

PhD student position available

Subject:

Membrane biophysics

Project title:

Molecular simulations of biological membranes and lipid droplets

Duration of employment: 3 years

Starting date: October 2018

Host laboratory:

Molecular microbiology and structural biochemistry (MMSB)
UMR 5086, CNRS & University of Lyon
Lyon, France

Description of the project:

Lipid droplets (LDs) are the organelles regulating the energy balance in cells. They are similar to oil-in-water emulsion droplets, surrounded by a lipid monolayer [1]. Despite their fundamental role in metabolism and disease, the mechanism of their formation remains poorly understood [2].

Our objective is to understand the mechanism and driving forces for the formation of lipid droplets, by combining experiments on model systems with molecular simulations. Understanding this fundamental process in lipid metabolism will pave the way to the modulation of cell metabolism, with implications for biotechnology and treatment of metabolic diseases (diabetes, atherosclerosis, etc.) and viral infections (hepatitis C, dengue, etc.).

The PhD position is for simulation studies on lipid droplet formation, to be carried out in the group of Dr. Monticelli (CNRS, Lyon) in close collaboration with the group of A.R. Thiam (ENS, Paris). Simulations will be performed on multiple scales, from all-atom to coarse-trained level [3, 4], and may be combined with new theoretical developments [2, 5].

The host lab offers state of the art computational resources and access to massive national (GENCI) and European (PRACE) supercomputing facilities.

The lab participates actively in the development of the MARTINI coarse-grained force field [3, 4, 6], and the PhD student will be exposed to the most advanced developments in coarse-graining.

Requirements:

Outstanding candidates with a strong background in physics, chemistry or biochemistry are preferred. The ideal candidate has one or more of the following qualifications:

- Experience in computational physics or computational chemistry, including hands-on experience in molecular dynamics simulations;
- Numerical competences, including programming experience and ability to set up advanced computer-simulations and handle large data sets;
- Research experience in membrane biophysics or membrane biochemistry.

Applicants must document their successful MSc studies by a high grade point average. If the applicant's MSc work has resulted in a publication (accepted or in draft) this is considered a strong advantage. Candidates must have good interpersonal and communication skills. Working knowledge of the English language (written and oral) is a requirement.

Contact:

Dr. Luca Monticelli

<http://mmsb.cnrs.fr/equipe/mobi/>

Email: luca.monticelli@inserm.fr

Applications:

send CV and a cover letter describing your motivation to:

luca.monticelli@inserm.fr

References

1. Thiam, AR, *et al.* Nat Rev Mol Cell Biol (2013), 14, 775-786.
2. Thiam, AR, Forêt, L. BBA - Molecular and Cell Biology of Lipids (2016), 1861, 715-722.
3. Marrink, SJ, *et al.* J Phys Chem B (2007), 111, 7812-7824.
4. Monticelli, L, *et al.* J Chem Theory Comput (2008), 4, 819-834.
5. Deslandes, F, *et al.* Biophys J (2017), 113, 15-18.
6. Wong-Ekkabut, J, *et al.* Nat Nanotechnol (2008), 3, 363-368.