1145-60-1756 **Mauro Maggioni*** (mauro@math.jhu.edu), Department of Mathematics, 3400 N Charles St, Baltimore, MD 21218. *Statistical Learning and Geometric techniques for Dynamical Systems.*

We discuss problems on statistical learning for dynamical systems. We assume to have access to a (large number of expensive) simulators that can return short paths of the stochastic system, and introduce a statistical learning framework for estimating local approximations to the system, that can be (automatically) pieced together to form a fast global reduced model for the system, called ATLAS. ATLAS is guaranteed to be accurate (in the sense of producing stochastic paths whose distribution is close to that of paths generated by the original system) not only at small time scales, but also at large time scales, under suitable assumptions on the dynamics. We discuss applications to homogenization of rough diffusions in low and high dimensions, as well as relatively simple systems with separations of time scales, and deterministic chaotic systems in high-dimensions, that are well-approximated by stochastic diffusion-like equations. We also discuss the problem of learning interaction laws in agent systems, given only observed trajectories. This is joint work with M. Crosskey, F. Lu, S. Tang, and M. Zhong. (Received September 24, 2018)