Postdoctoral Position
Analysis of GTO and ERS JWST data
Characterization of Exoplanets & Disks with JWST images

Starting date: As early as September 1st 2022
Contract duration: 2 years with possibility of 1 year extension
Workplace: Laboratoire d'Astrophysique de Marseille (LAM), France
Funding: ESCAPE ERC Consolidator grant

Application deadline: August 15th 2022
Contact: Elodie Choquet, Elodie.Choquet@lam.fr

Job Description:

On July 12th 2022, JWST will start delivering science data of unprecedented quality. In the field of exoplanetary systems imaging, its unmatched combination of high angular resolution and exquisite sensitivity across the entire near-IR and mid-IR spectrum will soon allow to uniquely constrain the atmospheric properties of giant exoplanets, the cometary vs. asteroidal nature of debris disks, and possibly detect new exoplanets less massive and cooler than ever. While the telescope is expected to operate for at least 10 years, it is essential to understand the data as soon as possible and to develop now the data processing and analysis methods optimized for its on-sky behavior.

Our team at LAM is involved in several **JWST Cycle 1 programs**. In particular, we have the responsibility of two programs:

- The **disk coronagraphic imaging** part of the community-driven **Direct Imaging ERS program** (ERS-1386, PI S. Hinkley). These observations will allow us to diagnose the performance of JWST for disk imaging and to constrain the properties of the famous HD 141569 debris disk system.
- A 19h MIRI coronagraphy **GTO program** (GTO-1241, PI M. Ressler) aiming at characterizing the atmospheric properties of 4 **exoplanet/brown dwarf companions** (51 Eri b, beta Pic b, kappa And b, HR 2562 B).
- We are also involved in two additional Cycle 1 GO programs abouts debris disks characterization and an exoplanet search in a nearby system.

This **early access** to a diverse range of JWST science datasets constitutes a unique opportunity to investigate **image processing methods** dedicated to this state-of-the-art Space Telescope.

The postdoctoral researcher will be directly working with these prime JWST datasets. **They will have two primary goals**:

- Lead the analysis of the GTO exoplanet program and of the MIRI part of the ERS disk program.
- Optimize data processing methods using the reference star archives of and available telemetry.

In relation to the first goal, the researcher will be in prime position to lead followup programs and they will be encouraged to lead Cycle 2-3 JWST programs on their own in collaboration with the team. Related to the second goal, the development of subsequent methods for the future Roman Space Telescope will be encouraged as part of the broader goals of the ESCAPE program.

International collaborations:
The work of the postdoctoral researcher will be done as part of several international collaborations. The interpretation of the GTO program will be done in collaboration with the PIs at JPL, and with members of the complementary European-led GTO program (CEA, LESIA). The interpretation of the ERS program will be done in collaboration with M. Millar-Blanchaer (UCSB), co-lead of the Disk Imaging program, and with the ERS team, an international collaboration involving many institutes across Europe and the US. Finally, work related to optimizing JWST data processing methods will benefit from our existing collaboration with STScI (in particular with members of the JWST Telescope and Instrument teams) and with Lagrange Laboratory in Nice for their expertise statistical methods for the detection of exoplanets.

Research environment:
This research will be done as part of the ESCAPE ERC consolidator project (PI: Elodie Choquet, 2022-2027), which aims at developing advanced image processing methods for the detection of exoplanets for the Roman Space Telescope. The postdoctoral researcher will evolve in a team of 7 people to be built starting Fall 2022, 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.

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

Applicants must have a PhD degree in Astronomy, Astrophysics, Physics, or equivalent field. Experience in the following field will be given extra consideration, although not mandatory:

- Direct imaging observations and analysis of exoplanetary systems,
- Exoplanets atmospheric modeling
- Dynamical modeling of circumstellar disk and exoplanetary systems
- Instrumentation for High angular resolution astronomy

Application process:
Applications should include a CV, a publication list, and a statement of research experience and interests (2 pages). They should be sent by email to Elodie Choquet (elodie.choquet@lam.fr) by **August 15**. Applicants should also arrange for three letters of recommendation to be sent by the same deadline.

Applications received after the deadline will be considered until the position is filled.