



ERASMUS MUNDUS



MASTER in PHOTONICS EUROPHOTONICS-POESII

MASTER THESIS PROPOSAL

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Laboratory: TSC, Universitat Politècnica de Catalunya, Campus Nord
City: Barcelona
Country: Spain

Title of the master thesis: Photonic Correlation Radiometers

Name of the tutor of the master thesis: María C. Santos

Email address: santos@tsc.upc.edu

Phone number: 34-934017226

Mail address: Jordi Girona 1, UPC-Nord-D3-118.

Summary of the subject (maximum 1 page):

Correlation radiometers in the microwave and millimeter wave range constitute a useful tool in Earth Observation Science targeting climate change, environmental effects monitoring, and natural hazards assessment. They also play a key role in radiotelescopes aiming at determining the age and composition of the Universe by measurement of the Cosmic Microwave Background, and find application in security screening and substances detection.

They consist on an array of receivers whose output signals are correlated in pairs and then Fourier transformed to form brightness temperature maps which are related to the properties of the observed scene. In order to gain quality and accuracy, a large number of receivers in the array are required increasing the system's complexity and cost.

In that regard, photonic technologies are expected to have a key impact by allowing both the correlation and the Fourier transformation to take place in the optical domain, which by way of lenses and CCD arrays may very compactly be escalated to a high number of receivers (on the order of 1000). Technological challenges remain though, which is the reason why a number of proposals are being presently studied and pursued.

In this Master Thesis work, we aim at reviewing the field of photonic correlation radiometers, exposing benefits and challenges of present alternatives, and over that base, to work towards building a laboratory setup where simple microwave brightness temperature maps may be constructed using photonic technologies.

Keywords: radiometry, microwave photonics

