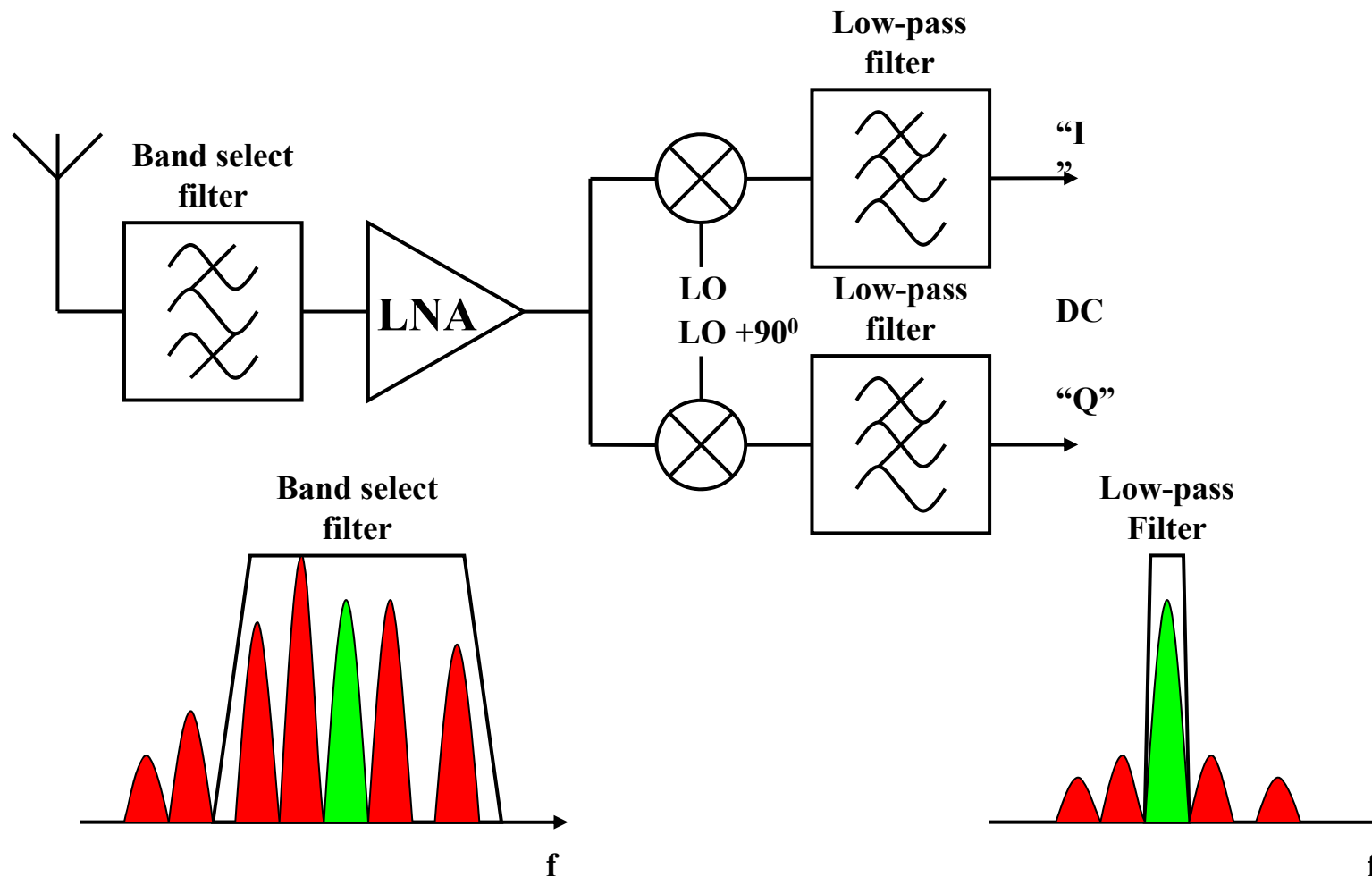


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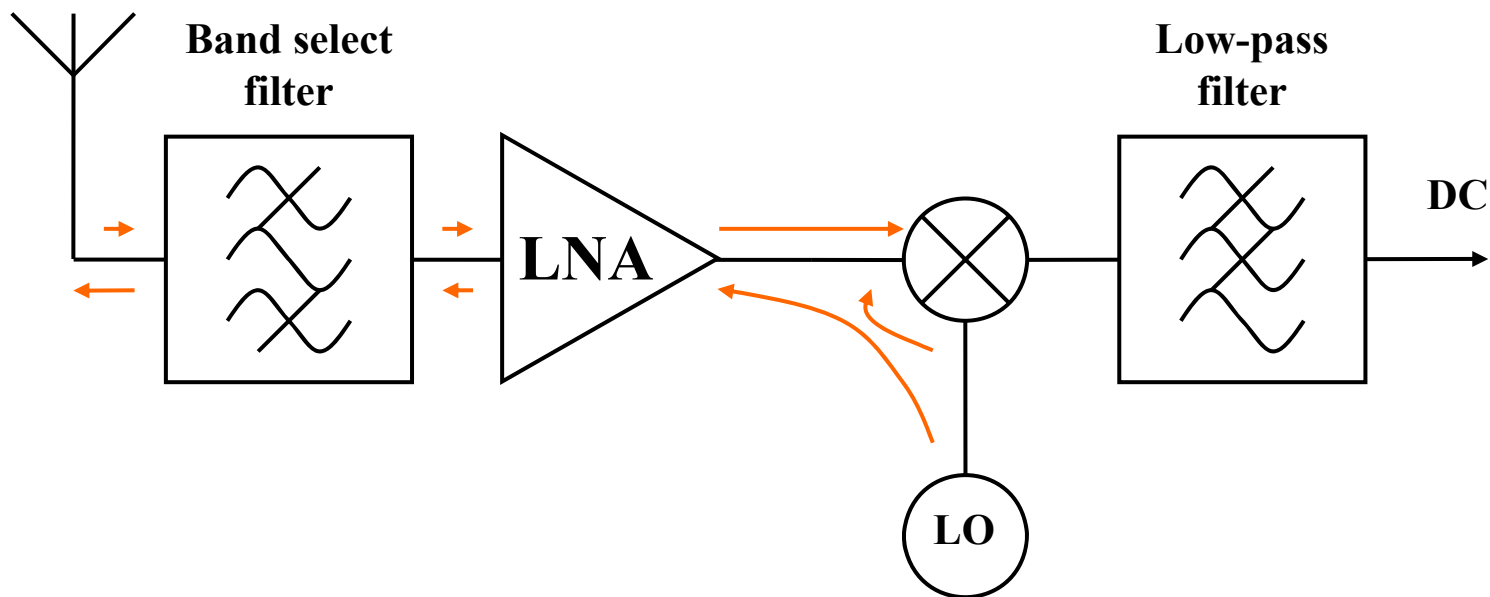
# Schema del ricevitore: Piano delle frequenze, Filtri & Mixer

