

PhD Position: Jupiter's Polar Chemistry in the Context of ESA's Jupiter Icy Moons Explorer (JUICE) Mission

Laboratory: Laboratoire d'Astrophysique de Marseille (LAM) – Aix-Marseille University

Supervisors: Pr. Vincent Hue (vincent.hue@lam.fr); Dr. Bilal Benmahi (bilal.benmahi@lam.fr)

Funding: Fully funded PhD position (Project JAFAR – Jupiter polar Atmosphere & Fate of AeRosols)

Description

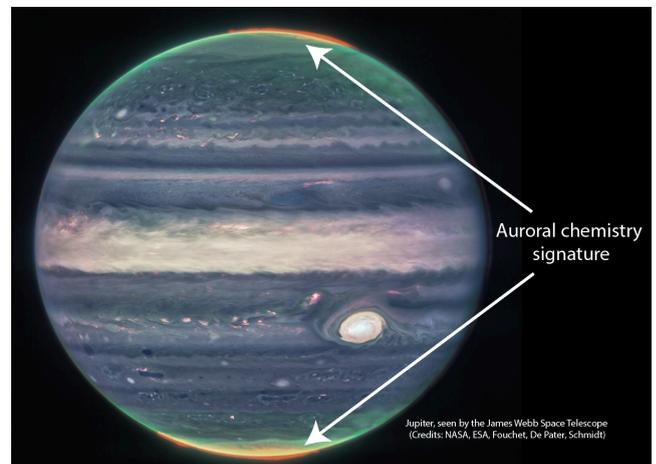
The *Laboratoire d'Astrophysique de Marseille* (LAM, Institut Origines) is offering a fully funded PhD position in planetary science focused on the chemistry of Jupiter's polar atmosphere. The project is supervised by Vincent Hue and Bilal Benmahi, actively involved in NASA's Juno mission and ESA's Jupiter Icy Moons Explorer (JUICE) mission.

The main objective of the PhD project is to study the impact of auroral particle precipitation on Jupiter's atmospheric composition. The work will involve modeling the abundances of key chemical species in Jupiter's polar regions using computer simulations. The core of the project consists of coupling a photochemical model (developed and used in numerous planetary applications) with an electron transport model (*TransPlanet*, also widely used), in order to quantify how auroral electrons modify Jupiter's atmospheric chemistry. The initial focus will be on hydrocarbons (C₂H₂, C₂H₄, C₂H₆) and will later be extended to other observed hydrocarbons.

The successful candidate will interpret available observations from the Juno mission together with ground-based and space-based data, including observations from IRTF and JWST (both recently published and newly acquired as part of this project).

This PhD project is directly connected to the scientific preparation of the JUICE mission. The candidate will be integrated into the JUICE science team and will contribute both to the mission's preparation phase and to its scientific exploitation following JUICE's arrival at Jupiter in 2031.

The project is part of the JAFAR research program, involving close collaborations with several French laboratories and NASA's Jet Propulsion Laboratory.



Funding

This is a fully funded PhD position, including a doctoral salary and dedicated research funding for the full duration of the thesis. Funding is secured through the JAFAR project.

Candidate profile

Applicants should hold a Master's degree (or equivalent) in planetary science, astrophysics, physics, atmospheric science, or a related field. A strong interest in planetary atmospheres, numerical modeling, and space missions is expected. Experience in programming or numerical simulations is **highly recommended**; prior knowledge of Fortran and Python is an asset. The position is open to both French and international candidates. The PhD will include presentations at scientific meetings and involve international travels related to JUICE mission activities.

Application documents: (to be sent to both Pr. Hue & Dr. Benmahi): Curriculum vitae (CV), Academic transcripts, and Contact details of two academic references

Application deadline: 15 May 2026 (applications will be reviewed until the position is filled)

Anticipated start date: 1 October 2026

Related references:

- Dobrijevic et al. 2020. 1D photochemical model of the ionosphere and the stratosphere of Neptune. *Icarus*, 335, 113375. <https://www.sciencedirect.com/science/article/abs/pii/S0019103519300569>
- Hue et al. 2024. The polar stratosphere of Jupiter. *Space Science Reviews*, 220(8), 85. <https://link.springer.com/article/10.1007/s11214-024-01119-5>, arXiv: <https://arxiv.org/abs/2410.20413>
- Benmahi et al. 2024. Auroral 3D structure retrieval from the Juno/UVS data. *Astronomy & Astrophysics*, 691, A91. <https://doi.org/10.1051/0004-6361/202451439>