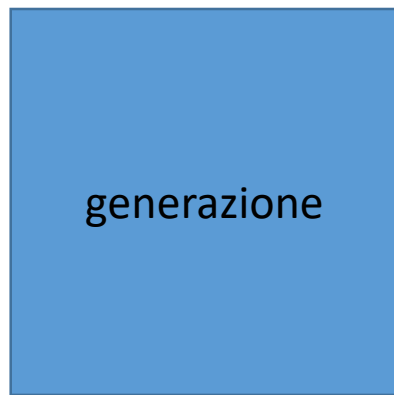




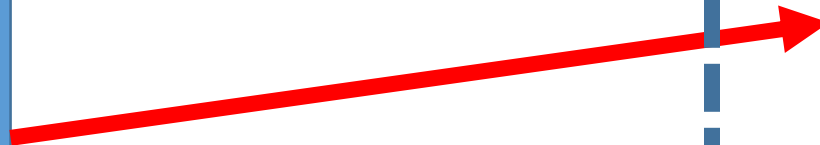
Esercitazione: Analisi in frequenza dei segnali



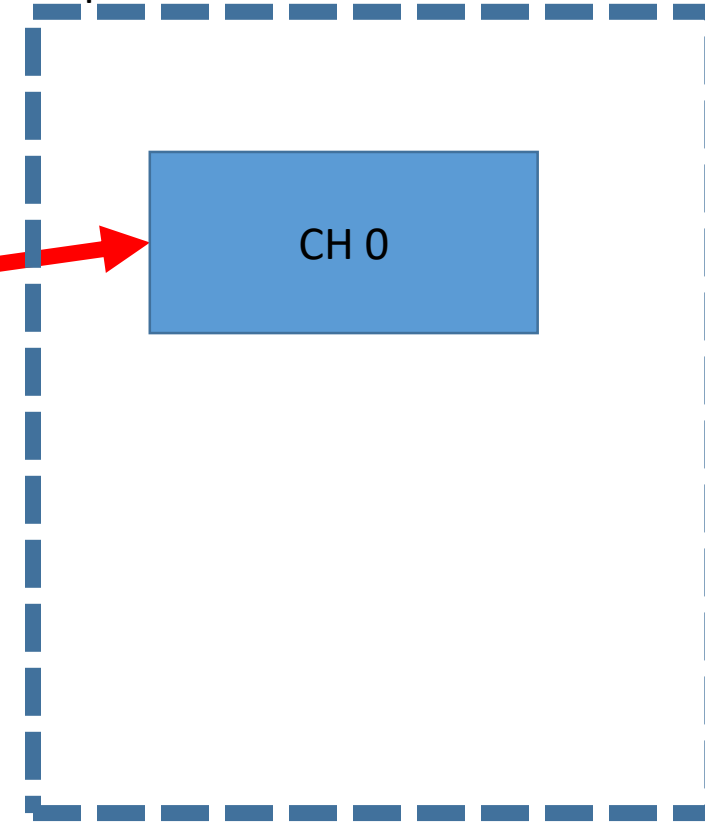
Singolo Canale



Pin generazione myDAQ: A00 - AGND



Acquisizione



Pin Acquisizione myDAQ: 0+ , 0-



Singolo Canale

The screenshot shows a software interface titled "Instruments & Apps". On the left is a dark sidebar with navigation options: "Instruments & Apps" (with a ruler icon), "Favorites" (with a star icon), "Labs" (with a flask icon), "My Files" (with a folder icon), and "Resources" (with a document icon). The main area displays a grid of instrument icons. The "Function Generator" icon, which depicts a sine wave, is circled in red. Other visible icons include: Arbitrary Waveform Generator, Bode Analyzer, Digital Reader, Digital Writer, Digital Multimeter, Dynamic Signal Analyzer, Oscilloscope, 8-Channel Oscilloscope, Audio Equalizer, Data Logger, DC Level, Octave Analyzer, and an "Add Item" icon (a plus sign).

