

**Master 2 internship project
Year 2021-2022**

Laboratory/Institute: Institute of Structural Biology (IBS)

Director: Winfried Weissenhorn

Team: Mass spectrometry laboratory

Head of the team: Elisabetta Boeri Erba

Name and status of the scientist in charge of the project: Elisabetta Boeri Erba, **HDR:** yes

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Program of the Master's degree in Biology:

Structural Biology of Pathogens

Title of the project:

Sequencing of proteins using mass spectrometry

Objectives (up to 3 lines):

This project aims to compare two different mass spectrometers used to perform sequencing of proteins and their "top-down" investigation (see below).

Abstract (up to 10 lines):

The primary sequence and post-translational modifications (PTMs) of proteins influence their structure and function, tuning their actions in key cellular processes. The IBS MS laboratory aims to characterise proteins and their PTMs using mass spectrometry (MS). MS can assess the mass of biomolecules with high accuracy, sensitivity and rapidity. The MS lab has two mass spectrometers which allow us to sequence intact proteins and to determine type, number and position of their PTMs using the so-called "top-down approach".

Methods (up to 3 lines):

The student will use a Matrix Assisted Laser Desorption Ionisation (MALDI) time-of-flight (TOF)/TOF, and an electrospray-quadrupole-TOF to sequence proteins and localise their PTMs. She/he will assess the performances of the two different instruments in terms of sensitivity, resolution, m/z range and sequence coverage.

Up to 3 relevant publications of the team:

Boeri Erba E, Signor L, Petosa C. Exploring the structure and dynamics of macromolecular complexes by native mass spectrometry. J Proteomics 2020; 222:103799. doi: 10.1016/j.jprot.2020.103799

Puglisi R, Boeri Erba E, Pastore A. A Guide to Native Mass Spectrometry to determine complex interactomes of molecular machines. FEBS J 2020; 287(12):2428-2439. doi: 10.1111/febs.15281

Boeri Erba E, Signor L, Oliva M F, Hans F, Petosa C. Characterising intact macromolecular complexes using native mass spectrometry. Methods Mol Biol. 2018;1764:133-151. doi: 10.1007/978-1-4939-7759-8_9

Requested domains of expertise (up to 5 keywords):

Structural biology and biochemistry