

March 23, 2026  
2:00pm-3:00pm  
KAP 414

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### Dynamic Schrödinger bridges beyond entropy

**Abstract:** Over the past decade, the Schrödinger bridge problem has emerged as a central tool for modeling the evolution of uncertainty in dynamical systems. It describes the most likely stochastic evolution connecting two observed distributions and forms the dynamic, entropy-regularized analogue of optimal transport. Unlike its static counterpart, the dynamic formulation explicitly models the temporal evolution of probability flows, a feature that has proven essential in modern generative modeling via diffusion processes, where data distributions are learned through time-dependent stochastic transformations. While the classical Schrödinger problem relies on relative entropy, which provides analytical convenience, this choice can be restrictive: it yields diffuse stochastic trajectories and imposes a specific log-penalty structure that may not capture robustness or the structural features of the system. General divergence-based penalties offer greater flexibility, allowing the model to capture alternative notions of discrepancy and sensitivity. Indeed, insights from quadratically regularized optimal transport, a static analogue of the problem considered in this project, suggest that  $L^2$ -type penalizations can induce sparsity in the transport plan, emphasizing the most relevant trajectories while downweighting minor fluctuations. In this work, we leverage stochastic control tools and convex duality to extend these ideas to the dynamic, path-space setting. The talk is based on a joint work with Ludovic Tangpi.

**Zoom Link:** USC Math Finance Colloquium

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