



## **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:** Design of light guides for cost-effective and compact automotive applications

**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)

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**Keywords:** light guide (LG), efficiency, 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.



VW Atlas USA & Tavendor China (2021)

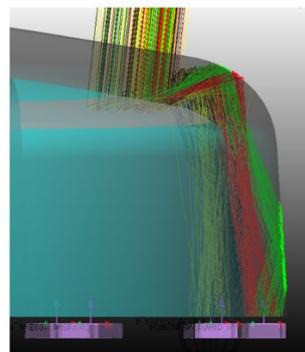


Mercedes CLA (2025)

There are many techniques that can be used to illuminate a surface, and one of them is using LG. The purpose of this proposal is designing a LG that can be integrated in a plastic trim to implement the illumination function in a cost-effective and compact manner.

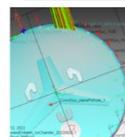
Starting with a pre-defined brand image, the work must be focused on the design and analysis of a light guide and its light source to obtain a homogeneously illuminated brand logo with the highest possible efficiency. This light band is composed of 2 materials, transparent and white, the latter useful to avoid light leakage in some specific directions.

An iterative design process must be executed using a simulation software such as Light Tools, Speos, Zemax... optimization of the light outcoupling features needs to be compatible with an injection process. The LG incoupling also needs to be addressed in the design to maximize the system efficiency and light distribution across the whole system.



Enable	Color	Power	Normalized Power	Rays	Source
<input checked="" type="checkbox"/>	Red	1.2421e-15	1.0000	72	RayDataSource_5
<input checked="" type="checkbox"/>	Black	1.2009e-15	0.96682	59	RayDataSource_4
<input checked="" type="checkbox"/>	Yellow	1.1138e-15	0.89666	68	RayDataSource_4
<input checked="" type="checkbox"/>	Green	1.0130e-15	0.81651	55	RayDataSource_5
<input checked="" type="checkbox"/>	Blue	5.2456e-16	0.52241	38	RayDataSource_4

Properties Results Beam Width Smoothing Mesh Data			
Mesh Dimensions			
X	450 bins	Average	0.024444 mm
Y	450 bins	Average	0.020000 mm
Mesh Boundaries			
<input type="radio"/> Defined by Surface <input type="radio"/> Defined by Data <input checked="" type="radio"/> User-Defined			
Min X	13.000 mm	Min Y	29.800 mm
Max X	24.000 mm	Max Y	38.800 mm



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

## 2. Objectives (maximum 1 page):

- a. Design a LG that can be integrated in an illuminated emblem
- b. Identify the fundamental characteristics of a LG 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



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**Additional information (if needed):**

\* Required skills:

\* Miscellaneous: