1116-VF-1482 **Caitlyn Parmelee*** (s-cparmel1@math.unl.edu) and **Carina Curto**. *Predicting neural sequences from network structure.* Preliminary report.

One of the basic unanswered questions in neuroscience is: how does the architecture of a neural circuit shape its dynamics? We investigate this question in the context of a simple neural network model, where the connections (synapses) between neurons are binary, and the network is thus defined from a directed graph. If the graph is oriented and has no sinks, it has been shown that the network has bounded activity and no stable fixed points. What kinds of dynamics emerge? And how do they depend on the structure of the underlying graph? Computational experiments show that in small networks, the dynamics typically converge to a limit cycle where the neurons fire in a regular sequence. Similar patterns have been observed in cortex and hippocampus. Can we predict the firing sequence from the structure of the graph? In this talk, I will describe a new graph deconstruction algorithm that allows us to successfully predict the sequence in most small networks. More generally, the algorithm is successful in graphs without a balanced induced subgraph. In addition to limit cycles, we have also observed chaotic behavior in networks with as few as 5 neurons. If time permits, I will discuss current work where we try to predict the presence of chaotic attractors from the structure of the graph. (Received September 20, 2015)