# Actin assembly and cell migration

***Moderation: Stefan C. Müller***

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1st speaker:

16:00 — ***Guillaume Romet –Lemonne*** *(Gif-sur-Yvette)*:

**Actin assembly dynamics, from single filaments to networks**

Actin proteins assemble to form filaments, which can elongate and disassemble from both ends, with different reaction rates. Each actin monomer binds an ATP, which is hydrolyzed into ADP after incorporation of the monomer into the filament. This results in a complex system, where ATP hydrolysis is coupled to the dynamics of assembly/disassembly, and modulates the interaction of the filament with regulatory proteins. Using microfluidics and fluorescence microscopy, we have developed experimental configurations where individual actin filaments are manipulated in vitro, in order to observe their assembly and disassembly, as well as their interaction with regulatory proteins. This allows us to quantitatively study the dynamics of individual events, while controlling the filament's biochemical environment. I will show how this has enabled us to reveal molecular details of the filament composition and dynamics. In cells, actin filaments are organized in a variety of networks, as they interact with regulatory proteins. Branched networks for example, can generate a force as they grow against a surface, such as the leading edge of a migrating cell, or the rear of an endosome or bacterium within the cytoplasm. By reconstituting this machinery in vitro, to propel artificial vesicles, we get valuable insight in the underlying mechanism. I will show how the diffusion of proteins bound to a the lipid membrane plays an important role in regulating the growing network and the resulting movement, and how this provides a better understanding of protein-protein interactions in this system.