Curriculum Vitae

Paulina **Palma-Bifani**

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GitHub: github.com/exoAtmospheres

Profile

Astrophysicist specializing in the atmospheric characterization of directly imaged exoplanets, leveraging expertise in high-contrast data reduction, atmospheric modeling tools, and spectral analysis and interpretation. Lead developer of open-source community tools and advocate for equity, diversity, and inclusion in STEM.

Education

Ph.D. in Sciences de la Planète et de l'Univers

Laboratoire Lagrange, Université de la Côte d'Azur, Nice, France 03/2022–02/2025

- *Atmospheric diversity of young exoplanets and brown dwarfs with the VLT and ELT*
- Supervisors: Gaël Chauvin (MPIA) and Pierre Baudoz (LESIA, Observatoire de Paris)

Master of Science in Astronomy

Departamento de Astronomía, Universidad de Chile, Santiago, Chile 03/2020–01/2022

- *Atmospheres of objects on the upper planetary-mass limit as a clue to distinguish formation mechanisms*
- Supervisors: Patricio Rojo (U. de Chile) and Gaël Chauvin (MPIA)

Bachelor of Science in Astronomy

Facultad de Ciencias Físicas y Matemáticas, Universidad de Chile 03/2015–12/2019

Work Experience

Postdoctoral research:

LIRA, Observatoire de Paris, Meudon, France 04/2025–Ongoing

- Group: Pôle Systèmes Exoplanétaires and HRA
- Focus: Development of atmospheric characterization methods for atmospheric characterization of young exoplanetary systems and characterization of future instrument performance.

International collaborations:

- Member of the ELT/PCS R&D roadmap group, ESO, Europe (06/2025 - today). Participating in the science cases definition and composition of the "PCS Roadmap: Science Cases & Top Level Requirements" document.
- Member of the MIRAGE ANR and HiRISE science team, France (2024 - today). Participating in taking the observations and the data analysis of HiRISE.
- Member of the ELT/MORFEO JeDiEx (jets, discs, and exoplanets) sub-working group, Europe (03/2022 - today). Participating in the elaboration of the next white paper, where I help define the direct imaging exoplanets science case.
- Member of the High-contrast Early Release Science (ERS) JWST team, international, 06/2022 - today.

Courses/lectures given:

- **University teacher**
  - Experimental physics, Universidad Andres Bello, Chile, 08/2020-11/2020
- **University teacher assistant**
  - General Astronomy, Universidad de Chile, 08-12/2020
  - Experimental Astronomy, Universidad de Chile, 08-12/2020, 03-07/2021 & 08-12/2021
  - General Astronomy, Universidad de Chile, 03-07/2020
  - Electromagnetism, Universidad de Chile, 03-07/2019, 08-12/2019, & 03-07/2021
  - Newtonian Systems, Universidad de Chile, 08-12/2018
  - Experimental Methods, Universidad de Chile, 03-07/2018 & 03-07/2020
  - Differential and Integral Calculus, Universidad de Chile, 08-12/2017
  - Introduction to Calculus, Universidad de Chile, 03-07/2017
- **Workshop teacher assistant**
  - Code/Astro Workshop, online in 06/2021 and 06/2022, and at Northwestern University, Evanston, USA, in 07/2023.
- **Hands-on sessions**
  - git & GitHub hands-on session, PhD breakfast, Laboratoire Lagrange, Nice, France, 01/2024
  - ForMoSA hands-on session, Cloud Academy, IPAG, Les Houches, France, 03/2023

Workshops attended:

- ExoSLAM school, Montreal, Canada, 07/2025. Participated in the pre-conference workshop, consisting of a broad overview of methods to model and interpret atmospheres of exoplanets.
- Cloud Academy 3, Les Houches, France, 03/2023. Advanced school for cloud physics.
- Exo-Atmospheres - Ecole de Physique des Houches, France, 09/2022. Two weeks of formative courses on exoplanetary atmospheres.
- Other Worlds Laboratory Summer Programme (OWL), University of Santa Cruz, California, USA, 07/2022. Two weeks of scientific collaboration at the OWL laboratory in the context of the JWST ERS collaboration.
- SPECATMOS - Spectroscopy and Atmosphere: measurements and modeling, Sorbonne Université, CNRS, IPSL, Frejus, France, 05/2022. Five-day formation for the study of atmospheres (mostly Earth's atmosphere) based on theoretical, applied, and practical spectroscopy lessons.
- ESO Summer Research Programme, ESO, Germany, 07/2021 - 08/2021. Worked on Project E "Probing the building blocks of planets with ALMA" with Łukasz Tychoniec, Maria Koutoulaki, and Leonardo Testi as advisors.

