

## Job offers in the BRAIN PORTAL project



The project **PORTAL (PhOtotrophy on Rocky habiTABLE pPlanets)** funded by the [BRAIN-BE 2.0](#) Research Programme of the [Belgian Science Policy Office](#). PORTAL is a multidisciplinary project led by the University of Liège (P Cardol, M Gillon, E Javaux, Y Lara; coordinator: [Prof. E. Javaux](#)) and the Royal Observatory of Belgium (V Dehant, T Van Hoolst), and done in collaboration with scientists from the University of Bordeaux (F Selsis), the Observatory of Geneva (M Turbet), and the Freie Universität Berlin (L Noack). Its central objectives are to assess the physical and radiative conditions existing at the surface of the potentially habitable exoplanets in orbit around the nearby very-low-mass star TRAPPIST-1, to investigate the possibilities of various types of phototrophy in these conditions and their potential atmospheric signatures, based on microbial strategies developed on the Early Earth and in present extreme habitats.

Several postdoctoral and doctoral positions are available, positions will remain open until filled. Postdoc salary or fellowship, and PhD scholarship are competitive and allow comfortable living in Belgium. Travel grants (conferences, on site missions) and equipment (laptop or desktop computer) will be available for the applicants. Appointments for postdocs are for 1 year each, renewable once depending on results and progress. Appointment for PhD student is 4 years, with a mid-term evaluation after 2 years.

### **Postdoctoral position 1: TRAPPIST-1 planetary system**

The [Astrobiology Research Unit](#) of the University of Liège, Belgium, invites applications for a postdoctoral fellowship in observational astronomy applied to the study of exoplanets. The successful applicant will work on the project [PORTAL](#). The selected applicant will work on the astronomical part of the project, focusing on the study of the TRAPPIST-1 planetary system. During the first part of this 2 years position, (s)he will use archival and new spectroscopic data combined to stellar atmosphere models to reconstruct the full Spectral Energy Distribution of the star, and to study its variability. Special focus will be brought on the biologically-relevant 100-400nm (UV-ABC) range. This first part of the postdoctoral fellowship should result in an improved understanding of the physical and magnetospheric structure of the star and of the electromagnetic environment of its planets. The second part of the postdoctoral fellowship will be devoted to the analysis of eclipse spectroscopic data acquired by the James Webb Space Telescope for TRAPPIST-1 planets, with a special focus brought on the modeling of the heterogeneous stellar photosphere and of its possible contamination of the transit transmission spectra. The goal of this second part is to contribute to the detecting or

discarding of compact secondary atmospheres around the planets, and, eventually, to constrain the physical and radiative conditions at their surfaces.

This postdoctoral fellowship will be done under the supervision of [Michaël Gillon](#) (FNRS/Liège), in interaction with the PORTAL science network, and in collaboration with members of the [TRAPPIST-1 JWST Community Initiative](#).

**Profile/skills of the candidate:** The applicants should have a PhD in astronomy or in astrophysics, or equivalent. Previous experiences with the study of transiting exoplanets, stellar spectroscopy, and the analysis of space-based observations are highly desirable. (S)he should have the ability to collaborate with members of an interdisciplinary team, and should have good communication skills in oral and written English. The contract is for one year, renewable for one year depending on mutual satisfaction. The candidate should not have worked or lived in Belgium for more than 12 months during the last 3 years before the start of the contract.

Applications should consist of a cover letter, a CV, a list of publications, and two letters of recommendation. They should be sent to [Michael.gillon@uliege.be](mailto:Michael.gillon@uliege.be). Deadline for applications: July 1st, 2021. Preferred starting date: Sep 1st, 2021.

### **Postdoctoral position 2: theoretical planetary sciences applied to terrestrial exoplanets**

The Royal Observatory of Belgium invites applications for a postdoctoral researcher in theoretical planetary sciences applied to terrestrial exoplanets. The selected applicant will work on the geophysical part of the project PORTAL, focusing on the study of the TRAPPIST-1 planetary system. (S)He will explore tides and tidal dissipation in the TRAPPIST-1 planets with state-of-the-art models developed for tidal calculations in Solar System bodies to determine the angular and radial distribution of tidal heating. The candidate will study the effect of tidal heating on convection in the mantle and on outgassing from the mantle to the atmosphere. This part will contribute to a better understanding of the efficiency of atmospheric build-up from outgassing on TRAPPIST-1 exoplanets. The candidate will also assess the possibility of dynamo action in these exoplanets. The research will be performed in close collaboration with the Freie Universität Berlin (FUB).

This postdoctoral researcher will work at the Royal Observatory of Belgium under the supervision of V Dehant and T Van Hoolst, in interaction with the PORTAL science network.

**Profile/skills of the candidate:** Applicants should have a PhD (or equivalent) in Science or Engineering. Previous experience in astronomy, planetary sciences, geophysics, and computational fluid dynamics is highly desirable. (S)he should have the ability to collaborate with members of an interdisciplinary team, and should have good communication skills in oral and written English. The contract is for one year, renewable for one year depending on mutual satisfaction.

Applicants should send their CV with a motivation letter and names and coordinates of two referees before 1 May 2021 to Véronique Dehant and Tim Van Hoolst, ([Veronique.dehant@oma.be](mailto:Veronique.dehant@oma.be), [tim.vanhoolst@oma.be](mailto:tim.vanhoolst@oma.be)).

### **PhD position: the limits of photosynthesis in the infra- red range**

In the frame of the project PORTAL (Phototrophy on rocky habitable planets), funded by the Belgian Federal Science Policy Office (BRAIN 2.0) (2021-2025), a 4 years scholarship is offered, starting ideally on 01/04/2021.

The PhD candidate will study specifically the limits of photosynthesis in the infra-red range and the mechanisms underlying availability of the essential components for phototrophic life (light, water, carbon, nitrogen), in some extremophiles photosynthetic bacteria and in complex eukaryotic algae. She/He will study how these microorganisms can use light to sustain a biosphere and develop strategies for surviving radiations on the UV-unprotected early Earth to extreme habitats on modern Earth, as well as on rocky exoplanets around the red dwarf star TRAPPIST-1.

This doctoral scholarship will be done under the supervision of Pierre Cardol (FNRS/Liège) in the Botany Institute, University of Liège, Belgium (UR INBIOS, Genetics and physiology of microorganisms, <http://labos.ulg.ac.be/genetique-physiologie-microalgues>) and Emmanuelle Javaux, Yannick Lara (UR Astrobiology, Early Life Traces & Evolution-Astrobiology Laboratory, [www.earlylife.uliege.be](http://www.earlylife.uliege.be)), in interaction with the PORTAL science network.

**Profile/skills of the candidate:** Applicants should have a Master degree in Biological Science (or equivalent). Previous experience in biophysical or biochemical analysis of photosynthesis is highly desirable. (S)he should have the ability to collaborate with members of an interdisciplinary team, and should have good communication skills in oral and written English. The scholarship contract is for four years.

Applicants should send their CV with a motivation letter and names and coordinates of two referees before 1 April 2021 to Pierre Cardol ([pierre.cardol@uliege.be](mailto:pierre.cardol@uliege.be)).

