PhD Subject ED – 206

Controlling the interactions of membrane proteins in lipid bilayers

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Membrane proteins are encoded by one quarter of all human genes, and constitute the target for about two thirds of all drugs from the modern pharmacopeia. They are involved in cell homeostasis and communication, cell division and cell bioenergetics. Reconstitution of a single protein type in a well-controlled lipid membrane is a compulsory step for understanding its role in cellular functions or for designing new drugs. Studies of the structure of membrane protein also often use different types of lipid media to keep the protein dispersed for NMR or cryo-TEM studies. Within this context one typically aims at a low level of protein content in the membranes, and seeks to avoid protein-protein interactions.

During this project, the PhD candidate will develop new strategies to assemble lipid bilayer platforms containing membrane proteins and to control their interactions. One might for instance wish to induce membrane-protein aggregation while keep the aggregation number at a low but finite level, or to take the 2D-organisation into a highly ordered state.

The work will be performed in Carlos Marques team at the Chemistry Laboratory of the ENS-Lyon, and will benefit from the support of local and international collaborations. The Marques team is recognized for his development of methods to self-assemble lipid bilayers. The so-called PVA-method is now arguably the preferred giant vesicle growing method in biophysical teams worldwide. Carlos also co-edited with his colleague R. Dimova the current reference textbook in the field, the Giant Vesicle Book.