LAUFER CENTER
FOR PHYSICAL AND QUANTITATIVE BIOLOGY

Seminar 2018

New Mathematics for New Biophysics: A Foray into Bayesian Nonparametrics

One route to modeling biophysical dynamics involves the bottom-up, molecular simulation, approach. In this approach, approximate classical potentials are used to simulate biological dynamics to draw insights on biological function and make predictions on emergent phenomena. Bottom-up approaches are used across most of physics and condensed matter in particular. Here we take a different route. We start from the data derived from the complex biological system. We motivate a top-bottom approach to learning models of biological dynamics starting from the data. The approach we present exploits a novel branch of Statistics – called Bayesian nonparametrics (BNPs) – first proposed in 1973 and now widely used in data science as the important conceptual advances of BNPs have become computational feasible in the last decade. BNPs are new to the physical sciences. They use flexible (nonparametric) model structures to efficiently learn models from complex data sets. Here we will show how BNPs can be adapted to tackle important questions in biophysics and address the challenge of super resolved particle tracking.

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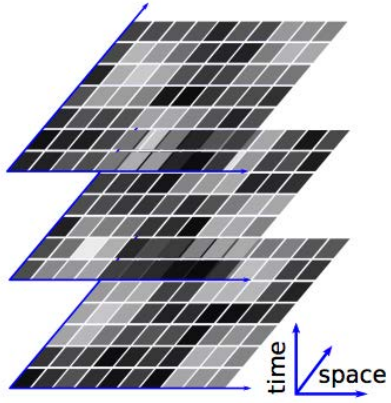

Monday, March 19, 2018

2:30 PM Laufer Center 101

Host: Ken Dill

Refreshments in Laufer Hub 110 after seminar

Stony Brook University

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