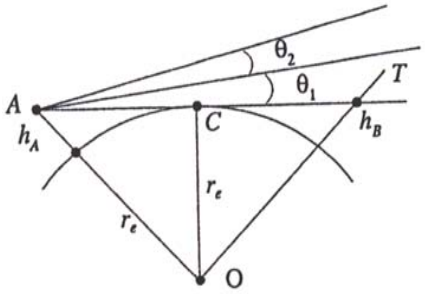
Integrazione non coerente contro clutter

Pierfrancesco Lombardo

Orizzonte Radar



$AO = h_A + r_e$

$AT = h_B + r_e$

Modello di terra sferica e raggio e.m. rettilineo ⇒ terra≡sfera con raggio equivalente:

$$r_e = \frac{4}{3} r_{terra} \cong 8500 Km$$

Orizzonte radar≡distanza massima, fissate le quote dell'antenna radar e del bersaglio, oltre la quale il radar non è più in grado di osservare il bersaglio a causa della curvatura terrestre ⇒ se il bersaglio va sotto l'orizzonte radar il radar non può più rivelarlo anche se la portata radar è più ampia.

$$\overline{AC} = \sqrt{(r_e + h_a)^2 - r_e^2} + \sqrt{(r_e + h_t)^2 - r_e^2} \cong \boxed{\sqrt{2r_e}\left(\sqrt{h_a} + \sqrt{h_t}\right)}$$

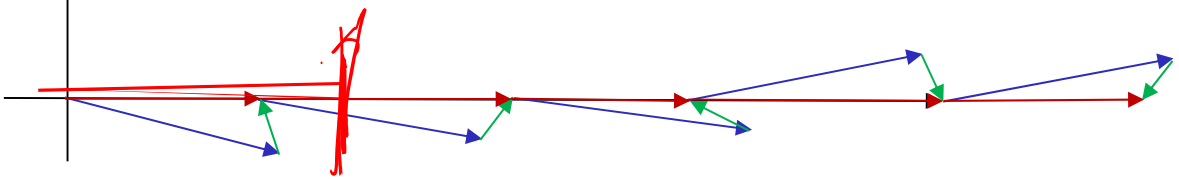
Hp: h_a e $h_t \ll r_e$

Per vedere bersagli a bassa quota (h_t piccolo)

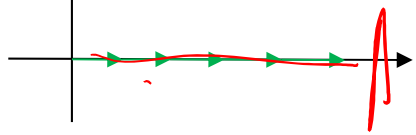
- Aumentare altezza del radar h_a (radar avionici o spaziali).
- Sfruttare propagazione non rettilinea dell'onda e.m dovuta a riflessioni degli strati ionosferici (sky wave -OTH Over The Horizon- bande HF:frequenze dai 4 ai 32 MHz).
- Sfruttare propagazione per effetto condotto.

Coherent vs Incoherent – high SNR

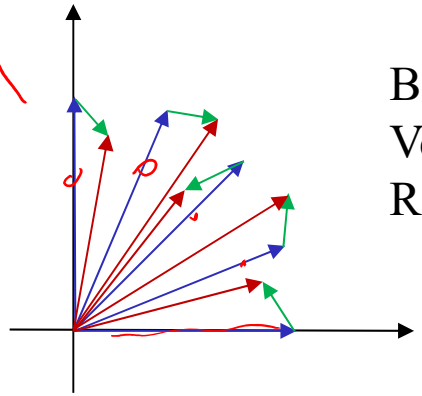
Incoherent S+N



Incoherent N

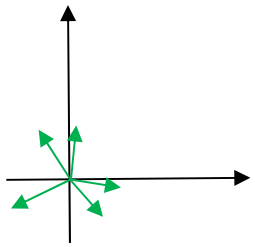


Pre-Integrazione:

