



Yale Institute for Nanoscience and Quantum Engineering

Friday-April 6, 2018

12:00-1:00 PM

BECTON SEMINAR ROOM
Light lunch will be served at 11:45 a.m.

Khoi Nguyen

Department of Mechanical Engineering and Materials Science, Yale University

“Collective Mechanics of Myosin Motors”

The collective dynamics of myosin motors in skeletal muscle, also known as actomyosin crossbridges, underlie the material and functional properties of muscles. Crossbridges are molecular motors that cycle between an attached state during which it mechanically couples two polymeric filaments and transmit forces, and a detached state. In its attached state, crossbridges behave as molecular springs that store elastic stresses and dissipate the stresses upon detachment. Therefore, its mean cycling time is the stress relaxation timescale for an ensemble of crossbridges. Against externally applied perturbations acting faster than this timescale, the ensemble resists like an elastic body with stiffness that scales in proportion to number of attached crossbridges. Against slower perturbations, the ensemble freely yields like a viscous fluid. We show using the attachment/detachment kinetics of crossbridges that the perturbation response of an ensemble of crossbridges is linearly viscoelastic, but with a spread of timescales. The response is the sum of many Maxwell bodies (a spring and damper in series). Unlike previously thought, we show that there is no single timescale over which stresses relax, rather a spectrum of timescales arises from the distribution of strains across crossbridges.

Alex Kwan

Departments of Psychiatry and Neuroscience, Yale School of Medicine

“Using Mice to Study Decision-Making”

Research in my lab focuses on understanding the neural circuits that enable flexible decision-making. Every day we make hundreds of decisions. Should I choose an original glazed or a honey cruller? Should I even eat a donut? Answering such questions relies on processing different types of information, such as sensory cues, past experience, context, and motivational state. When contingencies change, we adapt. The capacity to be flexible in choice behavior is a remarkable and essential part of our cognitive life. In this talk, I will discuss two recent projects in which we taught mice to perform decision-making tasks, and characterized the role of frontal cortex in flexible behaviors.

Host: Professor Corey O’Hern