*Pierfrancesco Lombardo*

# Direct I&Q downconversion (I)



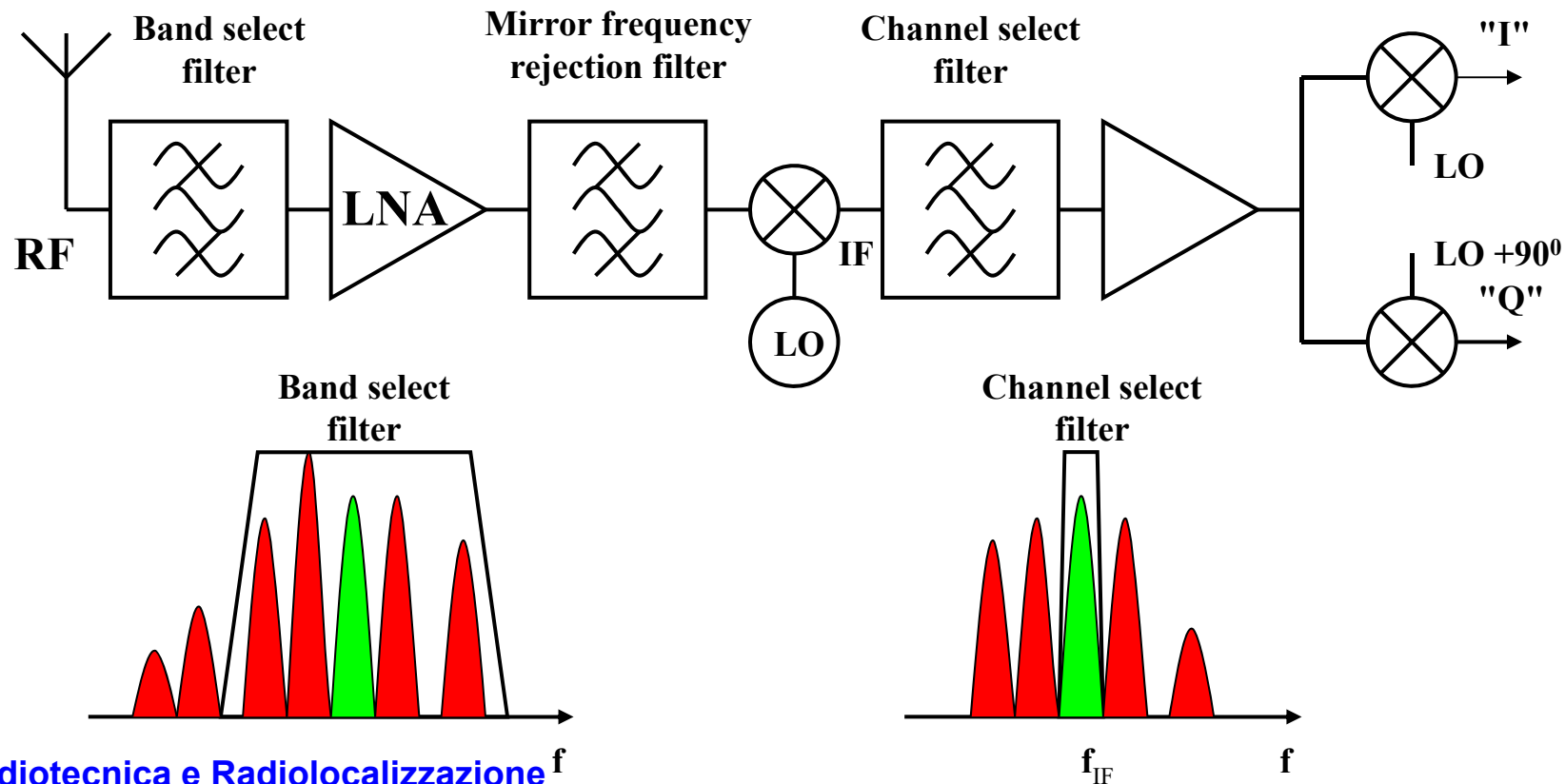
# Direct I&Q downconversion (II)



# Schema di ricevitore eterodina

Due stadi di conversione:

