AARON BELLO-ARUFE

NASA Jet Propulsion Laboratory
4800 Oak Grove Drive
Pasadena, CA 91109 USA
aaron.bello.arufe@jpl.nasa.gov

Education

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

B.SC., PHYSICS *2017*

Thesis: *Gravitational waves in general relativity*
Advisor: Michael Bradley

Research and Professional Experience

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

Bello-Arufe, A., et al. (2025), *Evidence for a Volcanic Atmosphere on the Sub-Earth L 98-59 b*, ApJL, 980, 2, L26

Zilinskas, M., ... **Bello-Arufe, A.**, et al. (2025), *Characterising the atmosphere of 55 Cancri e: 1D forward model grid for current and future JWST observations*, Nature, 630, 8017, A&A, 697, A34

Rathcke, A., ... **Bello-Arufe, A.**, et al. (2025), *Stellar Contamination Correction Using Back-to-back Transits of TRAPPIST-1 b and c*, ApJL, 979, 1, L19

Parker, L., ... **Bello-Arufe, A.**, et al. (2025), *Limits on the atmospheric metallicity and aerosols of the sub-Neptune GJ 3090 b from high-resolution CRIRES+ spectroscopy*, MNRAS, 538, 4

Unni, A., ... **Bello-Arufe, A.**, et al. (2025), *Doppler shifted transient sodium detection by KECK/HIRES*, MNRAS, 540, 1

Hu, R., **Bello-Arufe, A.**, et al. (2024), *A Secondary Atmosphere on the Rocky Exoplanet 55 Cnc e*, Nature, 630, 8017, 609-612

Patel, J., Brandeker, A., Kitzmann, D., Petit dit de la Roche, D. J. M., **Bello-Arufe, A.**, et al. (2024), *JWST reveals a rapid and strong day side variability of 55 Cancri e*, A&A

Damiano, M., **Bello-Arufe, A.**, et al. (2024), *LHS 1140 b Is a Potentially Habitable Water World*, ApJL, 968, L22

de Wit, J., ... **Bello-Arufe, A.**, et al. (2024), *A roadmap for the atmospheric characterization of terrestrial exoplanets with JWST*, Nature Astronomy, 8, 810–818

Liu, Q., ... **Bello-Arufe, A.**, et al. (2024), *An Extremely Low-density Exoplanet Spins Slow*, ApJL, 976, 1, L14

Masuda, K., ... **Bello-Arufe, A.**, et al. (2024), *A Fourth Planet in the Kepler-51 System Revealed by Transit Timing Variations*, AJ, 168, 6

Oza, A., ... **Bello-Arufe, A.**, et al. (2024), *Redshifted Sodium Transient near Exoplanet Transit*, ApJL, 973, L53

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

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

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. (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., Casayasas-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

2024 **Postdoc Research Award,** NASA Jet Propulsion Laboratory

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

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, *A Search for Refractory Species in the Atmosphere of 55 Cnc e*, (PI: H. Knutson), **Keck**, 1.5 nights

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

Contributed talk, *Exoclimes VII*, Montreal, Canada (2025)

Poster, *Atmospheric Characterization of Rocky to Giant Exoplanets in Thermal Emission with JWST*, Aspen, CO, USA (2025)

Contributed talk, *245th Meeting of the American Astronomical Society*, National Harbor, MD, USA (2025)

Poster, *Two HoRSEs*, Berlin, Germany (2024)

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

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

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

Contributed talk, *Exoclimes 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, *242th Meeting of the American Astronomical Society*, Albuquerque, NM, USA (2023)

Contributed talk, *240th 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)

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, *36th Biennial Meeting of the Spanish Royal Physics Society*, Santiago de Compostela, Spain (2017)

Selected Service, Outreach and Media

NASA Keck Time Allocation Committee 2025B

External reviewer for ROSES

Discussion Panelist for JWST Cycle 4 Exoplanet Atmospheres and Habitability

Discussion Panelist for JWST Cycle 3 Exoplanets and Disks

Referee for *A&A* and *AAS Journals*

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)