



## JOB OFFER

### **Phenomenologist or data analyst experienced in tests of fundamental physics with high precision sensors for a five-year position at the Royal Observatory of Belgium**

The Operational Directorate “Reference Systems and Planetology” of the Royal Observatory of Belgium (ROB), and more specifically its section “Time & Ionosphere”, is looking for an experienced phenomenologist, theorist or data analyst with a strong expertise in test of fundamental physics with precision sensors.

This scientific team maintains a time and frequency laboratory with atomic clocks that contribute to the international reference UTC (Coordinated Universal Time). They furthermore generate a precise realisation of UTC, namely UTC(ORB), available for Belgian users. The Time & Ionosphere section also carries out cutting edge researches in remote atomic clock comparisons, ionosphere/plasmasphere physics, and electromagnetic signal perturbations, using Global Navigation Satellites Systems (GPS, Galileo...). Besides its current activities in applied research, the Time & Ionosphere section is going to develop links with fundamental physics research by exploiting the excellent precision and stability of atomic clocks, both on the ground and onboard GNSS satellites, as well as time and frequency transfer capabilities. The candidate must be able to develop and contribute substantially to this new field of research.

It is often claimed that General Relativity (GR) and the Standard Model (SM) are effective low-energy approximations of a more fundamental theory that remains to be discovered. Most attempts towards such a unified theory lead to tiny violations of the basic principles of GR and/or the SM, in particular the Einstein Equivalence Principle. Our goal is therefore to develop projects of tracking experimental signatures of such modifications by making use of the outstanding performance provided by modern tools of the time/frequency metrology.

The selected candidate should possess skills in phenomenological approaches. The first task consists in modelling the impact of any deviation from the SM or GR on atomic clocks, GNSS signals propagation, reference systems, time and frequency transfer based on electromagnetic links. It will imply to define observables to test fundamental physics. These observables will be defined for the purpose of proceeding to data mining or dedicated observation campaigns, in relation with time and frequency activities of the ROB. The second task consists in valorising international data banks in which the ROB is taking part by carrying out exhaustive data analysis of time series in order to extract the signature of any deviation from the SM or GR.



This position offers a contract of undetermined duration (salary level SW2) with a seed budget that will cover approximately 5 years of salary. To extend the position, the applicant will have to ensure his/her own funding through the introduction of research project proposals at Belgian or international levels.

The candidate must have a PhD in physics or equivalent. Applications that include one or more of the following characteristics/qualities will be ranked as a priority:

- Strong research background in test of fundamental physics, in either modelling or data analysis
- Skills in statistics, data analysis and numerical computation.
- A good knowledge of time and frequency metrology and/or GNSS data analysis is an asset.
- Proficiency in written and spoken English. Knowledge of French, Dutch or German is an added value.

The candidate is expected to be part of the Time & Ionosphere team of the ROB, to be able to work autonomously and to lead research projects, as well as to participate to some operational activities. Strong communication skills and an open-minded personality are also expected.

### **How to apply:**

- The candidate needs to send a cv and a motivation letter to [pascale.defraigne@oma.be](mailto:pascale.defraigne@oma.be) at the latest on September 30, 2021.
- The candidate needs to demonstrate past activity in the desired fields.
- The candidate needs to present a plan of action on how to fulfil this five-year position (max. 5 pages).
- The candidate must provide two recommendation letters.