

TRANSITION PATH SAMPLING AND LARGE DEVIATIONS FOR CLIMATE TIPPING POINTS

TOBIAS GRAFKE

Tipping points and rare transitions in metastable systems are a notoriously hard problem in complex system science and climate science. Combinations of rate and noise induced tipping, where additional stochasticity pushes the system over an activation barrier into a novel long-lived state, fall into the purview of transition path sampling. In particular, we are often interested in drawing from the ensemble of transition paths to investigate typical tipping trajectories and their physical properties. In this talk, I will present novel mechanism for sampling the transition path ensemble even in the presence of multiple coexisting tipping mechanisms, by combining pathspace Markov chain Monte Carlo with metadynamics, and elucidate their relation to sample path large deviations. I will show applications from simple climate systems, including the tipping of the AMOC.