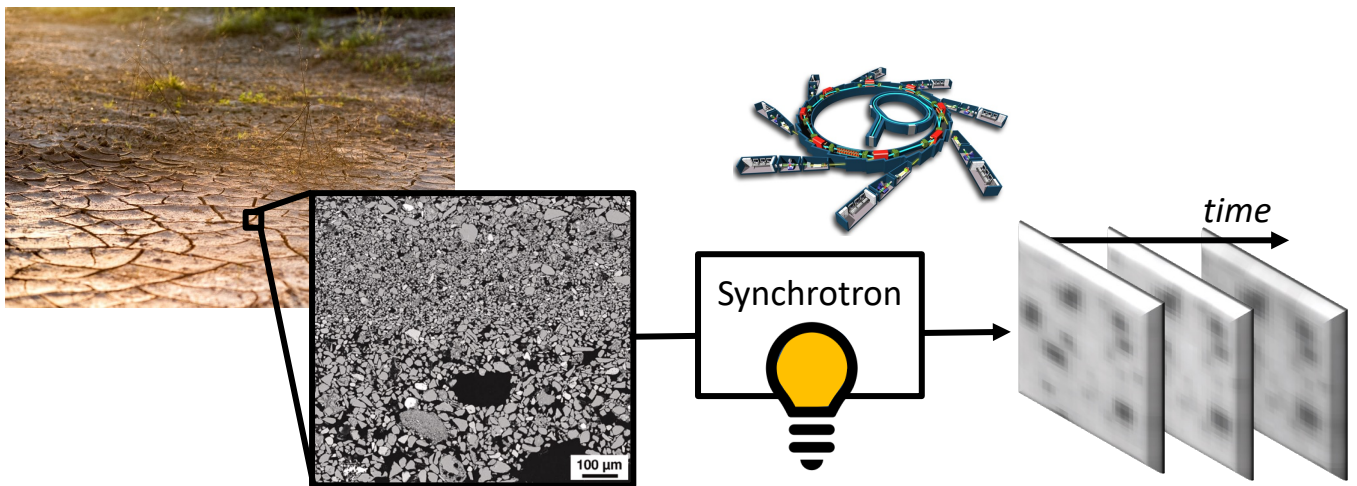


# Seeing in the Dark: Dynamics in opaque porous materials

To enhance the healing of degraded soils, it is of prime importance to understand how microorganisms navigate through such environments before settling in. Since soils are opaque, internal dynamics can only be probed experimentally with X-ray beams. Yet, an image analysis tool to quantify particle dynamics in these highly heterogeneous media is still lacking. **The goal of this Ph.D. project is to unravel the transport mechanisms of particles at micrometric scales in soils by establishing new analysis tools and conducting experiments in model soils.** The first step will be developing an image analysis toolbox to extract dynamical variables from correlations of X-ray images obtained in heterogeneous opaque materials using multiscale theoretical tools. We will then use the analysis tool to measure the internal dynamics of particles, including active particles, in porous opaque media with increasing complexity. Harvesting these detailed experimental results, we will thus be able to isolate dominating navigation mechanisms in the global context of soil colonization by microorganisms.



**Candidate profile :** We are looking for a highly motivated candidate with a masters degree in Physics or Physical chemistry, motivated by experimentation and some theory to analyze data. Previous experience in research is an asset.

**How to apply:** To apply please send a CV, a short motivation letter, a document with your master's and grades and 1 or 2 reference persons (ideally a previous internship supervisor) that we may contact. The deadline for the application is May 30th 2023, and the final decision will be made in June.

**PhD dates:** Oct. 2023 - Oct 2026. This PhD project will take place in 2 labs: PHENIX (Sorbonne University, Paris) for data analysis and theory development and IC2MP (Poitiers) for experimental synthesis of soil samples.

**Contact :** [sophie.marbach@sorbonne-universite.fr](mailto:sophie.marbach@sorbonne-universite.fr) (PHENIX, Main Advisor, for applications)  
Also check out <http://sophie.marbach.fr/> for more info  
[laurent.michot@sorbonne-universite.fr](mailto:laurent.michot@sorbonne-universite.fr) (PHENIX, 2<sup>nd</sup> Adv.), [fabien.hubert@univ-poitiers.fr](mailto:fabien.hubert@univ-poitiers.fr) (IC2MP, 3<sup>rd</sup> Adv.)

Sorbonne University is a world-class, research-intensive university bringing together a broad range of arts, humanities, social sciences, natural sciences, engineering and medicine. The campus was completely refurbished in 2016.

PHENIX is a laboratory at the interface between Chemistry, Physics and Materials Science with a long-standing expertise of colloidal systems, electrolytes and fluids under confinement. Its strength lies in a combination of experimental and modelling activities. Several international projects take place in PHENIX, providing a multicultural and diverse environment.

