

## Training Opportunity for Portuguese Trainees

Reference	Title	Duty Station
PT-2019-TEC-EFE(2)	Advanced materials for high performance RF hardware	ESTEC

### **Overview of the Unit missions:**

The RF Payloads & Technology Division is responsible for RF payloads, instruments and technologies for space and ground applications, including all equipment having a RF 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.

Within the Division, the RF Equipment and Technology Section provides functional support to ESA projects and carries out technological research (R&D) in the fields of RF equipment and building blocks, active and passive components, technologies and related design and characterisation tools.

### **Overview of the field of activity proposed:**

High power channel filters are key elements at the payload output to combine signals previously amplified, divide the signal coming from a HPA to several beams or simply eliminate unwanted signals. Losses due to the finite conductivity of the employed material contribute to increase the temperature in the structure.

Thermal issues often dictate the mass and complexity of the design due to the characteristic of the available materials. Classical materials predominantly used are Aluminum and INVAR.

Invar has a low thermal expansion coefficient however, presents very high density and low thermal conductivity leading to bulky and high mass per channel.

Aluminum has a lower density than INVAR but presenting a very high thermal expansion coefficient needing, for high power levels temperature compensation mechanisms to achieve the needed frequency stability. This complex mechanisms introduce an added risk that is preventing the commercial widespread of this solution.

Novel materials could overcome current limitations and eliminate the need for any complex temperature compensation mechanism.

In this study, design and techniques for self-compensated high power channel filters based on advances material such as metal alloys, polymers or ceramics will be studied.

### **Required Education:**

Applicants should have just completed a University course at Masters Level (or equivalent) in an Engineering or scientific field, with emphasis on electromagnetics or physics.

Good skills with simulations tools (MATLAB, CST, HFSS, FEST) will be highly beneficial.

Applicants should have good interpersonal and communication skills and should be able to work in a multi-cultural environment, both independently and as part of a team.

Applicants must be fluent in English and/or French, the working languages of the Agency. A good proficiency in English is required.