Stochastic Auto-regulation Models and Mixed Poisson Distributions therein[1] SRIVIDYA IYER-BISWAS, Joseph Henry Laboratories of Physics, Princeton University, C. JAYAPRAKASH, Department of Physics, The Ohio State University — In this work we study the interplay between stochastic gene expression and system design using simple stochastic models of auto-activation and auto-inhibition. Using the Poisson Representation, a technique whose usefulness in the context of non-linear gene regulation models we elucidate, we are able to write down exact, analytical results for these feedback models in steady state. We also use this representation to analyze the parameter-spaces and demarcate where qualitatively distinct types of distributions (bimodals, power-laws and so on) occur. Using our results, we reexamine how well the auto-inhibition and auto-activation models serve their conventional roles as paradigms for noise suppression, and noise exploitation through increased heterogeneity, respectively.

[1]This work was done while the first author was in the Department of Physics, The Ohio State University.

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