

Master and Engineer Internship: 2022-2023

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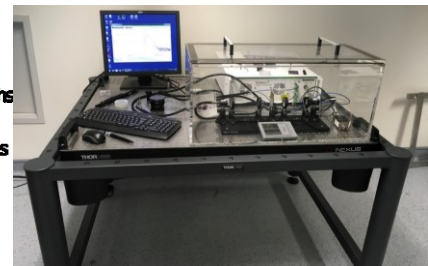
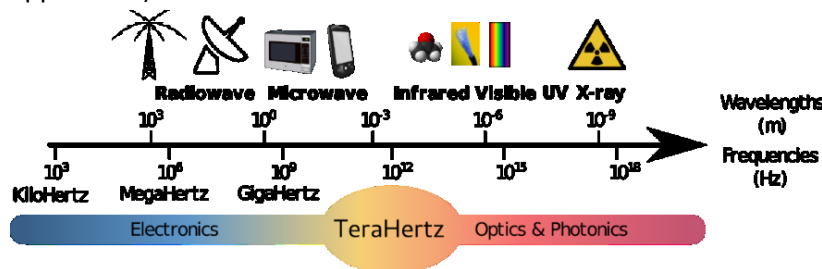
Research group : THz photonics

Title: Analysis of Lysozyme by Terahertz Time-Domain Spectroscopy

Abstract **Context and objectives**

The TeraHertz range (between 0.1 and 10 THz) is at the crossroads between optics and electronics and is currently booming. Indeed, THz waves allow non-invasive probing of matter and thus help to identify the composition of many materials, in particular biological materials. TeraHertz spectroscopy, based on the use of femtosecond lasers, has been developed in order to have a better understanding of molecules such as proteins or DNA that possess vibrations in the TeraHertz range.

IEMN (Institute of Electronics, Microelectronics and Nanotechnologies) has a characterization room at the international state of the art, where is installed a TeraHertz time-domain spectroscopy (THz-TDS) setup. This setup is used to analyze solid samples (characterization of semiconductors, of insulators...), liquids (aqueous solution, polar or non-polar solvent) or gases (in particular for the TeraHertz gas laser application).



Nevertheless, the study of biological samples in their natural state is limited by the lack of knowledge on liquid water in the TeraHertz range. After an extensive study of this liquid by our group, the intern will tackle the study of a common protein, the lysozyme, which will open the door to the study of more and more complex proteins in a liquid solution. During this internship, the student will have to learn how to use the THz time-domain spectroscopy setup and use it to analyze biological samples.

He will begin by doing experiments on liquid water before tackling lysozyme crystallization and its study by THz-TDS. The results will then be open for discussion within the group as well as with biologists from the university.

The applicants are encouraged to contact the members of the Photonics THz team involved in this subject in order to discuss the project or additional informations :

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