

## Training Opportunity for Belgian Trainees

| Reference  | Title  | Duty Station |
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| BE-2017-SCI-FV(2)  | Investigation of Near-Infrared Avalanche Photo-diode Detectors for Future Science Missions | ESTEC        |
| <p><b>Overview of the unit's mission:</b><br/>           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 Technology Validation Section (SCI-FV) 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> ).<br/>           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><br/>           The technology validation activities are currently focused on detectors and electronics, typically for astronomy mission payloads. The support provided by SCI-FV 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. PLATO, SMILE)</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 technology validation activity encompasses the following tasks:</p> <ul style="list-style-type: none"> <li>• Definition of activity: interaction with the customer (e.g. study, project or operations team, or 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>NIR APDs (Near-Infrared Avalanche Photo-diode) sensors offer the unique capability to overcome the readout noise barrier imposed by CMOS readout electronics and deliver sub-electron readout noise performance. This potentially offers a whole new area for applications in the NIR and may enable future science missions. The Agency intends to obtain hands-on experience with these devices in order to evaluate their possibility of use in future missions, to investigate required areas of technology development, and increase their technology readiness level.</p> <p>The role of the trainee would be to participate in the evaluation of the NIR APDs for future science missions, supported by the experts within the section.</p> <p>In support of this goal the main tasks (list not exhaustive) for the trainee would be:</p> <ul style="list-style-type: none"> <li>• Conduct literature review and technology study</li> <li>• Definition of NIR APD evaluation approach</li> <li>• Test bench requirement specification</li> <li>• Test bench design, monitoring of the manufacture and purchase of required equipment</li> <li>• Test bench commissioning</li> <li>• Performance of measurements</li> <li>• Model development and validation through comparison of simulations with test data.</li> <li>• Data analysis and report writing</li> <li>• Participation in meetings, reviews, working groups</li> </ul> |  |              |
| <p><b>Required education:</b><br/>           Master's Degree or equivalent in optoelectronics, optics and or solid-state/semiconductor physics, hands-on experience with detector characterization is considered a plus.</p>   |  |              |