



## **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:** ZANINI Auto Group

**Institution:**

**City, Country:** Parets del Vallès, Spain

**Title of the master thesis:** Optical designs based on lenses for uniform illuminated emblems used in the car industry

**Name and affiliation of the master thesis supervisor:** Benjamín Izquierdo

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

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

**Email address:** [bizquierdo@zanini.com](mailto:bizquierdo@zanini.com)

**Phone number:**

**Mail address:** Polígono Industrial Levante, Carrer la Marineta, 2, 08150 Parets del Vallès, Barcelona

**Keywords:** inner lens, surface texturization, optical design

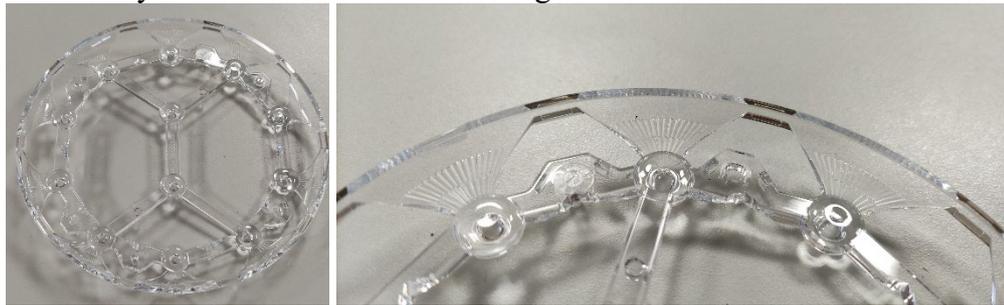
#### **1. Summary of the subject (maximum 1 page):**

Optical design and illumination are becoming one of the focal points in automotive design, as can be seen in the latest auto shows. Automakers are replacing chromed appearance in exterior trim with illumination, and this offers the opportunity of redefining the style of vehicles.



To develop cost competitive emblems, it is key minimizing PCB size and number of LEDs, as well as achieving the highest possible optical efficiency. The use of bulk diffusors has been long been used in the industry as a material suitable to provide good surface illumination. But strong diffusors decrease optical efficiency. An alternative uses lenses with specific surface geometries and textures that distribute light across the space near them. This has the advantage of delivering higher efficiency, albeit it requires some space to spread the light.

Starting with a pre-defined brand image, the work must be focused on the design and analysis of an inner lens to obtain a homogeneously illuminated brand logo with the highest possible efficiency and the smallest number of light sources and PCB size.



Example: Lens #1



Example: Lens #2

An iterative design process must be executed using a simulation software such as Light Tools, Speos, Zemax... optimization of the light source number and location, lens geometry and surface texture needs to be addressed. The LG incoupling also needs to be addressed in the design to maximize the system efficiency and light distribution across the whole system.

We need to be able to identify the impact of different design variables in the optical performance, also to understand which are the design elements that help to improve the photometric homogeneity.

## 2. Objectives (maximum 1 page):

- a. Design a lens that can be integrated in an illuminated emblem



- b. Identify the fundamental characteristics of a lens suitable to fulfil typical photometric requirements for this kind of plastic trim
- c. Understand the trade-offs between different design parameters VS photometric requirements
- d. Define and identify the number and characteristics of light sources required to fulfil photometric requirements

**Additional information (if needed):**

\* Required skills:

\* Miscellaneous: