

## Master internship

**Hosting laboratory:** Laboratoire Navier (UMR ENPC - UGE et CNRS)  
6 et 8 avenue Blaise- Pascal - Champs-sur-Marne

**Period:** 4-6 months, starting in February-March 2024.



### Study of the coarsening of liquid foams via discrete numerical simulations

**Key words:** Soft condensed matter, Modeling, Numerical simulations.

Liquid foams, concentrated dispersions of gas bubbles in a liquid matrix, have many applications, such as detergency, flotation and oil recovery. Even when stabilized by surfactants adsorbed at gas-liquid interfaces, liquid foams generally have a relatively short life. Understanding and controlling their stability is necessary for applications.

Coarsening is one of the destabilization processes of liquid foams. It is due to the transfer of gas between bubbles caused by pressure differences (transfer from small to large ones). New experimental elements have recently been obtained during experiments carried out on board the International Space Station, in microgravity conditions [1,2]. This work made it possible to understand how coarsening changes moving from “dry foams” to “bubble suspensions” (by increasing the liquid fraction) crossing a jamming transition known. In this context, numerical simulations could promote additional progress, by establishing the missing link between the coarsening laws and the evolution of the microstructure of the bubble assembly.

The objective of this internship is to study via discrete numerical simulations how coarsening is affected by the structural changes near the jamming transition. To this purpose, discrete particle models will be constructed, which will incorporate the minimal ingredients to describe interactions and gas transfer between bubbles. We will focus on the characterization of the microstructure for different values of the liquid fraction.

References :

1. M. Pasquet et al., *Soft Matter*, **19**, 6267 (2023).
2. N. Galvani et al., *PNAS* **120**, e2306551120 (2023).

#### Applications and contacts:

Interested candidates should send their CV accompanied by a cover letter to Francesco Puosi ([francesco.puosi@univ-eiffel.fr](mailto:francesco.puosi@univ-eiffel.fr)), Anaël Lemaitre ([anael.lemaitre@univ-eiffel.fr](mailto:anael.lemaitre@univ-eiffel.fr)) and Olivier Pitois ([olivier.pitois@univ-eiffel.fr](mailto:olivier.pitois@univ-eiffel.fr)).

**A PhD thesis is planned in the following.**