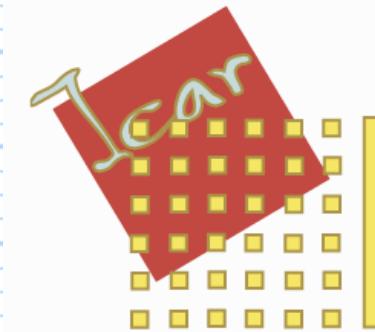
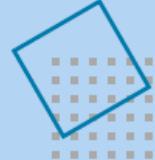


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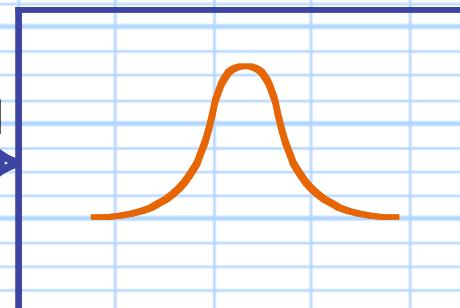




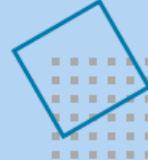
Imprecise estimation in signal processing

Interval-valued estimation

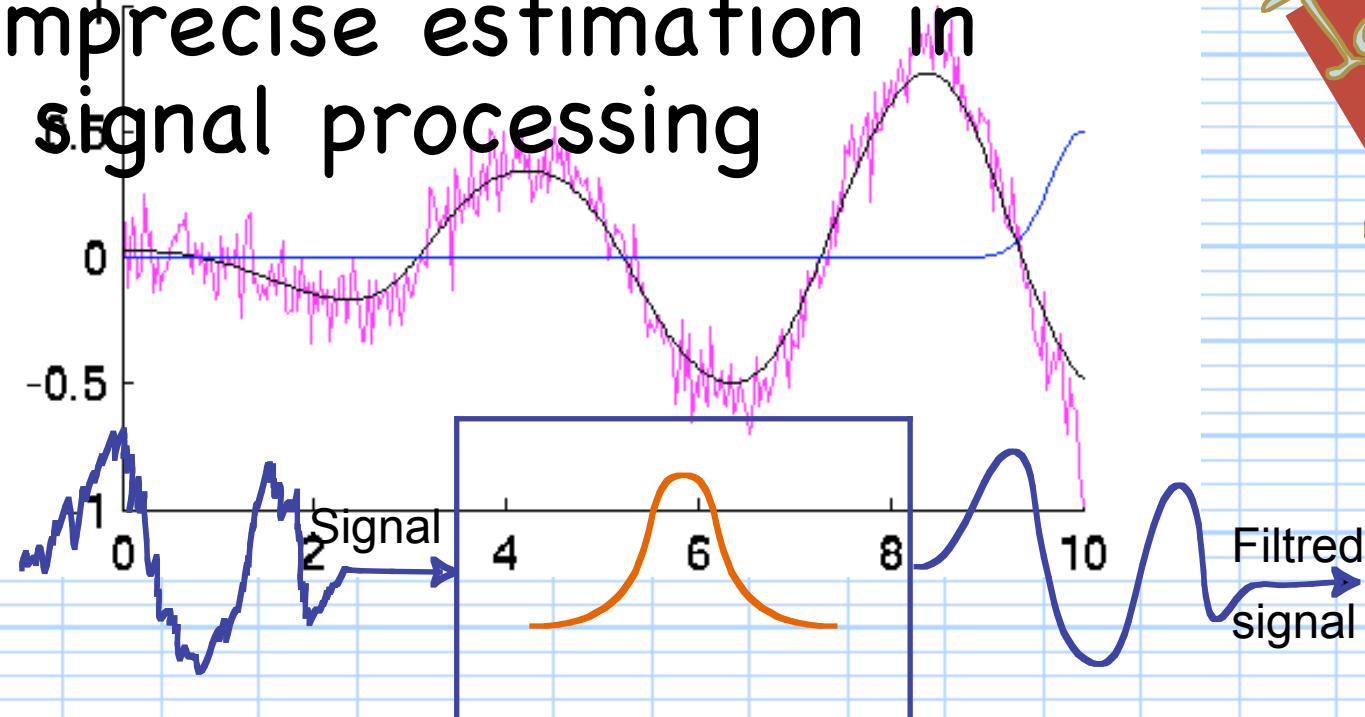
- specific
- guaranteed

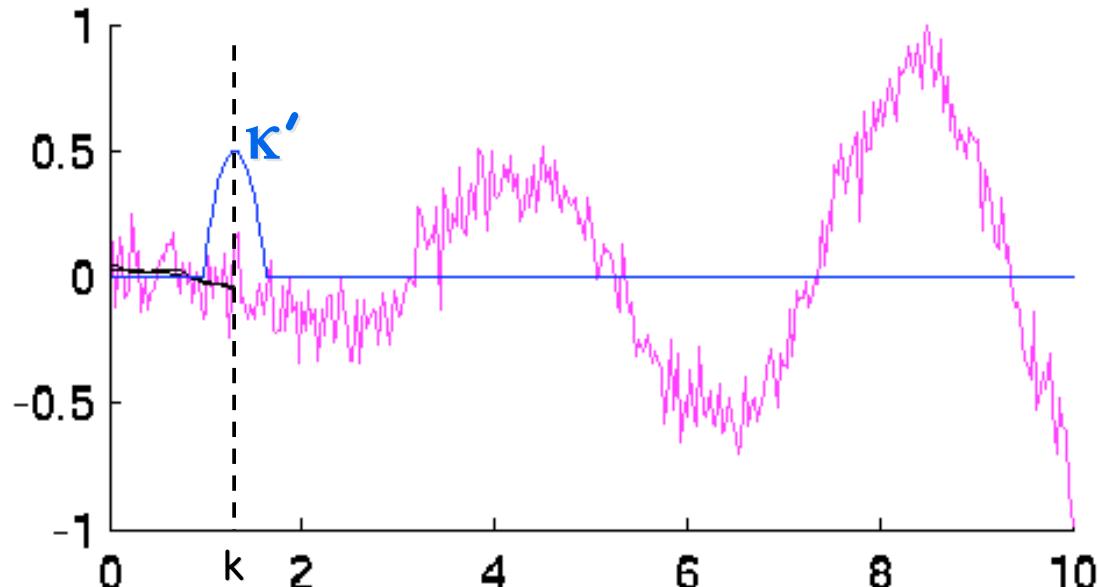
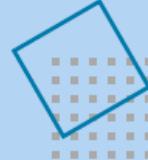


Filtred
signal



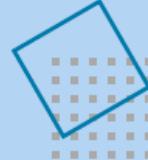
Imprecise estimation in signal processing