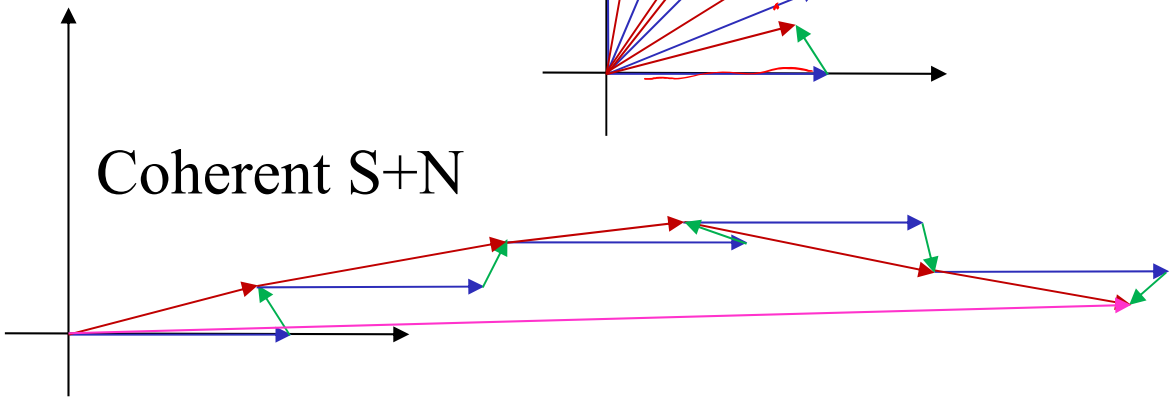


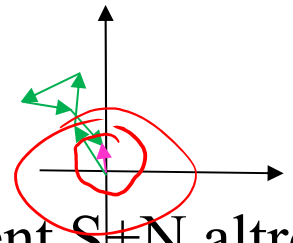
Blu: segnale utile (S)
Verde: rumore (N)
Rosso: S+N

Coherent N



Coherent S+N

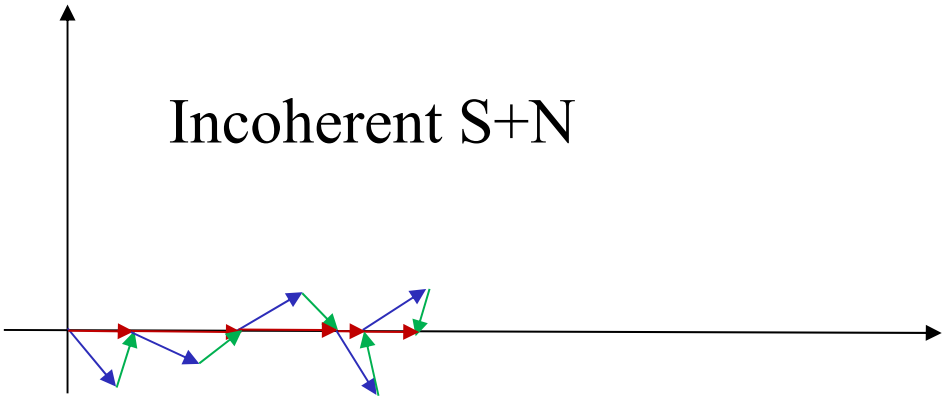




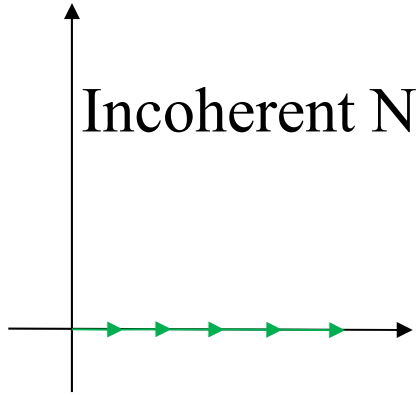
Coherent S+N altro filtro

Coherent vs Incoherent – low SNR

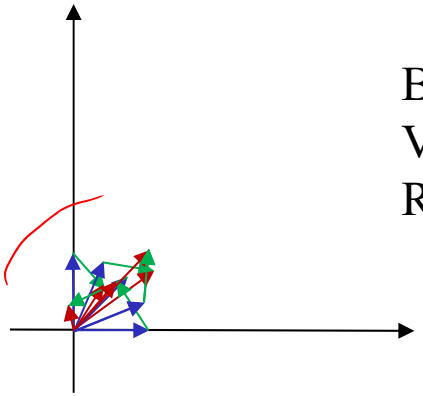
Incoherent S+N



Incoherent N

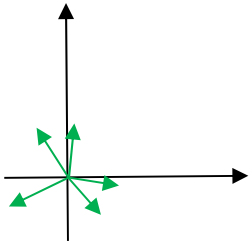


Pre-Integrazione:

