



## **Master in Photonics – “PHOTONICS BCN” Master ERASMUS Mundus “EuroPhotonics”**

### **MASTER THESIS PROPOSAL**

**Full time from April 2026** (it can start part time from February 2026)  
**Presentation date to be chosen: end of July or beginning of September 2026**

**Note:** The main Master Thesis supervisor has to be a professor of the Master in Photonics program. One co-supervisor (internal or external) can be defined. Main Supervisor is responsible for the subject of the proposal and has to give continuous support to the student (research development, Report writing and presentation preparation). For external proposals a co-supervisor from the Master program and a collaboration agreement with UPC are needed. You can find all information about the Master Thesis process in [our webpage](#).

**Laboratory:**

**Institution:** Monocrom S.L.

**City, Country:** Vilanova i la Geltrú, Spain

**Title of the master thesis:** Industrial Laser Systems

**Name and affiliation of the master thesis supervisor:** Jose Antonio Ramos de Campos

**Name and affiliation of the co-supervisor** (if any):

(for external proposals a co-supervisor chose among the Master Program professors and a collaboration agreement with UPC is needed)

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**Keywords:**

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

Since the first laser was manufactured more than 60 years ago, these devices that emit a very special light have progressively found more and more applications in medical, communications, defense, industrial, energy, etc. areas. We currently find lasers in all areas of life.

MONOCROM, specializing in the manufacture of semiconductor lasers, has been operating for over 30 years. To support the development of new laser solutions in the industrial field, MONOCROM has set up a new laboratory to validate its high-power lasers. There are two approaches: one using high-power diode lasers directly, and the other using diode-pumped solid-state lasers. In the case of the former, the main complexity lies in the optical and micro-optical systems integrated into the



modules. In contrast, in the case of the latter, the complexity lies in the optical systems external to the laser module.

Thanks to the research that can be carried out in this new laboratory, the application scope of the manufactured lasers can be better understood, and optical components and configurations for guiding laser beams can be validated. This is an eminently experimental and multidisciplinary field, combining knowledge of optics, electronics, materials, automation, software, etc., where an understanding of optical aspects is fundamental for the correct application of the "laser tool".

This research will involve both theoretical work on the knowledge of laser beam guiding and shaping techniques, supported by simulations, and experimental work on the assembly and alignment of optical systems and their use in materials processing applications for industrial applications.

## **2. Objectives (maximum 1 page):**

The main objective is to acquire knowledge of the design, construction and use of industrial laser systems.

To do this, it will also be necessary to:

- To acquire knowledge of semiconductor laser encapsulation processes for manufacturing high-power lasers.
- To learn about the lasers manufactured by MONOCROM and to be able to propose different approaches to the concepts of optical systems, depending on their use for industrial applications.
- To learn how to operate these lasers in a laboratory station for materials processing.

### **Additional information (if needed):**

\* Required skills: knowledge of optics, critical thinking, autonomy.

\* Miscellaneous: