

Laboratory for Interdisciplinary Physics (CNRS, Grenoble)

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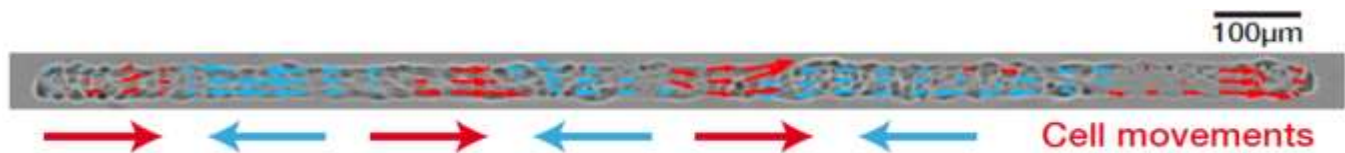
PhD thesis offer

## Self-sustained Velocity Waves and Pattern emergence in model Tissues

**Your profile.** The PhD candidate should have a strong motivation to work at the interface between physics and biology. A background and training in biophysics, as well as experience in data analysis, simulation and cell culture would be appreciated.

**Scientific context.** Supra-cellular organization is crucial to establish and maintain the structure, function and homeostasis of biological tissues. The reaction-diffusion framework justifies the emergence of morphogenetic patterns from an initially uniform distribution of biochemical molecules controlling cell fate. However, an increasing number of recent studies indicate that cell proliferation and differentiation are also impacted by the dynamic reciprocity between cell mechanical activity and the physical properties of their microenvironment. Several recent works reported that wave-like patterns of the velocity spontaneously appear in colonies of epithelial cells. Those supra-cellular waves appear in spreading epithelial sheets, and become stationary in confined geometries where cell migration is limited to internal rearrangements. Strikingly, supra-cellular waves are characterized by precise wavelength and period.

In this project, we will investigate whether supra-cellular waves induce a spontaneous transcriptomic divergence between the cells situated in the wave nodes and those located in the antinodes of the standing wave.



*Confined epithelium displays oscillatory motion. Supra-cellular waves emerge in quasi-1D colonies growing on adhesive stripes. Particle Image Velocimetry highlights the existence of velocity standing waves with well-defined temporal (4.5h) and spatial (370µm) periodicities*

**Your missions.** Within a national collaboration, you will be in charge of:

- **investigating the biophysical nature of supra-cellular waves and their resilience.**
- **testing the impact of standing supra-cellular waves on local transcriptomic**

**Your working environment:** this work will be based at the LIPHY, located on the University Grenoble Alpes campus in an exceptional mountain scenery. Our research lab offers unique interdisciplinary expertise at an international level and hosts numerous collaborators from various parts of the world in a sportive and relaxed atmosphere with state of the art technical and scientific support.

The project will be performed in close collaboration with the team "Mechanotransduction and Nuclear functions" at the Institute for Advanced Biosciences, Grenoble).

**Location :** University Grenoble Alpes campus

**Starting:** September 1<sup>st</sup> 2021.

**Context :** Agence Nationale pour la Recherche (ANR) grant

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**Application:** [https://www.adum.fr/as/ed/voirproposition.pl?langue=&site=phys&matricule\\_prop=37087](https://www.adum.fr/as/ed/voirproposition.pl?langue=&site=phys&matricule_prop=37087)