

**Master 2 internship project
Year 2026-2027**

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, head of the Mass spectrometry laboratory

HDR: yes ☒ ☐

Address: 71 Avenue des Martyrs, 38044 Grenoble cedex 9

Phone: 0457 42 8574

e-mail: elisabetta.boeri-erba@ibs.fr

Program of the Master's degree in Biology:

☒ Biochemistry & Structure

Title of the project: Characterizing glycosylated proteins using mass spectrometry

Objectives (up to 3 lines):

This project aims to use different enzymes and mass spectrometers for investigating glycosylated proteins (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 biological processes. Glycosylation is one of the most important PTMs. Deglycosylation enzymes are of key importance for glycosylation characterisation. Indeed, endoglycosidases are able to distinguish N-glycans and O-glycans. Exoglycosidases cleave only terminal monosaccharides. The IBS MS laboratory aims to characterize glycosylated proteins using enzymatic reactions and 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 assess the mass of intact proteins, to sequence these 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 analyse proteins and glycans before and after treatment with deglycosylation enzymes. She/he will optimize enzymatic deglycosylation. She/he will use a MALDI-TOF/TOF and an ESI-Q-TOF. 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:

Bourgeois M, Fouladkar F, Weber M, **Boeri Erba E**, Wild R. Chemo-enzymatic synthesis of tetrasaccharide linker peptides to study the divergent step in glycosaminoglycan biosynthesis Glycobiology, Volume 34, Issue 5, cwae016, doi.org10.1093/glycob/cwae016

Signor L, **Boeri Erba E**. Matrix-assisted laser desorption/ionization time of flight (MALDI-TOF) mass spectrometric analysis of intact proteins larger than 100 kDa. Journal of visualized experiments: JoVE, 2013, (79):50635. doi: 10.3791/50635

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