

# AARON BELLO-ARUFE

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## Education

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- National Space Institute, Technical University of Denmark, Denmark** 2022  
PH.D., ASTROPHYSICS  
Thesis: *The atmospheres of the hottest exoplanets at high spectral resolution*  
Advisors: Lars Buchhave, João Mendonça
- National Space Institute, Technical University of Denmark, Denmark** 2019  
M.Sc., EARTH AND SPACE PHYSICS AND ENGINEERING  
Honors Program  
Fall 2018: semester abroad, **University of Wisconsin – Madison, USA**  
Thesis: *Exploring exoplanet atmospheric models to study the capabilities of JWST*  
Advisors: Lars Buchhave, João Mendonça
- University of Santiago de Compostela, Spain** 2017  
B.Sc., PHYSICS  
Thesis: *Cosmic ray irradiance in the atmospheres of Earth-like exoplanets orbiting M-dwarfs*  
Advisors: Juan Garzon, Ana Ulla
- Umeå University, Sweden** 2017  
B.Sc., PHYSICS  
Thesis: *Gravitational waves in general relativity*  
Advisor: Michael Bradley

## Research and Professional Experience

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- Oct 2022 - present     **JPL postdoctoral fellow**, NASA Jet Propulsion Laboratory, CA, USA  
Observational studies of exoplanet atmospheres with JWST.
- Oct 2019 - Sep 2022     **“la Caixa” Ph.D. fellow at the Exoplanet Group**, National Space Institute, Denmark  
Advisors: Lars Buchhave, João Mendonça  
Characterization of exoplanet atmospheres through transmission spectroscopy. Atmospheric composition and dynamics. Detrending methods.
- Jan 2022 - Jun 2022     **Visiting student researcher at the Knutson Group**, Caltech, CA, USA  
Advisor: Heather Knutson  
Characterization of exoplanet atmospheres through transmission spectroscopy. Atmospheric composition and escape.
- Jul 2019 - Aug 2019     **Nordic Optical Telescope summer school**, La Palma, Spain  
Intensive training on preparation, execution and reduction of astrophysical data. Science case development. Hands-on experience and training on modern instrumentation.
- Jan 2019 - Jun 2019     **M.Sc. thesis research at the Exoplanet Group**, National Space Institute, Denmark  
Advisors: Lars Buchhave, João Mendonça  
Study of the capabilities of JWST to characterize the atmospheres of terrestrial exoplanets and sub-Neptunes. Simulation of observations. Spectral retrieval.

- Sep 2018 - Apr 2019 **M.Sc. research at the Mars Group**, University of Copenhagen, Denmark  
Advisor: Morten Bo Madsen  
Study of ultraviolet irradiance on the Mastcam-Z calibration targets on the Mars 2020 rover.
- Jul 2018 **European Space Agency summer school**, Alpbach, Austria  
End-to-end design of a space mission to explore minor bodies in the Solar System. Coordination of an international and multi-disciplinary team of scientists and engineers.
- Jan 2017 - Jul 2017 **B.Sc. thesis research**, University of Santiago de Compostela, Spain  
Advisors: Juan Garzon, Ana Ulla  
Modeling of stellar cosmic ray irradiance on the atmospheres of terrestrial exoplanets.
- Nov 2016 - Jun 2017 **B.Sc. thesis research**, Umeå University, Sweden  
Advisor: Michael Bradley  
Linearization of general relativity. Gravitational waves.
- Sep 2016 - Oct 2016 **Data Analysis intern**, *MeteoGalicia* (regional meteorological agency), Spain  
Analysis of ozone concentration data during the 2016 summer season. Calculation of back trajectories of air masses. Comparison between rural and industrial air quality stations.

