13/07/2018**
Universidade de A Coruña, Spain

TELESCOPE TIME

IAC80 Telescope (IAC80)

4) Massive binary systems in Cygnus OB2 **2024B**

- Photometry mode
- 8 nights in visitor and remote mode

3) BSc thesis supervisor *"Photometric analysis of the low-mass eclipsing binary system ASASSN-VJ050229.84-052203.4"* **2024B - 2025A**

- Photometry mode
- 21 nights in visitor and remote mode

2) MSc thesis *"Physical parameters of the low-mass eclipsing binary system ASAS J052919-1617.3"* **(PI)** **2022B**

- Photometry mode
- 10 nights in visitor mode

1) BSc thesis *"Photometric observations of eclipsing binary star systems: ASAS J052919-1617.3 & 2MASS J01074282+4845188"* **(PI)** **2020B - 2021A**

- Photometry mode
- 9 nights in remote mode

Carlos Sánchez Telescope (TCS)

1) Research project *"MuSCAT2 Project: validation of exoplanets"* **2022A - 2024B**

- Photometry mode
- 47 nights in remote mode

Nordic Optical Telescope (NOT)

3) PhD thesis *"Life channels and fate of the most massive stars"* **(PI)** **2024B**

- Spectroscopy mode
- 3 nights in visitor mode

2) IACOB project: *A new era in the study of Galactic massive OB stars* **2022B**

- Spectroscopy mode
- 1 night in visitor mode

1) MSc thesis *"Physical parameters of the low-mass eclipsing binary system ASAS J052919-1617.3"* **(PI)** **2022B**

- Spectroscopy mode
- 8 nights in service mode

Isaac Newton Telescope (INT)

2) PhD thesis *"Life channels and fate of the most massive stars"* **(PI)** **2023B -2024A**

- Spectroscopy mode
- 5 nights in service mode

1) MSc thesis *"Physical parameters of the low-mass eclipsing binary system ASAS J052919-1617.3"* **(PI)** **2022B**

- Spectroscopy mode
- 3 nights in service mode

Mercator Telescope (MT)

1) IACOB project: *A new era in the study of Galactic massive OB stars* **2022B**

- Spectroscopy mode
- 1 night in visitor mode

Gran Telescopio de Canrias (GTC)

1) PhD thesis *"Life channels and fate of the most massive stars"* **(PI)** **2024B**

- Spectroscopy mode
- Filler program (15 hours)

TEACHING

Universidad de La Laguna, La Laguna, Spain

• Courses that I have coordinated and where I gave part of the teaching:

Course	Year	ECTS credits	Lecture hours	ECTS credits awarded for teaching	Level
Positional astronomy and basics of astronomical observation	2024-2025	1	7 out of 18	1	Degree & Master

• Courses that I did not coordinate:

Course	Year	ECTS credits	Lecture hours	ECTS credits awarded for teaching	Level
External Practices	2024-2025	12	9 out of 120	1	Degree
Basic observational techniques	2023-2024	3	30 out of 30	0	Master

SUPERVISION

Universidad de La Laguna, Spain

1) BSc thesis *"Photometric analysis of the low-mass eclipsing binary system ASASSN-VJ050229.84-052203.4"* **2025**

- Author: Elena Ruiz Laguna
- Supervisors: M.J. Arévalo Morales & D. Galán Diéguez

REFEREED THIRD-AUTHOR PUBLICATIONS

[Hor+24] Yasunori Hori et al. "The Discovery and Follow-up of Four Transiting Short-period Sub-Neptunes Orbiting M Dwarfs". In: AJ 167.6, 289 (June 2024), p. 289. DOI: 10.3847/1538-3881/ad4115. arXiv: 2405.12637 [astro-ph.EP].

[Kan+24] H. Kang et al. "Simultaneous multicolour transit photometry of hot Jupiters HAT-P-19b, HAT-P-51b, HAT-P-55b, and HAT-P-65b". In: MNRAS 528.2 (Feb. 2024), pp. 1930–1944. DOI: 10.1093/mnras/stae072. arXiv: 2401.03715 [astro-ph.EP].

[Kuz+24] Masayuki Kuzuhara et al. "Gliese 12 b: A Temperate Earth-sized Planet at 12 pc Ideal for Atmospheric Transmission Spectroscopy". In: ApJ 967.2, L21 (June 2024), p. L21. DOI: 10.3847/2041-8213/ad3642. arXiv: 2405.14708 [astro-ph.EP].

[Pel+24] A. Peláez-Torres et al. "Validation of up to seven TESS planet candidates through multi-colour transit photometry using MuSCAT2 data". In: A&A 690, A62 (Oct. 2024), A62. DOI: 10.1051/0004-6361/202347251. arXiv: 2409.07400 [astro-ph.EP].

[Mor+23] G. Morello et al. "TOI-1442 b and TOI-2445 b: Two potentially rocky ultra-short period planets around M dwarfs". In: A&A 673, A32 (May 2023), A32. DOI: 10.1051/0004-6361/202243592. arXiv: 2201.13274 [astro-ph.EP].

[Rai+23] C. M. Raiteri et al. "The optical behaviour of BL Lacertae at its maximum brightness levels: a blend of geometry and energetics". In: MNRAS 522.1 (June 2023), pp. 102–116. DOI: 10.1093/mnras/stad942. arXiv: 2302.10555 [astro-ph.HE].

[Esp+22] E. Esparza-Borges et al. "A hot sub-Neptune in the desert and a temperate super-Earth around faint M dwarfs. Color validation of TOI-4479b and TOI-2081b". In: A&A 666, A10 (Oct. 2022), A10. DOI: 10.1051/0004-6361/202243731. arXiv: 2206.10643 [astro-ph.EP].

[Mur+22] F. Murgas et al. "HD 20329b: An ultra-short-period planet around a solar-type star found by TESS". In: A&A 668, A158 (Dec. 2022), A158. DOI: 10.1051/0004-6361/202244459. arXiv: 2211.02547 [astro-ph.EP].

Short description of the contributions made in the third-author publications

- **[Hor+24, Kan+24, Kuz+24, Pel+24, Mor+23, Esp+22, Mur+22]**: Planification and execution of photometric observations at the Telescopio Carlos Sánchez, Observatorio del Teide, Tenerife, Spain.
- **[Rai+23]**: Analysis and optimization of observations at the IAC80 telescope, Observatorio del Teide, Tenerife, Spain.

SOCIETIES

2) European Astronomical Society (EAS) **2024 - Present**

1) Sociedad Española de Astronomía (SEA, Spanish Astronomical Society) **2024 - Present**

LANGUAGES

- **Mother tongues:** Spanish and Galician.
- **Fluent:** English.

MISCELLANEOUS

- Full clean driving license.