UCLA Department of Physics & Astronomy

COLLOQUIUM

Thursday, October 27 at 4 p.m.
1-434 PAB

How Our Immune System Learns From a Changing Experience

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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 and capable of rapid Darwinian evolution within an individual. However, naturally occurring immune responses exhibit 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, through exploiting environmental variations and physical constraints. Using these examples, I show that a generalized landscape theory provides a unifying framework for understanding non-equilibrium processes across scales. In light of coevolution, I will discuss a broader scope of our work and its implications for vaccine strategies. I hope to convey that physicists can make a unique contribution to understanding systems as complex as the immune system – it is an exciting time to do so.

Refreshments at 3:30 p.m. on the PAB Patio. Undergraduates Welcome!