



MASTER IN PHOTONICS – PHOTONICS BCN EUROPHOTONICS-POESII MASTER COURSE

PROPOSAL FOR A MASTER THESIS

Dates: April -> 6 - 8 months

Laboratory: Optical Communications Group - Institute of Communications and Navigation
Institution: German Aerospace Center (DLR)
City, Country : Oberpfaffenhofen, D-82234 Wessling

Title of the master thesis: Coherent free-space optical link terminal

Name of the master thesis supervisor: Director @ German Aerospace Center (DLR) + Jose A Lazaro (UPC)

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Summary of the subject (maximum 1 page) :

Subject: The Optical Communications Group investigates new technologies to improve performance of free-space optical links between ground stations, aircrafts, satellites, etc. Optical communications systems nowadays aim towards higher spectral efficiency, increased data rate and improved sensitivity of the receiver. Widely used on-off keying modulation, together with direct detection, offers a relatively low system implementation complexity. Coherent modulation and detection techniques have also been studied and implemented. They offer improved sensitivity, but require an optical PLL or post-processing techniques in the receiver.

In the framework of this thesis the student will have to study, simulate, implement and experimentally evaluate performance of a given PSK modulation and detection system in terms of the achievable sensitivity and BER vs. OSNR, required linewidth and optical power of the local oscillator, etc. During the thesis the student will focus on the technical challenges of the system implementation and demonstration under laboratory as well as outdoor conditions, taking into account various noise sources, HW and SW limitations, etc.

Tasks:

The subject offers several internship and Master Thesis topics like:

- Proposing an improved detection technique taking into account the system and channel model.
- Design, setup and verification of the complete optical link in the laboratory and outdoors.
- Performance analysis of individual modulation and detection techniques under given conditions.
- Derivation of an improved atmospheric channel model and its implementation into a simulation tool.

It is an excellent opportunity to work in a cutting edge topic, gain experience on real optical hardware, and improve your engineering skills.

Research center: The German Aerospace Center (DLR) is Germany's national research center for aeronautics and space and Germany's space agency. Its extensive research and development work in Aeronautics, Space, Transportation and Energy is integrated into national and international cooperative ventures. Approximately 5,500 people are employed in DLR's 28 institutes and facilities at eight locations in Germany.

Inici: To be specified (Offer valid till: 01.09.2017)

Durada: 6 - 8 months

Requisits Study of Electrical Engineering / Optics & Photonics / Physics, Matlab® programming with intermediate to high level, experience with laboratory work and interest on free-space optical communications

Compensació A compensation will be given by the company.

Keywords : Electrical Engineering / Optics & Photonics / Physics, Matlab®, Coherent Receivers