

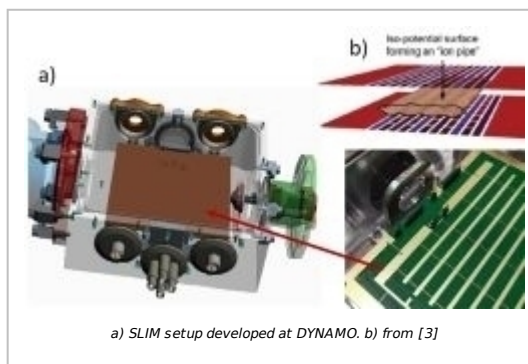
# MANIPULATION OF MOLECULAR IONS WITH SLIM DEVICE FOR INTERACTION WITH EXTREME RADIATIONS

**LABORATORY :** Institut Lumière Matière  
**LEVEL :** M1 / M2  
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**KEYWORD(S) :** mass spectrometry / molecular ions / technical development

## SCIENTIFIC CONTEXT :

In nature, molecular ions can exist in various structures that exhibit different physical or chemical properties for the same mass-charge ratio. For a better understanding of light-induced processes on molecules, one of the actual challenges is to couple structural analysis of molecular ions with light-matter interaction studies. With the advance of technologies to produce and manipulate molecular ions, and the development of extreme radiation sources, it is now possible to investigate both the static and dynamical properties of structurally resolved molecular ions in the gas phase.

In the DYNAMO group, molecular ions in the gas phase are studied with interests in both fundamental and application aspects by using state-of-the-art table-top light sources technologies (from mid-infrared to extreme ultraviolet) coupled to electrospray ionization source (ESI) and mass spectrometers (MS) [1, 2]. A novel ESI-SLIM-MS experimental apparatus is currently under construction with the goal of investigating light-induced processes in structurally resolved molecular ions of biological interest. Structures for lossless ion manipulation (SLIM) are ion optics devices to manipulate ions in the gas phase [3, 4] using radiofrequency (RF) and DC voltages applied to two parallel printed circuit boards. They have attracted growing attention due to their potential applications in the field of mass spectrometry and analytical sciences.



## MISSIONS :

The candidate will participate in the development and testing of the new ESI-SLIM-MS experimental setup. He/She will learn about molecular ions production and manipulation, have the opportunity to train on mass spectrometers and manipulate ions with SLIM devices. The performances of the setup will be characterized using model molecular ions of biological interest. The internship is mostly experimental but a simulation part can be included in the project.

## OUTLOOKS :

The internship can be extended into a PhD (application to Ecole Doctorale PHAST)

## BIBLIOGRAPHY :

- [1] M Hervé *et al.*, [Sci. Rep. 12, 13191 \(2022\)](#)
- [2] B Schindler *et al.*, [Int. J. Ion Mobil. Spec. 20, 119 \(2017\)](#)
- [3] YM Ibrahim *et al.*, [Analyst 142, 1010 \(2017\)](#)
- [4] A Zhang *et al.*, [Anal Chem 87, 6010 \(2015\)](#)