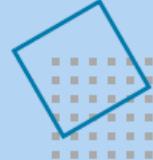
$$\kappa : \hat{S}_k = r_{k1}S_1 + r_{k2}S_2 + r_{k3}S_3 + r_{k4}S_4 + \dots + r_{kN}S_N$$

$$\kappa' : \hat{S}'_k = r'_{k1}S_1 + r'_{k2}S_2 + r'_{k3}S_3 + r'_{k4}S_4 + \dots + r'_{kN}S_N$$



$$\kappa : \hat{S}_k = r_{k1}S_1 + r_{k2}S_2 + r_{k3}S_3 + r_{k4}S_4 + \dots + r_{kN}S_N$$

$$\kappa' : \hat{S}'_k = r'_{k1}S_1 + r'_{k2}S_2 + r'_{k3}S_3 + r'_{k4}S_4 + \dots + r'_{kN}S_N$$

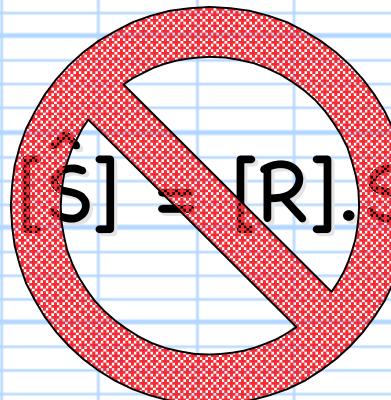


$$\hat{S} = R.S$$

$$\hat{S}' = R'.S$$

...

