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How cell growth, division, and stochastic gene expression contribute to the protein noise floor

Thursday 24 September 2020 14:55 (30 minutes)

The origins of the protein noise floor –a lower bound for noise in gene expression, experimentally observed in highly expressed genes –are still debated. We propose a minimal model of gene expression in bacteria, which combines several contributions to the stochastic noise in protein levels: Variation in mean protein concentration during cell cycle, translational bursts, protein partitioning at cell division, and cell-cycle age distribution within the population. Our model is capable of predicting the existence of the noise floor and to semi-quantitatively reproduce the shapes of the experimental noise vs. protein concentration plots. Thus, it allows one to disentangle the contributions to the noise floor coming from the specific sources.

[1] J. Jędrak, A. Ochab-Marcinek, Contributions to the 'noise floor' in gene expression in a population of dividing cells, Scientific Reports, 10, 13533 (2020)

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