

# IGOSat Project

Internship Proposal - Spring 2020

## Development of the Scintillator Payload for the IGOSat mission: operations preparation and development of the flight software

**Skills, Keywords** : Scientific instrumentation, digital and analog electronics, aerospace engineering, data processing, functional tests, scintillator, embedded software, c language, critical software development, ARM micro controller, fundamental algorithmic.

**Desired level** : 4th year, master degree **Duration** : 4 to 6 months **Stipend** : > 500 € / moth

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### Project Description :

The Laboratory of Excellence (LabEx) UnivEarthS, set up by laboratories AIM (Astrophysique et Interactions Multi-Echelles), APC (AstroParticule et Cosmologie) and IGGP (Institut de Physique du Globe de Paris) from Paris Diderot University, is carrying carrying transverse projects between those 3 laboratories.

Using the strong involvement of those laboratories in numerous space experiments and instrumentation, an educational nanosatellite project has begun in 2013, with the financial and technical support from CNES (Centre National d'Etudes Spatiales) and the Space Campus of Paris Diderot University.

More specifically, the project is to develop a scientific 3U CubeSat, and launch it in 2021. The satellite will carry 2 payloads, one to study the Ionosphere and one to study the radiation belt.

### Internship Description :

The purpose of the internship is to iterate the flight software design of a scintillator payload that will fly within a 3 units CubeSat. The student will study data transmission chain, from the detector, through the onboard data processing, to the ground station. The quality of the scientific data will be investigated too. As every space project related work, some documentation will have to be produced, and review in front of experts from the French Space Agency (CNES) will have to be performed.

This payload includes 2 scintillators, sensitive to different particles, operated through its own board designed by the IGOSat team. The aim of this internship is to continue and finish the embedded software. To do so, the student will use a dedicated toolchain (working under Linux environment). This payload is based on an Application-Specific Integrated Circuit. In this way, the student must be familiar with numerical electronics and micro controllers. Also, acquired data must be treated onboard then the software should carry a data processing functionality with regard to the requirements.

Moreover, a test bench is already in place, currently being integrated in a « flat-satellite ». The student will have to go one step further and work on the integration to the Engineering Model of the satellite (basically the flat-satellite integrated in a « flight-model » shape, with relevant functions and performance).

Within a team of students, engineers and scientists, the student need to be able to work autonomously as well as part of a team, have a sense of rigor especially in writing presentation, and already a global vision of information transmission.

This internship is a good opportunity to address numerous points of space engineering and scientific instrumentation.

**Website:** <http://www.igosat.fr>