}

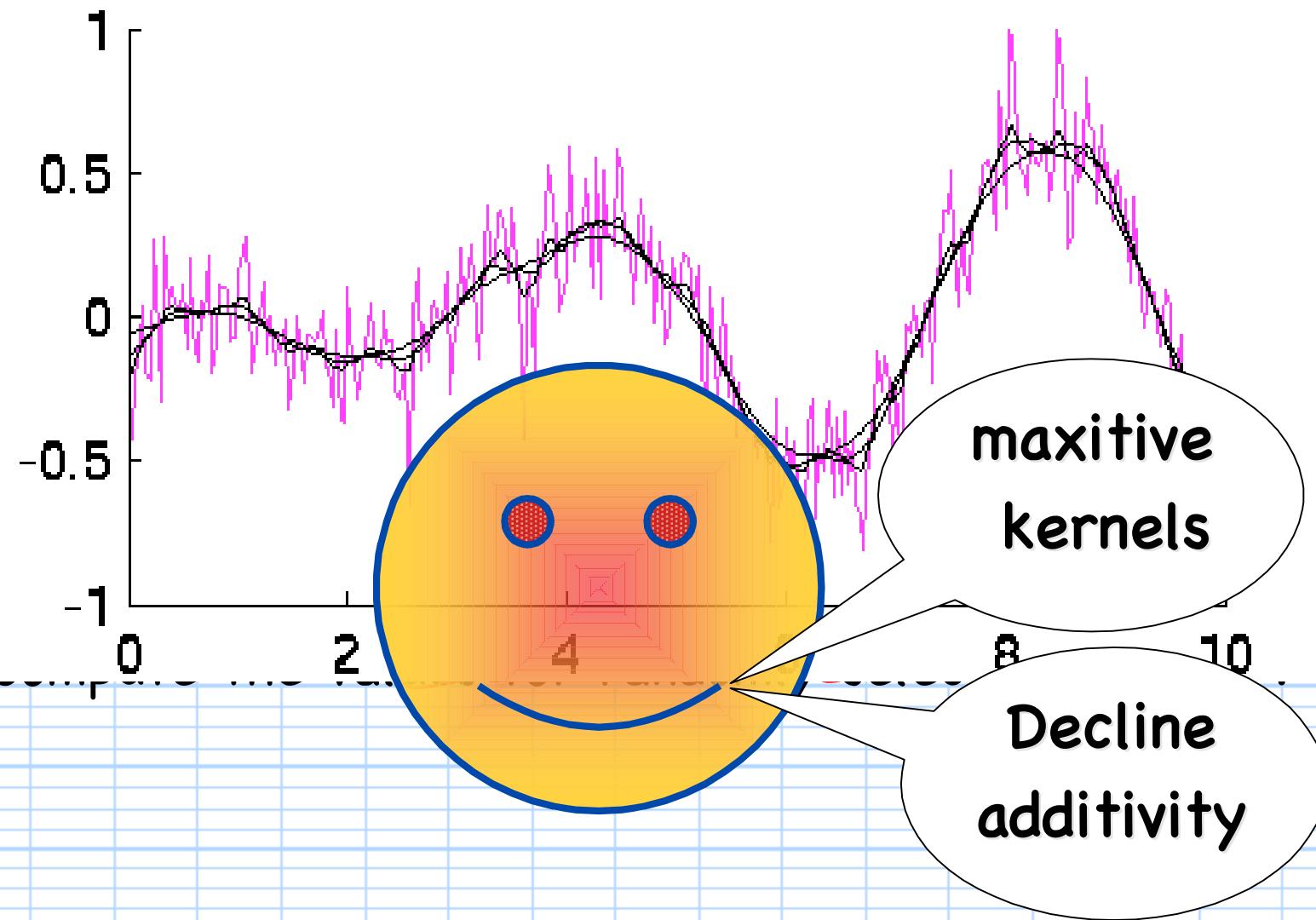
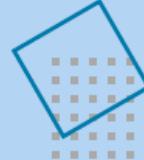


