



UNIVERSITAT POLITÈCNICA  
DE CATALUNYA

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# MASTER IN PHOTONICS – PHOTONICS BCN EUROPHOTONICS-POESII MASTER COURSE

## PROPOSAL FOR A MASTER THESIS

**Dates: April - September 2017**

**Laboratory :** Remote Sensing Lab. (RSLab)

**Institution:** Universitat Politècnica de Catalunya

**City, Country :** Barcelona, Spain

**Title of the master thesis:** POLARIZATION-SENSITIVE LIDAR AT UPC

**Name of the master thesis supervisor:** Michaël Sicard

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**Summary of the subject (maximum 1 page) :** Have you ever heard of polarized sunglasses? Polarized sunglasses reduce glare reflected in a non-random polarization plane by objects/materials on the ground. In the atmosphere the same phenomenon occurs: the objects which reflect light in a non-random polarization plane are tiny particles in suspension in the atmosphere. The ability of a particle to “depolarize” randomly polarized light depends greatly on its shape (spherical particles will not depolarize light while non-spherical particles will). And this is precisely what we are studying with the RSLab 7-wavelength lidar (laser radar)! Two of these 7 wavelengths are (visible) 532 nm/unpolarised and 532 nm/perpendicularly polarized. The higher the signal of the 532 nm/perpendicularly polarized channel, the more irregular the shape of the particles, and the higher the probability to identify their type. The project consists in developing an easy-to-use algorithm to retrieve the useful depolarization ratios by combining the two aforementioned channels. The student will also be involved in the implementation of a new pair of polarization sensitive channels: (ultraviolet) 355 nm/unpolarised and 355 nm/perpendicularly polarized.

**Keywords :** lidar, atmospheric aerosols, depolarization channel, algorithm development

### **Additional information :**

\* Allowance possible according to the student’s progress and the group funding.

\* Required skills: knowledge of LabVIEW/Matlab would be highly appreciated, knowledge of optical CAD software packages (Zemax, for example) would help, but is not mandatory.