Proposition de stage M2 et thèse

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Equipe : Régulation de la dynamique d'actine
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Financements de thèse : Écoles doctorales ou ANR

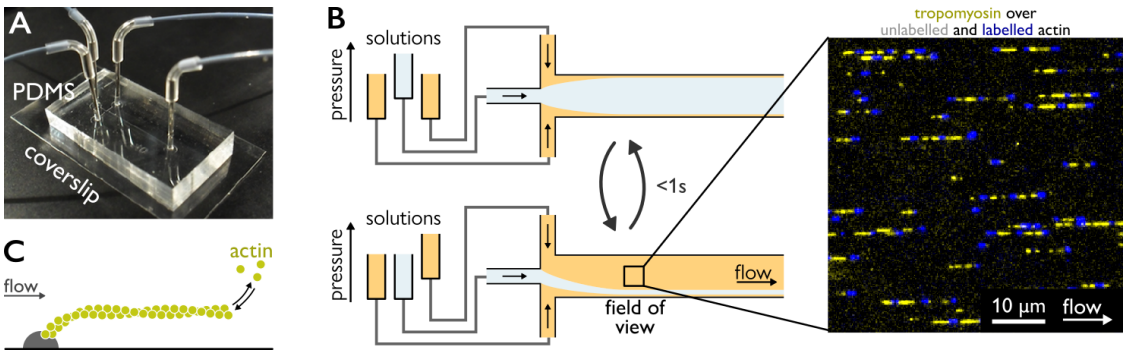
Title: Differentiation of actin filament networks

Summary: In every eukaryotic cell, the actin cytoskeleton assembles into multiple filamentous networks that support fundamental cellular functions. The goal of this project is to understand how different actin networks, made from virtually the same building blocks, can emerge and coexist within the same cell. In particular, we will focus on tropomyosins, an important yet enigmatic family of proteins, and decipher how actin-tropomyosin interactions are regulated.

The proposed work will be largely experimental, with a purely in vitro approach combining fluorescence microscopy and microfluidics. We reconstitute single filaments and actin networks from purified proteins, inside a microfluidic chamber. This powerful tool allows us to perfectly control the biochemical conditions and apply physiologically-relevant forces, to quantify the interactions between actin filaments and diverse regulatory proteins.

The Institut Jacques Monod is a major research center for fundamental biology in Paris. With its strong student community, it is a very dynamic and friendly working environment. The host team is internationally recognized as a leading lab in the field of the actin cytoskeleton. It is composed of 12 members with diverse backgrounds (physicists, biologists, biochemists) and 5 different nationalities.

The proposed project recently received an ANR funding, including a PhD fellowship. We are now looking for candidates with an interdisciplinary mindset, and background in either biophysics, cell biology or biochemistry. Candidates should be motivated, curious and eager to discover original experimental approaches.



Reconstitution of single actin filaments inside a microfluidic chamber
***A** Picture of a microfluidic chamber. **B** Sketch of a microfluidic setup. Pressure applied to each solution controls the flow within the chamber. Inset shows a typical field of view, with domains of tropomyosin over single actin filaments. **C** Sketch of a single actin filament, polymerized from a spectrin seed (grey).*