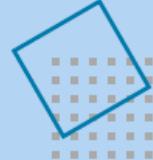
$$[\hat{S}] = [R].C^{te} \supseteq C^{te}$$

$$\underline{\hat{S}_k} = \underline{r_{k1}}S_1 + \underline{r_{k2}}S_2 + \underline{r_{k3}}S_3 + \underline{r_{k4}}S_4 + \dots + \underline{r_{kN}}S_N = E_{\underline{r_{kn}}} \{S\}$$

If $S=C^{te}$ then $\hat{S}=C^{te}$ $\Rightarrow \sum_{n=1}^N r_{kn} = 1$ "weighted sum"

$$[\hat{S}] = [\underline{S}, \bar{S}]$$





Maxitive kernel μ $\mu_k \in [0, 1] : \sup_{k=-\infty}^{\infty} \mu_k = 1$

μ defines a possibility measure : $\Pi_\mu(A)$ (maxitive \neq additive)

μ dominates κ if $\forall A : \Pi_\mu(A) \geq P_\kappa(A)$

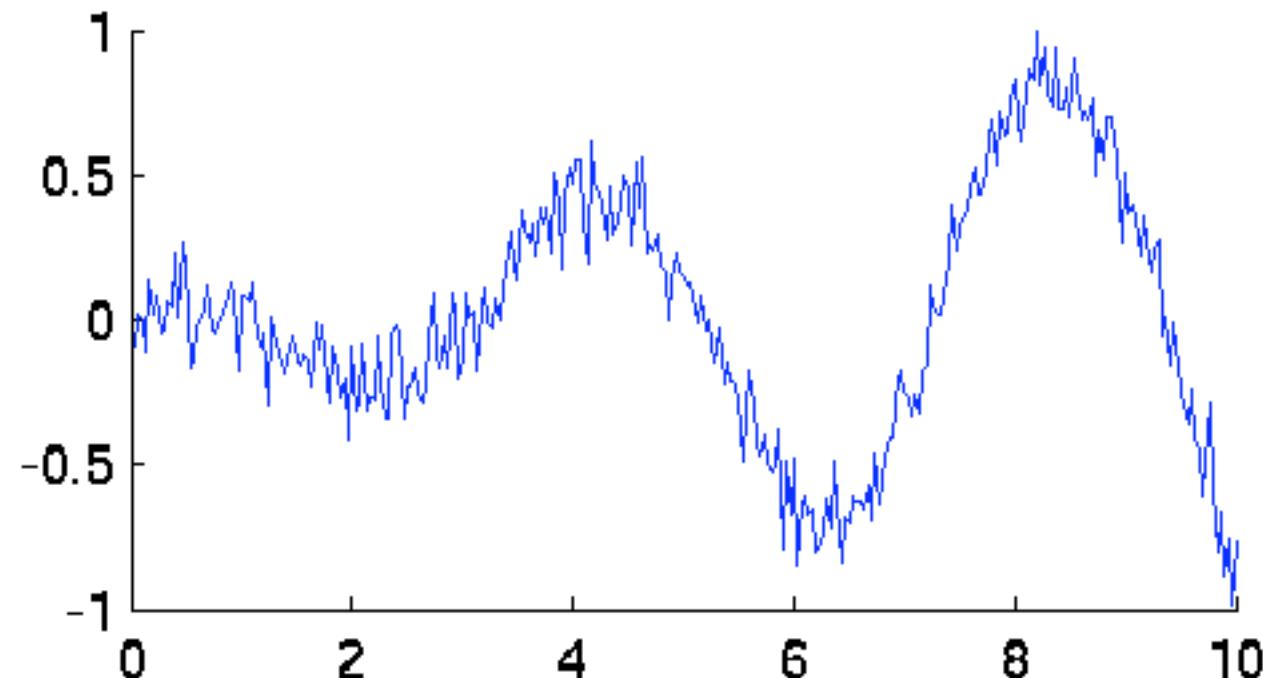
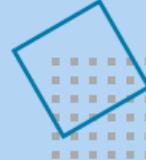
$\text{Core}(\mu) = \{ \kappa / \forall A : \Pi_\mu(A) \geq P_\kappa(A) \}$