## Refereed publications

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- Hu, R., **Bello-Arufe, A.**, et al. (2024), *A Secondary Atmosphere on the Rocky Exoplanet 55 Cnc e*, *Nature*
- Dash, S., ... **Bello-Arufe, A.**, et al. (2024), *Constraints on atmospheric water abundance and cloud deck pressure in the warm Neptune GJ 3470 b via CARMENES transmission spectroscopy*, *MNRAS*, 530, 3
- Powell, D., ... **Bello-Arufe, A.**, et al. (2024), *Sulfur dioxide in the mid-infrared transmission spectrum of WASP-39b*, *Nature*, 626, 979–983
- Kjærsgaard, R., **Bello-Arufe, A.**, et al. (2023), *TAU: A neural network based telluric correction framework*, *A&A*, 677, A120
- Bello-Arufe, A.**, et al. (2023), *Transmission Spectroscopy of the Lowest-density Gas Giant: Metals and a Potential Extended Outflow in HAT-P-67b*, *AJ*, 166, 69
- Bello-Arufe, A.**, et al. (2022), *Exoplanet atmospheres at high resolution through a modest-size telescope: Fe II in MASCARA-2b and KELT-9b with FIES on the Nordic Optical Telescope*, *A&A*, 662, A51
- Bello-Arufe, A.**, et al. (2022), *Mining the Ultrahot Skies of HAT-P-70b: Detection of a Profusion of Neutral and Ionized Species*, *AJ*, 163, 96
- Cabot, S., **Bello-Arufe, A.**, et al. (2021), *TOI-1518b: A Misaligned Ultra-hot Jupiter with Iron in its Atmosphere*, *AJ*, 162, 218
- Bitsch, B., Raymond, S. N., Buchhave, L. A., **Bello-Arufe, A.**, et al. (2021), *Dry or water world? How the water contents of inner sub-Neptunes constrain giant planet formation and the location of the water ice line*, *A&A*, 649, L5
- Stangret, M., Pallé, E., Casayas-Barris, N., Oshagh, M. **Bello-Arufe, A.**, et al. (2021), *The obliquity and atmosphere of the ultra-hot Jupiter TOI-1431b (MASCARA-5b)*, *A&A*, 654, A73
- Addison, B. C., ... **Bello-Arufe, A.** et al. (2021). *TOI-1431b/MASCARA-5b: An Ultra-hot Jupiter Orbiting One of the Hottest & Brightest Known Exoplanet Host Stars*, *AJ*, 162, 292
- Kinch, K. M., ... **Bello-Arufe, A.**, et al. (2020). *Radiometric Calibration Targets for the Mastcam-Z Camera on the Mars 2020 Rover Mission*, *Space Science Reviews*, 216, 141

## Selected Awards, Grants and Honors

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- 2022 **JPL Postdoctoral Fellowship**, NASA Jet Propulsion Laboratory
- 2022 **Niels Bohr grant**, Royal Danish Academy of Sciences and Letters
- 2019-2021 **“la Caixa” fellowship for studies abroad**, “la Caixa” Foundation
- 2017-2019 **Barrié postgraduate fellowship for studies abroad**, Barrié Foundation

2018 **Nordea scholarship**, Nordea Foundation

2018 **Oticon scholarship**, Oticon Foundation

## Approved Telescope Proposals

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PI, *Probing the rich chemistry of an impossible planet*, **Palomar 200-inch Hale Telescope**, 1 night

PI, *Searching for signs of geological activity in a rocky exoplanet*, **Calar Alto 3.5m telescope**, 1.33 nights

PI, *A first look at the exotic atmosphere of one of the hottest and most recent discoveries from TESS*, **TNG**, 8 hours

PI, *A world close to catastrophic mass loss? A first look at the extreme atmosphere of WASP-178b*, **VLT**, 6 hours

PI, *Exploring ultra-hot Jupiters in multiple-star systems with GIARPS — insights on atmospheres and formation*, **TNG**, 5 hours

PI, *Studying the atmosphere of HAT-P-70b, one of the hottest exoplanets*, **TNG**, 5.5 hours

Co-I, *Efficient and Detailed Characterization of a Temperate Water World Candidate*, (PI: R. Hu), **JWST**, 17.01 hours

Co-I, *Detailed Atmospheric Characterization of a Unique Low-Temperature Exo-Saturn*, (PI: R. Hu), **JWST**, 24.99 hours

Co-I, *The Discovery of a Fourth Low-Mass Planet in an Unusual Super-Puff System*, (PI: P. Gao), **HST**, 12 orbits

