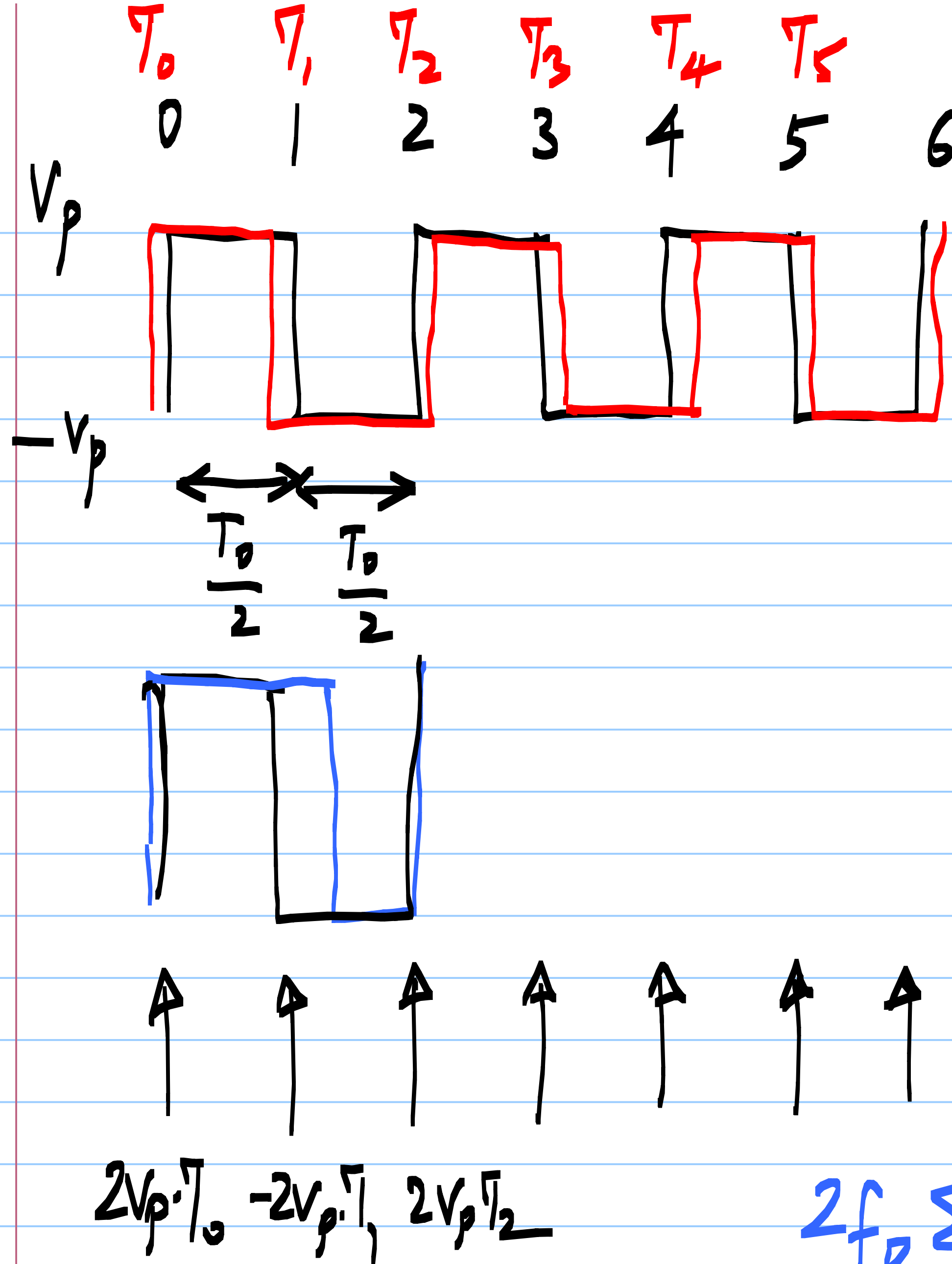
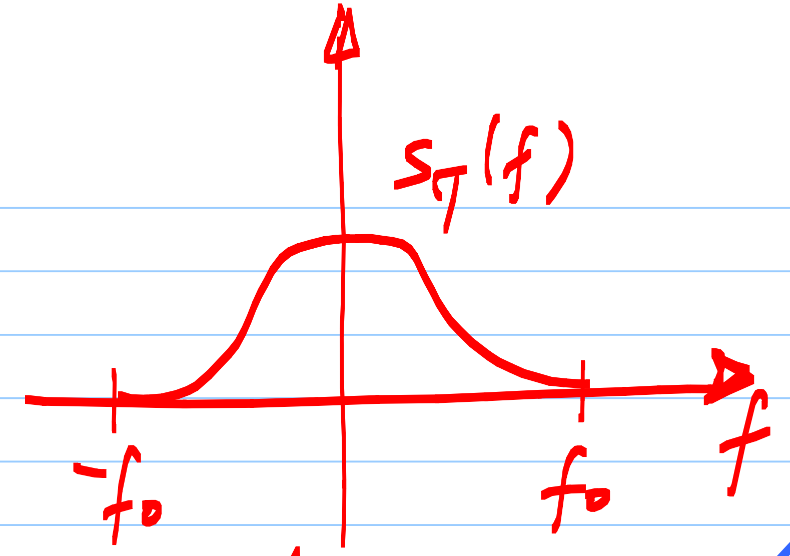