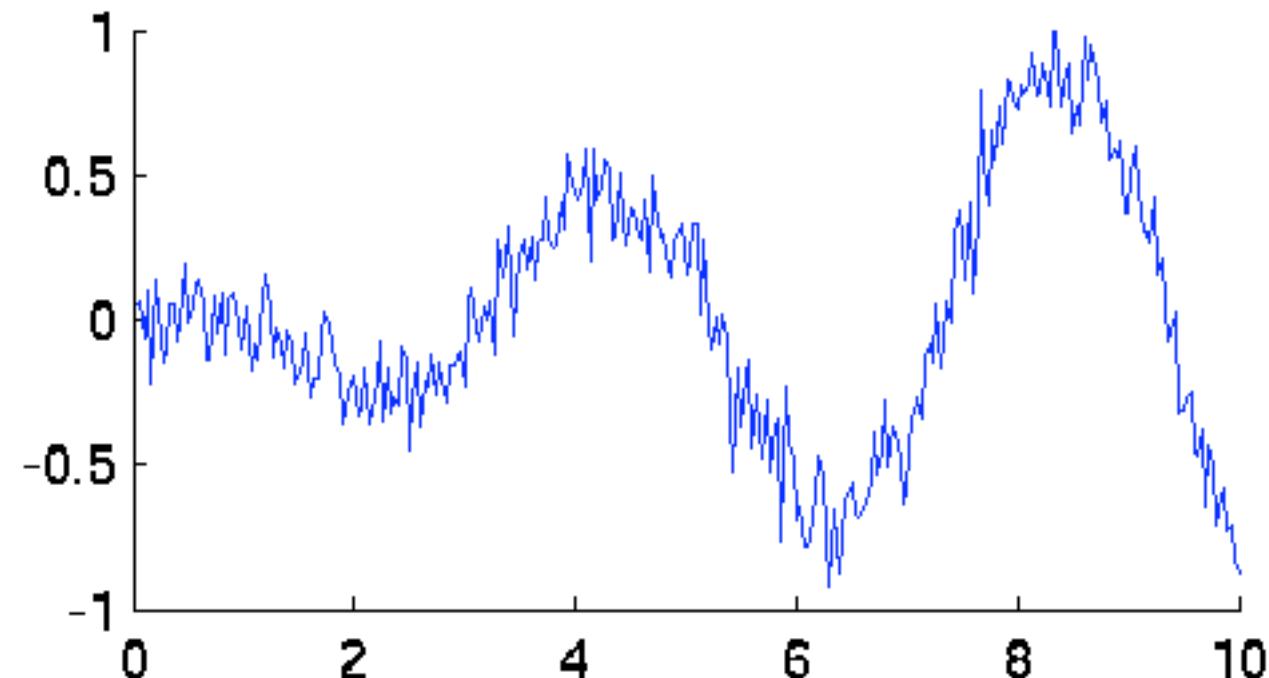
Extension of the expectation operator :

