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Laboratoire PMMH
10 rue Vauquelin, 75231 Paris Cedex 05

ESPCI PARIS
EDUCATION SCIENCE INNOVATION

Séminaire café - PMMH

Bureau d'Études, Batiment L, 2^{ème} étage

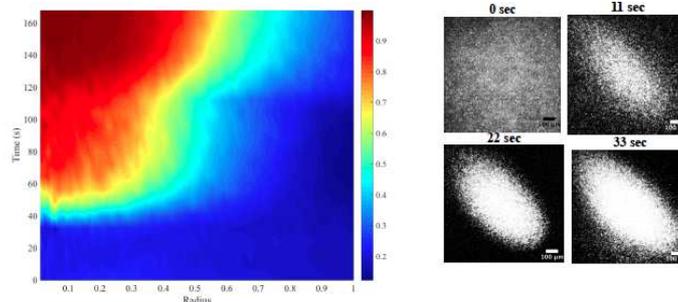
Jeudi 13 avril 2017, 13h30

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Acoustic manipulation of active baths : *Escherichia coli* suspensions in acoustic levitation

Active matter exhibit plenty intriguing non equilibrium properties, in the case of active suspension it has been shown that suspensions of swimming bacteria exhibit different characteristic from the ones of individual cells. The study of *Escherichia coli* suspensions under acoustic confinement is the focus of the present work. This technique will help to elucidate and characterize some of the phenomena arising in bacteria societies such as aggregation, collective motion and will give new insight in biofilm formation. To confine the bacteria cells and avoid contributions of the walls we built an acoustic trap which consist of two parallel layers : the emission layer, where a $2MHz$ piezo ceramic transducer is attached, and a reflection layer, a quartz slide. The manipulation of the suspension in the resonator was achieved using acoustic forces. The primary radiation force generates levitation of the bacterial cells at the nodal plane of the ultrasonic standing wave generated inside the resonator. On the other side, secondary forces leads to the consolidation of stable aggregates. For all the experiments *Escherichia coli* RP437-pZA 3R-YFP, cells were cultured in a minimal medium until they reached mid exponential phase with a cell density between $3 - 6 \times 10^8 CFU/mL$. We analyzed the spatiotemporal dynamics in the ultrasonic trap where initially bacteria are evenly distributed in the resonant cavity and after 3 minutes of interaction with the acoustic field forced a stable aggregate is formed (Fig.1); when a bacterial aggregate is relaxed from the acoustic force, a disintegration process is triggered. Finally we also characterized the dynamic of the stable aggregates by their velocity fields and vorticity.



Prochain séminaire : jeudi 20 avril 2017 à 13h30,
Guillaume Laffite, Ingénieur du plateau technologique de l'IPGG.

Programme des séminaires café : <https://www.pmmh.espci.fr/?-Seminaire-Cafe-Interne->
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