**Thesis title : Spectral routers for colour imaging**

**Host Laboratory : ImViA**

**Speciality : Imaging**

**Keywords : Colour imaging, spectral routers**

**PhD description :**

This research proposes to explore new generations of filters for colour and spectral imaging. Advances in photonics to create metamaterials allows us to revisit the conception of spectral imaging systems. This project is a collaboration between the laboratories ImViA and ICB at Université Bourgogne Europe, it involves two major regional infrastructures PimRob and SMARTLIGHT. The goal is to model electromagnetic properties of metamaterials to define adequate filters and to create a prototype of colour camera with colorimetric properties.

Within spectral and colour imaging, advances in photonics allow us to define selective filters in very new ways [1, 2]. The technique of spectral routers emerges as a great alternative to interferometric filters [3-7]. This permits to solve two major constraints in the design of imaging systems: (1) the efficiency of filters, and (2) the transmission shape of filters. Indeed, interference filters traditionally used are based on the rejection of specific wavelengths, thus little energy goes through the filter. In addition, the shape of the filters is specific to the interferometric technique (e.g. Fabry-Pérot). Conversely, the use of spectral routers allows to potentially use all the incident light, and ideally to realise any shape of transmission filters [8]. In addition, cross-talk could be reduced by using such technique.

Thus, the goal is to define, design, build and characterize a new system for colour imaging based on spectral routers, with the technical support of PimRob and SMARTLIGHT infrastructures.

**Références bibliographiques / Bibliography**

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**Applicant profile**

The ideal candidate has a Master degree in Physics or Signal processing with majors in Optics or Imaging. Candidates with majors in Electronics or Applied Mathematics are welcome to apply.
The candidate must have:
-Good understanding of optical principles and instrumentation.
-Excellent communication skills in written and oral English.
-The quality of the research proposal will weight a lot in the selection.

Preferred selection criteria:
-Knowledge in: colour science, spectral imaging.
-Knowledge in: quantitative & qualitative research methods, experimental design, applied mathematics, statistical methods, machine learning and optimization.
-Enthusiasm for research, teamwork, and capability of independent problem-solving.

Personal characteristics:
-Ability to work individually and a high level of personal responsibility.
-Ability to meet deadlines and produce work of a consistently high standard.
-High motivation for research work.
-Eager to disseminate research results through publications and presentations at international conferences.

**Funding : EIPHI Graduate School, Region BFC**

Applications before the 25th of May 2025
Position start : 1er Octobre 2025
Salary (gross) : 2200€ (from the 1er janvier 2026 increased to : 2300€)

**Thesis Supervisor, director**
**Jean-Baptiste THOMAS, jean-baptiste.thomas@ube.fr**

**Co-supervisor**
**Benoît CLUZEL (co-director)**

Please send the following documents as a single pdf file of maximum size 5 Mo, by email to jean-baptiste.thomas@ube.fr AND benoit.cluzel@ube.fr by May 25th.
Applications must contain the following documents:

- CV
- Cover letter
- Reference letters (max 3)
- Grade transcript
- Research proposal, in English (max 3 pages + references)