



INTERNSHIP PROGRAM FOR INTERNATIONAL STUDENTS

INTERNSHIP SUBJECT FORM

Name of the Host Laboratory	LadHyX
Website of the Host Laboratory	www.ladhyx.polytechnique.fr
Research Group	
Internship Supervisor	Sébastien Michelin
Internship Subject	Leidenfrost droplets: spontaneous rotation and self-propulsion
Student's level	<input 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 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 Ideally this internship will last 6 months. Shorter internships (3-5 months are also possible)
Prerequisites	Fluid Mechanics, in particular viscous flows. Some experience on asymptotic methods will also be welcome
Internship description (max. 15 lines)	<p>Water droplets deposited on a very hot pan undergo rapid movements. For a couple of centuries now, the explanation of this phenomenon was thought to be understood: the liquid droplet levitates over its own vapor film in the vicinity of a hot surface, thereby reducing its drag and making it prone to translation under the effect of any small perturbation.</p> <p>Yet recent experiments, published this year in Nature Physics, have shed some new light on this phenomenon, demonstrating that rather than a simple translation under the effect of an outer force, a true self-propulsion can appear when the water droplet is small enough: small enough droplets do not surf but instead actively roll in random directions.</p> <p>This phenomenon is yet not understood fundamentally and the goal of this internship will be to analyze it in depth using lubrication theory to model the flow within the vapor film, in order to understand how it can generate such spontaneous rotation.</p>