

# ESR4 – Bacterial dynamics in heterogeneous landscapes

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The resource landscape of microbes in a range of environments is composed of nutrient pulses and filaments, as occurs for example for microbes in the ocean due to turbulence. This is a problem at the interface between fluid mechanics and the biophysics of searching, and has to date received very little attention despite being the ubiquitous situation in which chemotaxis unfolds in aquatic environments. Numerical models (based on Direct Numerical Simulations) predict that the benefit afforded by chemotaxis is affected by the intensity of turbulence, yet experimental tests are lacking, due largely to the difficulty of generating nutrient filaments at the appropriate scales while simultaneously quantifying microbial responses. This project will focus on developing a new approach to tackle this question, by combining microfluidic technology with video-microscopy and advanced image analysis.

In this project the Early Stage Researcher (ESR) is to develop new approaches to go beyond classic analyses of chemotaxis in smooth resource landscape and to develop experimental procedures to quantify the behavior and reproduction of microbes in environments composed of nutrient pulses and filaments.

**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 MSc and with excellent background in theoretical physics, biophysics, and/or soft matter physics.

**Further obligations:** The ESR is expected to travel to network partners for secondments and a mini-project for durations up to 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 Switzerland for more than 12 months in the 3 years immediately before starting the PhD.

**Hiring procedure:** Applications (CV, transcript of studies, statement of motivation and at least one letter of recommendation) should be sent by email to Francesco Carrara ([carraraf@ethz.ch](mailto:carraraf@ethz.ch)). 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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