

Postdoctoral Research Position

Pushing exoplanets detection limits in JWST direct imaging data

Workplace: [Laboratoire d'Astrophysique de Marseille](#) (LAM), France

Initial appointment: 2 years

Application deadline: March 15th, 2024

Context:

Within two years of operation, JWST has transformed the field of exoplanetary systems studies, providing spectacular images and spectra of known exoplanets and dusty disks in the near and mid infrared. These first results have also demonstrated the exquisite image quality and stability of the observatory resulting in significantly deeper detection limits, sensitive to a few Saturn masses. As a result, the community is now proposing more exoplanet search programs in targeted systems. As these programs move to deeper observations, the starlight contamination at the shortest angular separations becomes prominent and requires dedicated image post-processing methods. In parallel, the MAST archive has accumulated two years of data, images and sensor telemetry, that allow to monitor the instruments stability. This database offers opportunities to explore new post-processing methods to better model and discard the stellar noise. Developing such methods is particularly timely right now, as JWST is foreseen to operate for at least 10 years, and as the Roman Space Telescope (RST, launch 2027) coronagraphic instrument will deliver high-contrast data 2-3 orders of magnitude deeper, along with associated sensor telemetry. Methods developed now will have long term prospects to be applied for JWST data and to be adapted and implemented on RST data.

Job description:

We are seeking a highly motivated and talented postdoctoral researcher to join our ESCAPE research group at LAM. The successful candidate will be responsible for the development of innovative post-processing methods to improve direct imaging detection limits with JWST, with a focus on using the wavefront sensor telemetry to inform the stellar PSF subtraction. In addition to publicly available data, they will have access to the team's programs and be encouraged to submit JWST proposals on their own related to this research. The researcher will also investigate possible adaptation of the methods to the Roman Space Telescope, in collaboration with members of the ESCAPE team.

Research environment:

The successful applicant will join the ESCAPE team, an [ERC consolidator project](#) (PI: Elodie Choquet, 2022-2027) aiming at developing advanced image processing methods for the detection of exoplanets for modern and active Space Telescopes. The postdoctoral researcher will evolve in a team of 7 people (inc. 2 in Lagrange institute, Nice), working on a diversity of topics related to space coronagraphic imaging, ranging from data numerical simulations, lab experiments, development of image processing and statistical methods, and interpretation of observing programs. The postdoctoral researcher is expected to contribute to and benefit from the mutual interactions and emulsion with the whole team. Support will be provided for computing resources, collaborative works, and participation to conferences as part of the ESCAPE project.

International collaborations:

The position offers numerous opportunities to collaborate with a strong national and international network. The team has a strong history of collaboration with the ExoPlanetary Systems Imaging Group at STScI on these research topics, with an on-going collaborative project funded through CNRS TARPIN project (PI M. Ferrari, R. Soummer). Other strong international collaborations include JPL, Caltech, and UC Santa Barbara. At the national level, collaboration on these topics include the Lagrange institute (Nice), LESIA (Meudon), and IPAG (Grenoble). The postdoc will collaborate with and benefit from this network.

Qualifications:

Applicants must have a PhD degree in Astronomy, Astrophysics, Physics, or equivalent field.

Experience in any of the following fields will be given extra consideration:

- Direct imaging observations and analysis of exoplanetary systems,
- Instrumentation for High angular resolution astronomy
- Data science, artificial intelligence methods

Our team recognize the key role of diversity and inclusivity in our scientific community. We are committed to equal opportunity employment, and we thus encourage applications from members of under-represented communities. We will not discriminate applicants because of gender identity, sexual orientation, religion, color, nationality, or disability status.

Application process:

Interested candidates should address their application as pdf files by email to Elodie Choquet (elodie.choquet@lam.fr) by **March 15th**. Application material includes:

- A curriculum vitae (CV) including a list of publications.
- A statement of research experience and interest (2 pages).

The candidates should also arrange for three reference letters to be sent by the same deadline.

Review of applications will begin on March 18th and will continue until the position is filled.