



## PhD Opportunity :

### Collective dynamics of active microparticles and droplets

We are looking for a talented student to join our research group at LadHyX on the self-propulsion of active microparticles. Potential candidates should have a background in fluid dynamics, applied mathematics and/or physics. The selected candidate(s) will join Dr. Michelin's team at LadHyX to work on the mathematical and physical modeling of the individual and collective propulsion of these microparticles. This work will be part of a broader research project, CollectSwim supported by the European Research Council (ERC), on the modeling and control of active fluids.

In recent years, self-propelled catalytic particles have attracted much attention as biomimetic alternatives to biological microorganisms, in order to study individual and collective dynamics at the micron scale. They are also potential candidates to perform controlled applications in the field of biomedical engineering (e.g. targeted drug delivery or microsurgery) or to actively control the macroscopic behavior of a synthetic suspension.

Generically, these systems rely on a chemical activity of their surface (namely the ability to change the physico-chemical properties of their environment such as temperature or solute content) and surface mobility that generate a surface slip velocity or stress forcing in response to local thermodynamic gradients (e.g. phoretic mobility or Marangoni stress). Examples of such phoretic systems are bi-metallic catalytic swimmers or reactive droplets, that release a solute in their environment.

The present PhD project will focus specifically on the hydrodynamic and phoretic interactions between many swimmers within a suspension, and the arising collective behavior, using theoretical and numerical analysis. It aims at a better understanding of the properties of the many different experimental systems currently proposed, and their optimization and control.

The 3-year position is fully-funded by the European Research Council, starting on October 1st, 2018. Interested candidates should contact Dr. Michelin as soon as possible. Please include a CV, a description of past research experience and motivation to join this project, and the name of two academic references.

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