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Stochastic modeling of gene regulation by small RNAs VLAD ELGART, Department of Biology, Virginia Tech, TAO JIA, ANDREW FENLEY, RAHUL KULKARNI, Department of Physics, Virginia Tech — Recent research has uncovered several examples wherein post-transcriptional regulation by small RNAs plays an important role in critical cellular processes. We considered a stochastic model for regulation of target mRNAs by small RNAs. While the corresponding master equation is analytically intractable, application of the bursty synthesis approximation yields results for the steady-state protein probability distribution and the first moments. We compare our analytical results to stochastic simulation results using the Gillespie algorithm and to the results of linear noise approximation approach. The effects of transcriptional pulsing on protein steady-state expression are also explored within the same formalism.

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