EPFL PHYSICS COLLOQUIUM

Nonequilibrium Physics in Living Systems and Machine Learning

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Monday
October 17th
16:15
Room CM 1

APERO after the colloquium

Complex networks from biochemical networks to artificial neural networks perform intricate biological functions and machine learning tasks. Most of these complex networks operate far out of equilibrium where equilibrium statistical mechanics fails. In this colloquium, I will describe our recent work applying concepts and methods from nonequilibrium physics to biology and machine learning.

Part I:Energy-accuracy tradeoff in biological systems. For a wide range of systems, we show that the energy cost sets an upper bound for the performance of the intended biological functions.

Part II: Learning dynamics in deep-nets. Our recent study revealed a robust inverse relation between the weight variance in stochastic gradient descend (SGD) and the loss landscape flatness opposite to the fluctuation-response relation in equilibrium systems.

School of Basic Sciences

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