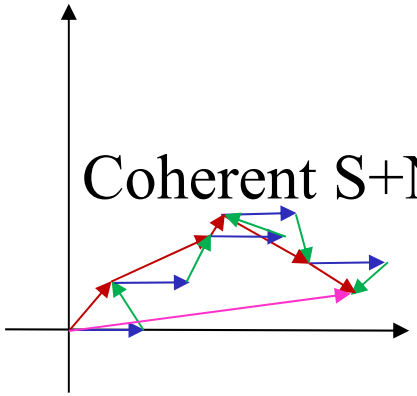


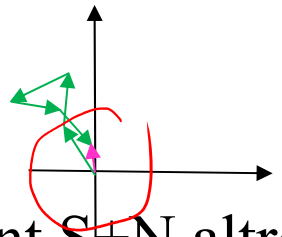
Blu: segnale utile (S)
Verde: rumore (N)
Rosso: S+N

Coherent N



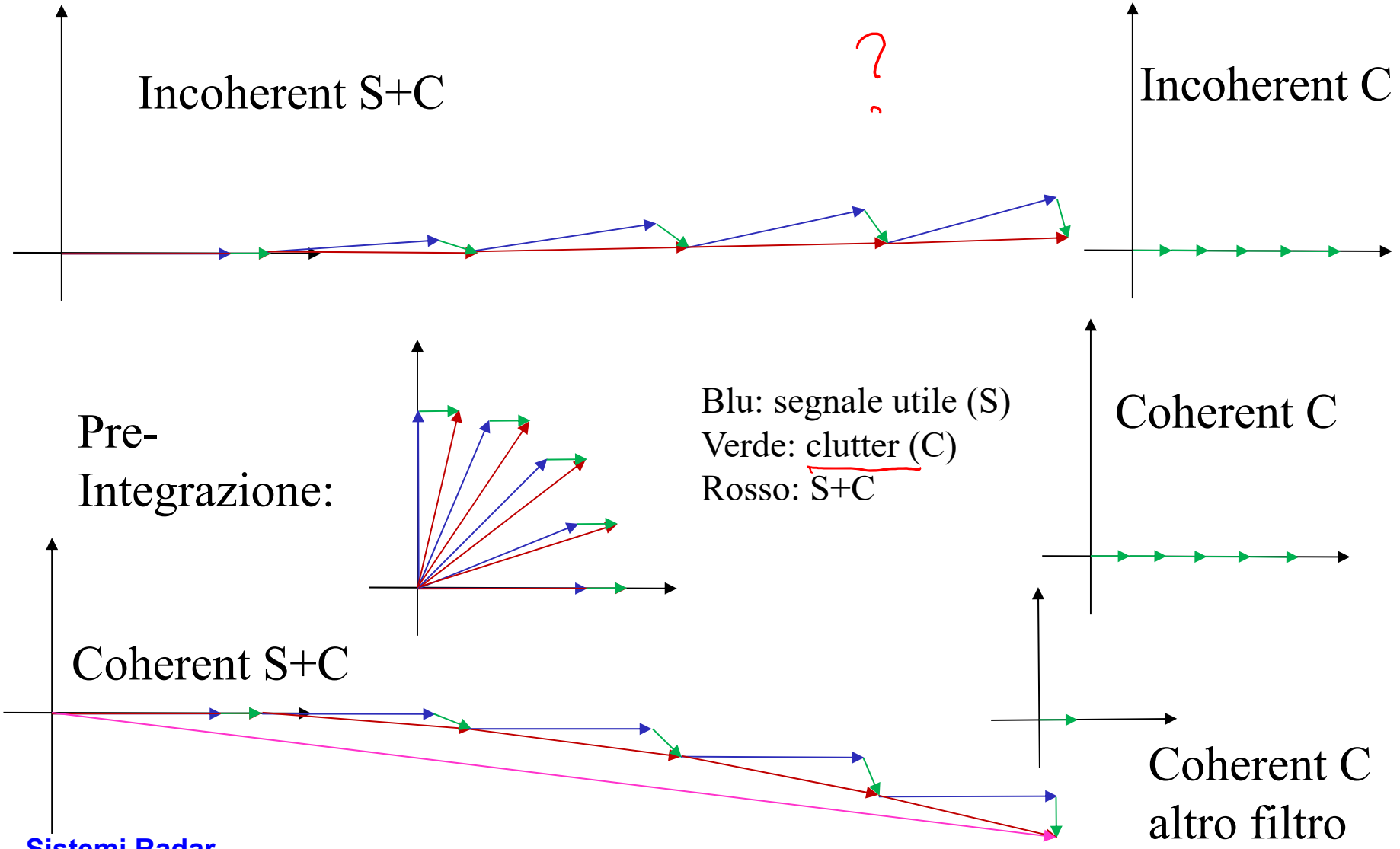
Coherent S+N



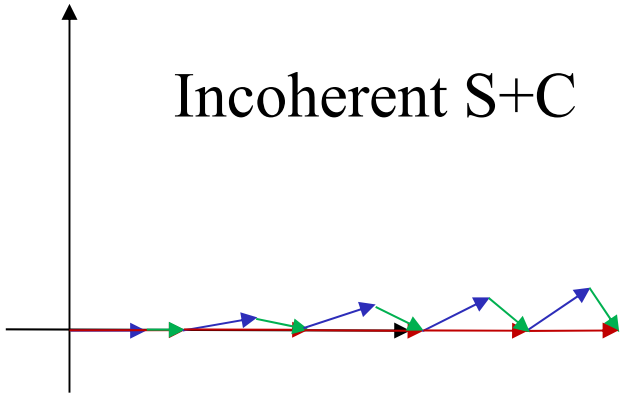


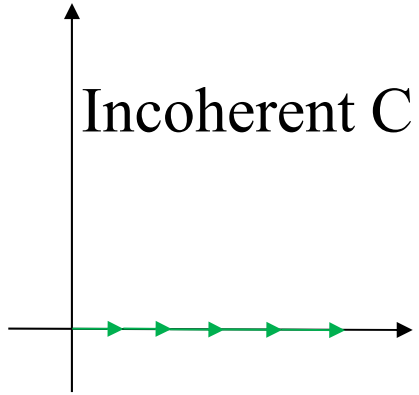
