Conditioned stochastic processes

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An interesting question in statistical Physics is what evolution a system undergoes when it is conditioned to satisfy certain constraint. For example, a Brownian motion conditioned to end at a certain point, a Langevin equation conditioned to perform certain amount of work in a certain interval of time, or a transport model conditioned to produce a fixed amount of flux or entropy. The last two are examples of conditioning on a time-integrated quantity or empirical observable. I shall discuss, how one can describe dynamics in such constrained ensembles. The analysis will be presented in a pedagogical style, starting from a Markov chain, to a Langevin processes, and then to a fluctuating hydrodynamics description of systems with many degrees of freedom. Towards the end, I shall introduce conditioned large deviations and emphasize on how it could play a role in extending the ideas of thermodynamic ensembles outside equilibrium.

† Tridib Sadhu and Bernard Derrida, *Large deviations conditioned on large deviations I: Markov chain and Langevin equation,* J Stat Phys **xx**, xxx (2018).
‡ Tridib Sadhu and Bernard Derrida, *Large deviations conditioned on large deviations II: Fluctuating hydrodynamics,* J Stat Phys **xx**, xxx (2018).