PHYS 3360 / AEP 3630

Lecture 42

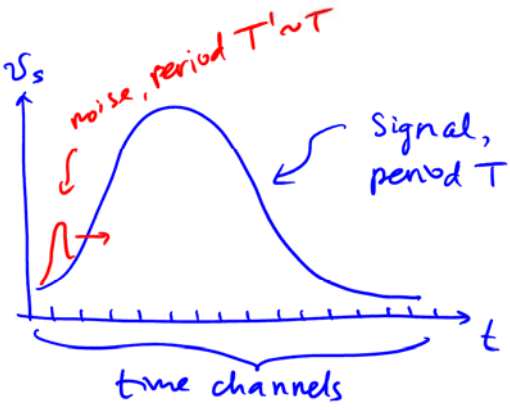
Detecting signal buried in noise

For poor S/N signal, recovery is often possible

⇒ SNR can be made very large

signal averaging – example of _____

Ex.



$$SNR_{dB} = 10 \log_{10}\left(\frac{P_s}{P_n}\right)$$

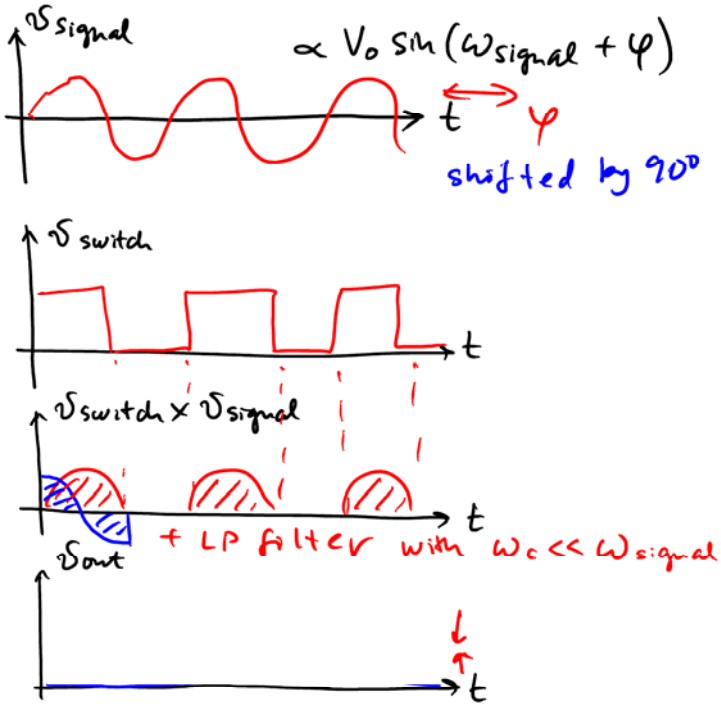
SNR increases 3dB for each _____

Lock-in amplification

- most signals can be made repetitive

- if signal can be addl. made periodic, can use lock-in amp

Phase sensitive detector:

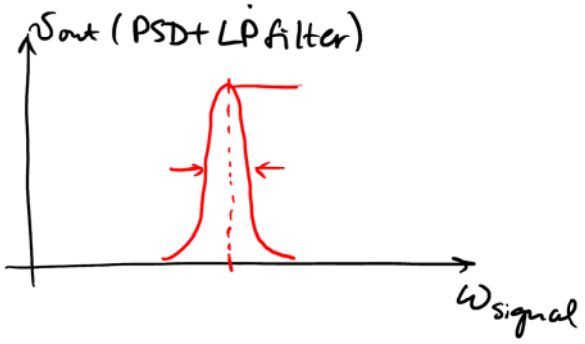


Lock-in amp

1) system response signal of interest V_0

2) PSD:

3) LP filter after PSD



Application Example

you are measuring a very weak signal, e.g. fluorescence