

ESR13 - Transport of bacteria in disordered and complex environments

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Transport of bacteria in disordered and complex environments - either by their geometry or stemming from the nature of the carrier fluid- is key to many innovative processes such as bioremediation or bacteria assisted drug delivery. In narrow biological conduits or soils, bacteria evolve in complex confined environments, leading to particularly complex and still not fully understood transport dynamics.

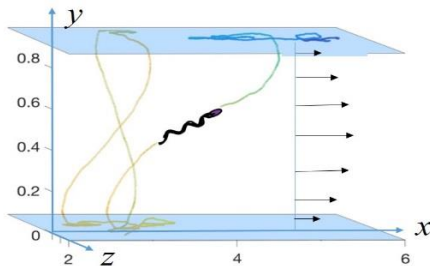


Figure –E.coli bacterium swimming in a Poiseuille flow. Example of a 3D trajectory of a motile bacterium alternatively transiting between the bulk and the surfaces (continuous line), obtained using Lagrangian tracking method developed in the PMMH-ESPCI laboratory. The flow is generated in a rectangular channel obtained via soft-microfluidics technique.

In this project we will use a 3D-Lagrangian tracking technique recently developed in the group to observe individual bacteria trajectories in confined environments with complex micro-flow

geometries using a suspending fluid that can be of Newtonian or more complex rheology. Individual trajectories and global transport properties in link with surface hydrodynamics will be characterized. In parallel, the 3D trajectory and the flagella bundling and unbundling dynamics will be visualized to understand the link between bacteria transport and run and tumble statistics. Finally, the study will be extended to artificial 3D light transparent porous media with tunable properties.

Salary: The PhD salary is based on the [regulations of appointment and remuneration](#) for Marie Skłodowska Curie Fellows in ITN networks. The successful candidate will also benefit from additional funding for several visiting trips (typically 1 month each) in the partner teams.

Requested profile: We welcome highly-motivated applicants holding a Master and with excellent background in hydrodynamics, soft matter physics and/or biophysics. Motivation for experimental work is required and experience with microfluidics is a plus.

Further obligations: The Early Stage Researcher (ESR) is expected to travel to network partners for secondments and a mini-project for durations up to of 2-3 months. In addition, the ESR participates in outreach activities (social media, participation in public events), as well as dissemination to popular press.

Funding conditions: Candidates must not have resided or carried out their activities - work, studies, etc.- in France for more than 12 months in the 3 years immediately before starting the PhD.

Deadline for applications: January 20, 2021.

Hiring procedure: Applications (CV, transcript of studies, statement of motivation and at least one letter of recommendation) should be sent by email to Anke Lindner (anke.lindner@espci.fr). The recruitment is taking place following the [European Code of Conduct for Recruitment of Researchers](#), which all candidates are encouraged to study.

Selection process: PHYMOT is open to researchers regardless of gender, religion, ethnicity, disability, sexual orientation, political views, language, age and nationality. Applications from highly qualified applicants from outside the EU will thus be equally considered to other applicants. The integration of refugees is an EU priority and we will ensure equal opportunities to the researchers whose scientific careers have been interrupted. To ensure a gender balance in the project and work towards the Commission's own policies on narrowing the gap between the genders in research, should two applicants be found to be equally qualified the preference will be given to the one that will balance the gender distribution in the entire Network. All submitted applications will be checked against the defined admissibility and eligibility criteria (e.g. submitted electronically, readable, complete, in English, including grades and references), and applicants will be informed by email within two work weeks on the outcome. Evaluation criteria include: Scientific background (with particular focus on theoretical physics), previous publications, capacity for creativity and independent thinking and leadership, mentoring and presentation abilities.

Protection of personal data: The personal data of the applicants will be handled in compliance with applicable EU and national law on data protection (GDPR).
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