

## Stochastic bursting production in gene expression

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### Abstract

Gene expression is a process by which the information from a gene is used to synthesize molecules. Its stochastic nature is the effect of the low copy numbers of DNA and can lead to large variability in molecule levels for genetically identical cells. Recent experimental studies allowed to detect and count individual mRNAs and proteins in cells and revealed that the production of mRNAs and/or proteins occurs in random bursts of many molecules rather than a single one. We represent the number of these molecules as a stochastic process with continuous time and with values in a two-dimensional discrete state space. The model is based on the work of J. M. Pedraza and J. Paulsson *Effects of Molecular Memory and Bursting on Fluctuations in Gene Expression*, Science 2008, and our analysis goes beyond the calculations of the mean and the variance.

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