1145-37-1421 **Henry Adams**, **Veronica Ciocanel**, **Kelsey Houston-Edwards**, **Lauren Lazarus*** (lauren.lazarus@trincoll.edu), **Mark J. Panaggio**, **Bin Xu** and **Chad Topaz**. *Network reconstruction from temporal data for coupled oscillators.*

In a complex system, the interactions between individual agents often lead to emergent collective behavior like spontaneous synchronization, swarming, and pattern formation. The topology of the network of interactions can have a dramatic influence over those dynamics. In many studies, researchers start with a specific model for both the intrinsic dynamics of each agent and the interaction network, and attempt to learn about the dynamics that can be observed in the model. Here we consider the inverse problem: given the dynamics of a system, can one learn about the underlying network? We investigate arbitrary networks of coupled phase-oscillators whose dynamics are characterized by synchronization. We demonstrate that, given sufficient observational data on the transient evolution of each oscillator, one can use machine learning methods to reconstruct the interaction network and simultaneously identify the parameters of a model for the intrinsic dynamics of the oscillators and their coupling. (Received September 21, 2018)