

INTERNSHIP PROPOSAL

(One page maximum)

Laboratory name: Institut Jacques Monod, Université Paris Cité,
CNRS identification code: CNRS UMR7592,
Internship director's surname: Cecile Leduc
e-mail: cecile.leduc@gmail.com Phone number:
Web page: [Regulation of cytoskeleton dynamics](#)
Internship location: 15 rue Hélène Brion, 75013 Paris
Thesis possibility after internship: YES
Funding: No If YES, which type of funding: ANR

Mechanical regulation of actin/vimentin crosstalk in vitro

Context of the project

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 environmental cues, but are not mechanically resistant to deformation. Conversely, vimentin intermediate filaments form stable networks that are highly extensible and resistant to rupture. Despite these 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.

Objectives

The goal of the internship is to reconstitute in vitro certain aspects of the vimentin/actin crosstalk and understand how it is modulated under external stresses. Using original microfluidic approaches developed by the team, we will study the impact of vimentin filament tension on the recruitment of vimentin/actin crosslinkers and how this could impact the morphology of vimentin/actin composite networks.

The team

The team 'Regulation of cytoskeleton dynamics', directed by Guillaume Romet-Lemonne and Antoine Jegou at the Institut Jacques Monod, is a very dynamic, multidisciplinary team, working at the interface between biochemistry, biology, and physics. It is composed of 18 persons of 5 different nationalities. The project will be supervised by Cécile Leduc, CNRS senior researcher, in collaboration with other team members and could be followed by a PhD thesis.

Bibliography

-Tran QD, Lenz M, Lamour G, Paty L, Varela-Salgado M, Campillo C, Wioland H, Jegou A, Romet-Lemonne G, Leduc C. PNAS 2025 [\[link\]](#)
-Tran QD, Sorichetti V, Pehau-Arnaudet G, Lenz M, Leduc C. PRX 2023 [\[link\]](#)
-Nunes Vicente F, Lelek M, Tinevez JY, Tran QD, Pehau-Arnaudet G, Zimmer C, Etienne-Manneville S, Giannone G, Leduc C. Science advances 2022 [\[link\]](#)

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