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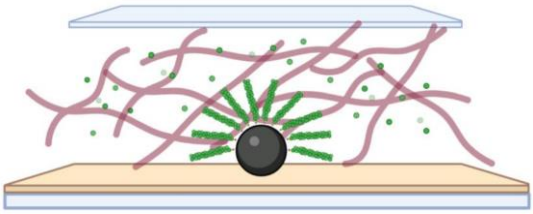
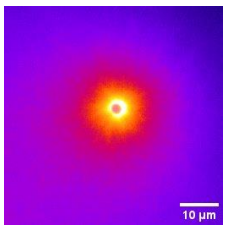
| **Lab :**<br>Institut Jacques Monod<br>15 rue Hélène Brion<br>75013 PARIS<br>**Team :**<br>'Regulation of Actin Assembly Dynamics'<br>**Team leaders :**<br>G. Romet-Lemonne & A. Jegou | **Supervisor :**<br>Cécile Leduc, HdR<br>**Contact :**<br>cecile.leduc@ijm.fr |


**Title of the project:**
In vitro reconstitution of the actin/vimentin cross-talk


**Abstract :**
Cell mechanics is mostly governed by the cytoskeleton which is composed of three types of interconnected filaments : actin, microtubules and intermediate filaments. Among them, **actin** forms dynamic networks that can remodel rapidly in response to its environment, but are not mechanically resistant to deformation. Conversely, **vimentin** intermediate filaments form stable networks that are highly extensible and resistant to rupture. Although having very different properties, actin and vimentin are involved in many common cellular functions such as cell migration or mechano-sensitivity, and work in coordination to perform them. However, **very few studies have focused on the interaction between actin and vimentin at the molecular level to understand the mechanisms involved in this coordination.**


During the internship, we will first study how vimentin regulates actin assembly properties, either directly or through cross-linking proteins. To do so, the different components will be purified, and the **vimentin/actin interaction will be reconstituted in vitro**. The mixed networks and their dynamics will be observed by **fluorescence microscopy and microfluidics**, and the different morphological and dynamic properties will be quantified under different conditions. Through this project, we expect to elucidate how the coupling between two very different filament networks creates emergent properties that are essential for ensuring the mechanical integrity of the cell.






This internship will be carried out jointly with a post-doctoral fellow, in order to work in pairs and thus be rapidly productive. The team 'Regulation of Actin Assembly Dynamics', at the Institut Jacques Monod, is a very dynamic, multidisciplinary team, working at the interface between biochemistry, cell biology and physics. It is composed of 12 persons of 5 different nationalities. We are looking for motivated students, open to original experimental approaches and whose curiosity is an important driver of their learning process. **The internship may be extended by a PhD thesis funded by the ANR.**

**Bibliography :**

1. Nunes Vincente F , Lelek M, Tinevez JY, Tran QT, Pehau-Arnaudet G, Zimmer C, Etienne-Manneville S, Giannone G, Leduc C+. Science Advances. (2022)
2. Jégou, A., and Romet-Lemonne, G. (2020). Mechanically tuning actin filaments to modulate the action of actin-binding proteins. Curr. Opin. Cell Biol. 68, 72–80.