

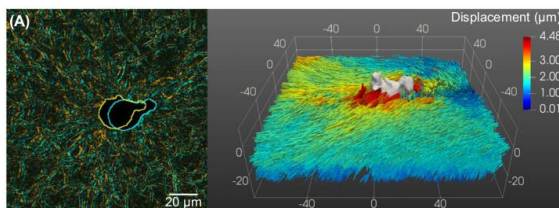
PhD Position

«3D mechanics of cells in complex fibrous media»

Project summary

The forces generated by cells in complex media are important in various physiological/pathological phenomena such as wound healing, cancer metastasis or embryogenesis. The aim of this project is to precisely investigate cell migration in biological networks by studying the interactions between cancer cells and the surrounding fibrous medium. Therefore, the main tasks of this thesis will be :

- A morphological characterisation of different fibrous media (collagen networks at different concentrations) using confocal microscopy.
- The development of a stretching/shearing device to investigate fibre deformations of these networks subjected to various physiological loadings.
- The achievement of micromechanical stretching/shearing tests on Extra Cellular Matrix (ECM) samples. The data obtained will allow to build a micromechanical model for the macroscale visco-hyperelastic mechanics of the soft fibrous ECM.
- The analysis of cell migration in the different ECMs. To understand the feedback between cell motility and network relaxation, observations will also be compared to numerical simulations.
- The determination of the local stresses exerted by cells using the micromechanical model developed.



Contour of a migrating cell in a collagen network (left picture) and associated displacement field of collagen fibres (right picture)

This project will benefit from an existing collaboration between researchers in physics of biological systems, imaging and mechanical engineering.

Location and practical aspects

The successful applicant will be hosted by the **LIPhy** (Interdisciplinary Laboratory of Physics – Grenoble, France – www-liphy.univ-grenoble-alpes.fr/) in the “MC2” team, and by the **3SR Laboratory** (Soils, Solids, Structures, Risks – Grenoble, France – www.3sr-grenoble.fr/) in the “CoMHet” team. He/she will work under the supervision of Dr Laurent, Dr Verdier at the LIPhy and Dr Bailly at 3SR Laboratory. The PhD fellowship offer is available starting **October 2021** for a period of **3 years**. The gross salary will be 1787 €/months, equivalent to a net salary of 1414 €/month.

Qualifications of the applicant

The PhD candidate should have academic backgrounds in cell biophysics and mechanobiology, with a strong motivation to work at the interface between physics and biology. Specific skills in microscopic imaging, structural characterization of fibrous media and/or experimental mechanics of soft (bio)materials/gels will be strongly examined.

Applications

Interested candidates should send their CV, a cover letter and official transcripts of the last two years to Dr Valérie Laurent (valerie.laurent@univ-grenoble-alpes.fr), Claude Verdier (claud.verdier@univ-grenoble-alpes.fr), and Lucie Bailly (lucie.bailly@3sr-grenoble.fr).

Deadline 01/07/2021