ÉCOLE POLYTECHNIQUE
UNIVERSITÉ PARIS-SACLAY

# INTERNSHIP PROGRAM FOR INTERNATIONAL STUDENTS

# INTERNSHIP SUBJECT FORM

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| Name of the Host Laboratory | LadHyX |
| Website of the Host Laboratory | https://www.ladhyx.polytechnique.fr/ |
| Research Group | Microfluidics |
| Internship Supervisor | Gabriel Amselem |
| Internship Subject | Interactions between swimming algae and liquid interfaces |
| Student's level | ☒ Advanced Undergraduate Students (3rd or 4th year)<br>☐ Master's students (1st or 2nd year)<br>☐ PhD students |
| Proposed Duration | ☒ 3 months<br>☒ 4 months<br>☐ 5 months<br>☐ 6 months |
| Prerequisites | Desire to work on experiments and data analysis |
| Internship description (max. 15 lines) | Oceans, soils and living beings are as many habitats for swimming microorganisms, whose motion can be drastically altered by the presence of a solid or liquid interface. These interactions have been largely studied for microswimmers of the "pusher" type, such as bacteria. The influence of a solid boundary on "puller" microswimmers, such at the microscopic algae *Chlamydomonas*, has only been recently characterized, while nothing is known about the influence of a liquid interface on swimming.<br><br>The aim of this internship is to use a microfluidic platform developed at LadHyX to encapsulate individual *Chlamydomonas* in water microdroplets surrounded by oil, and study the interactions between algae and the water/oil interface. Two aspects will be particularly studied: (i) the sequence of interaction between the algae and the interface will be filmed with a high-speed camera to unravel the effects of steric and hydrodynamic interactions; and (ii) the shape and size of the droplet will be varied systematically, to determine if regions of the interface with a high curvature play the same attracting role as for a solid boundary. The internship is purely experimental, and will contain extensive image and data processing. |