

## Training Opportunity for Belgian Trainees

Reference	Title	Duty Station
BE-2019-SCI-FIV(2)	Detection Chain Simulation	ESTEC
<p><b>Overview of the unit's mission:</b></p> <p>The Future Missions Department (SCI-F) is in charge of mission preparation activities (system definition studies Phases 0/A/B1 and technology developments) and of small missions implementation in the Science Directorate (D/SCI). The Payload Validation Section (SCI-FIV) in the Future Missions Department is in charge of specific mission oriented validation activities, for science missions, aiming at reducing development risks in the implementation phase. The section also provides general support to the Directorate's other Departments for specific validation activities, for missions under development or during operations (see <a href="http://sci.esa.int/sci-fv/57057-payload-technology-validation/">http://sci.esa.int/sci-fv/57057-payload-technology-validation/</a> ).</p> <p>One of the main activities of the section is to validate payload instrument detector and detector readout electronic performances.</p> <p><b>Overview of the field of activity proposed:</b></p> <p>The validation activities are currently focused on detectors and electronics, typically for astronomy mission payloads. The support provided by SCI-FIV occurs at different phases of an ESA science mission:</p> <ul style="list-style-type: none"> <li>• During the early precursor technology development (e.g. European Near-Infrared detection systems)</li> <li>• In the assessment/definition phase (e.g., ARIEL)</li> <li>• In the project implementation phase (e.g. Euclid and CHEOPS)</li> <li>• In the mission operations phase (e.g. GAIA)</li> </ul> <p>Each validation activity encompasses the following tasks:</p> <ul style="list-style-type: none"> <li>• Definition of activity: interaction with the stakeholders (e.g. study, project or operations team, or payload consortium, instrument developers scientist) for requirements specification, test plan definition and implementation schedule</li> <li>• Design of the validation setup (generally by tailoring existing set-ups to the need)</li> <li>• Commissioning and characterization of the test set-up</li> <li>• Execution of the tests according to the test plan</li> <li>• Data analysis in collaboration with other sections and reporting</li> </ul> <p>In this context and to support payload definition and validation activities SCI-FIV has developed a new software tool called Pyxel. Pyxel is a novel and multi-purpose Python framework for imaging detector simulation. It is designed to host and combine models, codes simulating instrument effects such as optical diffraction, charge deposition by cosmic rays, charge diffusion, detector Point Spread Function, readout noise sources, Charge Transfer Inefficiency or persistence on images produced by CCD or CMOS-based imaging detectors.</p> <p>Pyxel is now in beta testing and is being used and developed within and outside ESA (see <a href="http://sci.esa.int/future-missions-department/60390-pyxel-a-software-framework-for-imaging-detector-simulation/">http://sci.esa.int/future-missions-department/60390-pyxel-a-software-framework-for-imaging-detector-simulation/</a>)</p> <p>The role of the trainee will be to:</p> <ul style="list-style-type: none"> <li>• Develop further and maintain the Pyxel framework</li> <li>• Add additional existing detectors models to the framework</li> <li>• Contribute to the management and development of the Pyxel user community/collaboration (gitlab issue management, workshop organization, documentation, user need survey, tutorials)</li> </ul> <p><b>Required education:</b></p> <p>Master Degree in Physics (optics and semiconductor) with experience in Python programming or equivalently Master Degree in Computer Programming with experience in developing software for experimental physics application. Knowledge of Gitlab, Jupyter notebook, and experience in open source software contribution are considered an advantage.</p>		