

EuReCa International PhD Program

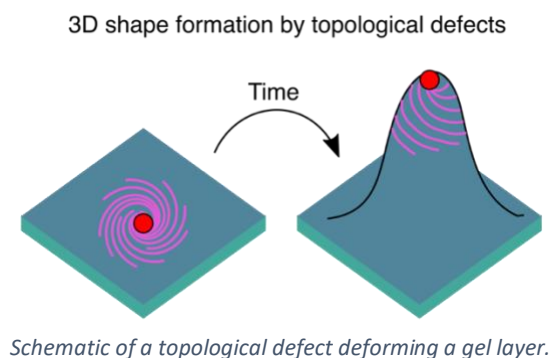
# Fully-funded PhD position

## Shaping of biological tissues by topological defects

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**Keyword(s)** Non-equilibrium thermodynamics; Collective cell migration; Microfabrication

Monolayers of elongated cells exhibit characteristics of active liquid crystals, such as long-range orientational order and topological defects: regions where orientational order is ill-defined. During the development of organisms, topological defects are at the core of morphogenetic events, such as protrusion formation or cell extrusion. However, the interplay between morphogenesis and topological defects remains to be elucidated.

This PhD project will combine theory and experiments to disentangle the interplay between biological active matter, topological defects, and geometry in shape formation of slender tissues. First, we aim at theoretically understanding feedbacks between topological defects and geometry in the emergence of 3D shapes of active liquid-crystal surfaces. Second, we will create and analyze a minimal experimental system, which will allow one to study correlations between order of cell monolayers and deformations on a gel layer. Combining theory and experiments will facilitate the identification of new morphogenetic mechanisms in multicellular systems, which can also open new ways to design shape-morphing materials inspired by biological systems.



### International, interdisciplinary & intersectoral aspects of the project

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This PhD position sits at the interface between the physics of liquid crystals and the biology of cell migration and will combine theory and experiments. The candidate will learn and apply a set of mathematical tools, such as the active gel theory or differential geometry for the theoretical part; and cell-control techniques, such as microfabrication or micropatterning for the experimental part. The latter will be developed in close collaboration with the company [Idylle](#), which specializes in the development of innovative consumables and reagents for life sciences. They will provide state-of-the-art and ready-to-use tools for the control of the cell microenvironment.

### Expected profile of the candidate and eligibility criteria

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The ideal candidate will be a physicist with proficiency in statistical physics and nonlinear physics. Prior knowledge in soft condensed matter and complex systems will be an asset. Willing to work at the interface between experiments and theory. Prior knowledge of experimental cell biology is not required.

Eligibility criteria: Applicants may not have resided in France for more than 12 months in the 3 years immediately before the call deadline, and must hold a master degree or equivalent.

Application online before **10th of January, 2022** on the [link](#)

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