

## **Project title: How to escape from a maze? A study of collective strategies of animal groups in complex environments.**

This call is supported by the MITI project *Emergence of Collective Motion in Biological Intermittent Systems* (ECOMBIS).

Motion in animal collectives is a striking and widespread phenomenon in nature appearing across different scales. One key aspect observed in moving animal groups is the fact that individuals communicate in order to move or stop collectively. In some systems, this communication happens among individuals with different hierarchical roles, for example leaders and followers. The effect of hierarchical structures on collective motion of animal groups, in particular in complex environments, is poorly understood.

In this project, we aim to address this gap by studying the collective motion of groups of sheep in a well defined complex environment: a maze. To do so, we plan to use groups of  $N=2$  up to  $N=30$  sheep. We intend to position the group in the center of a maze and study i) the time of exit of the maze, ii) the group dynamics during the exit of the maze and iii) the effect of the presence of one (or more) trained leader(s) that know how to exit the maze. We intend as well to study the effect of the maze itself, by using different mazes that go from “simple” to “difficult” (quantified by their statistical properties).

The experiments will be implemented at the Domaine du Merle (Institut Agro Montpellier, Salon-de-Provence). This behavioral study will mainly focus on the acquisition of positional data of single individuals over time (examples: position, orientation & speed), that will be acquired using Global Navigation Satellite Systems (GNSS).

**Keywords:** Collective motion, collective strategies, leader-follower interactions, biophysics.

**Field site:** Domaine du Merle, 13300 Salon de Provence, South of France.

**Period of work:** October to December 2026.

**Salary:** The candidate will receive a grant of around 614 €/month. Travel and stay expenses in the field will be paid by the project. Candidates will have to assume their living expenses. We encourage students to find additional support from their university, or from other institutions.

**Required qualifications and skills:** A candidate with a background in ethology or animal behavior (preferably at the master’s level) who is interested in learning about digital monitoring of animal behavior—both in terms of tools and methodologies—or, alternatively, a candidate with a background in electronics, computer science, physics, or data analysis who wishes to apply their skills to the study of animal behavior.

The candidate will be based at a farm station, where he/she will receive training from professional shepherds to manage sheep both in barns and in open fields. They will also be responsible for the care of sheep involved in experimental studies, which requires a strong commitment throughout the entire week, including weekends, and close collaboration with the station staff.

The candidate will as well be responsible of the recording of the data (using GNSS) and experimental videos of the setup. Ideally, the candidate will assist as well on the processing and curation of the data, to obtain positions and orientations of individuals, but this is not mandatory.

The job involves physically demanding tasks related to handling adult sheep and includes working outdoors, often early in the morning and potentially in the evening. Fieldwork will be conducted in close cooperation with another student and occasionally with professionals during short fieldwork periods. Therefore, the ability to work effectively as part of a team is essential.

Although proficiency in French is not mandatory, it would be an advantage for working at the field station.

Interested candidates will have to contact:

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