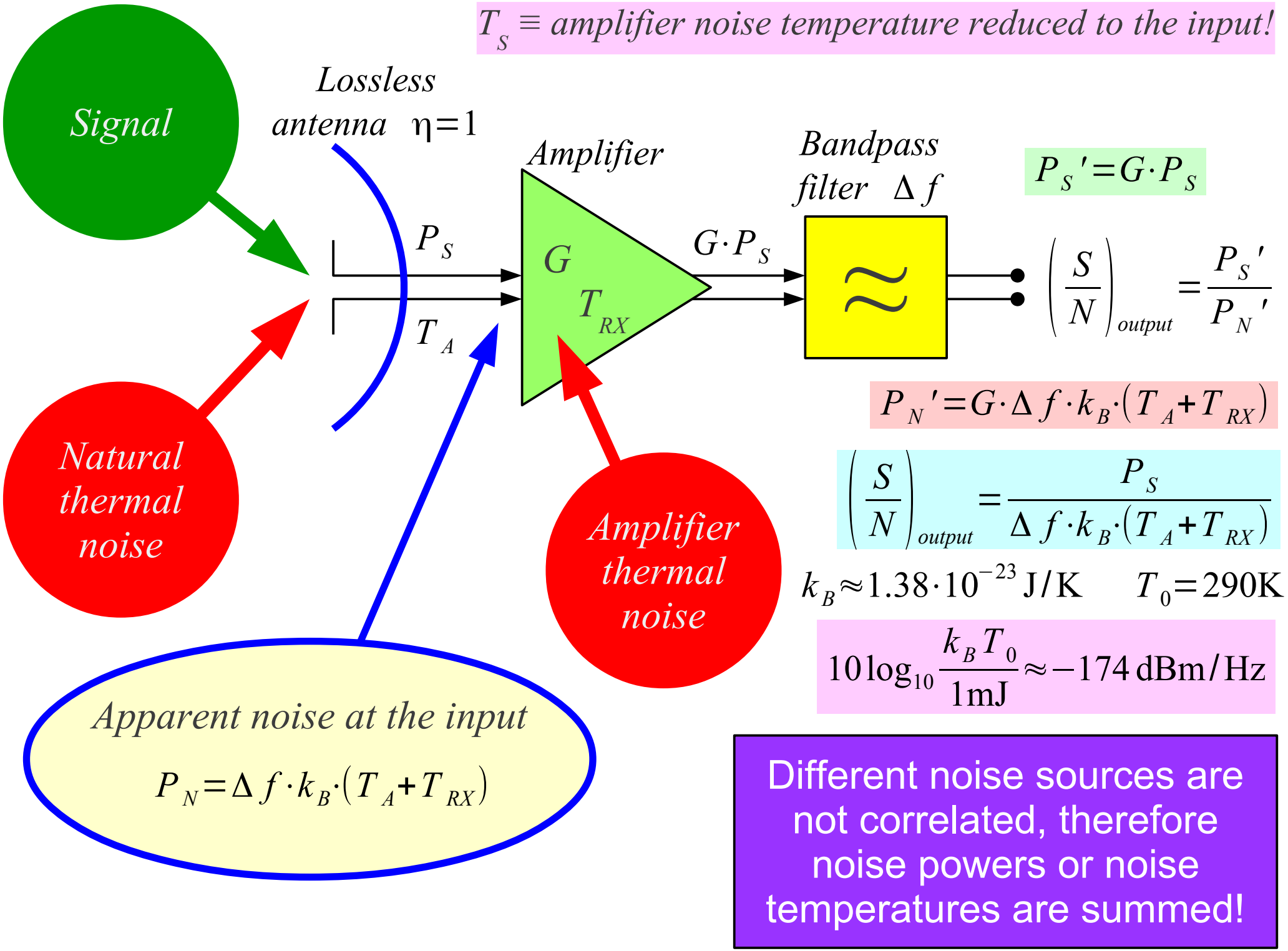
$T_S \equiv$ amplifier noise temperature reduced to the input!
Signal
Lossless antenna $\eta=1$
Amplifier
Bandpass filter Δf
$P_S' = G \cdot P_S$
P_S
T_A
G
T_{RX}
$G \cdot P_S$
$\left(\frac{S}{N}\right)_{output} = \frac{P_S'}{P_N'}$
Natural thermal noise
Amplifier thermal noise
$P_N' = G \cdot \Delta f \cdot k_B \cdot (T_A + T_{RX})$
$\left(\frac{S}{N}\right)_{output} = \frac{P_S}{\Delta f \cdot k_B \cdot (T_A + T_{RX})}$
$k_B \approx 1.38 \cdot 10^{-23}\,\mathrm{J/K}$
$T_0 = 290\mathrm{K}$
Apparent noise at the input
$P_N = \Delta f \cdot k_B \cdot (T_A + T_{RX})$
$10\log_{10}\frac{k_B T_0}{1\mathrm{mJ}} \approx -174\,\mathrm{dBm/Hz}$
Different noise sources are not correlated, therefore noise powers or noise temperatures are summed!