Machine learning techniques to investigate porous materials
Paolo Malgaretti: malgaretti@is.mpg.de

Nanopore based devices have been revolutionizing several key-applications such as energy harvesting, water treatment and biosensing. Similarly, several biological processes are controlled by the transport of ions and molecules across pores and channels. Technological and scientific advancements are hindered by our lack of knowledge of the shape of these cavities. Indeed due to their micro- nano-scopic size, standard optical techniques fall short. A way out is represented by obtaining the shape of the cavities by measuring the transport of ions across them. In this project we will exploit the measurements of the Mean First Passage Time (MFPT) to predict the shape of the pore the ions are crossing over. Exploiting Machine Learning techniques we will invert the problem and we will reconstruct the shape of the pore based on MFPT measurements. In order to do so the candidate will develop both numerical and analytical skills. In particular, concerning the Machine Learning part we will rely on python-based scripts.

Contact
Paolo Malgaretti
Dpt. Theory of Inhomogeneous condensed matter
Max Planck Institute for Intelligent Systems
Heisenbergstr. 3
70569 Stuttgart
e-mail: malgaretti@is.mpg.de