

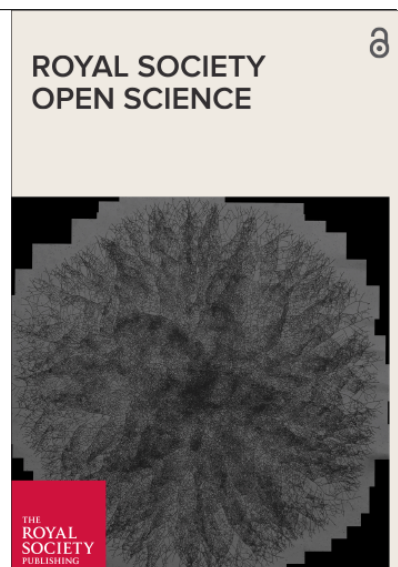
INTERACTIONS IN FUNGAL THALLUS

Master's internship, at the interface of physics and biology, on the growth of branching networks in the filamentous fungus *Podospira anserina*.

Laboratoire LIED
Université Paris Cité
6eme étage, Bat. Lamarck
35 rue H. Brion

Contacts:
eric.herbert@u-paris.fr
mathieu.riviere@u-paris.fr

- Ledoux, *et al.* (2023) Prediction and Experimental Evidence of Different Growth Phases... Scientific Reports
- Chassereau, *et al.* (2024). Full Identification of a Growing and Branching Network's Spatio-Temporal Structures. arXiv, 2407.06824. Accepted in Biophysical Journal
- Chassereau, *et al.* (2026). Direct evidence of apex hypha interactions during vegetative growth... R. Soc. Open Sci., 13(9).



Research environment Research will be conducted at the LIED, an interdisciplinary lab gathering a broad spectrum of disciplines, located at *Université Paris Cité* on the *Rive Gauche campus*.

Profile sought Interns would work in close interaction with a team of physicists and mycologists. An interest in the physics of living systems, and familiarity with common programming languages such as Python, are essential.

Continuation to a PhD is possible, but not yet funded. Joint application to grad school funding possible.

Hyphal network The achievement of filamentous fungi in colonizing terrestrial ecosystems can be largely attributed to their flexible morphology, and more specifically to their ability to form an interconnected hyphal network, the mycelium, based upon some fundamental cellular processes, such as hyphal tip (or apex) growth, septation, hyphal orientation, branching and fusion (also known as anastomosis). Hyphal tip expansion is a highly polarized, based upon secretory vesicles which are transported to the apical cell wall using a combination of microtubule and microfilaments, allowing a localized polar secretion of wall materials. Polarity is directly correlated to the morphology of the hypha via the growth velocity. The delivered secretory vesicles accumulate temporarily in an apical vesicle cluster, the spitzenkörper. Vesicle exocytosis at the apical membrane allows both the release of secretory enzymes and the expansion of apical membrane and cell wall.

Internship Two lines of work are possible. The first focuses on the interactions between tips and the network, and on self-recognition. For this, the intern will be able to rely on a collection of growth images and the dynamic graph extracted from them. Building on this work, the internship will focus on the local level, with interactions such as avoidance and attraction of hyphae/apex structures.

The second line is experimental and focuses on the fusion process observed when two hyphae meet. A protocol based on microfluidic setups will make it possible to guide the hyphae and control these encounters.