

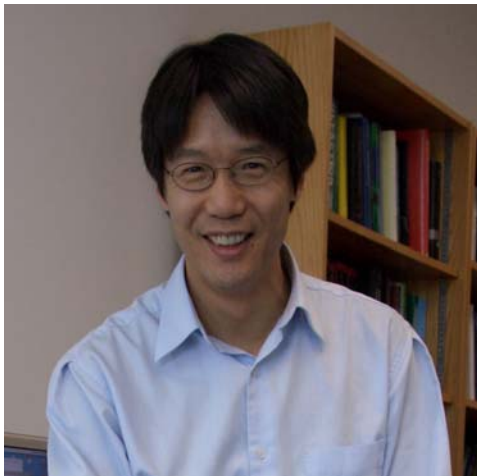


# JOHNS HOPKINS

## BIOMEDICAL ENGINEERING



**Monday February 23, 2009, 1:00 PM**  
**Ross G007(Darner Conference Room)**  
Light lunch will be provided at 12:30 in Ross G007



## **How stochastic neurons in the brain make decisions: Theory meets experiments**

**Xiao-Jing Wang, PhD**

Professor  
Dept. of Neurobiology and  
Kavli Institute of Neuroscience  
Yale University School of Medicine

Hosted by Xiaoqin Wang

**Abstract:** Decision making, which pervades our daily lives, is ultimately a computation carried out by the collective dynamics of millions of neurons in the brain. Can we understand the neural circuit mechanism of decision making, at the biophysical level, similarly to studies of sensory systems? Recently, neurophysiologists have recorded from nerve cells in the brains of monkeys performing simple decision tasks. These studies have begun to reveal how neurons accumulate information in favor or against choice options in a deliberative decision process, eventually leading to a categorical response. In this talk, I will summarize experimental data and present a biophysically-based recurrent neural network model of decision making. I will show that this model accounts for a range of observations from two sets of monkey experiments: one on perceptual decisions in the visual system, the other on reward-based economic choice behavior. In particular, I will discuss the highly stochastic nature of neural activity, how it is generated and may be computationally harnessed. This model suggests a circuit mechanism for decision making that can be described theoretically in terms of stochastic attractor dynamical systems.

Upcoming Seminar:

February 27: Michael Guttman

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