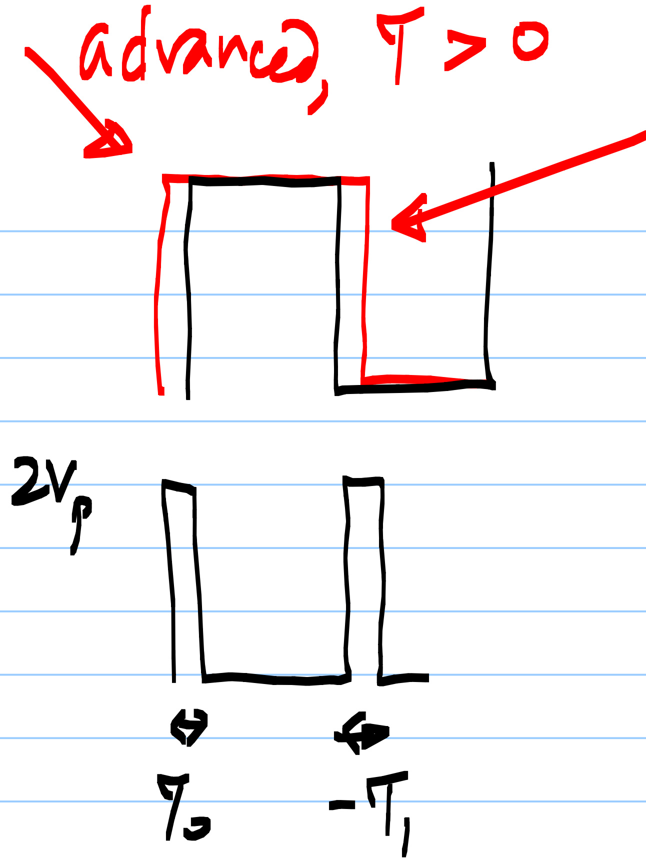




