

**Internship project Master 2
Year 2017-2018**

Laboratory/Institute: IBS
Team: IBS/MEM/AFM

Director: W. Weisenhorn
Head of the team: J.L. Pellequer

Name and status of the scientist in charge of the project: HDR: yes no
Address: 71 avenue des Martyrs – CS10090; 38044 Grenoble
Phone: 0457 42 8756 **e-mail:** jlpellequer@cea.fr

Program the Master's degree in Biology:

- Neurosciences and Neurobiology Immunology, Microbiology, Infectious Diseases
 Integrative Structural Biology Physiology, Epigenetics, Development, Differentiation

Title of the project:

Large complex structure determination using atomic force microscopy topography

Objectives (up to 3 lines):

The aim of the project is to continue the development of methods that enable the laboratory to reconstruct large molecular complexes using high-resolution topographic surfaces and the partial three-dimensional structures of individual domains of large protein complexes.

Abstract (up to 10 lines):

One of the challenges in integrative structural biology is the ability to extract and combine structural information from various origin. We have demonstrated the feasibility of using atomic force microscopy to build large macromolecular complexes using high-resolution topography. The current reconstruction protocol is based on a six-dimensional docking of individual components of the large complex (in short it is simply three-dimensional LEGO). At the end, it is necessary to combine these individual components and thus it is extremely important to develop a good scoring function for final assembly. The core of the project is the testing of different scoring methods. It will also be possible to perform high-resolution imaging of single molecules using atomic force microscopy.

Methods (up to 3 lines):

The candidate will work in a Linux-based computer environment and should be familiar with some level of programming as well as some basic knowledge in structural biology. The candidate will be trained on our high-resolution atomic force microscope.

Up to 3 relevant publications of the team:

- Godon C, Teulon J-M, Odorico M, Basset C, Meillan M, Vellutini L, Chen S-wW and Pellequer J-L (2017) Conditions to minimize soft single biomolecule deformation when imaging with atomic force microscopy. *J. Struct. Biol.* **197**: 322-329.
Chaves RC, Dahmane S, Odorico M, Nicolaes GAF and Pellequer J-L (2014) Factor Va alternative conformation reconstruction using Atomic Force Microscopy. *Thromb. Haemost.* **112**: 1167-1173.
Chaves RC and Pellequer J-L (2013) DockAFM: benchmarking protein structures by docking under AFM topographs. *Bioinformatics* **29**: 3230-3231.

Requested domains of expertise (up to 5 keywords):

Structural biology, Unix/Linux, shell programming