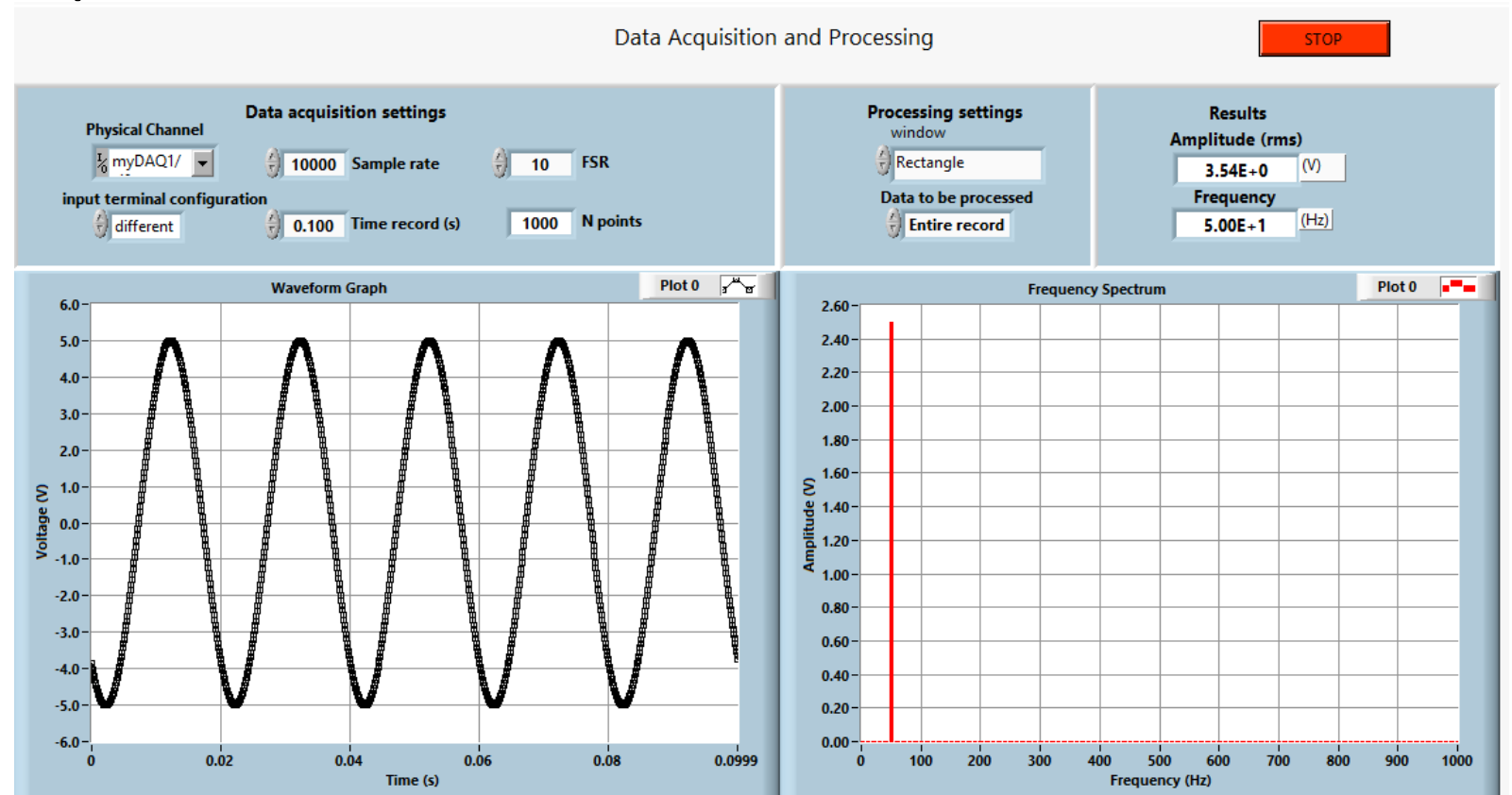
Esercizio 1 – Campionamento

Generazione Segnale

- Sinusoidale
- 10 V
- 50 Hz

Acquisizione

- Time Record 0.1 s
- Frequenza campionamento da 10000 S/s a 300 S/s





Concetti Fondamentali

- Segnale periodico e aperiodico
- Periodo e Frequenza ($T, f_1 = 1/T$)
- Scomposizione in serie di Fourier (kf_1)
- Segnali fondamentali:
 - sinusoidale, onda quadra, triangolare, treno di impulsi, continuo
- Limite derivato della trasformata di Fourier per segnali continui



Concetti fondamentali

- Dominio Tempo \leftrightarrow Dominio Frequenza
- Dominio della frequenza $X(f)$, spettro complesso \rightarrow modulo e fase
- Operazioni fondamentali per l'elaborazione del segnale tramite sistema digitale
 - Campionamento
 - Troncamento del segnale
 - Discretizzazione dell'asse delle frequenze

Campionamento

- Teorema del campionamento
 - (segnale limitato in banda $\rightarrow f_m$)
 - $x(t) \rightarrow x(iT_s) \rightarrow$ Segnale Tempo Discreto
 - T_s Tempo Campionamento
 - F_s Frequenza di campionamento
 - $x(t)s(t) \leftrightarrow X(F)*S(F)$
 - No sovrapposizioni tra le repliche
 - $f_s, 1/T_s \geq 2f_m$
 - $f_s < 2f_m \rightarrow$ aliasing
 - Segnale originale \rightarrow spettro limitato!