$$\sum 2V_p T_k (-1)^k \delta\left(t - k\frac{T_0}{2}\right)$$

$$2f_0 \sum_{k:\text{odd}} \delta(f - kf_0)$$



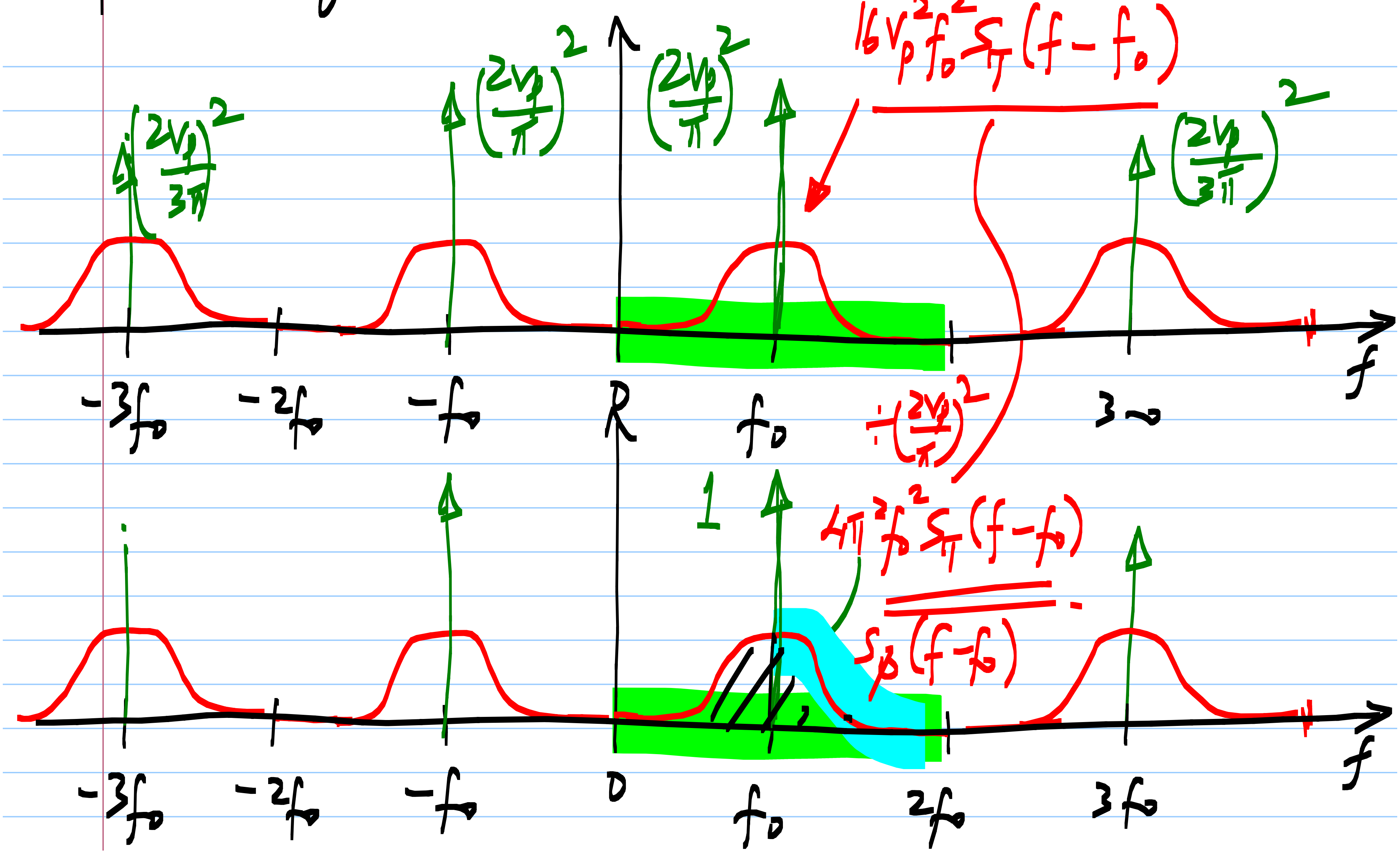
positive pulse if

{ k is even (rising edge)
and T > 0

OR

k is odd
and T < 0

Spectrum of error due to jitter



$$4\pi^2 f_0^2 S_\tau(f)$$

τ_k

$$2\pi f_0 \tau_k = \phi_k$$

τ : time jitter

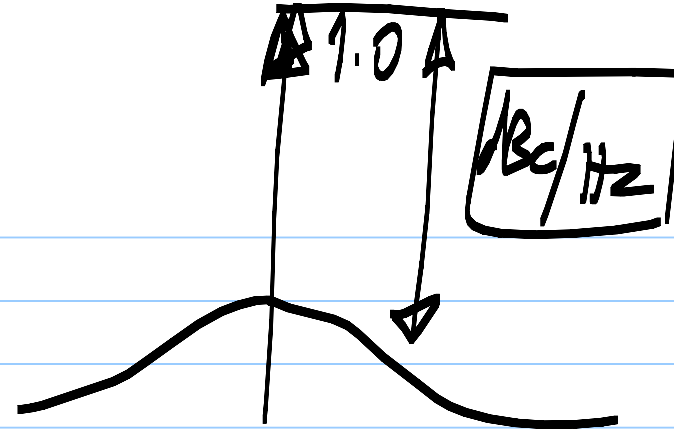
$f_0 \tau$: UI jitter (cycles)

