



DOCTORAL



Complex membranes from microorganisms

Context and Job Description: A three-year PhD position held jointly between the Department of Life and Environmental Sciences at the Università Politecnica delle Marche (Ancona, Italy) and the Institut Laue Langevin (ILL, Grenoble, France)

Project details: Phospholipids are fundamental components of cell membranes. They form bilayers that regulate cellular interactions and transport and their ability to self-assemble into complex, functional forms make them ideal for developing nanomaterials that mimic cellular membranes for advanced applications such as targeted drug delivery and biosensing. The project mainly focuses on developing methods for the extraction and separation of lipids from microbial cultures either grown under protiated or deuterated conditions, thereby serving as sustainable lipid sources. With the support of the MSCA program, the project will focus on optimizing growth protocols, ensuring that protiated and deuterated organisms exhibit closely aligned lipid compositions. This optimization is crucial for the consistent and accurate reconstitution of membrane mimics to be used in neutron scattering and NMR experiments, enhancing the reliability of the research findings within this project. In addition to their use in the form of natural lipid extracts from cells adapted to deuterated conditions, diverse lipid classes containing different head groups will be purified by HPLC. Once extracted, the acyl chain compositions of these mixtures will be assessed by Gas chromatography and mass spectrometry. Further, the project will aim to prepare biologically relevant model membranes composed of such natural mixtures thereby helping to provide novel information on the fundamental properties of such complex lipid self-assembled systems. Finally, the project will investigate the interaction of complex membranes with proteins and membrane active peptides and compounds. In addition, within this project leading research labs shall help characterize these novel lipid mixtures for applications in mRNA delivery, biosensors, and eco-friendly formulations.

Expected profile and skills:

- We are seeking a highly motivated PhD candidate with a degree allowing enrolment for a PhD (such as MSc or equivalent) in Physical Chemistry, Biophysics, Molecular Biology and Biochemistry
- The candidate should be able to work in a highly interdisciplinary environment
- Knowledge in scattering techniques and in production of recombinant proteins will be considered an advantage.

What do we offer: We are offering an international and interdisciplinary working environment that involves experts in membrane biophysics, lipid extraction and purification, neutron scattering and protein production. The student will work in a highly multidisciplinary campus located at the heart of the French Alps. The candidate will be employed for a period of three years at the Institut Laue Langevin (Grenoble, France). In addition, the candidate will spend some time at the UNIVPM Doctoral School, Ancona, Italy along with other planned secondments at the European Spallation source (ESS) and the University of Graz during the course of his/her PhD studies.

Contact and Application: Questions can be addressed to Associate Prof. Anna La Teana (a.lateana@univpm.it), Prof. Giovanna Fragneto (giovanna.fragneto@ess.eu) or Dr. Krishna Chaithanya Batchu (batchu@ill.fr). Please send applications including a CV, a grade transcript, and a motivation letter to all of us.

Only short-listed candidates for the interview will be informed about the outcome of the application