

## PROPOSITION DE POST-DOCTORAT

**Intitulé : Software development for scientific instruments on CROCUS CubeSat mission**

Référence : **PDOC-DPHY-2024-04**  
(à rappeler dans toute correspondance)

**Début du contrat : January 2025**

**Date limite de candidature : August 31st, 2024**

**Durée : 12 months, possibly extendable up to 24 months - Gross salary: about 38 k€ (medical insurance included)**

### Mots clés

Nanosatellite, Embedded system, Instrumentation, Electrostatic charging, Discharges

### Profil et compétences recherchées

PhD in Electrical Engineering, Computer Science, or Physics.  
Experience in embedded systems or CubeSat.

### Présentation du projet post-doctoral, contexte et objectif

The ChaRging On CubeSat (CROCUS) mission aims at generating low-Earth orbit flight data to improve our understanding of the physics of 1-100 keV electrons from the plasma sheet and inner magnetosphere, and their precipitation into the ionosphere. It will be necessary to identify the origins and drivers of a sudden increase in electron flux, including the parameters of solar activity, solar wind and geomagnetic activity. The scientific objective of CROCUS is to complement the data set already available from a number of successful missions (e.g. THEMIS, Van Allen Probes, Jason-3, MMS, NOAA/LANL/other geosynchronous satellites, DMSP, NOAA-POES, ...). The technological objective of CROCUS is to demonstrate our ability to provide useful data with a CubeSat in low-Earth orbit. This will pave the way for the integration of space weather nanosatellites offering short-term spatial and temporal resolution into future constellations.

CROCUS strategy is to measure precipitation indirectly, by detecting its effects on spacecraft. Space weather conditions can generate significant electrostatic charges. Eventually, the deposited charges can produce parasitic electrostatic discharges (ESD). The payload developed at ONERA is dedicated to measuring charge levels leading to ESD, characterizing ESD and ultimately preventing it. CROCUS will thus provide valuable data for a global end-to-end approach, from in-flight and ground-based observations of magnetospheric conditions to space weather forecasts and the assessment of its effects on spacecraft and instruments.

The aim of this post-doctorate position is to develop, adapt and integrate the digital tools needed for scientific operations, and to validate them during ground test campaigns. The activities will focus on payload and satellite on-board computer. Experimental results obtained in vacuum plasma chamber will be analyzed and prepared for publication in an international journal.

Depending on the results obtained, an extension of the post-doctorate period will be envisaged, in particular to support in-flight acceptance activities after injection of the satellite into its orbit, and the restitution and analysis of scientific data.

### Collaborations extérieures

Centre Spatial de l'Ecole Polytechnique ; LATMOS.

### Laboratoire d'accueil à l'ONERA

Département : Physique, instrumentation, environnement, espace

Lieu (centre ONERA) : Chatillon

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