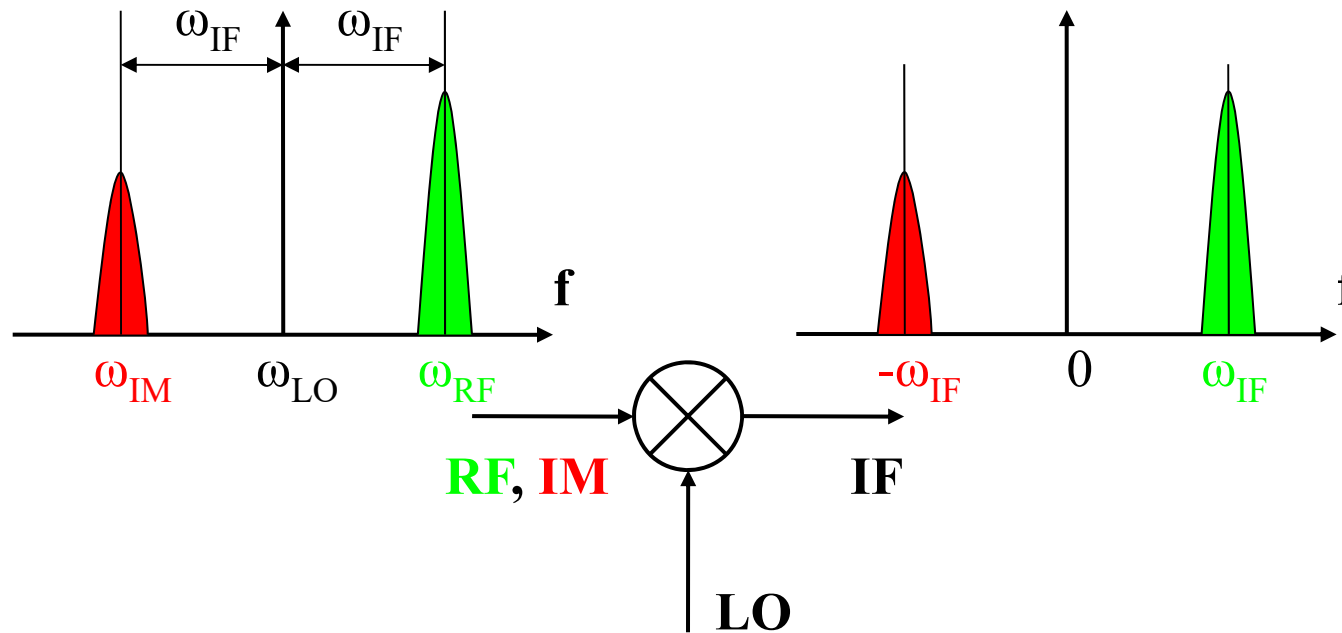
- 2° stadio ad IF : *amplificazione e filtraggio a frequenza costante*
- 1° stadio a RF : *capacità di selezionare una frequenza da una banda più ampia*



