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Intrinsic noise in stochastic models of gene expression with molecular memory and bursting TAO JIA, RAHUL V. KULKARNI, Department of Physics, Virginia Polytechnic Institute and State University — Regulation of intrinsic noise in gene expression is essential for many cellular functions. Correspondingly, there is considerable interest in understanding how different molecular mechanisms of gene expression impact variations in protein levels across a population of cells. In this work, we analyze a stochastic model of bursty gene expression which considers general waiting-time distributions governing arrival and decay of proteins. By mapping the system to models analyzed in queueing theory, we derive analytical expressions for the noise in steady-state protein distributions. The derived results extend previous work by including the effects of arbitrary probability distributions representing the effects of molecular memory and bursting. The analytical expressions obtained provide insight into the role of transcriptional, post-transcriptional and post-translational mechanisms in controlling the noise in gene expression.

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