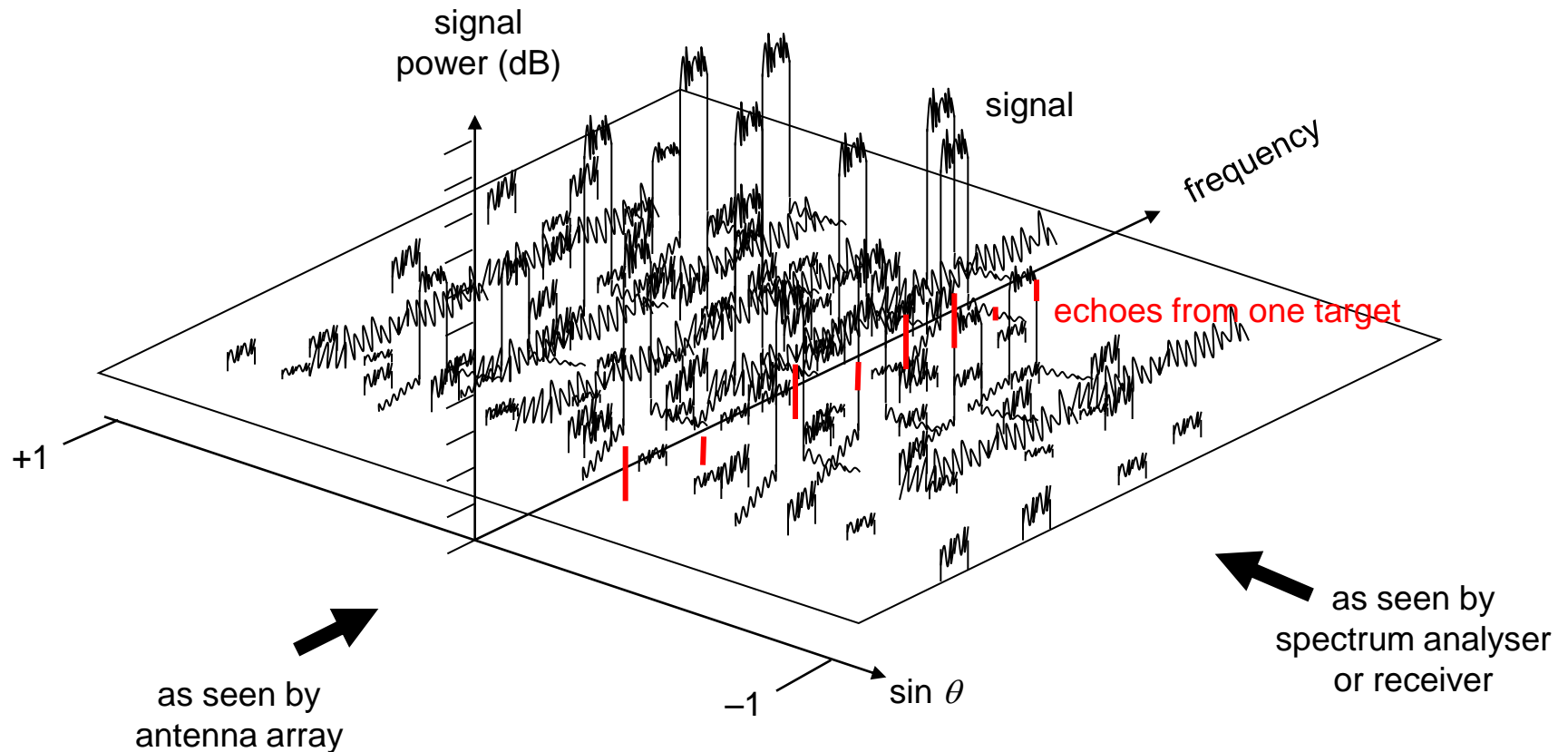


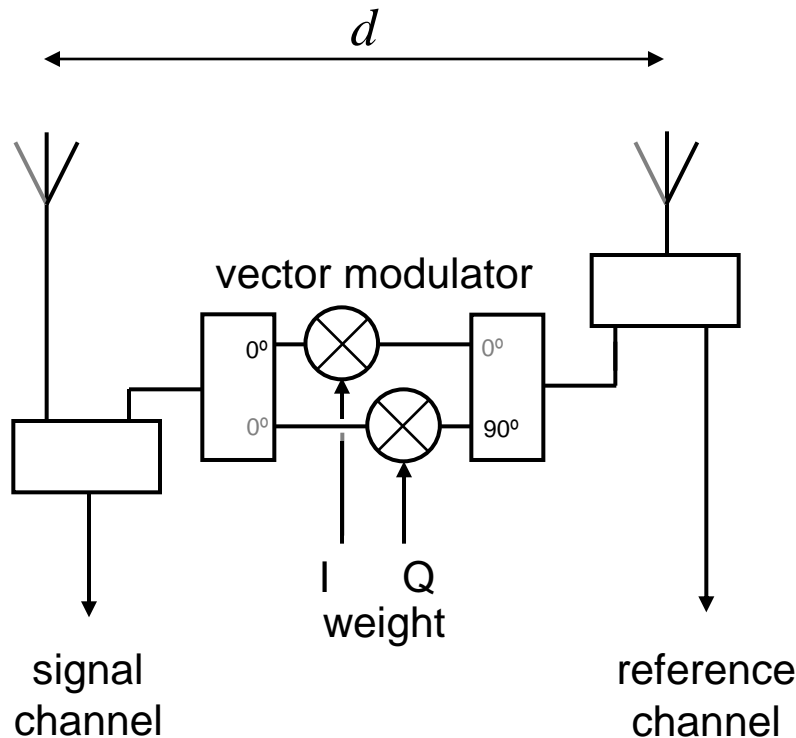
5.1 MatLab session on *Direct signal cancellation*

1. The interference environment
2. Analogue cancellation
3. The Colone algorithm
4. Implementation methods

Noise and interference



Null steering



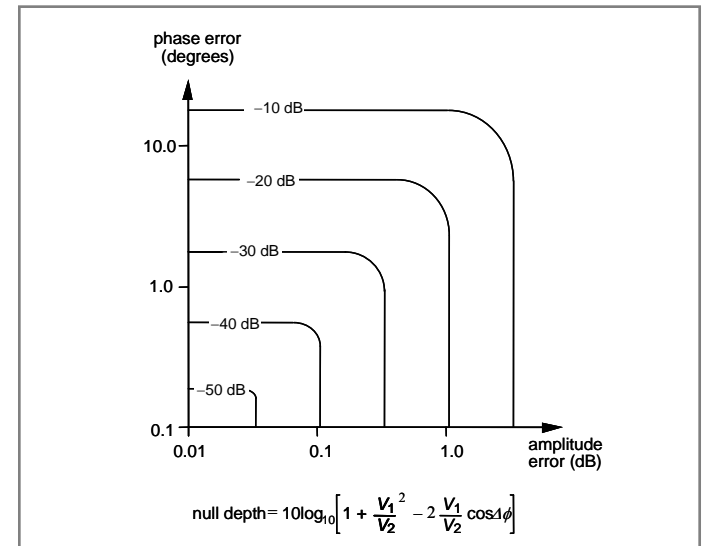
$$\hat{W} = -\exp\left(-j\frac{2\pi d}{\lambda}\sin\theta_B\right)$$