# Frequenza immagine e sua reiezione

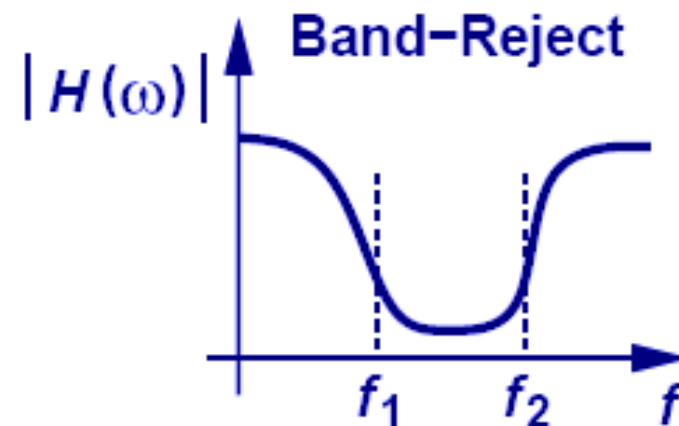
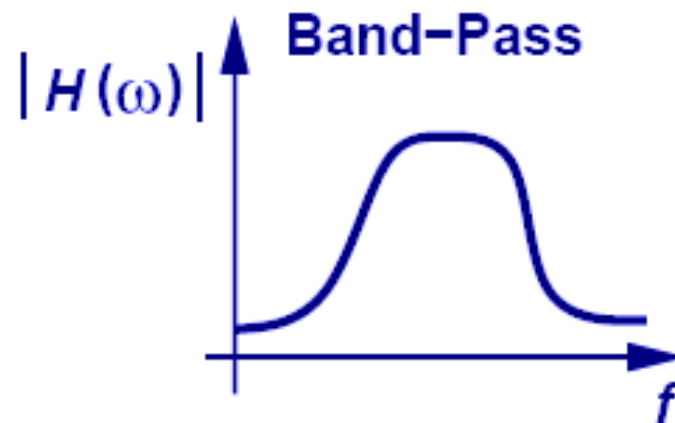
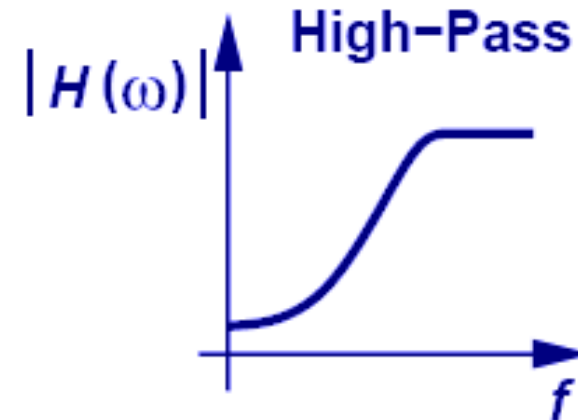
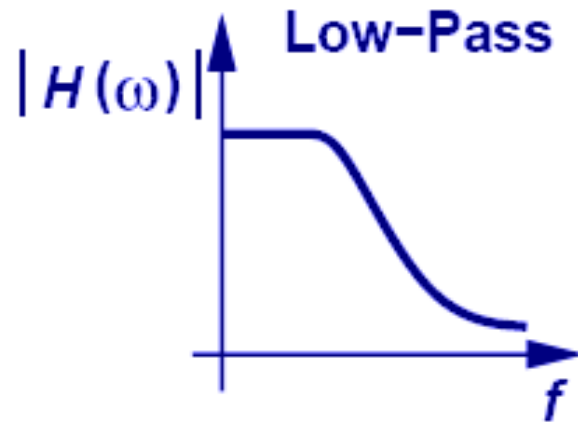
Funzione di Ambiguità: Chirp con involuppo rettangolare

