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Stochastic gene expression with bursting and positive feedback THIERRY PLATINI, Virginia Bioinformatics Institute, HODJAT PENDAR, RAHUL KULKARNI, Department of Physics, Virginia Tech — Stochasticity (or noise) in the process of gene expression can play a critical role in cellular circuits that control switching between probabilistic cell-fate decisions in diverse organisms. Such circuits often include positive feedback loops as critical elements. In some cases (e.g. HIV-1 viral infections), switching between different cell fates occurs even in the absence of bistability in the underlying deterministic model. To characterize the role of noise in such systems, we analyze a simple gene expression circuit that includes contributions from both transcriptional and translational bursting and positive feedback effects. Using a combination of analytical approaches and stochastic simulations, we explore how the underlying parameters control the corresponding mean and variance in protein distributions.

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