

INTERNSHIP PROPOSAL

(One page maximum)

Laboratory name: LPENS

CNRS identification code: UMR8023

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Internship location: 24 rue Lhomond, 75005 Paris

Thesis possibility after internship: YES

Funding: YES

If YES, which type of funding: ERC

Formation of membrane enclosed compartment with high surface/volume ratio

Some cell membrane-bound compartments are highly deflated, meaning their surface/volume ratio is high. For instance, the shape of the Golgi apparatus is easily recognizable on electron microscopy images because it is made of stacked deflated compartments. Forming such deflated structures from membranes *in vitro* is a difficult challenge that was never achieved before because these shapes are unstable. The goal of the internship is to find conditions that stabilize deflated compartments or that allow the formation of such shapes. Vesicles, *i.e.* spherical membrane-bound compartments, will be the starting point. Two approaches will be tested. First, micrometric vesicles will be formed and individually observed by fluorescence microscopy. Their surface/volume ratio will then be increased by osmotic effects. Second, small nanometric vesicles will be formed and actively fused at constant surface and volume, each fusion increasing the surface/volume ratio. After thousands of fusions have occurred, the resulting compartment is expected to be very deflated.

The internship will be performed in collaboration with the laboratories of Nobel Prize laureate Professor James Rothman at Yale University, Professor Vivek Malhotra at the Center for Genomic Regulation in Barcelona, Spain and Professor Ivan Lopez-Montero at Complutense University in Madrid.

The internship can be followed by a PhD in which the deflated stacks will be used to reproduce the Golgi stack assembly by adding the right molecular conditions. Funds for the PhD are already secured.

Please, indicate which speciality(ies) seem(s) to be more adapted to the subject:

Condensed Matter Physics: NO Soft Matter and Biological Physics: YES

Quantum Physics: NO Theoretical Physics: NO