$$s_0(t) = \frac{1}{\sqrt{\tau_p}} \text{rect}_{\tau_p}(t) e^{j\pi k t^2}$$



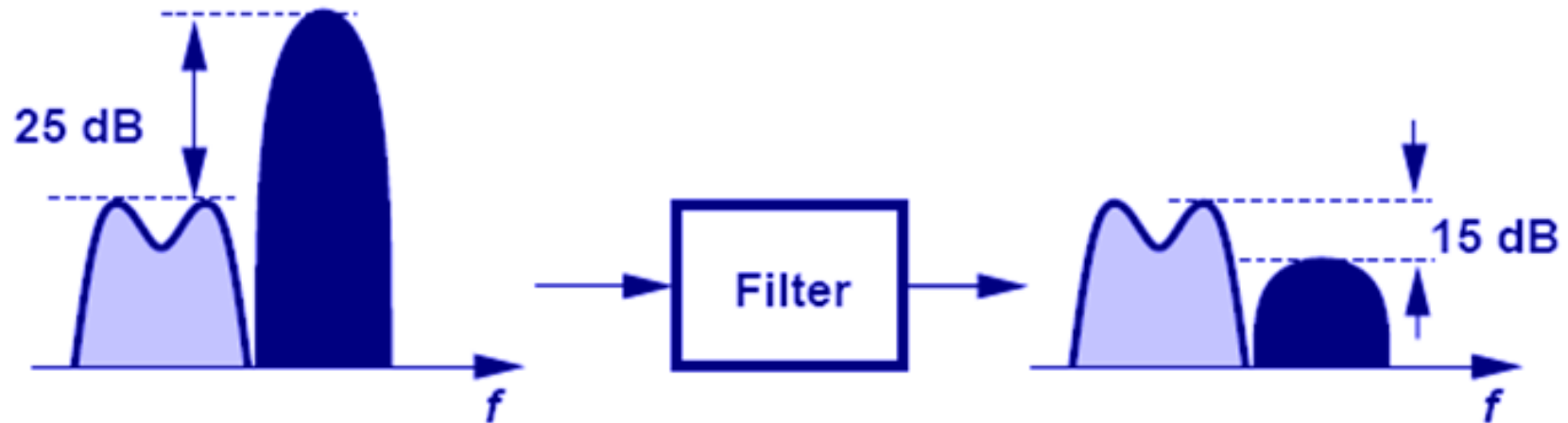
# Tipologie di filtro

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# Example: Filter I

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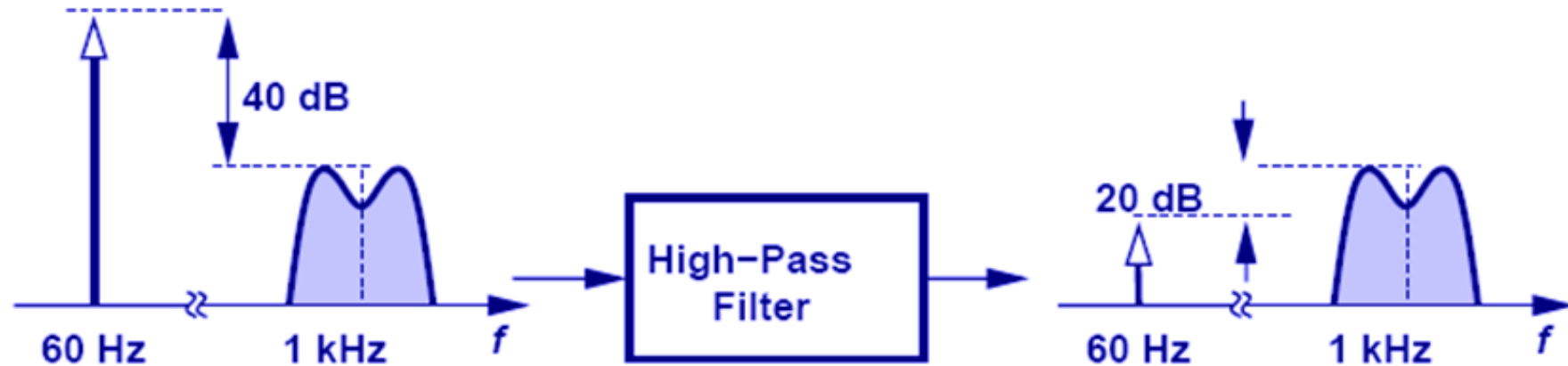


