

## CHIRAL MICROSCOPY

**LABORATORY :** Institut Lumière Matière  
**IN COOPERATION WITH** iLM

:

**LEVEL :** M1 / M2 / L3  
**TEAM(S) :** MNP

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**KEYWORD(S) :**

### SCIENTIFIC CONTEXT :

Chiroptical spectroscopies are widely used to probe molecular chirality. As chirality is a key to life (<https://www.youtube.com/watch?v=71GjsRns0L8>, <http://remotecat.blogspot.fr/2014/11/chiral-molecules-in-everyday-life-from.html>), its control is crucial in different areas including the pharmaceutical industry, the food industry, the environment... Circular dichroism (CD) and optical rotation dispersion (ORD) are spectroscopic tools commonly used in many chemical and biological laboratories. They are based on the circular anisotropy of a chiral material, having different response for the interaction with left and right circularly polarized light. Chirality can also be observed in the emission of chiral emitters which produce more left or right circularly polarized light. This phenomenon is called CPL for Circularly Polarized Luminescence and allows to characterize these emitters.

### MISSIONS :

We have developed in the team our own CPL spectrometers dedicated to the study of molecules in solution. We want to increase the capabilities of our installation in order to be able to perform chiral imaging of molecules coated on a substrate. The final objective will be to image in vivo chiral probes attached to targeted cells with specific chiral structures". The advantage of chiral probes is that they preferentially bind to the living chiral center. In addition, circular polarization allows ballistic photons to be distinguished from diffuse photons and thus can potentially increase the imaging capability through natural diffuse arrays.

The objective of the internship will be to develop a CPL chiral microscope. Highly luminescence samples, of densely packed molecular grids thin films will be used as resolution targets. The student will have (i) to design the microscope (optical set-up and CPL detection), (ii) mount the new setup and (iii) test it on the resolution targets.

### OUTLOOKS :

PhD possible. Fund: Ecole doctorale

### BIBLIOGRAPHY :

Theoretical and experimental analysis of circularly polarized luminescence spectrophotometers for artifact-free measurements using a single CCD camera *Nat. Commun.*, **2023**, 14, 1065

Solid-State Near-Infrared Circularly Polarized Luminescence from Chiral YbIII-Single-Molecule Magnet Chemistry - *A European Journal*, 2021, 27, 1