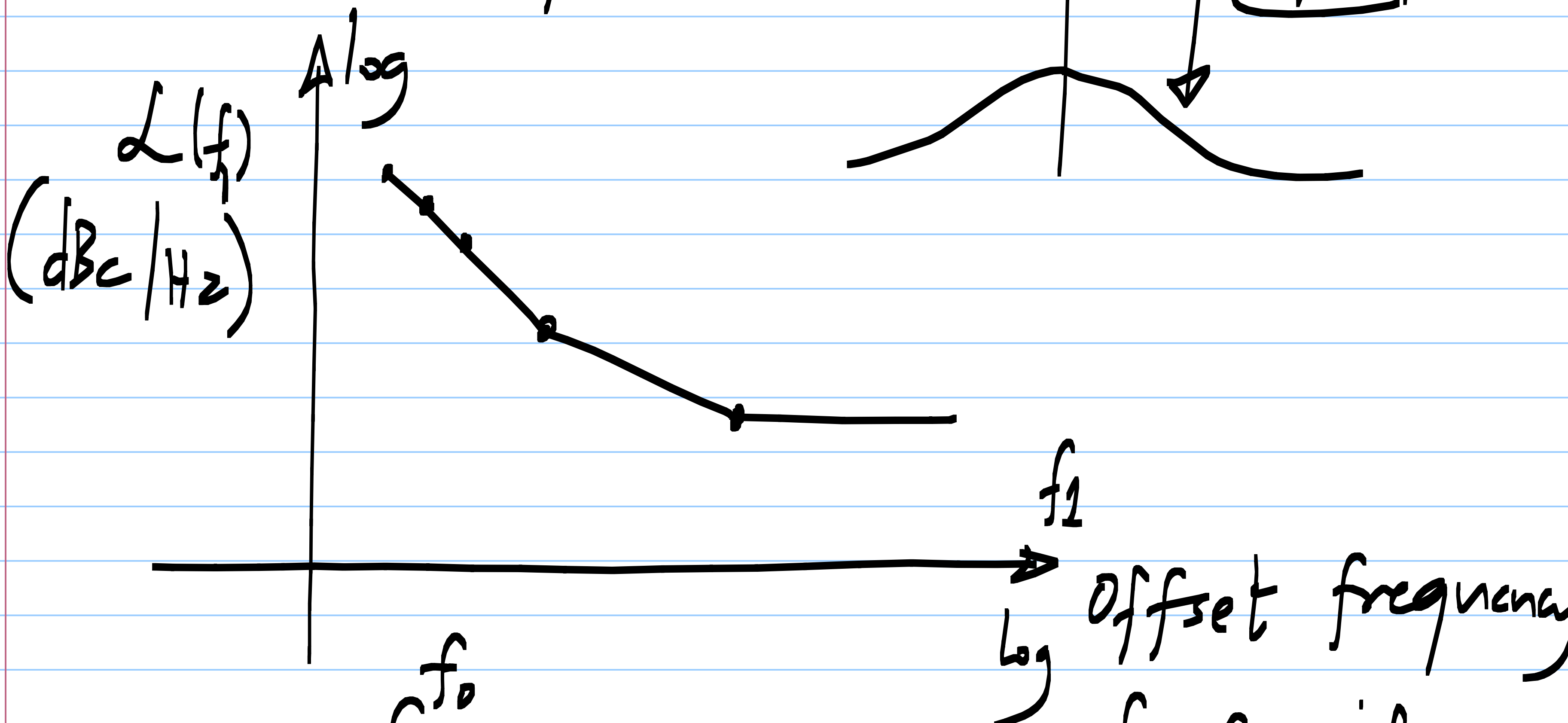
$2\pi f_0 \tau$: phase jitter radians

A periodic signal @ f_0 is jittered by a sequence τ_k

In the spectrum normalized such that the power @ $f_0 = 1$, the sidebands = 2-sided phone noise spectrum

