

## Training Opportunity for Luxembourgish Trainees

Reference	Title	Duty Station
LU-2022-TEC-EFP	<b>Advanced Radio Frequency Payloads and On-board signal processing</b>	ESTEC
<p><b><u>Overview of the mission</u></b></p> <p>The Radio Frequency Payloads &amp; Technology Division is responsible for RF payloads, instruments and technologies for space and ground applications, including all equipment having a Radio Frequency space/ground interface and its associated Laboratories. The division supports the definition, specification and development/ procurement of laboratories either for ESA projects and technology programmes or external customers.</p> <p>Within the Division, the RF Payload Engineering and Digital equipment Section responsibilities encompasses payloads and instruments with Radio Frequency interface for telecommunication, remote sensing and navigation exploiting different technologies (e.g. analogue, digital, optical) including design and performance analysis tools and testing and digital functions. Additionally, the section covers the research, design, development and testing of Radio Frequency Digital equipment for telecommunication/navigation payloads and RF/microwave and millimetre wave remote sensing instruments, as well as Payload Signal and Data Processing techniques.</p>		
<p><b><u>Overview of the field of activity proposed</u></b></p> <p>You will have the opportunity to contribute in one of the following disciplines, depending on your background and interests:</p> <ul style="list-style-type: none"> <li>• <u>Advanced Remote Sensing Instruments</u>: Design, modelling, analysis and performance assessment of future earth observation remote sensing instruments. These instruments include wide-swath Synthetic Aperture Radars, wide-swath Radar Altimeters and/or Scatterometers. You will assess novel instrument architectures and establish performance trade-offs.</li> <li>• <u>On-board digital signal and data processing techniques for RF payloads and microwave instruments</u>: This trainee opportunity will focus on the evaluation and implementation of novel and efficient on-board signal processing functions for future RF payloads and instruments such as digital beamforming, filtering, signal generation, as well as on-board data processing and others. You will assess novel signal and data processing techniques, carry out hands-on work in the lab and prototype novel digital beamforming functions and evaluate performance on representative HW.</li> <li>• <u>Flexible Telecommunication Payloads</u>: Design, modelling, analysis and performance assessment of future flexible telecommunication payloads. Future telecommunication payloads will need to generate hundreds to thousands of beams in the field of view with capability to reconfigure in a flexible manner, the power, bandwidth and coverage in order to cope with the traffic needs. You will assess the performance of novel payload architectures and perform trade-offs among the most suitable architectures.</li> <li>• <u>Machine Learning techniques for RF Payloads and Instruments</u>: Evaluation of Machine learning techniques for future RF payloads and instruments. Possible applications include data compression, cognitive radars, radio frequency interference identification, data compression, and others. You will study Machine Learning techniques and devices for one or more applications relevant to RF payloads and microwave instruments. Besides the study, you will target the implementation of a use-case based on a relevant dataset.</li> <li>• <u>Evaluation of RF System-on-Chip (RFSoc) and RF Transceivers</u>: Key enablers for future</li> </ul>		

Software Defined Radio/Radar (SDR) applications are FPGAs with integrated processors and RF analogue blocks, as well as RF transceiver integrated circuits, embedding in the same package the RF front-end functions and the conversion between analogue and digital domains, also known as "Agile Transceivers". Your contribution will be in the evaluation of these devices taking into account different applications, such as Earth Observation instruments. You will integrate them in typical signal processing architectures & chains, and evaluate their performance in our laboratory and under radiation.

**Required background**

- Master's degree in Telecommunications/Electronic/Microwave Engineering
- Technical knowledge in Radio Frequency payloads and instruments, Analog and digital signal processing and/or radio frequency and digital sub-systems
- Good interpersonal and communication skills
- Ability to work in a multi-cultural environment, both independently and as part of a team
- Fluency in English and/or French, the working languages of the Agency