Supervision of Interns

- **Idriss Abdoulwahab** (Master Student), Laboratoire Lagrange, Nice, France
  Project: Development of the *exoSpin* Python package (github.com/exoAtmospheres/exoSpin) and re-analysis of the obliquity of AB Pic b using CRIRES+ observations. Resulted in co-authorship in *Ghandi et al. (2025)*.
  Period: 06/2024–08/2024 (3 months)
- **Damien Borja** (Master Student), Laboratoire Lagrange, Nice, France
  Project: Atmospheric characterization of the young Jupiter-like planet AF Lep b. Tested *ForMoSA* across various model grids; this work provided the foundation for *Palma-Bifani et al. (2024)*, where he is listed as third author.
  Period: 06/2023–07/2023 (2 months)

Talks and seminars

1. (Planned) Contributed talk, "Spirit of Lyot 6 Conference, Pasadena, USA", 02/2026
2. Contributed talk, "Exo-ELT Conference, Garching, Germany", 11/2025
3. Contributed talk, "AO4ELT8, Viña del Mar, Chile", 09/2025
4. Seminar, "Visitor at Universidad de Chile, Santiago, Chile", 09/2025
5. Contributed talk, "SOCHIAS, Puerto Montt, Chile", 09/2025
6. Poster contribution, "Exoclimes VII, Montreal, Canada", 07/2025
7. Contributed talk, "Two Horses Conference, Berlin, Germany", 07/2024
8. Poster contribution (x2), "Exoplanets 5 Conference, Leiden, Netherlands", 06/2024
9. Contributed talk, "SF2A Conference, Marseille, France", 06/2024
10. Seminar, "Visitor at IPAG, Grenoble, France", 02/2024
11. Seminar, "Exoplanet seminar at LESIA, Paris Observatory, Meudon, France", 01/2024
12. Invited talk, "HRAA Day at LESIA, Paris Observatory, Meudon, France", 01/2024
13. Contributed talks (x3), "SF2A Conference, Strasbourg, France", 06/2023
14. Poster contribution, "EDSFA Second year PhD Workshop, Nice, France", 05/2023
15. Seminar, "Visitor at Universidad de Chile, Santiago, Chile", 05/2023
16. Seminar, "Visitor at Universidad de Valparaiso, Valparaiso, Chile", 05/2023
17. Seminar, "Visitor at Universidad Adolfo Ibañez, Santiago, Chile", 05/2023
18. Contributed talk, "Cloud Academy, IPAG, Les Houches, France", 03/2023
19. Contributed talk, "Exo-ELT Workshop, Frejus, France", 11/2022
20. Contributed talk, "Other Worlds Laboratory Summer Program (OWL), UCSC, USA", 07/2022
21. Poster contribution, "In the Spirit of Lyot Conference, Leiden, Netherlands", 06/2022
22. Contributed talk, "Atmospheres, Atmospheres! Do I look like I care about atmospheres? ESO Conference, Online", 08/2021

Community Service & Outreach

Organizing events

- Organizer of the Exoplanet Seminars, LIRA, Observatoire de Paris, Meudon, France, 04/2025–today
- SOC member, ForMiX workshop, Heidelberg, Germany, 06/2025
- LOC member, HALO workshop, Frejus, France, 12/2024
- LOC member, Two HoRSEs conference, Berlin, Germany, 09/2024
- SOC & LOC member, Exo-ELT workshop, Frejus, France, 11/2022

Peer review

- ESO delegated proposal reviewer (DPR), 2022–today
- Member of postdoc selection committee, invited by Vivien Parmentier, Lagrange, Nice, France, 02/2024

Outreach

- Nuit Coupoles Ouvertes, Plateau Calern Telescope site, France, 07/2024
- Observatory woman day (*Observatoire au féminin*), Observatoire de la Côte d'Azur, Nice, France, 02/2024
- Astronomy day (*Día de la Astronomía*), Cerro Calán, Universidad de Chile, 03/2022

Representation

- Postgraduate students representative at Departamento de Astronomía, Universidad de Chile, 08/2020–10/2021

Observing Experience

Observing proposals

(ESO/VLT)

