



## BIOPHYSICS POST-DOCTORAL POSITION



### **Regulation and coordination of Arp2/3- and formin- actin machineries on a membrane**

2-year post-doctoral position at the Laboratory of Structural Enzymology and Biochemistry (LEBS; Gif-sur-Yvette, France), in the Cytoskeleton and Motility Dynamics group.

Starting: January 2010, or later.

Funding: Agence Nationale de la Recherche (ANR)

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Keywords: membrane-cytoskeleton interaction, in vitro reconstitution, actin-based motility

#### General context

In vivo and in vitro studies have shown that lamellipodial and filopodial protrusions, located at the leading edge of a crawling cell, are generated by spatially controlled polymerization of actin filaments at the cell membrane, induced by two different nucleation machineries (WASP-Arp2/3 generates a branched network in the lamellipodium; formins generate long unbranched filaments in filopodia). The regulation of the individual systems is now partially understood, but how they are controlled in a concerted fashion at the membrane is still a crucial question to be answered.

#### Research project

The goal of the project is to combine in vitro the two actin machineries on synthetic membranes and to study how membrane properties take part in regulating and coordinating the two dynamic actin arrays. Before that, each system will be studied independently to understand the role of the membrane in the growth of each actin network on the surface. The distribution of the activators (N-WASP and formin) will be observed, while the actin structures grow, using varied techniques (FRAP and TIRFM setups are available in the lab; FCS experiments will be run in collaboration with the group of P. Schwille, TU Dresden).

N-WASP-functionalization of vesicles was successfully developed in the lab in the recent past years. Formins have never been anchored on membranes yet. The post-doc fellow will first find the optimal conditions to get formins bound to membranes and able to generate single actin filaments. By varying the regulatory proteins of the biochemical medium and the membrane properties, he/she will determine which parameters tune the formin clusterization and filament bundle growth. The two machineries will then be combined together on supported membranes or vesicles: biochemical and physical conditions (regulating proteins/biochemical medium and membrane properties) will be varied to determine how the two actin filament structures coexist and reorganize at the membrane surface. The results should lead to an integrated model of the concerted regulation/coordination of the protruding machineries anchored on the membrane.

#### Application:

The candidate will have a PhD, or equivalent, in experimental physics. A strong interest for the interface between physics and biology is required. Physicists having experience with in vitro experiments and/or membrane physics are encouraged to apply. Knowledge/background in one of the techniques planned for use is appreciated but not required.

Please send application and recommendation letter(s) to Dr. Emmanuèle Helfer:

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