# Analysis and Data Science Seminar

## Andrew Meng

## Tractable Sampling in Linear State Space Models

Tuesday, February 3, 2026
3:00 P.M. in Massry B012

Abstract. State space models are useful tools in many systems in which a variable which is not directly observable evolves over time according to some law whose structure is known but where we can observe a noisy observation of a function of the variable of interest. Models in which transitions and emissions are assumed affine are known to be tractable in many cases, but even in this simplified setting, particularly long time series data can present issues with model fitting in practice. The classical forward-backward algorithm requires a sweep over the entire length of the time series, an operation linear in the input size. Christopher Aicher et al present a sufficient condition for model parameters under which the forward-backward algorithm can be approximated to arbitrary precision in time constant in input length. We will expand the sufficient condition to almost all practical models.