$$F(\theta) = 1 + \hat{W} \exp\left(j\frac{2\pi d}{\lambda}\sin\theta\right)$$

$$= 1 - \exp\left[j\frac{2\pi d}{\lambda}(\sin\theta - \sin\theta_B)\right]$$

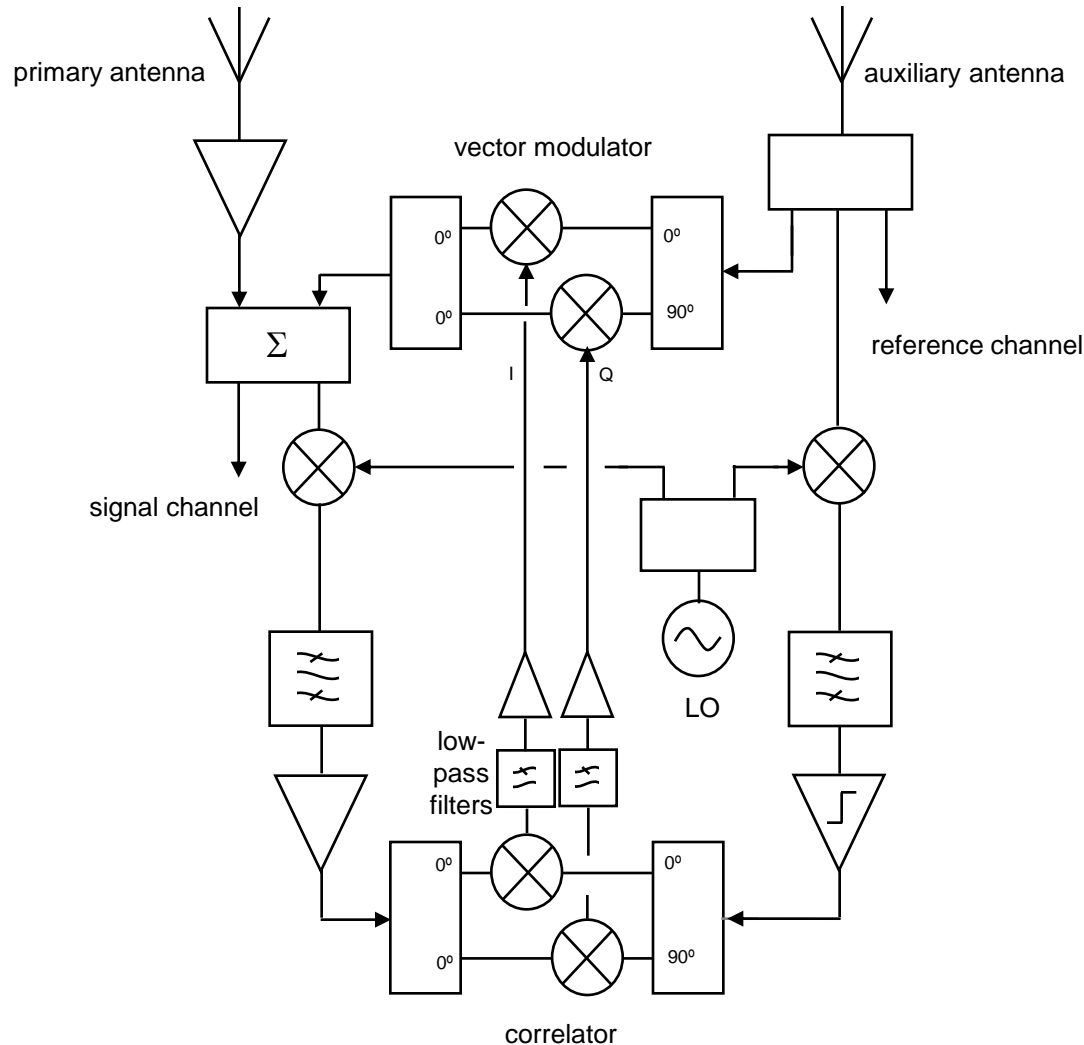
$$= 2j \sin\left[\frac{\pi d}{\lambda}(\sin\theta - \sin\theta_B)\right]$$