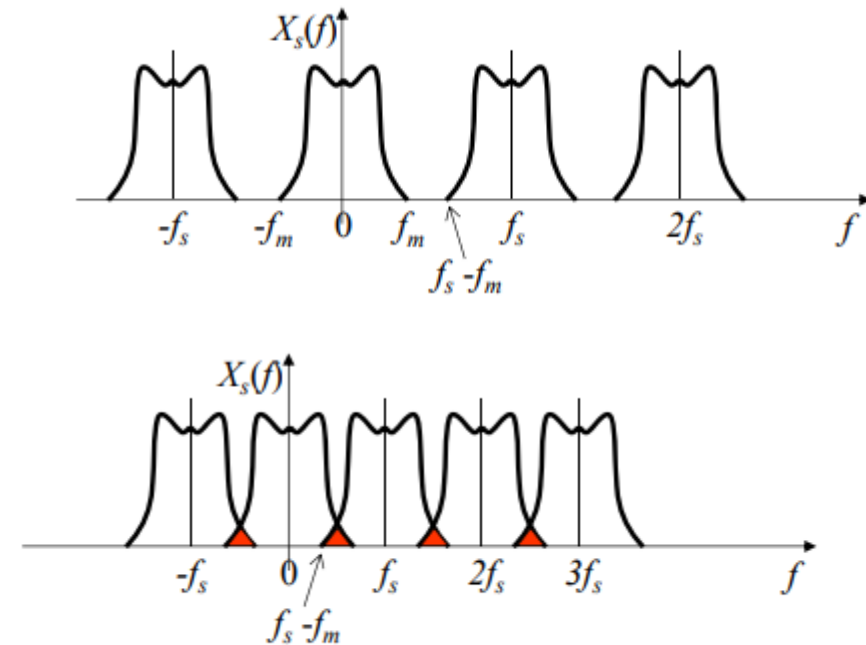
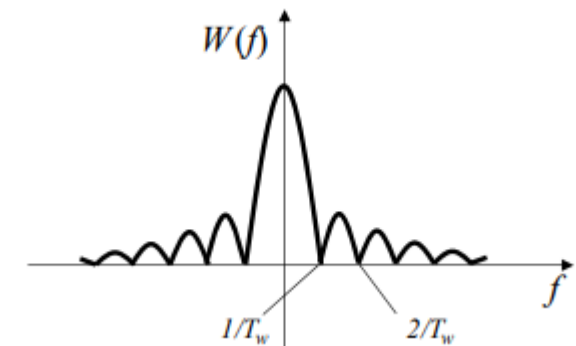
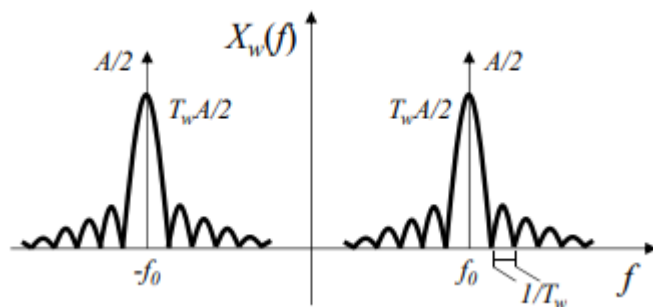
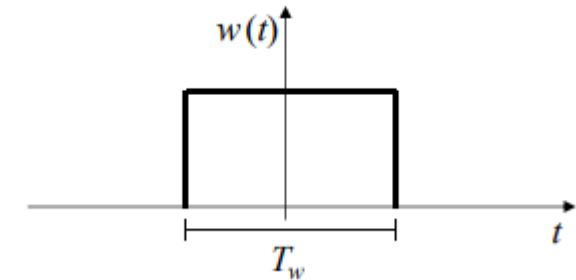
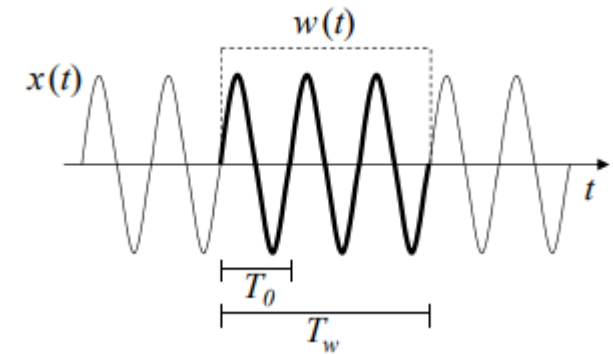


Fig.2.6 – Fenomeno di aliasing.

