



Laboratory of the Physics of Biological Systems

We have two open positions for PhD students:

A) Physics and Synthetic Biology

Antibodies are key components of protein- and cell-based therapies. One tool for antibody development that laboratories around the world are focusing on is artificial intelligence (AI), leveraging structural and binding data to create prototypes of proteins that bind their targets well. However, AI tools are currently far from generating good designs with high success rates. Further, 'smart' proteins that switch on or off are not within the scope of AI-based tools currently. More importantly, we also need breakthroughs in experimental techniques that make it easy (and cheap) to test and improve on designs. We want a PhD student to join our lab, who is interested in developing both

- 1) novel experimental directed evolution techniques and
- 2) physics- and AI-based design methods

to make better binding, smarter, more controlled, and cheaper antibodies.

B) Physics and Systems Neuroscience

We would like a PhD student to join us to study two questions:

Project 1: What underlies individuality? After excluding genetic differences, large variability in animal behavior remains. We want to understand what the neural source of this individual-to-individual diversity is by studying brain activity and behavior.

Project 2: In collaboration with a large Swiss company, we want to collect massive amounts of behavioral data of animals modeling different human diseases and exposed to a large library of chemicals. Can you read out the health status of animals from their behavior? Can you dissect behavioral data in health-relevant categories?

All experiments will be performed with the nematode *C. elegans*, which is currently the only tractable model for these questions.

Your research would involve:

- 1) experiments, using and developing further a 3D-printed high-throughput imaging system that we have developed and recording animal behavior, and
- 2) computation, developing novel physics- and AI-based methods to extract meaning from your data.

Please reach out if you have any questions: Prof. Sahand Rahi (sahand.rahi@epfl.ch)

