Department of Biomathematics Seminar Series:
Frontiers in Systems and Integrative Biology

BIOMATH

Applications of physical models to biology

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4:00 PM (refreshments)
33-105 Center for the Health Sciences

ABSTRACT:
The first part of the talk deals with long distance synchronization in the brain, inspired by the laser synchronization experiments. A model of coupled neurons with delays in the axonal propagation of a signal is presented and analyzed. It is shown that while time delays introduce correlations in the time series, synchronization itself is highly dependent on the synaptic time constant. Thus faster synapses were found to increase the degree of synchronization and perhaps surprisingly the firing rate. In the second part of the talk, we investigate stochastic extinction of an SIS (Susceptible-Infective-Susceptible) epidemic in large populations. Epidemic extinction is shown to correspond to an escape from a noisy over-damped potential well. Using Feynman's path integral approach, it is found that under certain conditions, it is much more effective to vaccinate people in groups, rather than each individual making an independent decision on when to vaccinate.

Host: Dr. Tom Chou (tomchou@ucla.edu)

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