

## Training Opportunity for Luxembourgish Trainees

Reference	Title	Duty Station
LU-2019-TEC-EFA	RF measurements of Marine Litter	ESTEC
<p><b>Overview of the unit's mission:</b></p> <p>The Radio Frequency Payloads &amp; Technology Division (TEC-EF) 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 TEC-EF Division, the domains covered by the Antenna and (Sub)-Millimetre Wave Section include stand-alone radiators, reflector antennas and array (active or passive) antennas. The section addresses system aspects as well as interference effects between antennas and the spacecraft structure, covering the range from a few MHz up to 1 THz of the frequency spectrum. The section also manages the Antenna Laboratory which comprises of four state-of-the-art antenna testing and material characterization facilities that provide testing capabilities between a few hundred MHz up to 750 GHz, test specimen sizes up to 6 meter and 5000 Kg mass.</p> <p>The present training opportunity is focused on research on the spectral signatures of marine litter in the microwave and mm wave frequency bands, in particular, but not limited to, plastic litter.</p>		
<p><b>Overview of the field of activity proposed:</b></p> <p>Marine debris, also known as marine litter, is human-created <u>waste</u> that has deliberately or accidentally been released in a <u>lake</u>, <u>sea</u>, <u>ocean</u>, or <u>waterway</u>. With the increasing use of <u>plastic</u>, human influence has become an issue as many types of plastics do not <u>biodegrade</u>. Waterborne plastic poses a serious threat to <u>fish</u>, <u>seabirds</u>, <u>marine reptiles</u>, and <u>marine mammals</u>, as well as to boats and coasts. Dumping, container spillages, litter washed into storm drains and waterways and wind-blown landfill waste all contribute to this problem [1].</p> <p>Several institutions worldwide, including ESA, are actively engaged in the study of detection and monitoring of marine litter using data from existing space assets, in particular missions with SAR payloads. These include SAR data from Sentinel-1, Sentinel-2, COSMO-SkyMed, TerraSAR-X, between others [2], which provide data in C-band and X-band.</p> <p>The field of this research is to carry out experimental research in controlled conditions that allow contributing to the knowledge of the response of the most common plastics pollutants - polyethylene (PE) and polyethylene terephthalate (PET) - to passive and active micro and millimeter waves in the frequency range between 400 MHz and 1 THz using the available RF and antenna equipment in ESA's Antenna Laboratory in this wide frequency range. The aim is to establish the frequency ranges that could be used in future payloads for the detection and monitoring of plastic litter in the oceans, seas and rivers.</p> <p>[1] – <a href="https://en.wikipedia.org/wiki/Marine_debris">https://en.wikipedia.org/wiki/Marine_debris</a></p> <p>[2] - Davaasuren, Narangerel; Marino, Armando; Ackermann, Nicolas; Alparone, Matteo; Nunziata, Ferdinando and Boardman, Carl (2018). <i>Detecting microplastics pollution in world oceans using SAR remote sensing</i>. In: <i>IGARSS 2018: IEEE International Geoscience and Remote Sensing Symposium, 22-27 Jul 2018, Valencia, Spain</i>.</p>		
<p><b>Required education:</b></p> <p>Applicants should have a MSc degree in Radio Frequency/ Electrical Engineering. Applicants should have good analytical and communication skills and should be able to work in a multi-cultural environment in an autonomous manner.</p>		