1106-90-1221 **Feng Shi*** (bill10@uchicago.edu). *Modeling and Predicting Evolution of Networks.*

Since complex networks are found ubiquitous across disciplines including social, biological and physical sciences, significant attention has focused on their formation and evolutionary dynamics. We present studies on two special dynamics: one coevolves with network topology and the other drives the evolution of higher-order interactions. We study an abstract mathematical model (evolving voter model) for networks in which the evolution of the network topology is tied to the states of the nodes and vice versa. Based on previous results, we show that our model displays many real-world features such as fragmentation and small-world properties. Moreover, we find a family of quasi-stationary distributions of node states, which determines the final state of the network and yields a phase transition in the dynamics. In another study, we propose a hypergraph model for a class of networks featuring interactions that can involve more than two nodes, e.g., group interactions, co-authorships, etc. We develop a statistical model for its evolution, and by fitting this model to millions of published articles in biomedical fields we successfully predict new hyperedges formed every year. This framework provides a machinery to quantitatively study real networks with higher-order interactions. (Received September 11, 2014)