

## Motif Expansion of Global Information Flow in Spike Train Data

**Alexander Strang, PhD**  
**William H. Kruskal Instructor**  
**Department of Statistics and the College**  
**University of Chicago**

**12:00 Noon Eastern time, Tuesday, September 13, 2022**  
**47 College Street, Room 106 A&B**

### **ABSTRACT**

Networks of neurons encode information processing in the interacting dynamics of individual neurons. Transfer entropy (TE), which measures the effective influence of the past of one time series on the future of another, can be applied to spike train data to estimate the influence of one neuron on another. By applying TE to simulated spike trains, we extract an information flow graph, which records the directed exchange of information between neurons directly from the simulated time series. We introduce a motif expansion that summarizes the global organization of ensembles of flow graphs via a minimal sequence of local statistics at increasing scales. We then investigate how connectivity controls the number statistics required to reconstruct global statistics for the ensemble.