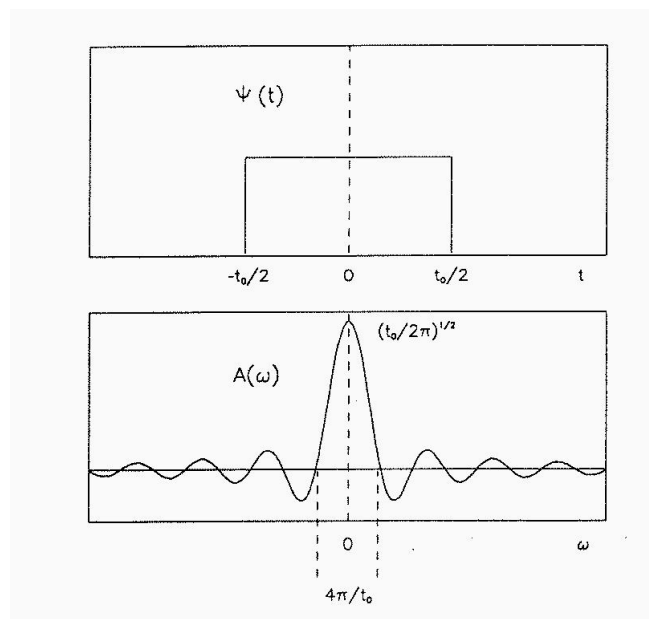


Relazione di indeterminazione per energia e tempo

$$\Psi(t) = \frac{1}{\sqrt{2\pi}} \int d\omega A(\omega) e^{-i\omega t}, \quad \int dt |\Psi(t)|^2 = 1$$

$$A(\omega) = \frac{1}{\sqrt{2\pi}} \int dt \Psi(t) e^{i\omega t}, \quad \int d\omega |A(\omega)|^2 = 1$$



larghezza di banda: $(\Delta\omega)^2 = \int d\omega (\omega - \langle\omega\rangle)^2 |A(\omega)|^2$

durata del segnale: $(\Delta t)^2 = \int dt (t - \langle t\rangle)^2 |\Psi(t)|^2$

$$\Delta\omega \Delta t \gtrsim \frac{1}{2}$$

ma $E = \hbar\omega \Rightarrow \Delta E \Delta t \gtrsim \frac{1}{2} \hbar$