

Department Biozentrum



BIOZENTRUM The Center for Molecular Life Sciences

Basel Computational Biology Seminar

Corentin Briat

Basel, Switzerland

Cybergenetics: A Control Theory for Living Cells

The objective of this talk is to give an idea of the problems encountered in the control of biological systems, and how they can be solved. In particular, we will discuss the concept of reaction networks as models for a wide class of dynamical systems including biological, ecological, and epidemiological systems. The concept of noise or randomness an its role in those systems will be also discussed. When starting the discussion on the control of biological processes, a parallel between the concept of regulation, integral action, homeostasis and perfect adaptation will be drawn and will serve as a bridge between control theory and biology. Various control paradigms will be briefly introduced, with a specific emphasis on the in-vivo control of cellular networks, that is the design of controllers that can be implemented inside living organisms, such as bacteria. A solution to the robust regulation problem based on the so-called Antithetic Integral Controller will also be discussed and shown to theoretically work both in the deterministic and the stochastic settings. the Finally, the approach discussed in talk will be illustrated via simulations and experimental results.

Date:	Monday, 20.03.2023
Time:	16:15 h
Location:	Biozentrum U1.197
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