Data and the gauge-invariant observation of dynamical systems

Yannis Kevrekidis, Princeton University

I will discuss connections between manifold learning techniques (mainly diffusion maps) and different observations / different data driven realizations of complex dynamical systems.
An idea that naturally arises is very much analogous to "gauge invariance" in physics -- the ability to make predictions about a dynamical system independent of the way that we observe
it (as long as we have sufficient "generic" observations). This line of thinking connects naturally
with classical embedding ideas (Whitney, Nash, and -for dynamical systems- Takens). I will discuss our idea of an "equal space" embedding, and a link with dictionary learning.