TEOREMA DI PARSEVAL

$$E_X = \int_{-\infty}^{\infty} |x(t)|^2 \, dt = \int_{-\infty}^{\infty} |X(f)|^2 \, df$$

DENSITÀ SPETTRALE DI POTENZA

<u>dim.</u>

$$E_X = \int_{-\infty}^{\infty} x(t) \, x^*(t) \, dt$$

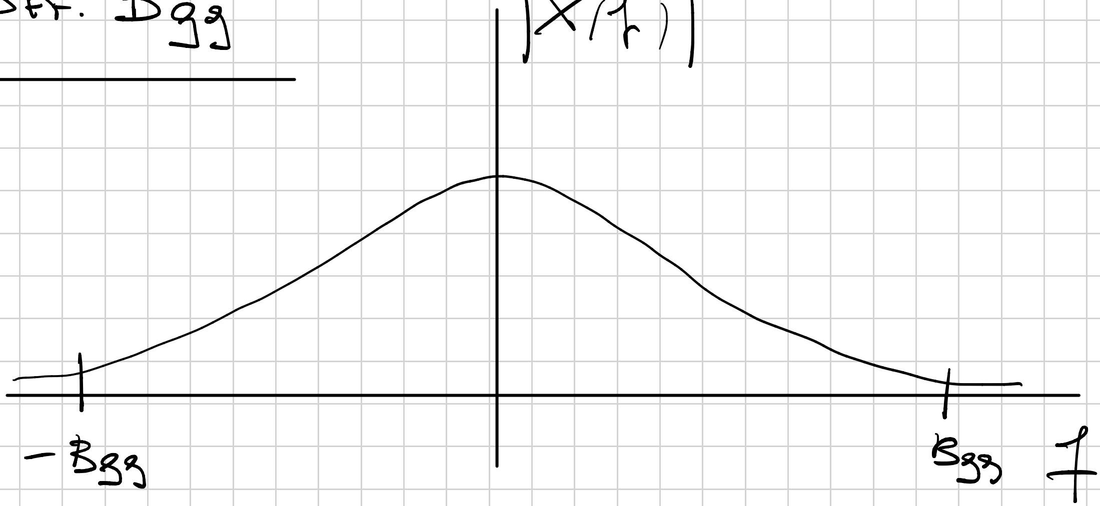
$$= \int_{-\infty}^{\infty} x(t) \left(\int_{-\infty}^{\infty} X(f) \, e^{j2\pi f t} \, df \right)^* dt$$

$$= \int_{-\infty}^{\infty} x(t) \int_{-\infty}^{\infty} X^*(f) \, e^{-j2\pi f t} \, df \, dt$$

$$= \int_{-\infty}^{\infty} X^*(f) \int_{-\infty}^{\infty} x(t) \, e^{-j2\pi f t} \, dt \, df$$

$$= \int_{-\infty}^{\infty} X^*(f) \, X(f) \, df = \int_{-\infty}^{\infty} |X(f)|^2 \, df$$

DEF. B_{99}



$$\int_{-B_{99}}^{B_{99}} |X(f)|^2 \, df = 0.99 \, E_x$$

FILTRO LTI

$$Y(f) = X(f)\,H(f)$$

$$|Y(f)|^2 = |X(f)|^2 \, |H(f)|^2$$

LA DENSITA' SPETTRALE DI POTENZA DIPENDE SOLO DA $|H(f)|^2$ NON DALLA FASE DI $H(f)$

FUNZIONE DI AUTOCORRELAZIONE

$$R_x(\tau) = \int_{-\infty}^{\infty} x(t)\, x(t-\tau)\, dt$$

MISURA LA VARIABILITA' DEL SEGNALE NEL TEMPO.

$$|R_x(\tau)| \leq R_x(0)$$

$$\boxed{x(t) \otimes x(t) = \int_{-\infty}^{\infty} x(\alpha)\, x(t-\alpha)\, d\alpha}$$

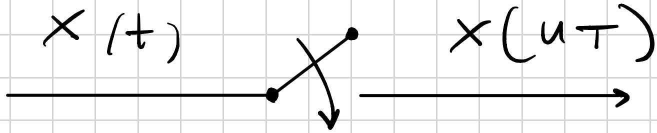
$$= \int_{-\infty}^{\infty} x(t)\, x(-(\tau-t))\, d\tau$$

