1106-92-854 **Victor Barranca*** (`barranca@nyu.edu`). *Reconstruction of Structural Connectivity in Sparsely-Connected Neuronal Networks Using Compressive Sensing.*

Recovering structural connectivity in large neuronal networks is an unresolved yet fundamental problem in characterizing neuronal computation. Taking into account the prominence of sparsity in neuronal connectivity, we develop a framework for efficiently reconstructing neuronal connections in a sparsely-connected, feed-forward network model with nonlinear integrate-and-fire dynamics. Driving the network with a small ensemble of random stimuli, we derive a set of underdetermined linear systems relating the network connectivity to the firing rates of the downstream neurons. In reconstructing the network connections, we utilize compressive sensing theory to facilitate the recovery of sparse solutions to such underdetermined linear systems. Using the reconstructed connection matrix, we also accurately recover network inputs distinct from the training set of stimuli. We expect this work to be useful in understanding the structure-function relationship for neuronal networks, giving insight into a possible mechanism for unconscious inference of natural stimuli. (Received September 08, 2014)