Co-I, *Searching for signs of geological activity in a rocky exoplanet orbiting a Sun-like star*, (PI: H. Knutson), **Keck**, 2 nights

Co-I, *TOI-125: Comparative Atmospheric Chemistry Within One System*, (PI: C. Fisher), **JWST**, 19.82 hours

Co-I, *Probing the volcanic outgassing activity of a warm sub-Earth planet*, (PI: M. Damiano), **JWST**, 13.14 hours

Co-I, *Constraining the Oxidation State of the Super-Earth TOI-1685 b*, (PI: C. Fisher), **JWST**, 24.72 hours

Co-I, *A comparative study of the atmospheres of ultra-hot Jupiters* (PI: A. Ulla), **Calar Alto 3.5m telescope**, 1.8 nights

Co-I, *Exploring the Atmospheric Evaporation of a Terrestrial Exoplanet* (PI: S. Gandhi), **Gemini South**, 3.2 hours

Co-I, *Exploring the morning and evening limbs of a transiting exoplanet* (PI: N. Espinoza), **JWST**, 15.6 hours

Co-I, *Probing the Terrestrial Planet TRAPPIST-1c for the Presence of an Atmosphere* (PI: A. Rathcke), **JWST**, 24.9 hours

Co-I, *The first near-infrared spectroscopic phase-curve of a super-Earth* (PI: N. Espinoza), **JWST**, 14.9 hours

Co-I, *Revealing an atmosphere shrouded in mystery with high-resolution spectroscopy* (PI: H. Diamond-Lowe), **VLT**, 8 hours

Co-I, *Transmission spectroscopy of our newest terrestrial neighbor only 8 pc away* (PI: H. Diamond-Lowe), **VLT**, 13 hours

## Selected Presentations

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Poster, *Extreme Solar Systems V*, Christchurch, New Zealand (2024)

Contributed talk, *243<sup>th</sup> Meeting of the American Astronomical Society*, New Orleans, LA, USA (2024)

Invited talk, *ExoSS II workshop*, NASA JPL, CA, USA (2023)

Contributed talk, *Exoclimates VI*, Exeter, UK (2023)

Invited talk, *Astrophysics Lecture Series*, University of Leeds, Leeds, UK (2023)

Invited talk, *Astrophysics Seminar Series*, University of Birmingham, Birmingham, UK (2023)

Contributed talk, *242<sup>th</sup> Meeting of the American Astronomical Society*, Albuquerque, NM, USA (2023)

Contributed talk, *240<sup>th</sup> Meeting of the American Astronomical Society*, Pasadena, CA, USA (2022)

Invited talk, *Exoplanet Journal Club*, NASA JPL, CA, USA (2022)

Poster, *Exoplanets IV*, Las Vegas, NV, USA (2022)

Invited talk, *Planetary Science Seminar*, Caltech, CA, USA (2022)

Invited talk, *Knutson Group Meeting*, Caltech, CA, USA (2022)

Contributed talk, *Annual Danish Astronomy Meeting*, Virtual (2021)

Poster, *Annual Danish Astronomy Meeting*, Nyborg, Denmark (2019)

Invited talk, *Astrophysics and Atmospheric Physics Science Club*, DTU Space, Kgs. Lyngby, Denmark (2019)

Contributed talk, *36<sup>th</sup> Biennial Meeting of the Spanish Royal Physics Society*, Santiago de Compostela, Spain (2017)

## Selected Service, Outreach and Media

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Discussion Panelist for JWST Cycle 3 Exoplanets and Disks

Referee for *Astronomy & Astrophysics*

*Letters to a Pre-Scientist* (2023-present)

*Smaller, Ground-Based Telescopes can Study Exoplanet Atmospheres too*, coverage of our work by [Universe Today](#) (2022)

Interview for [Yale Daily News](#) on the discovery and characterization of TOI-1518 (2021)

Teaching assistant: *30120 Astrophysics*, and *30230 Data Analysis and Modeling in Geoscience and Astrophysics* (2020-2021)

Speaker at the outreach event *Space Night*, Copenhagen Geological Museum (2019)

Instructor of a specialized study project for high school students (2018)

## Languages

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Spanish	Native
Galician	Native
English	Fluent
French	Proficient