Noise propagation in gene regulation networks involving interlinked positive and negative feedback loops

(*Supplementary Text S3*)

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**Figure 1.** The role of the noise autocorrelation time $\tau_0$ and the time scale of the protein reaction $\epsilon$ on signal sensitivity. The sensitivity of protein $S_\phi$ and miRNA $S_\mu$ as function of $\tau_0$ (A, C) and $\epsilon$ (B, D), respectively. Parameters are $\alpha = 0.15, \gamma_1 = 1.0, \gamma_2 = 1.3, \kappa = 4.5$. 
Figure 2. The role of the noise autocorrelation time $\tau_0$ and the time scale of the protein reaction $\varepsilon$ on signal sensitivity with initial steady off-state in bistable region. The sensitivity of protein $S_\phi$ and miRNA $S_\mu$ as function of $\tau_0$ (A, C) and $\varepsilon$ (B, D), respectively. Parameters are $\alpha = 0.15$, $\gamma_1 = 1.0$, $\gamma_2 = 1.3$, $\kappa = 4.5$.

Figure 3. The role of the noise autocorrelation time $\tau_0$ and the time scale of the protein reaction $\varepsilon$ on signal sensitivity in monostable region with on-state. The sensitivity of protein $S_\phi$ and miRNA $S_\mu$ as function of $\tau_0$ (A, C) and $\varepsilon$ (B, D), respectively. Parameters are $\alpha = 0.15$, $\gamma_1 = 1.0$, $\gamma_2 = 1.0$, $\kappa = 4.5$. 
Figure 4. The role of the noise autocorrelation time \( \tau_0 \) and the time scale of the protein reaction \( \varepsilon \) on signal sensitivity in monostable region with off-state. The sensitivity of protein \( S_\phi \) and miRNA \( S_\mu \) as function of \( \tau_0 \) (A, C) and \( \varepsilon \) (B, D), respectively. Parameters are \( \alpha = 0.15 \), \( \gamma_1 = 1.0 \), \( \gamma_2 = 1.9 \), \( \kappa = 4.5 \).

Figure 5. The role of the noise autocorrelation time \( \tau_0 \) and the time scale of the protein reaction \( \varepsilon \) on noise amplification with initial steady off-state in bistable region. (A, D) The noise amplification in the protein module and miRNAs as a function of \( \varepsilon \) and \( \tau_0 \). The noise amplification evolves with \( \tau_0 \) for different \( \varepsilon \) (B, E), and with \( \varepsilon \) for different \( \tau_0 \) (C, F), respectively. Parameters are \( \alpha = 0.15 \), \( \gamma_1 = 1.0 \), \( \gamma_2 = 1.3 \), \( \kappa = 4.5 \).
Figure 6. The role of the noise autocorrelation time $\tau_0$ and the time scale of the protein reaction $\varepsilon$ on noise amplification in monostable region with on-state. (A, D) The noise amplification in the protein module and miRNAs as a function of $\varepsilon$ and $\tau_0$. The noise amplification evolves with $\tau_0$ in input signal for different $\varepsilon$ (B, E), and $\varepsilon$ for different $\tau_0$ (C, F), respectively. Parameters are $\alpha = 0.15$, $\gamma_1 = 1.0$, $\gamma_2 = 1.0$, $\kappa = 4.5$.

Figure 7. The role of the noise autocorrelation time $\tau_0$ and the time scale of the protein reaction $\varepsilon$ on noise amplification in monostable region with off-state. (A, D) The noise amplification in the protein module and miRNAs as a function of $\varepsilon$ and $\tau_0$. The noise amplification evolves with $\tau_0$ for different $\varepsilon$ (B, E), and $\varepsilon$ for different $\tau_0$ (C, F), respectively. Parameters are $\alpha = 0.15$, $\gamma_1 = 1.0$, $\gamma_2 = 1.9$, $\kappa = 4.5$. 