



復旦大學
FUDAN UNIVERSITY

Applied Math Ph.D. Seminar

Convex Relaxations for the Optimization of Markov Processes

Speaker: Hongyi Zhang (University of Chicago)

Time: 2026-09-24, 16:10 to 17:00

Location: Rm 1801, Guanghai East Tower

Advisor: Yuehaw Khoo (University of Chicago)

Abstract: In this paper, we study the problem of optimizing Markov processes that interpolate between two prescribed probability distributions while minimizing a given cost. The main computational challenge is the curse of dimensionality: in high-dimensional state spaces, representing the full distribution is intractable. To address this, we reformulate the problem in terms of sequential couplings and develop convex relaxations based on local marginals and cluster moments. These relaxations exploit locality and sparse interaction structure, provide computable lower bounds, and recover low-order statistics of the intermediate laws. We identify dynamic optimal transport as a special case of our Markov process optimization problem and develop a procedure for recovering the underlying Benamou–Brenier dynamics from the relaxed solution. We also show that the procedure extends to more general Markov processes and illustrate it with a constrained process between Ising models.