$$= x(\tau) \otimes x(-\tau)$$

$$R_x(\tau) \rightleftharpoons X(f)\, X(-f) = X(f)\, X^*(f)$$

$$= |X(f)|^2 = S_x(f)$$

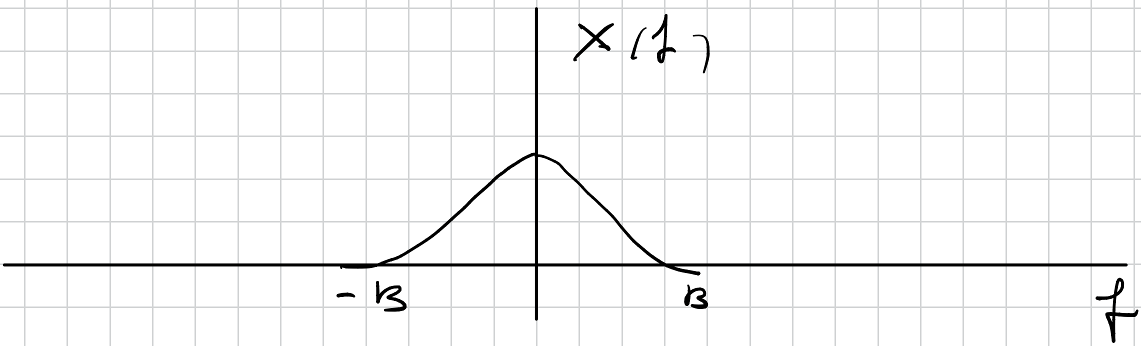
TRASFORMATA DISCRETA FOURIER

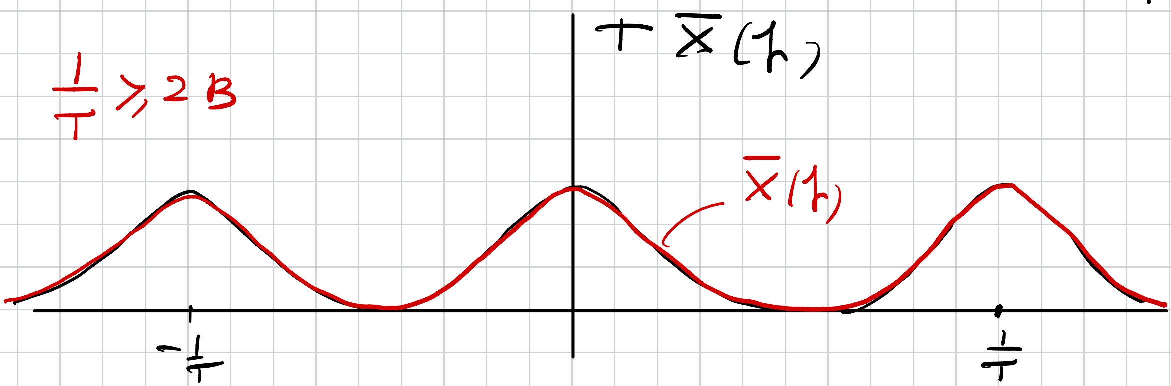


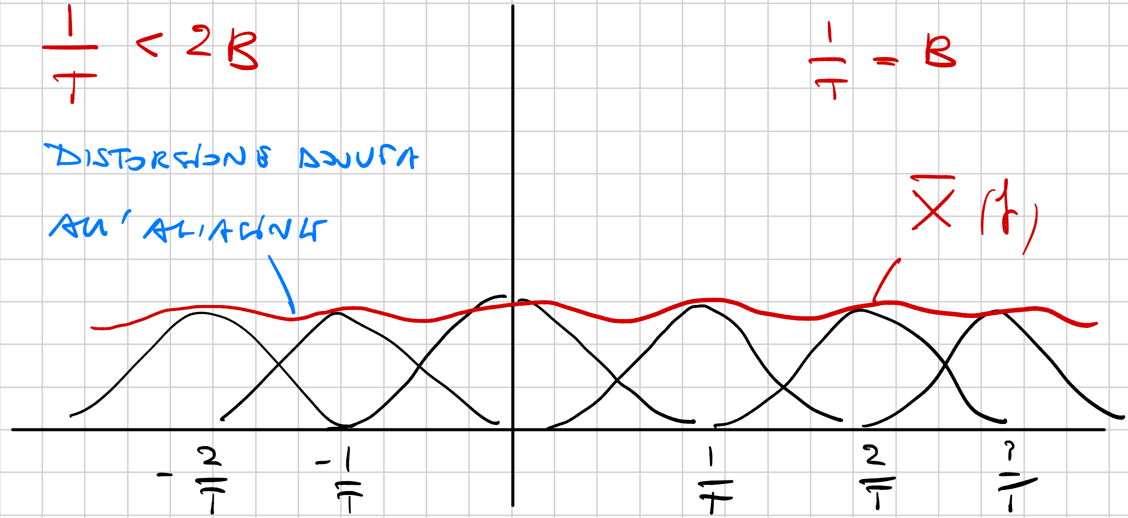
$$\frac{1}{T} \geq 2B$$

$$\bar{X}(f) \triangleq \sum_n x(nT)\, e^{-j 2\pi f n T}$$

(dim. omessa) $$= \frac{1}{T} \sum_k X\left(f - \frac{k}{T}\right)$$







CONDIZIONE DI NYQUIST

FISSATA LA BANDA B DEL SEGNALE, LA FREQUENZA DI CAMPIONAMENTO DEVE ESSERE SCELTA:

$$\boxed{f_s = \frac{1}{T} \geq 2B}$$

DETTA CONDIZIONE DI NYQUIST.