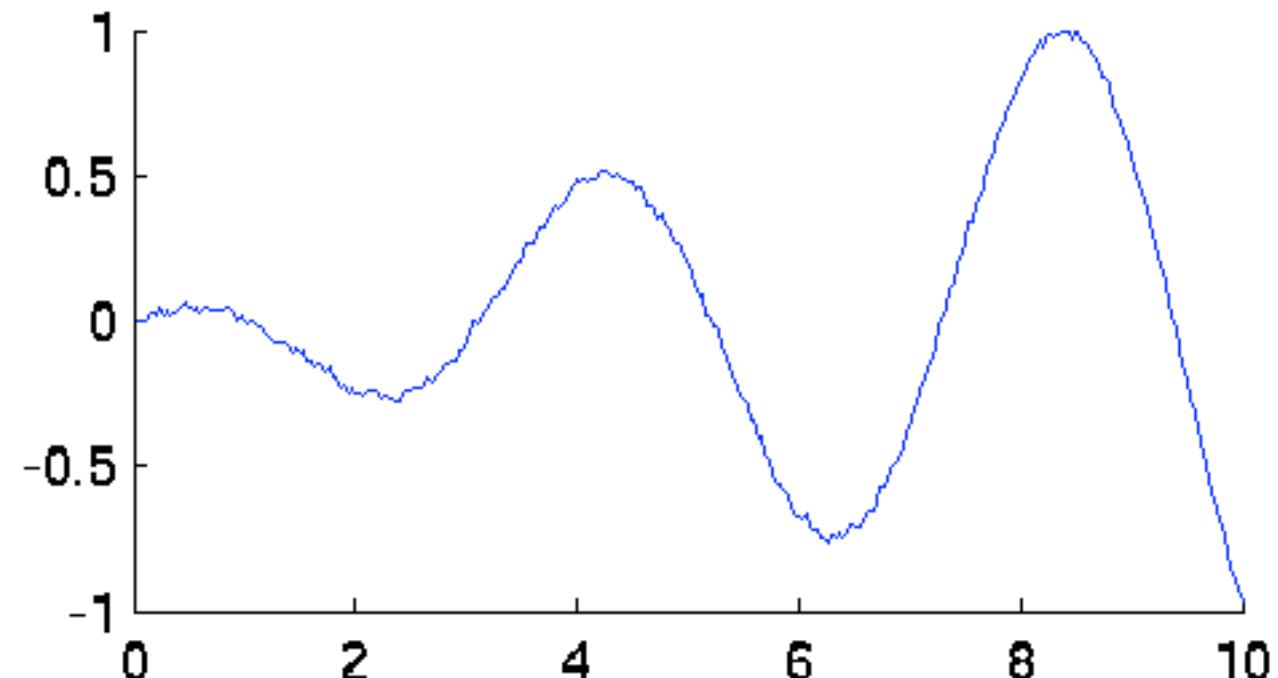
$$\bar{E}_{\Pi_\mu}\{S\} = [\underline{S}, \bar{S}]$$

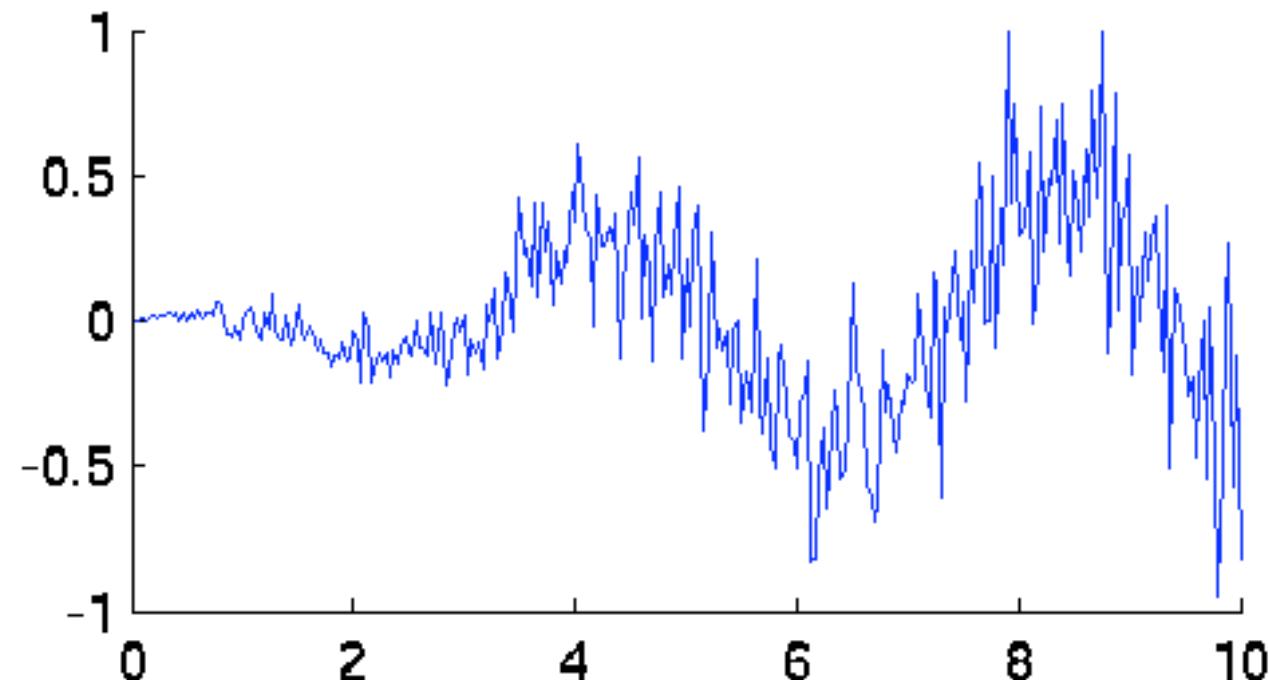
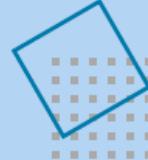
$$\forall \kappa \in \text{Core}(\mu) \quad E_{P_\kappa}\{S\} \in \bar{E}_{\Pi_\mu}\{S\}$$

