Dr. Sui TANG
Johns Hopkins University

Analysis of high dimensional dynamical data

High-dimensional dynamical data arise in many fields of modern science and introduce new challenges in statistical learning and data recovery. In this talk, I will present two sets of problems. One is related to the data-driven discovery of dynamics in systems of interacting agents: given only observed trajectories of the system, we are interested in estimating the interaction laws between the agents using tools from statistical/machine learning. We show that at least in particular circumstances, where the interactions are governed by (unknown) functions of distances, the high-dimensionality of the state space of the system does not affect the learning rates. We can achieve an optimal learning rate for the interaction kernel, equal to that of a one-dimensional regression problem.

The other one is related to the dynamical sampling: a new area in sampling theory that deals with processing a linear time series of evolving signals and aims at recovering the initial state and the forward operator from its coarsely sampled evolving states. We show when this inverse problem is well-posed and feasible algorithms of recovery.