

Lukas Delaye

PhD Student in Astrophysics

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EDUCATION

- Master's Degree (M2) in Astronomy and Astrophysics** 2024 - 2025
Université Paris-Saclay & Observatoire de Paris - PSL (Paris, France)
- Master's Degree in Physics Education (M2)** 2023 - 2024
Passed the Agrégation in Physics (competitive examination for secondary-school teachers).
Université Paris-Saclay & École normale supérieure Paris-Saclay (Orsay, France)
- Magistère in Fundamental Physics** 2021 - 2024
Université Paris-Saclay (Orsay, France)
- Scientific Preparatory Classes for Grandes Écoles, PCSI / PC** 2019 - 2021
Lycée Camille Vernet (Valence, France)
- Scientific Baccalaureate, Physics and Chemistry Major** 2016 - 2019
Lycée Polyvalent la Saulaie (Saint-Marcellin, France)

RESEARCH EXPERIENCES

- PhD in Astrophysics, *Observatoire de Paris - PSL* (Meudon, France)** 2025 - 2028
- **Thesis title:** "Imaging exoplanets with the Roman Space Telescope".
 - **Topics:** *exoplanets, direct imaging, high-contrast imaging, adaptive optics, wavefront sensing and control, differential imaging, coronagraphy, numerical simulations, optical bench, Roman Space Telescope.*
 - **Supervisors:** ✉ Johan Mazoyer & ✉ Axel Potier.
 - **Professional involvement:** Member of the Roman Coronagraph Community Participation (CPP).
- M2 Research Internship, *Observatoire de Paris - PSL* (Meudon, France)** March 2025 - July 2025
- **Internship title:** "Coherence Differential Imaging (CDI) for the direct detection of exoplanets".
 - **Topics:** *exoplanets, direct imaging, high-contrast imaging, adaptive optics, wavefront sensing and control, differential imaging, numerical simulations, VLT/SPHERE.*
 - **Supervisors:** ✉ Axel Potier & ✉ Raphaël Galicher.
- M2 Research Project, *Institut d'Astrophysique Spatiale* (Orsay, France)** 2024 - 2025
- **Project title:** "Study of a photodissociation region".
 - **Topics:** *star formation, photodissociation regions, radiative processes, data analysis, numerical simulation, JWST.*
 - **Supervisor:** ✉ Emilie Habart.
- L3 Research Internship, *Institut d'Astrophysique Spatiale* (Orsay, France)** June 2022 - July 2022
- **Internship title:** "Analysis of the aliphatic component of meteorites using infrared hyperspectral imaging".
 - **Topics:** *astrochemistry, infrared spectroscopy, hyperspectral analysis, Ryugu and the Hayabusa2 mission.*

- **Supervisors:** ✉ Zélia Dionnet & ✉ Zahia Djouadi.

High School Internship, *CERN - European Organization for Nuclear Research*

October 2017

- **Internship title:** "French High School Student Internship Programme".
- **Topics:** *particle accelerator, magnetism, magnets.*

TEACHING

Contract Teacher, *Observatoire de Paris - PSL (Paris, France)*

2025 - 2028

- Responsible for teaching 64 hours per year during the doctoral thesis.
- **Responsibilities:** *optics practicals in the first and second years of CPES, astronomical observation practicals in CPES, supervision week at the Haute Provence Observatory (CNRS) for the DU-ECU and for high school and college teachers, preparation for the DU-ECU cosmology TD, solar physics practicals for the DU-ECU, science festival: supervision of activities and visits to the domes of the Paris Observatory.*

Oral Examiner, *Lycée Marcelin Berthelot (Saint-Maur-des-Fossés, France)*

2024 - 2025

- Two hours of oral practice per week in Scientific Preparatory Classes for Grandes Écoles. Preparation of second-year students (PC) for final recruitment exams.

Teaching Intern, *Lycée Louis Blaringhem (Béthune, France)*

May 2023

- Teaching internship for a teacher in high school classes.
- **Supervisor:** ✉ Benoit Decke

Teaching Intern, *Lycée Polyvalent la Saulaie (Saint-Marcellin, France)*

January 2022

- Teaching internship for a teacher in high school classes.
- **Supervisor:** ✉ Myriam Lutrin

SKILLS

Programming Languages: Python, C, C++.

Teaching and Research: L^AT_EX, Git environment (GitHub, GitLab, GitKraken).

Languages: French (native), English (C1), Spanish (B1).

