Relació Partícules - Corrents

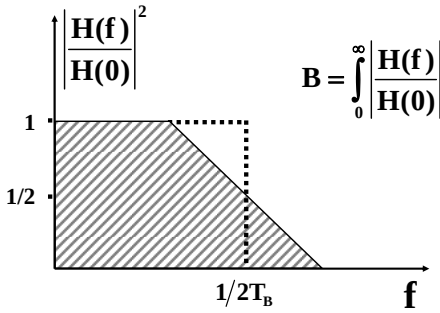
$$\langle s\rangle = \langle m\rangle + \langle p\rangle = \eta\langle n\rangle + \langle p\rangle$$

→ Soroll Tèrmic $\quad \langle p\rangle = \frac{I_T}{q} T_B$

$$\begin{cases} I_T = 0 \\ \sigma_T^2 = \dfrac{4KTB}{R_L} \end{cases} \qquad \begin{cases} \langle p\rangle = 0 \\ \sigma_p^2 = \left(\dfrac{T_B}{q}\right)^2 \dfrac{4KTB}{R_L} \end{cases}$$

Soroll Shot $\quad \langle n\rangle = \dfrac{P\,T_B}{hf}$

$$\begin{cases} \langle m\rangle \equiv M\eta\langle n\rangle \\ \sigma_m^2 \equiv M^2 F\eta\langle n\rangle \end{cases}$$



$$B = \int_0^\infty \left|\frac{H(f)}{H(0)}\right|^2 \partial f = \frac{1}{2T_B}$$

$$\begin{cases} I = M\Re P = M\eta\dfrac{q}{hf}P = \dfrac{q}{T_B}M\eta\langle n\rangle \\ \sigma_I^2 = 2qBM^2F(M)\Re P = \dfrac{q}{T_B}M^2F(M)\eta\dfrac{q}{hf}P = \left(\dfrac{q}{T_B}\right)^2 M^2F(M)\eta\langle n\rangle \end{cases}$$

Sensibilitat del Receptor

$$\langle s\rangle \equiv M\eta\langle n\rangle \qquad I = M\Re P$$

$$\sigma_s^2 \equiv M^2F\eta\langle n\rangle + \sigma_p^2 \qquad \sigma_I^2 = 2qBM^2F(M)\Re P + \sigma_T^2$$

Estadística Gaussiana

$$Q \equiv \frac{I_1 - I_0}{\sigma_1 + \sigma_0} = \frac{M\Re P_1}{\sqrt{2qBM^2F(M)\Re P_1 + \sigma_T^2} + \sigma_T} \qquad \bar{P} \equiv \frac{1}{2}(P_1 + P_0)$$

$$\frac{M\Re P_1}{\sqrt{2qBM^2F(M)\Re P_1 + \sigma_T^2} + \sigma_T} \geq 6 \longrightarrow \boxed{\bar{P} \geq 36qB\frac{F(M)}{\Re} + 6\frac{\sigma_T}{M\Re} \equiv S}$$

$$F(M) = M^x$$

$$S_{PIN} = 36q\frac{B}{\Re} + 6\frac{\sigma_T}{\Re} \approx 6\frac{\sigma_T}{\Re}$$ Domini Tèrmic

$$\frac{\partial S}{\partial M} = 36xqB\frac{M^{x-1}}{\Re} - 6\frac{\sigma_T}{M^2\Re} = 0 \longrightarrow \boxed{M_{OPT}^{x+1} = \frac{\sigma_T}{6xqB}} \longrightarrow S_{OPT}$$