Coherent S+N altro filtro

Coherent vs Incoherent – high SCR

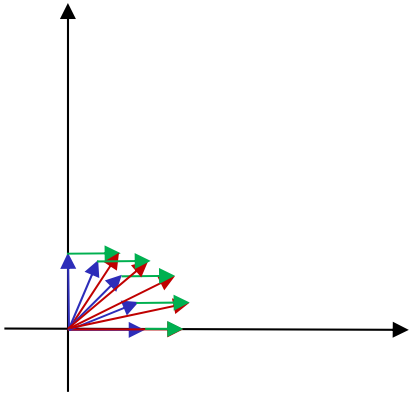


Coherent vs Incoherent – low SCR

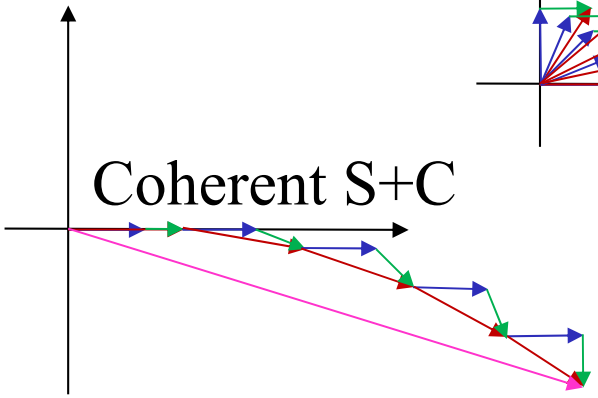


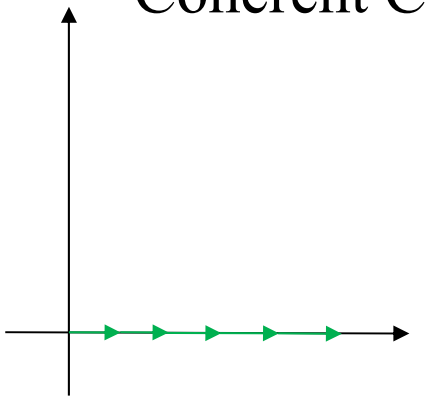


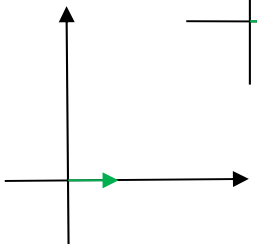
Pre-Integrazione:

