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Low dissipation in non-equilibrium control: sampling the ensemble of efficient protocols. GRANT ROTSKOFF, Univ of California - Berkeley, TODD GINGRICH, Massachusetts Institute of Technology , GAVIN CROOKS, Lawrence Berkeley National Laboratory, PHILLIP GEISSLER, Univ of California - Berkeley — Designing schemes to efficiently control fluctuating, non-equilibrium systems is problem of fundamental importance and tremendous practical interest. A number of optimization techniques have proven fruitful in the pursuit of optimal control, but these approaches focus on the singular goal of finding the exact, optimal protocol. Here, we investigate the diversity of protocols that achieve low dissipation with a Monte Carlo path sampling algorithm. Akin to Boltzmann weighting configurations in Metropolis Monte Carlo, each protocol is exponentially biased by its mean dissipation. We show that the ensemble of low dissipation protocols can be sampled exactly in the Gaussian limit and that the method continues to robustly generate low dissipation protocols, even as the external control drives the system far from equilibrium.

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