cardioid pattern
with null at $\theta = \theta_B$



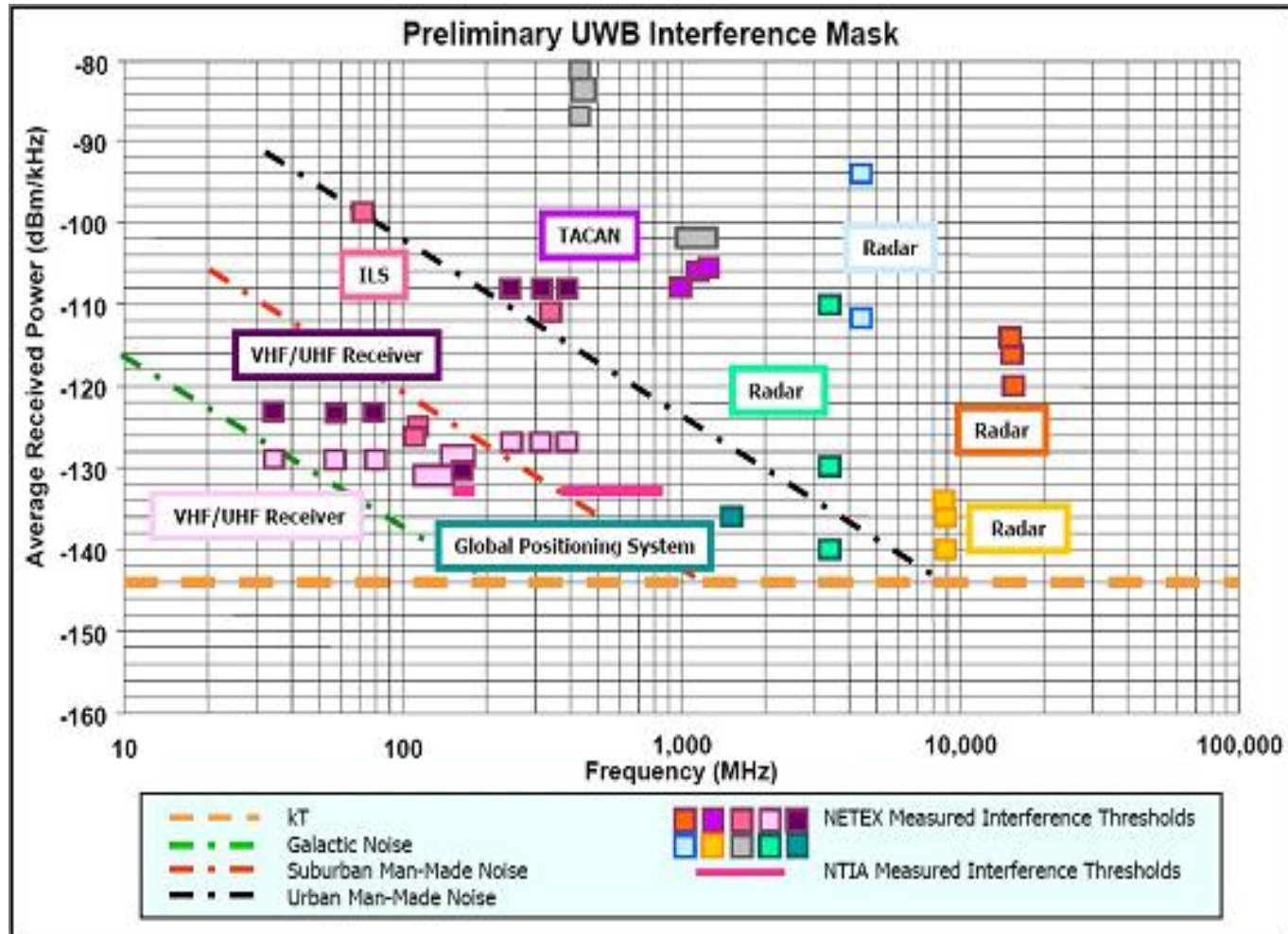
null depth vs weight accuracy

Null steering – Howells-Applebaum correlation loop



- Can use a circular antenna array to give full 360° coverage, using phase modes as inputs to processor rather than element signals
- Readily extended to more than one degree of freedom

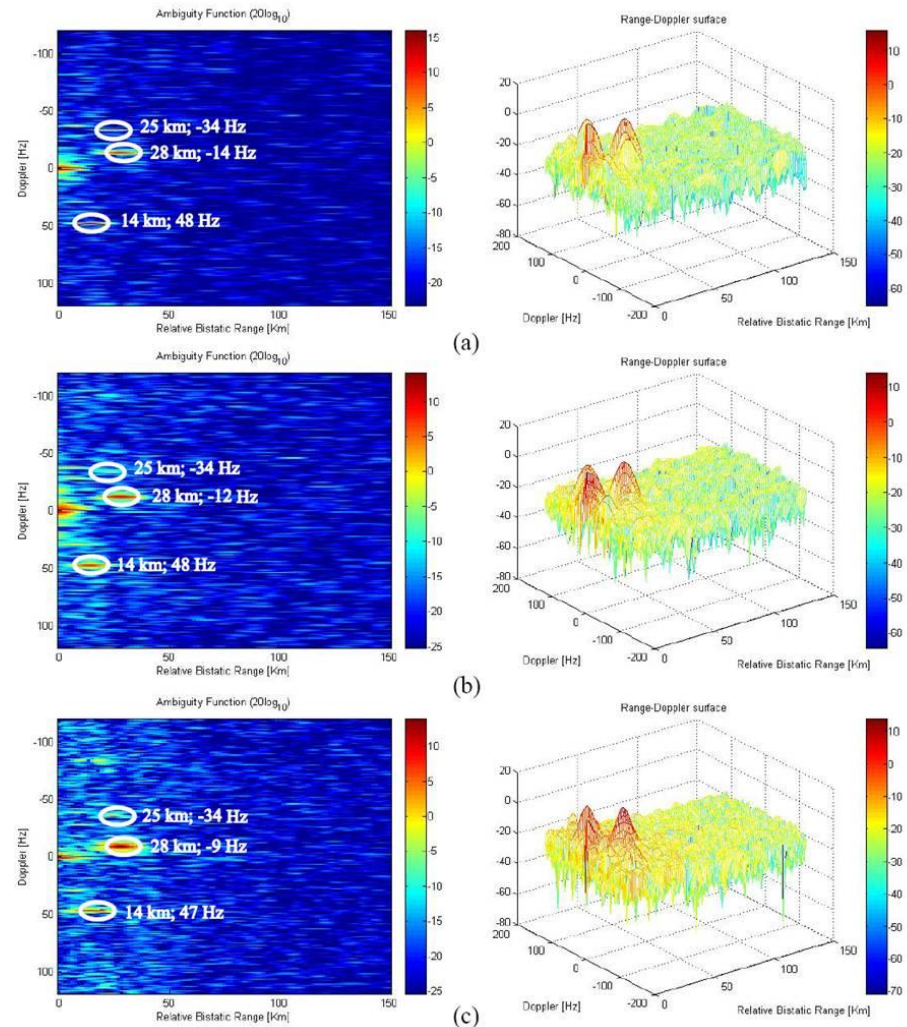
Noise and interference



Direct Signal Suppression

Here we explore one well-known algorithm for Direct Signal Suppression – due to Colone et al.

The approach of may be understood by visualizing the signal and multipath environment in the range-Doppler plane. It is assumed that a clean reference version of the direct signal is obtained via a separate antenna and receiver which is free of multipath.



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