

Spring  
2016

# *Mathematical Sciences/RTG Seminar*

## *Colloquium*

### **Sampling hazards in data inference of spatiotemporal dynamics**

Most of dynamical processes are continuous, whereas in experiment, signals are often measured in the form of discrete spatiotemporal series and conclusions are drawn by analyzing these sampled signals. In this talk, I will illustrate two examples to show how different samplings may lead to artifact of data processing and provide corresponding approaches to extract the intrinsic properties from the underlying continuous processes. The first example is about analyzing spatiotemporal activities measured by voltage-sensitive-dye-based optical imaging in the primary visual cortex of the awake monkey. Through computational modeling, we show that our model can well capture the phenomena observed in experiment and can separate them from those statistical effects arising from spatial averaging procedures in experiment. The second example is about analyzing Granger causality for information flow within continuous dynamical processes. We show that different sampling rate may potentially yield incorrect causal inferences and such sampling artifact can be present for both linear and nonlinear processes. We show how such hazards lead to incorrect network reconstructions and describe a strategy to obtain a reliable Granger causality inference.

**Speaker: Douglas Zhou**

**(Shanghai Jiao Tong University)**

**Monday, March 7, 2016 (Joint with RTG)**

**Time: 4:00 – 5:00 PM**

**Location: AE214**