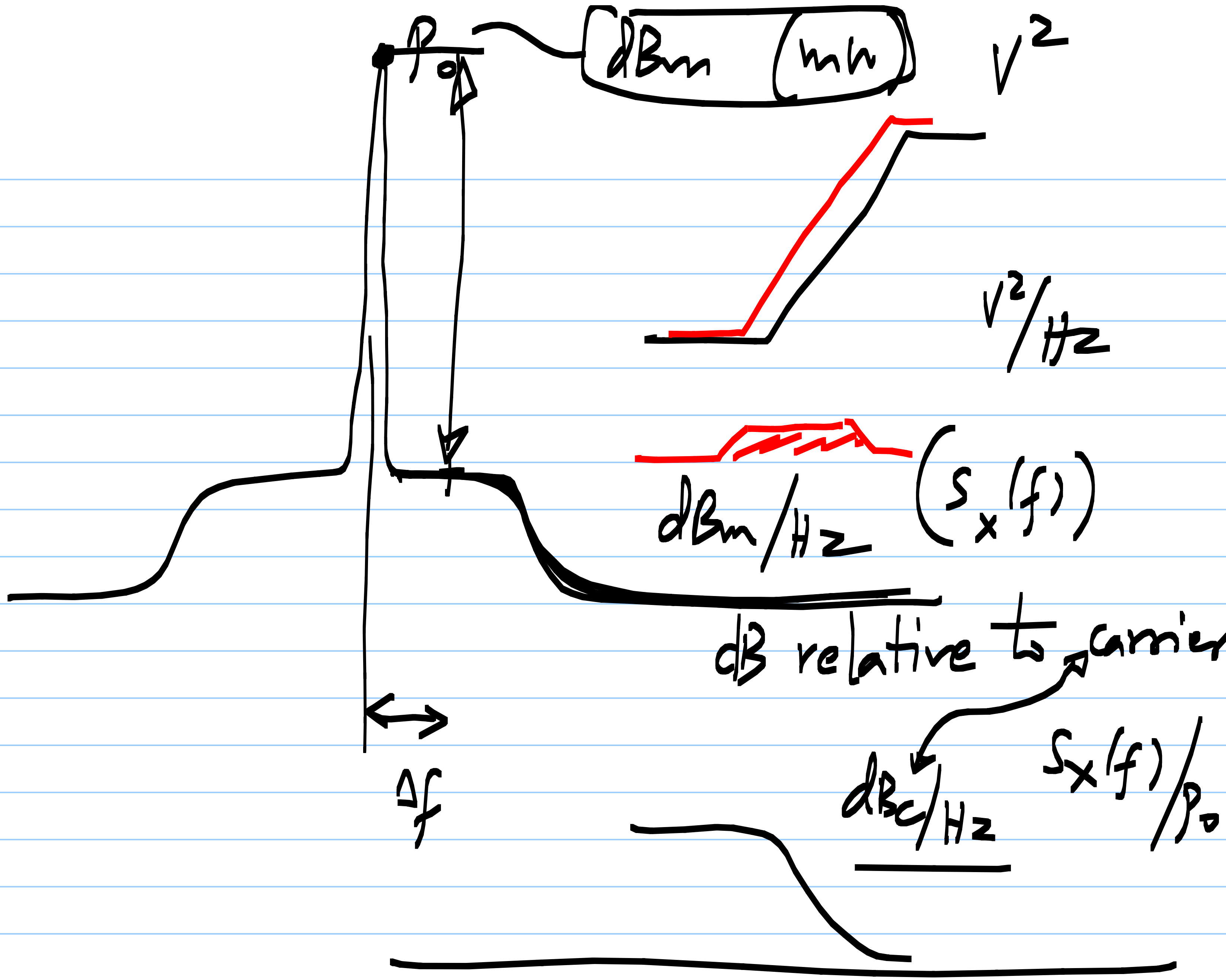
Phase noise plot





$$f - f_0 = f_1$$

$$\sigma_\phi^2 = 2 \int_0^{f_0} \mathcal{L}(f_1) \cdot df_1$$



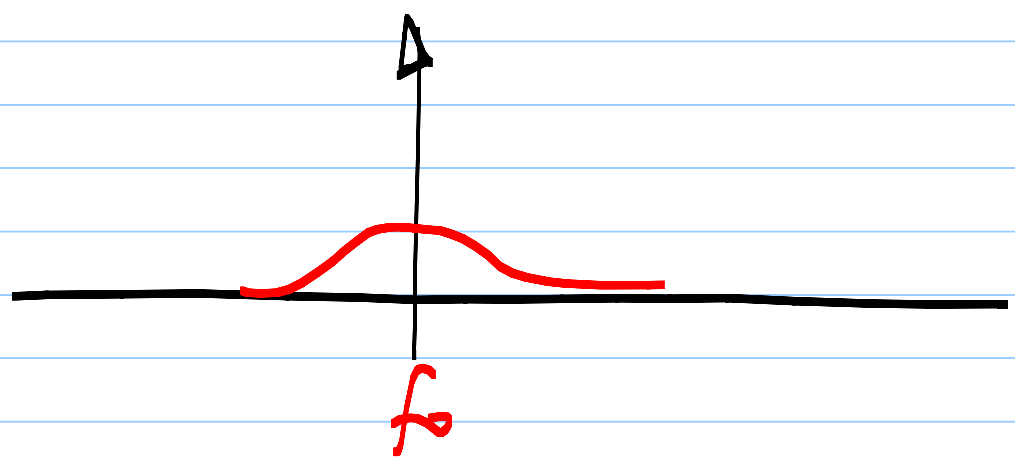
P_0
dBm
mW
V^2
V^2/Hz
dBm/Hz
$(S_x(f))$
dB relative to carrier
dBc/Hz
$S_x(f)/P_0$
Δf

$$V_p \cos(2\pi f_0 t + \phi_n)$$

$$V_p \left[\cos(2\pi f_0 t) \cdot \underbrace{\cos(\phi_n)}_{1} - \sin(2\pi f_0 t) \cdot \underbrace{\sin(\phi_n)}_{\sim \phi_n} \right]$$