- CoI of "Disentangling the atmospheres & circumplanetary disks of the PDS 70 protoplanets (b)" Program ID:116.2931 at the VLTI, MATISSE, 19 hours.
- CoI of "Detecting wind and accretion signatures during a bright accretion event on Delorme 1 (AB)b" DDT Program ID:115.29GA at the VLT, CRIRES, 3.6 hours.
- CoI of "Direct characterization of substellar companions at high spectral resolution with the HiRISE visitor instrument - Part 4" Program ID:115.284P at the VLT, HiRISE, 45.4 hours.
- CoI of "Origin and fate of the young, warm and dusty super-Jupiter HIP65426 b" Program ID:115.283F at the VLT, CRIRES, 6.7 hours.
- CoI of "Disentangling the atmospheres & circumplanetary disks of the PDS 70 protoplanets (a)" Program ID:114.27PG at the VLTI, MATISSE, 11.2 hours.
- CoI of "Exploring exojovian atmospheres with young free-floating planetary analogs" Program ID:114.27B1 at the VLT, XSHOOTER, 8.4 hours.
- CoI of "Peering into the AB Pic system to unveil the planetary candidate AB Pic c" Program ID:114.273P at the VLTI, GRAVITY, 3 hours.
- CoI of "Disentangling accretion flow geometry on a planetary-mass companion" Program ID:113.26J1 at the VLT, CRIRES, 7.5 hours.
- CoI of "Towards a global exploitation of the spectral signatures of super-Jupiters: The high resolution provided by CRIRES+" Program ID:113.26JY at the VLT, CRIRES, 12 hours.

(JWST)

- CoI of "From Day to Season: Constraining the Rotation Period and Obliquity of Beta Pic b with Time-resolved High-contrast Imaging" Cycle 3, ID:4758, JWST NIRCam, 24.2 hours.
- CoI of "Panchromatic view of an Adolescent and Frigid Jovian Exoplanet" Cycle 2, ID:3514, JWST NIRSpec and MIRI, 8.2 hours.

Observing nights

- 09/2025, ESO/VLT/UT3 visitor mode, HiRISE, three full nights.
- 04/2024, ESO/VLT/UT3 visitor mode, HiRISE, two full nights.
- 05/2023, Cerro Tololo visitor mode, 0.6m telescope, two full nights.

Data reduction

- *EsoReflex* and *TExTRIS* to reduce and perform the spectral extraction of SINFONI/VLT archival K-band data. The results are public in Palma-Bifani et al. (2025).

Coding & Open Source Development

Community Leadership & Organizations

- **Founder, *exoAtmospheres*** (github.com/exoAtmospheres): Established a collaborative hub for exoplanetary atmospheric tools; transitioned *ForMoSA* to an open-source model.
- **Co-founder, *Science & Commit*** (github.com/Science-and-Commit): Developed workshop materials on releasing, documenting, and maintaining scientific Python packages.

Software Development & Technical Stack

- **Lead Developer/Maintainer:** *ForMoSA* (Forward Modeling for Spectral Analysis), *exoSpin* (planetary obliquity analysis), and *GitExpress* (git quick-start guide).
- **Internal Tools:** *MicadoRoutines*, *DetectionLimits*, and *Optex* for characterization of instruments, detection limits, and atmospheric retrievals based on optimal estimation.
- **Scientific Python:** Advanced proficiency in `Astropy`, `SciPy`, `Pandas`, `Xarray`, and `Matplotlib`.
- **Community Codes:** Experienced user of Bayesian inference and radiative transfer codes including `PyMultiNest`, `petitRADTRANS`, `orbitize!`, `pyOptimalEstimation`, and `Exo_k`.

Version Control & Technical Tools

- **git & GitHub:** (github.com/Palma-Bifani) Expert use for CI/CD, collaborative code review, and versioning.
- **Other Tools:** LaTeX, HTML, Matlab, and environment management via Anaconda.

Publications

Full Publication List: **NASA/ADS Public Library**
(Counts: **21** peer-reviewed publications / **3** as first-author / **18** as co-author.)

Grants & Funding

- **Project: *Science & Commit***
  Support for academic projects by graduate students (*Estímulo para proyectos académicos de estudiantes de postgrado*), $1,500,000 CLP, Departamento de Postgrado y Postítulo, Universidad de Chile, Chile, 04/2021–03/2022

Languages

Spanish: Native **English:** Fluent **German:** Fluent **French:** Intermediate

References

Dr. Mickaël Bonnefoy | CNRS, IPAG, Grenoble | mickael.bonnefoy@univ-grenoble-alpes.fr

Dr. Benjamin Charnay | CNRS, LESIA, Obs. de Paris | benjamin.charnay@obspm.fr

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