



Contribution ID: 33

Type: **Contributed talk (20 min)**

Transport of passive beads by random and directed motion of swimming micro-organisms

Passive particles immersed in an active bath of micro-swimmers, either artificial swimmers or living microorganisms, may be displaced due to the activity of the suspension [1]. This enhanced motion can lead to rich phenomena such as aggregation or phase separation. In this experimental work, we study how passive beads are moved by randomly swimming bacteria and directionnaly swimming micro-algae.

First, in a uniform environment, we highlight the aggregation dynamics of the beads in a bacterial bath of *Burkholderia contaminans* [2]. Unexpectedly, the passive beads display a dynamic clustering similar to Ostwald rippening: clusters are slowly growing in time as a $t^{1/3}$ power-law, dynamically as beads are constantly getting exchanged from one cluster to another.

Second, we bring our experiment closer to a natural environment by adding biases to the swimming motion of the microorganisms. This time, we use micro-algae *Chlamydomonas reinhardtii* considering their quick reaction to light [3]. As their local concentration grows, the algae push away the passive beads in a steric fashion. By varying the incoming light direction, we manage to create complex patterns of passive particles, and even direct them towards precise locations. Such directed motion of micro-particles open up exciting perspectives, for instance in medicine.

References

- [1] X. L. Wu and A. Libchaber, Physical review letters **84**(13), 3017, (2000)
- [2] J. Bouvard, F. Moisy and H. Auradou, Physical Review E **107**, 044607, (2023)
- [3] A. Ramamonjy, J. Dervaux, and P. Brunet, Physical Review Letters, **128**(25), 258101, (2022)

Primary authors: BOUVARD, Julien (LadHyX, Institut Polytechnique de Paris); Mr LAROUCSI, Taha (LadHyX, Institut Polytechnique de Paris)

Co-authors: Prof. MOISY, Frédéric (FAST, Université Paris-Saclay); Prof. AMSELEM, Gabriel (LadHyX, Institut Polytechnique de Paris); AURADOU, Harold (FAST, CNRS, Université Paris-Saclay); Prof. JARRAHI, Mojtaba (FAST, Université Paris-Saclay)

Presenter: BOUVARD, Julien (LadHyX, Institut Polytechnique de Paris)