

# Postdoctoral Position in clusters of galaxies and large scale structures

- IRAP, Toulouse, France
- **Deadline on Dec 15, 2022**

## **Job description:**

Applications are invited for a postdoctoral research position on the intra-cluster gas physics and its impact in CMB and large scale cosmological analyses, within the French ANR funded project BATMAN (Better Accuracy and robusTness for Mass Assessment of Neutrino). The project aims at using the combined current CMB observations with better and coherent modelling of astrophysics signals and systematics to constrain the neutrino mass and extensions of the standard  $\Lambda$ CDM model.

The post is available for a fixed-term duration of 24 months. The expected start is in spring 2023 at the earliest and no later than December 2023. Candidates must hold a PhD in Physics or Astronomy by the date of the appointment.

## **Project description:**

The post holder will work with Etienne Pointecouteau to revisit the state-of-the-art gas model in massive halos to provide a comprehensive description of the baryon properties in large-scale structures. These new constraints will be used within the BATMAN team to build up coherent models for probes such as tSZ and kSZ power spectra, SZ cluster number counts and kSZ pairwise velocities, and to investigate the hypothesis of neutrinos at the scale of galaxy clusters.

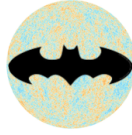
The successful candidate will work on the reconstruction of the gas properties of large cluster samples from millimetre SZ data sets (Planck, ACT and SPT). The applicant will be in charge of optimising existing SZ signal reconstruction methods and developing new approaches to the extraction of key physical information (such as the gas pressure) over the largest possible scales. The candidate will be integrated to international scientific collaborations (of relevance to the project) such as CHEX-MATE.

## **Skills:**

We especially encourage applicants with expertise on the physics of groups and clusters of galaxies, in the formation and evolution of large-scale structures and observational cosmology. We seek applicants with skills in millimetre SZ observations, signal processing and/or machine learning techniques. Added experience in X-rays, gravitational lensing or multi-wavelength probe of massive halos will be considered.

The postdoc will collaborate with the respective research teams, local and remote, participate in the work of specific Working Groups and attend regular teleconferences, when the postdoc will periodically discuss work progress. The candidate will contribute to publications and scientific presentations, and to be able to provide new ideas for the research project.

The candidate should be able to communicate in English, both spoken and written.



### **Work Context:**

The postdoc will be integrated within the research team of the Institut de Recherche en Astrophysique et Planétologie which is located in Toulouse University (Toulouse, France). The project contains three nodes: one for the study of secondary anisotropies, mainly reionisation epoch, and their impact on cosmological constraints (IAS, Orsay), one for the study of gas physics involved in CMB analyses (IRAP, Toulouse), one of the building of coherent likelihood of combined CMB observations and modelling of extension of LCDM (IJCLab, Orsay-Paris).

The position will thus involve team work and close collaboration with the partner teams.

Included benefits: health insurance, holidays, retirement scheme.

### **Application:**

**Deadline for application:** 15 december 2022

The application should include a cover letter, a research statement, a CV, a list of selected publications (max 10) in a single file in PDF format to be sent, by email only to [batman-anr-admin@ias.u-psud.fr](mailto:batman-anr-admin@ias.u-psud.fr), stating in the subject: **PostDoc-Gas**

**2 Letters of Reference should be sent** at the same email address.

We seek a diverse pool of applicants and we will consider all applications on equal basis.

Candidates can contact the BATMAN team at [batman-anr-admin.ias@universite-paris-saclay.fr](mailto:batman-anr-admin.ias@universite-paris-saclay.fr) and browse the BATMAN website: <https://batman-anr.ias.universite-paris-saclay.fr/>