**Given: Adjacent channel Interference is 25 dB above the signal**

**Design goal: Signal to Interference ratio of 15 dB**

**Solution: A filter with stop band of 40 dB**

# Example: Filter II



**Given:** Adjacent channel Interference is 40 dB above the signal

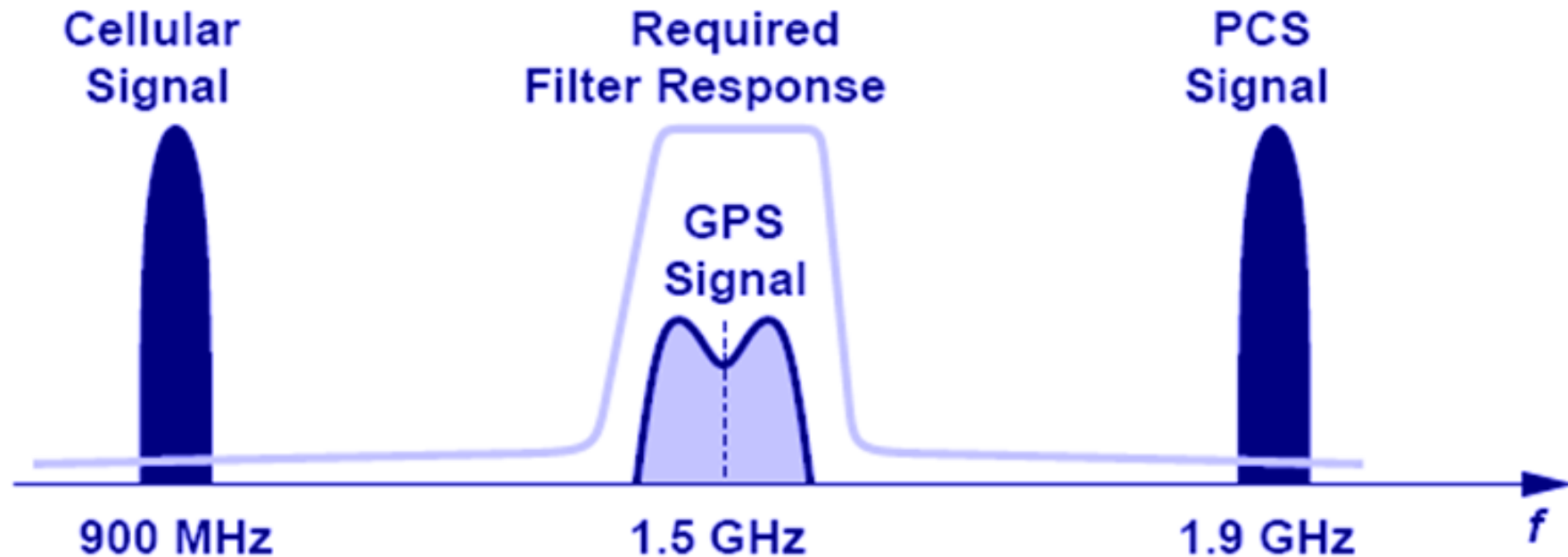
**Design goal:** Signal to Interference ratio of 20 dB

**Solution:** A filter with stop band of 60 dB at 60 Hz



# Example: Filter III

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- A bandpass filter around 1.5 GHz is needed to reject the adjacent Cellular and PCS signals.

