Vassily HATZIMANIKATIS - Laboratory of Computational Systems Biotechnology / Institute of Chemical Sciences and Engineering / School of Basic Sciences

Understanding cellular processes is crucial for making progress in medicine, biology, and biotechnology. In this context, characterizing the behavior of cells under different conditions will provide tools that improve personalized and precision medicine, green energy, or efficient chemical production. Experimental approaches are currently generating an abundant amount of biological data and further computational methods are required to perform an integrative analysis of the cellular processes.

In the Laboratory of Computational Systems Biotechnology, LCSB, we focus on modeling different cellular processes, performing large-scale computations, and data analysis. We aim to develop mathematical models and novel mathematical and computational methods that allow us to conduct research in systems medicine, systems biology, metabolic engineering, and prediction of novel bio-transformations.

We have openings for a PhD position with an expected starting time-frame of **beginning 2022**.

The following research topic is offered:

Human metabolism data analysis and modeling

In this project, we aim to develop mathematical models that describe the metabolic state of different human cells under different conditions, such as cancer cells, retina cells and liver cells. The developed models will be used to study the alterations in metabolism that are hallmarks of a variety of human diseases, including cancer, retina degeneration, as well as various bacterial, viral, and parasitic infections. The ultimate aim of these efforts it to understand the metabolic mechanisms that underlie these alterations and guide the discovery of new drug targets and the design of new therapies.

Microbiome data analysis and modeling

In this project, we aim to develop mathematical models that describe the metabolic networks of individual organisms in microbial communities and the interactions through metabolites and competition for resources. We will also develop individual agent-based representations of bacterial motility and growth using adaptive metabolic networks for each agent-cell and study how metabolic interactions can give rise to spatio-temporal arrangements in microbial communities.

The inquiries about the positions and applications including a motivation letter and the CV letters should be sent by email to:

vassily.hatzimanikatis@epfl.ch and **ljubisa.miskovic@epfl.ch**

Applicants should also fill an online application with *Doctoral Program of Chemistry and Chemical Engineering simultaneously at: https://www.epfl.ch/education/phd/edch-chemistry-and-chemical-engineering/edch-for-applicants/*