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Physical learning and collective memory of adaptive immunity

Our adaptive immune system is able to learn from past experience to better fit an unforeseen future. This is made possible by a diverse and dynamic repertoire of cells expressing unique antigen receptors on their surface and capable of rapid evolution within an individual. However, naturally occurring immune response exhibits limits in efficacy, speed and capacity to adapt to novel challenges. In this talk, I will discuss theoretical frameworks we developed to (1) explore functional impacts of non-equilibrium antigen recognition, and (2) identify conditions under which natural selection acting local in time can find adaptable solutions favorable in the long run. Using these examples, I show that a generalized landscape theory provides a unifying framework for connecting physical mechanisms and evolved functions. To close, I stress the need for considering viral-immune ecology in order to gain a fuller understanding of their coevolution.

Tuesday, June 27, 2023, 17:00

Institute for Biological Physics, Zùlpicher Str. 77a

Seminar Room 0.02, Ground Floor

Hosted by Michael Lässig