# Filtro Passabanda ad RF

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Considerando banda frazionale stretta di 0,5%

$$1 \text{ GHz} \quad BW = 5 \text{ MHz}$$

$$3 \text{ GHz} \quad BW = 15 \text{ MHz}$$

$$6 \text{ GHz} \quad BW = 30 \text{ MHz}$$

$$10 \text{ GHz} \quad BW = 50 \text{ MHz}$$

Con risoluzione di 60 m

$$B = \frac{c}{2 \cdot 60} = \frac{3 \cdot 10^8}{2 \cdot 60} = 2,5 \cdot 10^6 = 2,5 \text{ MHz}$$

# Mixer e spurie

## Funzione di Ambiguit

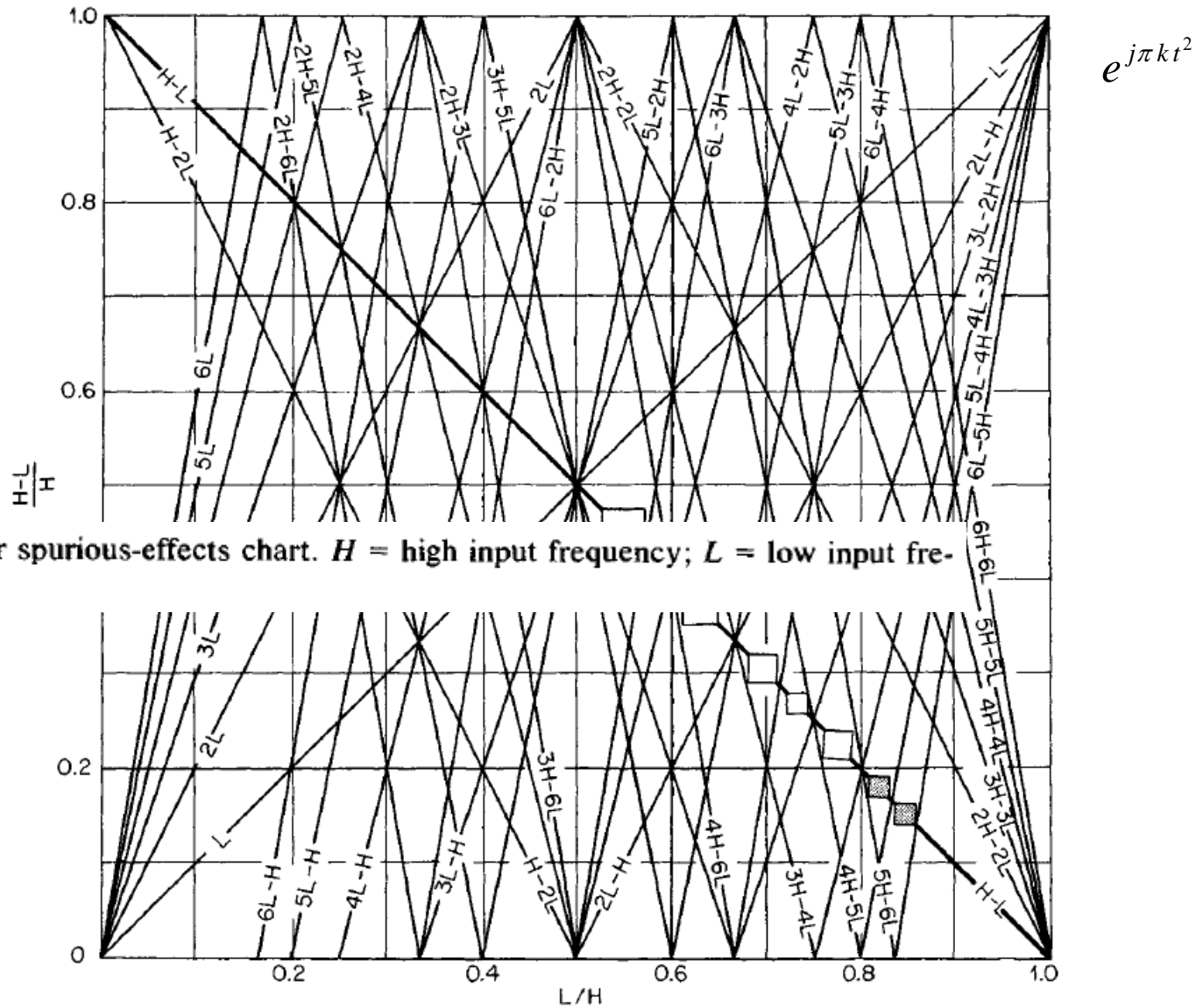


FIG. 3.2 Downconverter spurious-effects chart.  $H$  = high input frequency;  $L$  = low input frequency.

# Piani di frequenza