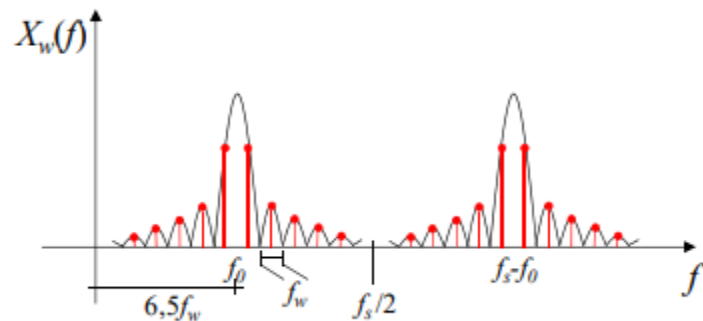
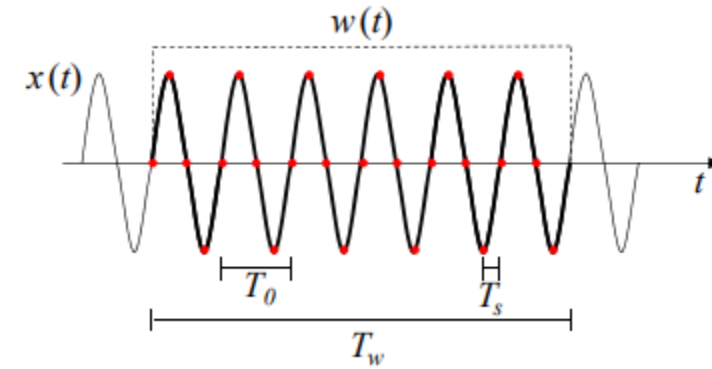
Troncamento del segnale

- # finito di campioni
- $x(t)$, $w(t)$
- Introduzione della dispersione spettrale leakage

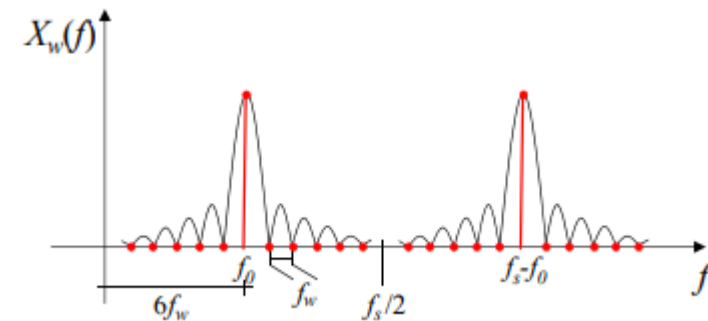


DFT

- $T_w = NT_s$
- $1/T_w \rightarrow f_w \rightarrow$ risoluzione spettrale
- $f_w = F_s/N$



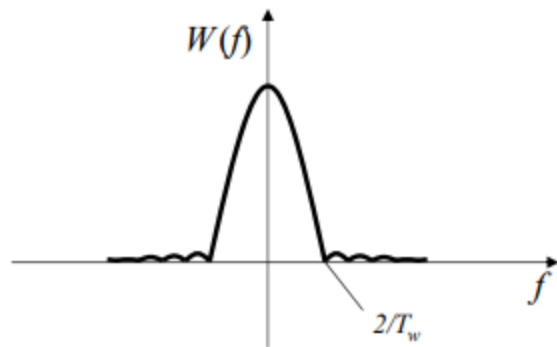
Caso Campionamento non Coerente



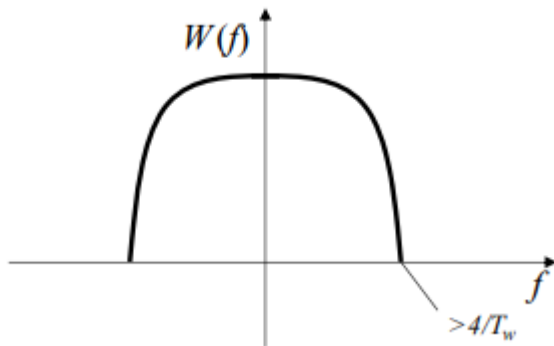
Caso Campionamento Coerente



Finestratura



Hann



Flat Top

