

## JOB ANNOUNCEMENT DD 113/2023

The Istituto Nazionale di Astrofisica – Osservatorio Astrofisico di Arcetri (INAF-OAA) is offering a one-year position on the *role of UV irradiation induced by cosmic rays* within the framework of the project Theory Grants INAF 2023 entitled "Multiwavelength signatures of Cosmic rays in star-forming Regions (MERCATOR)".

Deadline for the applications: **30/01/2024 - 23:59 CET**

Gross yearly salary is 28 k€, corresponding to a net of ~ 2000 €/month after taxes.

Scientific supervisor and contact point: Dr. Marco Padovani ([marco.padovani@inaf.it](mailto:marco.padovani@inaf.it))

### RESEARCH PROJECT

The desorption of complex molecules from dust grains in a molecular cloud is dominated by the UV fluorescence of molecular hydrogen excited by cosmic rays. This phenomenon, called photodesorption, has been studied by laboratory experiments, while theoretical studies only provide qualitative estimates. The candidate will have to develop a theoretical model for calculating the UV spectrum of molecular hydrogen collisionally excited by the primary and secondary electron components of cosmic rays, both Galactic and locally accelerated in star-forming regions (shocks in protostellar jets, accretion shocks on the protostar, magnetic reconnection events in the star-disc region). UV spectra will be used to build a database of photodesorption rates for astrochemical codes. In addition, the flux of UV photons will be compared with the thermal flux generated in shocks as a function of distance from the shock.

### ELIGIBILITY

The appointment is expected to begin by March 30<sup>th</sup>, 2024 and will be for one year in the first instance, and renewable afterwards, subject to funding availability and performance review.

### REQUIREMENTS

- PhD diploma in Astronomy, Physics, Mathematics, Engineering, Chemistry, Informatics or equivalent qualification (**case A**);

or

- Master degree plus three years of documented research activity in Astronomy, Physics, Mathematics, Engineering, Chemistry, Informatics or equivalent qualification (**case B**);

awarded by public or private Universities, Institutions, Research Organisations or Centres or other qualified research bodies, both in Italy and abroad, in the topics relevant to the scientific area and the research object of this call.

### PREFERENTIAL QUALIFICATIONS:

- knowledge of the physics of the interstellar medium;
- knowledge of the role of cosmic rays in Galactic star formation;
- astrochemistry;

- excellent skills in programming (at least Python and Fortran90).

## **APPLICATION PROCEDURE**

Applications must be sent before the deadline via e-mail to: [inafoarcetri@pcert.postecert.it](mailto:inafoarcetri@pcert.postecert.it)  
In the email subject the applicant should make explicit reference to: **“Bando Theory Grants MERCATOR - Domanda per Assegno DD n. 113/2023”**.

The application must include:

- the Application Form (Annex A) **dated and signed**;
- the self-certification Form (Annex B) **dated and signed**;
- a copy of a valid passport or ID;
- the curriculum vitae **dated and signed**;
- the list of research publications **dated and signed**;
- a research statement, max. 2 pages, **dated and signed**;
- a copy of the degree certificate. In case of degrees awarded by a non-Italian institution, please include a copy of the certificate of your highest degree (PhD in case A, or Master degree in case B), and associated transcriptions of exams done (in case B);
- in case the candidate has not the PhD, she/he is invited to clearly describe the three years of research activity as indicated in the requirements;
- any other document, work, or publication the candidate considers useful to qualify her or his scientific curriculum;
- a list of all the submitted documents.

## **REFERENCE LETTERS**

Two reference letters in PDF format must be sent by the referees (selected by the candidate) before the deadline to [inafoarcetri@pcert.postecert.it](mailto:inafoarcetri@pcert.postecert.it)

The subject field needs to include the string “DD n.113/2023” and the full name of the applicant.

Incomplete or unsigned applications will be rejected. INAF is an equal opportunity employer and all minorities are encouraged to apply.