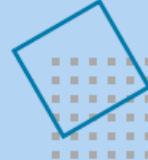
The same works in the continuous domain !!!





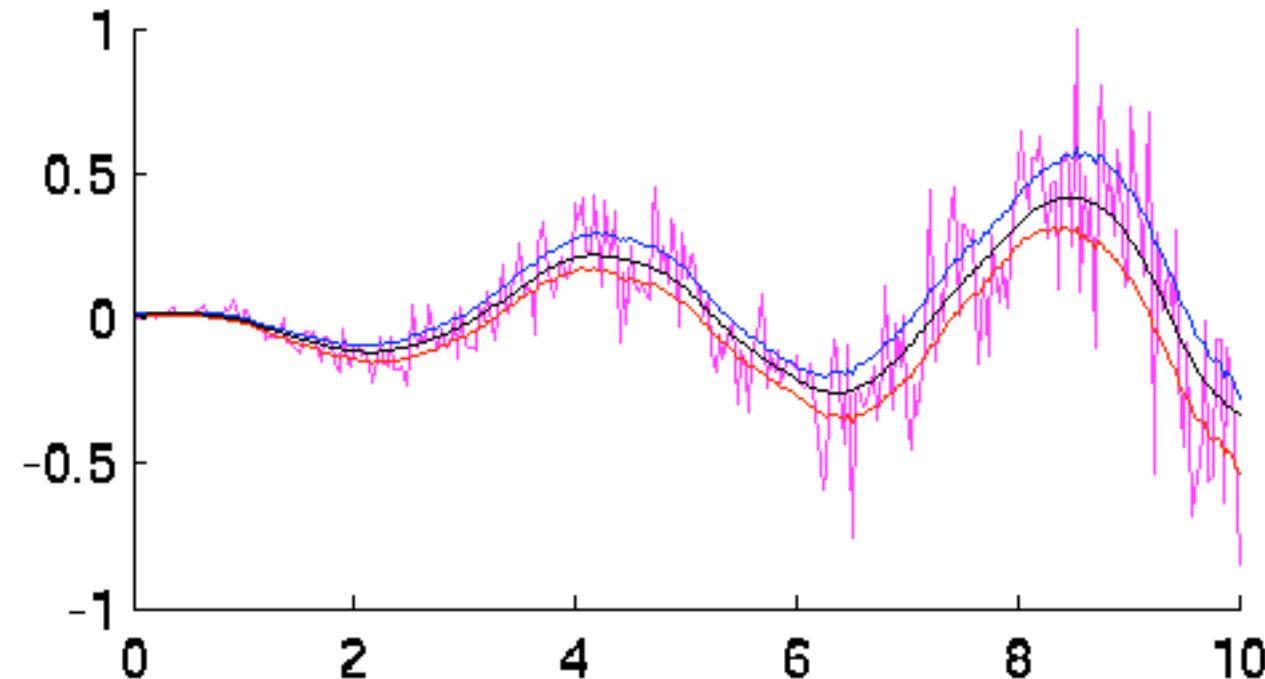


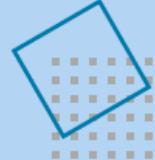




Can I have something smoother ?

- Yes ! Use concave distortion of your kernel !





To be continued ...

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- Jean-François Crouzet (*MdC ACSIOM*)
- Denis Mariano-Goulart (*MdC-PH CHU-Lapeyronie*)

... if you have any question ?