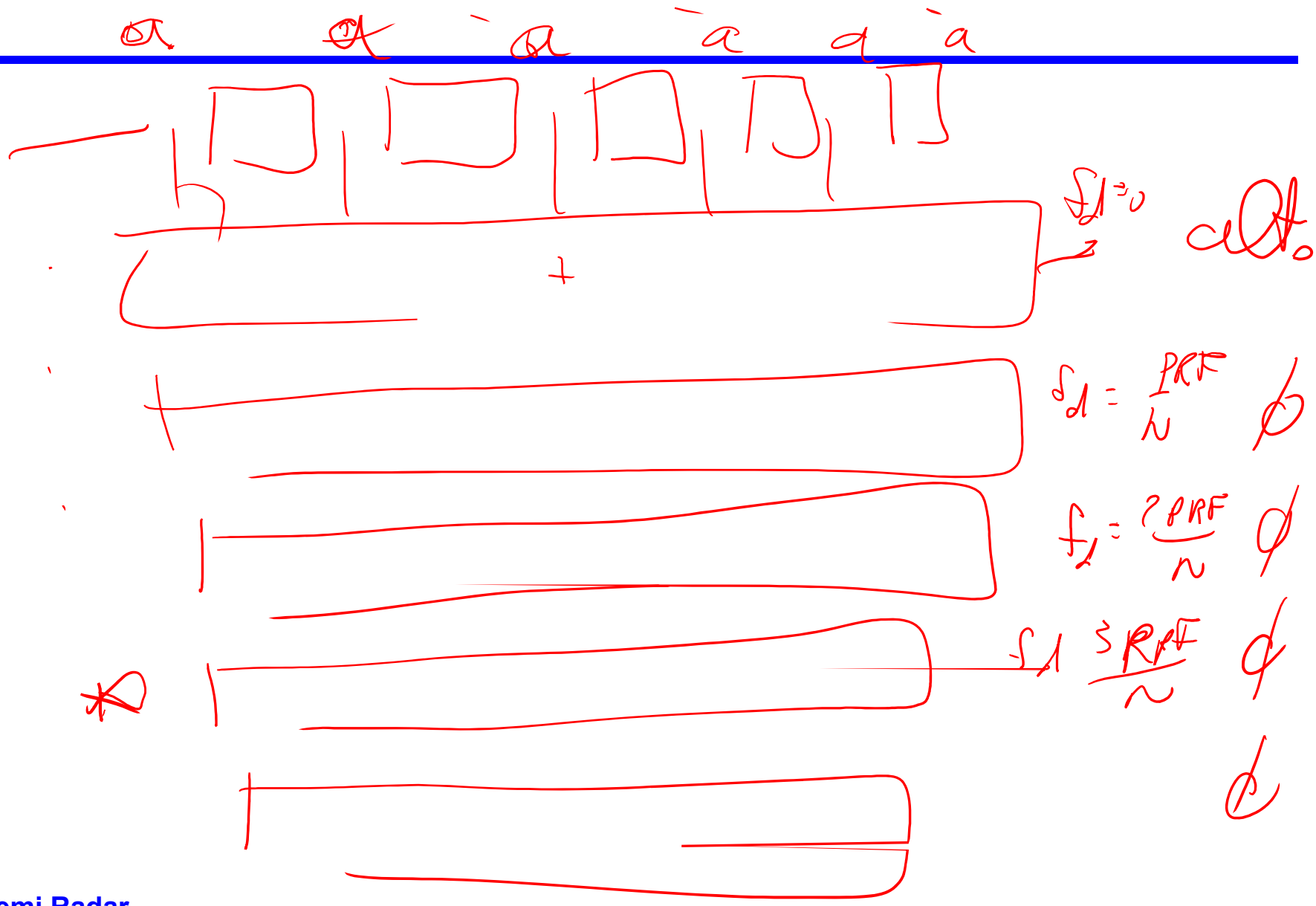


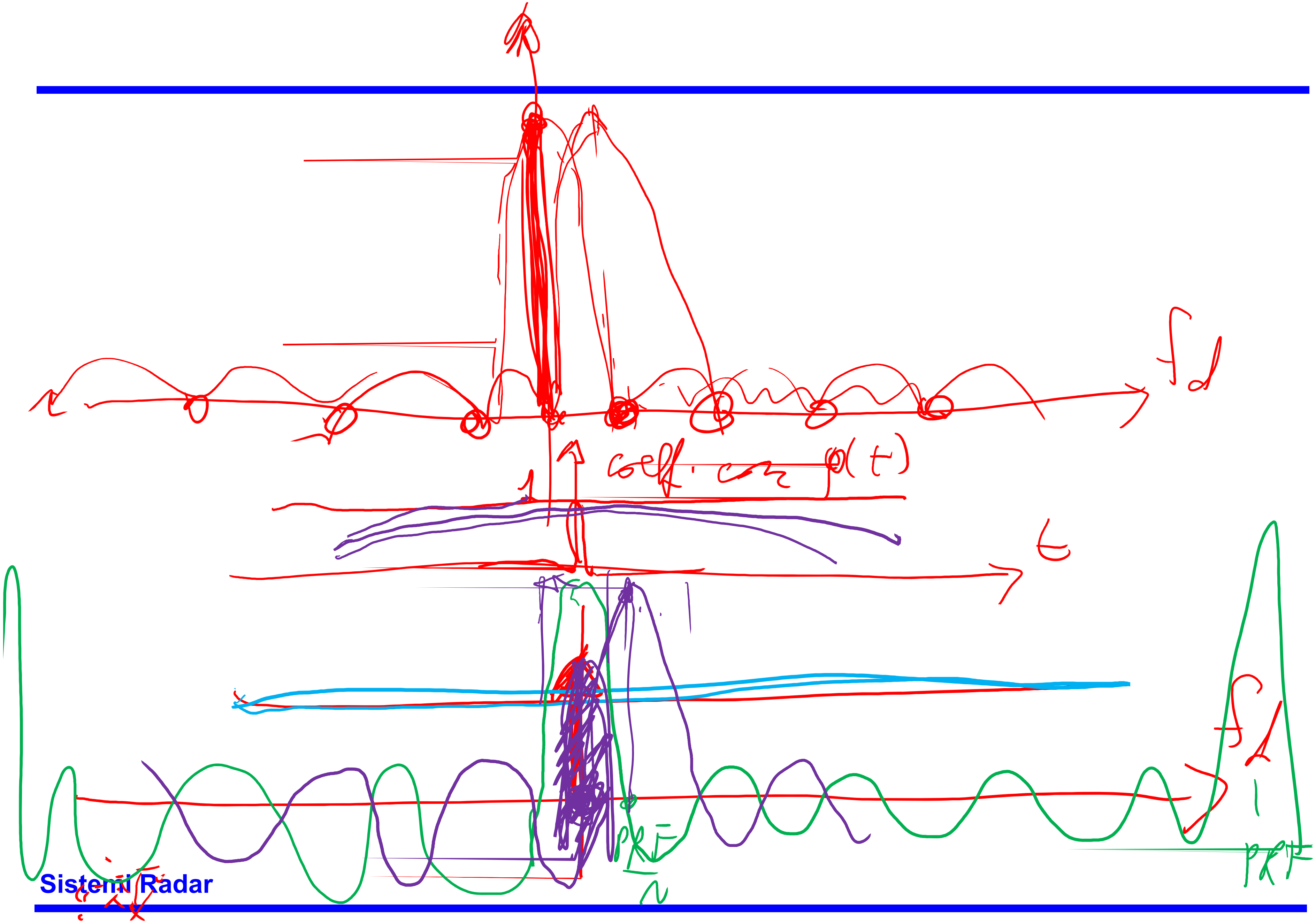
Blu: segnale utile (S)
Verde: clutter (C)
Rosso: S+C







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