



INTERNSHIP PROGRAM FOR INTERNATIONAL STUDENTS

INTERNSHIP SUBJECT FORM

Name of the Host Laboratory	LadHyX
Website of the Host Laboratory	https://www.ladhyx.polytechnique.fr/en/
Research Group	
Internship Supervisor	Gabriel Amselem
Internship Subject	Membrane fluctuations and motion due to swimming microorganisms
Student's level	<input checked="" type="checkbox"/> Advanced Undergraduate Students (3 rd or 4 th year) <input checked="" type="checkbox"/> Master's students (1 st or 2 nd year) <input checked="" type="checkbox"/> PhD students
Proposed Duration	<input checked="" type="checkbox"/> 3 months <input checked="" type="checkbox"/> 4 months <input checked="" type="checkbox"/> 5 months <input checked="" type="checkbox"/> 6 months
Prerequisites	A taste for experimental work and image analysis
Internship description (max. 15 lines)	<p>Swimming microorganisms such as micro-algae or bacteria can be seen as self-propelled particles that undergo a random motion, very much like atoms do. Unlike atoms though, swimming microorganisms have a tendency to accumulate at walls, and this accumulation depends on the curvature on the wall. At the same time, microorganisms exert a force on the wall, which tends to deform it and can enhance accumulation. In this internship, we will use microfluidic tools to study the interaction between a soft, deformable wall and the model swimming microalgae <i>Chlamydomonas reinhardtii</i>. We expect to observe very large deformations of the wall, as observed with active particles at the macroscopic scale e.g. in [1,2]. We can then ask is the motion of microorganisms enclosed in a soft membrane (or a droplet) enables a global motion of the enclosure, and how to control this global motion. The internship is experimental, with a good amount of image analysis involved.</p> <p>[1] Junot, G., et al. "Active versus passive hard disks against a membrane: mechanical pressure and instability." <i>Physical review letters</i> 119.2 (2017): 028002 [2] Deblais, et al. "Boundaries control collective dynamics of inertial self-propelled robots." <i>Physical Review Letters</i> 120.18 (2018): 188002</p>

The boxes marked with cross implies eligible