Stochastic protein turnover model

Protein

γ_p

ϕ

k_{sp}

γ_m

mRNA

k_{sm}

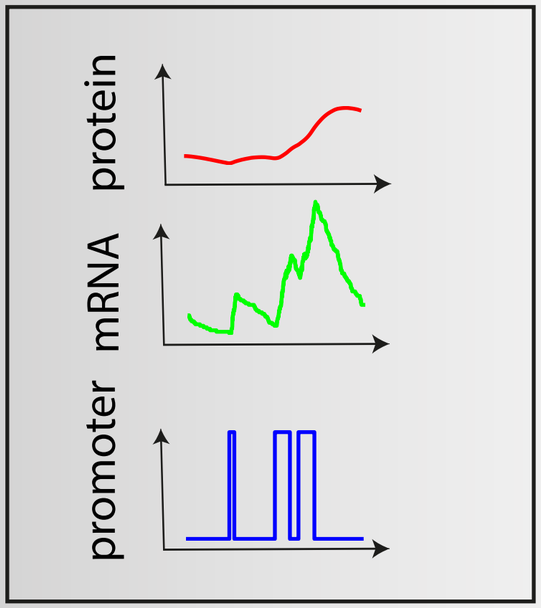
k_{on}

k_{off}

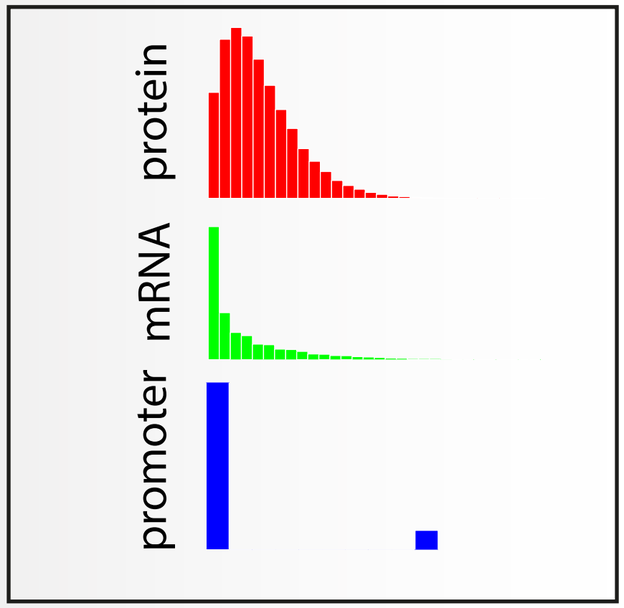
"ON" promoter "OFF"

Numerical simulations

Analytical results



Fluctuations in single cells



Steady-state population variability

protein	$\text{Autocorrelation}^{\text{Prot}} = f(k_{on}, k_{off}, k_{sm}, \gamma_m, k_{sp}, \gamma_p)$
mRNA	$\text{Autocorrelation}^{\text{mRNA}} = f(k_{on}, k_{off}, k_{sm}, \gamma_m)$
promoter	$\text{Autocorrelation}^{\text{Gene}} = f(k_{on}, k_{off})$

protein	$\text{Mean}^{\text{Prot}} = f(k_{on}, k_{off}, k_{sm}, \gamma_m, k_{sp}, \gamma_p)$ $\text{Var}^{\text{Prot}} = f(k_{on}, k_{off}, k_{sm}, \gamma_m, k_{sp}, \gamma_p)$
mRNA	$\text{Mean}^{\text{mRNA}} = f(k_{on}, k_{off}, k_{sm}, \gamma_m)$ $\text{Var}^{\text{mRNA}} = f(k_{on}, k_{off}, k_{sm}, \gamma_m)$
promoter	$\text{Mean}^{\text{Gene}} = f(k_{on}, k_{off})$ $\text{Var}^{\text{Gene}} = f(k_{on}, k_{off})$