

MAR11-2010-002647

Abstract for an Invited Paper
for the MAR11 Meeting of
the American Physical Society

The Statistical Mechanics of Trajectories and Weights: Applications to Gene Expression

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Many fascinating questions concerning the behavior of systems ranging from chemical reaction patterns to the patterns of gene expression in living systems do not concern their terminal states, but rather the various microscopic trajectories connecting those states. Some of the most intriguing examples of these kinds of phenomena center on the time evolution of the many molecular machines that populate living cells. Motivated by studies of the time evolution of gene expression, this talk will review both classic approaches to time evolution using rate equations (but couched in the language of trajectories and weights) and more controversial ideas based upon the principle of maximum entropy.