



## INTERNSHIP PROGRAM FOR INTERNATIONAL STUDENTS

### INTERNSHIP SUBJECT FORM

Name of the Host Laboratory	LadHyX
Website of the Host Laboratory	<a href="https://www.ladhyx.polytechnique.fr/en/">https://www.ladhyx.polytechnique.fr/en/</a>
Research Group	
Internship Supervisor	Blaise Delmotte
Internship Subject	Probing the robustness of colloidal creatures
Student's level	<input checked="" type="checkbox"/> Advanced Undergraduate Students (3 <sup>rd</sup> or 4 <sup>th</sup> year) <input checked="" type="checkbox"/> Master's students (1 <sup>st</sup> or 2 <sup>nd</sup> 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 numerical simulations and viscous flows
Internship description (max. 15 lines)	<p>The dynamics of active particles suspended in a fluid can display surprising behaviors. Our recent work has identified persistent cluster states in systems of colloidal microrollers [1]. Microrollers are small heavy particles that rotate about an axis parallel to the floor under the action of an external torque, and generate strong, slowly decaying flows. The superposition of these flows fields leads to spontaneous self-assembly into stable motile structures, observed both in experiments and large-scale simulations. These colloidal creatures, called critters, can be used for guided particle transport, pumping and mixing in microchannels. In order to evaluate their efficiency and adaptability to a variety of environments, we need to probe their robustness.</p> <p>The intern will focus on the equilibrium shape and stability of these critters using large scale numerical simulations and/or analytical methods, depending on his/her profile. Depending on the progress, further work will include the interactions between critters and obstacles (posts or constrictions), where the numerical results will be compared to the experiments performed by M. Driscoll (Professor, Northwestern University, USA).</p> <p>[1] Driscoll*, M., Delmotte*, B., Youssef, M., Sacanna, S., Donev, A., &amp; Chaikin, P. (2017). Unstable fronts and motile structures formed by microrollers. <i>Nature Physics</i>, 13(4), 375.</p>