WORKS

Peer-Reviewed Publications

- DIONNET, Z., DJOUADI, Z., **DELAYE, L.**, et al. Methylene-to-methyl ratio variability in Ryugu samples: Clues to a heterogeneous aqueous alteration. *Meteoritics & Planetary Science*. **2025**, vol. 60, no 2, p. 273-285.

Conference Proceedings

- **DELAYE, L.**, LAGINJA, I., BAUDOZ, P., et al. Enhanced wavefront sensing for the Roman Coronagraph Instrument: Gaussian probes and compact model validation. In: *SPIE Astronomical Telescopes + Instrumentation*. **2026**.
- DIONNET, Z., DJOUADI, Z., BRUNETTO, R., [...], **DELAYE, L.**, et al. Spatial heterogeneity of aliphatic compounds and their link with phyllosilicates as a result of aqueous alteration of Ryugu samples. In: *86th Annual Meeting of the Meteoritical Society*. **2024**.

Oral Presentations

- **DELAYE, L.** The Roman Space Telescope: preparing for the first image of another Earth (in French). Festival d’Astronomie de Fleurance — Fleurance, France. **2026**.
- **DELAYE, L.** The Roman Coronagraph Instrument: paving the technological path toward Earth-like exoplanet detection. Elbereth — Paris, France. **2026**.

Conference Posters

- **DELAYE, L.**, LAGINJA, I., POTIER, A., et al. Enhanced wavefront sensing for the Roman Coronagraph Instrument: Gaussian probes and compact model validation. In: SPIE Astronomical Telescopes + Instrumentation. **2026**.
- **DELAYE, L.**, POTIER, A., GALICHER, R., et al. Simulated parametric study of coherent differential imaging for exoplanet detection with SPHERE. In: Spirit of Lyot 6. **2026**.

Collaborative Works

- WILKINSON, C., WEHRUNG-MONTPEZAT, J., CHARNAY, B., [...], **DELAYE, L.**, et al. A semi-analytical surrogate model for giant planet evolution: bypassing ordinary differential equation solvers with localised thermodynamics, softplus asymptotes, and B-spline photometry. *Astronomy & Astrophysics*. **2026**.
- LAU, A., RIGGS, A. J., REDMOND, S. F., [...], **DELAYE, L.**, et al. Simulation tools for realistic high-order wavefront correction with the Roman Coronagraph. In: SPIE Astronomical Telescopes + Instrumentation. **2026**.
- MAZOYER, J., MELLADO-TENORIO, M. J., POTIER, A., [...], **DELAYE, L.**, et al. Coherence differential imaging using gradient-boosted decision trees for the direct detection of exoplanets. In: SPIE Astronomical Telescopes + Instrumentation. **2026**.
- WILKINSON, C., CHARNAY, B., MAZEVET, S., [...], **DELAYE, L.**, et al. Resolving core-envelope degeneracies in giant planets and sub-Neptunes: constraining the equivalence in the presence of dilute gradients. *Astronomy & Astrophysics*. **2026**.

Software & Observations

- POR, E. H., LAGINJA, I., STEIGER, S., [...], **DELAYE, L.**, et al. spacetelescope/catkit2: v0.7.0. Zenodo, Research protocol or technique. **2026**.
- BIRTWHISTLE, P., PETTARIN, E., GREEN, D. W. E., [...], **DELAYE, L.**, et al. Comet C/2026 m3 (master). Minor Planet Electronic Circulars, Research tool. **2026**.

GRANTS & FUNDING

HWO2026 Student Conference Grant

2026

- **Funding:** Full conference registration fee waiver for HWO2026.

SPIE Student Conference Grant

2026

- **Funding:** Travel reimbursement grant (\$700) and full conference registration fee waiver for SPIE Astronomical Telescopes + Instrumentation 2026.

Doctoral Funding

2025 - 2028

- **50% Research funding agency:** ANR (Agence Nationale de la Recherche) funds via the *Académie Spatiale d’Île-de-France*.
- **50% French public institution:** *Observatoire de Paris* funds, awarded through the Astronomy and Astrophysics of Île-de-France Doctoral School (ED AAIF - ED127) competitive examination.

INTERESTS

Music: drummer in a student rock band, amateur guitarist, music creation using professional software.

Sports and Esports: triathlon (best result: participation in the semi-finals of the French Triathlon Championship), hiking, amateur video game competitions.

Other: photography, video, cinema