

# MASTER IN PHOTONICS – “PHOTONICS BCN” ERASMUS+ “EUROPHOTONICS”

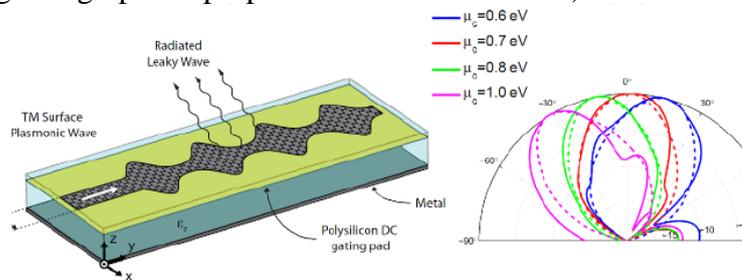
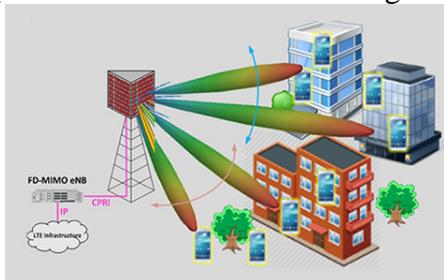
## MASTER THESIS PROPOSAL

**Dates: April - September 2019**

**Laboratory:** D4-S107, Optical Communications Laboratory  
**City, Country:** Barcelona, Spain  
**Title of the master thesis:** Photonics Integrated Circuits for beyond 5G Mobile Communications.  
**Name of the tutor of the master thesis:** José Antonio Lázaro Villa, Samael Sarmiento  
**Email address :** [jose.lazaro@tsc.upc.edu](mailto:jose.lazaro@tsc.upc.edu)  
**Phone number :** +34 934 017348  
**Mail address :** Optical Communications Group (GCO)  
 Universitat Politècnica de Catalunya (UPC)

### Summary of the subject (maximum 1 page):

Optical Fiber Communications provides an enormous transmission capacity of more than 10Tbps per single-core&mode fiber (new fibers having multiple cores multiply this capacity by e.g. x20). The challenge nowadays is: How to approach this enormous capacity to the end-users? (Informal definition of “end-users”: guys like you and me using a smart phone). This project is for analysing and making a first design of an interface (Photonic Integrated Circuit) for “connecting” optical fiber signals and smart phone antennas. Figure shows the main idea of Samsung (let’s send to each mobile a specific beam only with your data) and how graphene can be used for “radiating” (and receiving) the signal in a “tuneable way”. (Alternative solutions without getting into graphene properties are also available.)



\*: Images from: “SAMSUNG Demonstrates a Trio of 5G Technology Candidates at MWC 2015” & “Graphene-based Antennas for Terahertz Systems: A Review”, D. Correas-Serrano et al.

**Keywords:** Beamforming, Graphene, Photonic Integrated Circuits.

### Additional information:

\* Required skills: Interest on learning at interdisciplinary fields between physics, photonics and communications. Basic Comsol<sup>TM</sup> (If you do not know Comsol<sup>TM</sup>, no problem we have a nice short course. You will like it.)