$\phi_n \ll 1$ rad,

$$\cos(2\pi f_0 t) - \underbrace{\phi_n}\,\underbrace{\sin(2\pi f_0 t)}$$

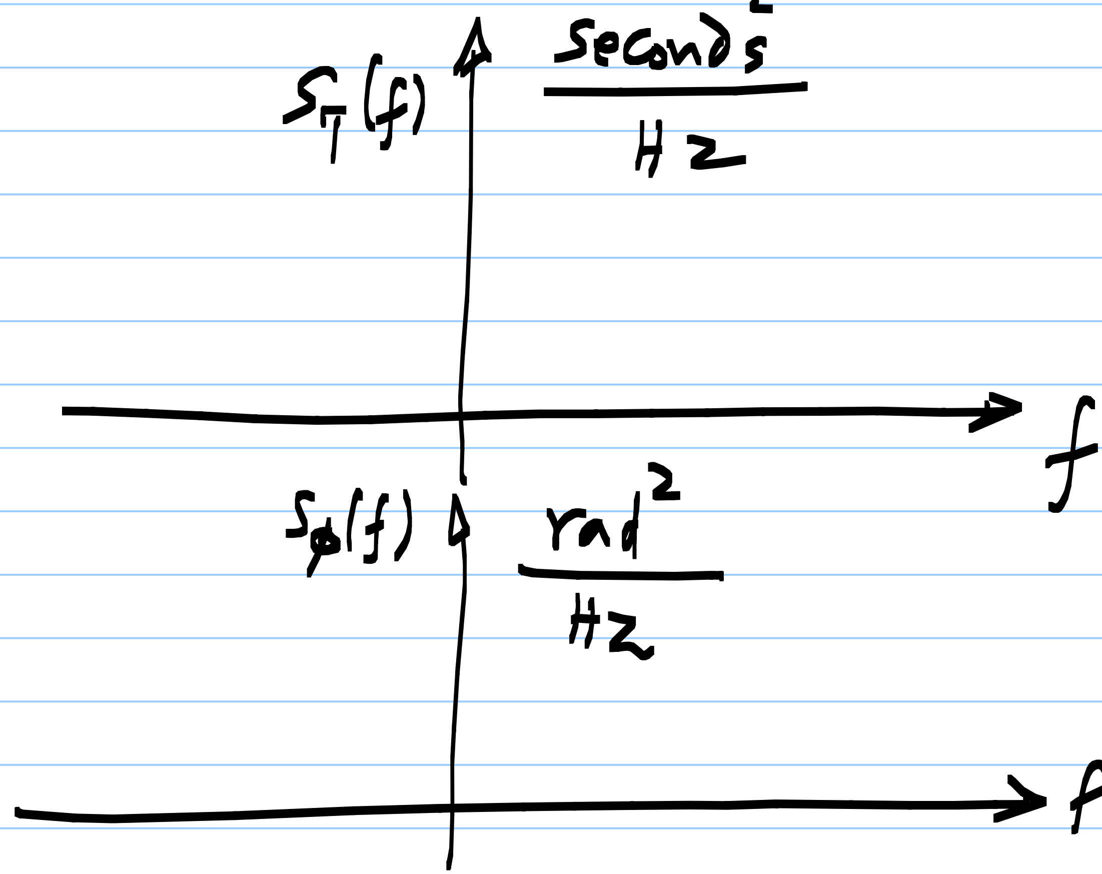


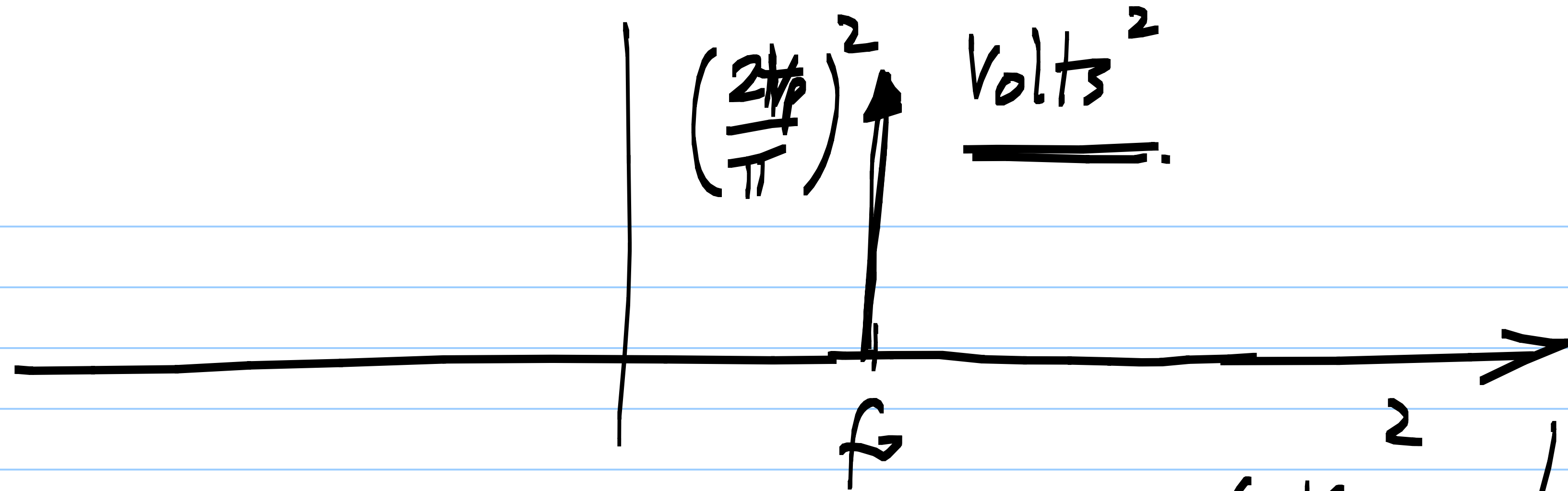
$\sigma_\tau^2 \rightarrow$ second^2

σ_τ^2: τ_k: time jitter, seconds $= \sigma_\tau$

σ_ϕ^2: $\phi_k = \underbrace{2\pi f_0}\,\tau_k$, phase jitter, radians $= \sigma_\phi$

$\sigma_\phi^2 \rightarrow$ rad^2





dBm: $10\log_{10}\left(\frac{P_{sig}}{1\,mW}\right) = 10\log_{10}\left(\frac{V_{sig,rms}^2/50}{1\,mW}\right)$

Ref. resistance = $50\,\Omega$

$$= 10\log_{10}\left(\frac{I_{sig,rms}^2 \cdot 50}{1\,mW}\right)$$

dBV :

$$20 \log\left(\frac{V_{sig,rms}}{1V}\right)$$