

# Detector induced assymetry in CP violation measurements

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# MC truth information

$$D^* \rightarrow D_0(K\pi)\pi$$

- using MC samples  
minisample\_Dst2D0pi\_D02Kpi\_2016\_Up\_GEN,  
minisample\_Dst2D0pi\_D02Kpi\_2016\_Dw\_GEN for different  
magnet polarities
- comparing truth level to detector simulation  
→ final state detector efficiency

# Efficiencies: Total, + and -

Table: Total reconstruction efficiencies

Polarity	$\epsilon_{\pi}$	$\epsilon_K$	$\epsilon_{\pi,s}$	$\epsilon_{D^0}$	$\epsilon_{D^*}$
UP	$86.65 \pm 0.01$	$84.63 \pm 0.01$	$76.65 \pm 0.02$	$73.34 \pm 0.02$	$56.31 \pm 0.02$
DOWN	$86.68 \pm 0.01$	$84.67 \pm 0.01$	$76.66 \pm 0.02$	$73.39 \pm 0.02$	$56.35 \pm 0.02$

Table:  $D^{*+}$  reconstruction efficiencies

Polarity	$\epsilon_{\pi^+}$	$\epsilon_{K^-}$	$\epsilon_{\pi^+,s}$	$\epsilon_{D_0}$	$\epsilon_{D^{*+}}$
UP	$86.66 \pm 0.02$	$85.02 \pm 0.02$	$76.37 \pm 0.02$	$73.01 \pm 0.03$	$55.86 \pm 0.03$
DOWN	$86.70 \pm 0.02$	$85.07 \pm 0.02$	$76.98 \pm 0.02$	$73.06 \pm 0.03$	$56.33 \pm 0.03$

Table:  $D^{*-}$  reconstruction efficiencies

Polarity	$\epsilon_{\pi^-}$	$\epsilon_{K^+}$	$\epsilon_{\pi^-,s}$	$\epsilon_{\bar{D}_0}$	$\epsilon_{D^{*-}}$
UP	$86.65 \pm 0.02$	$84.25 \pm 0.02$	$76.93 \pm 0.02$	$73.67 \pm 0.03$	$56.76 \pm 0.03$
DOWN	$86.66 \pm 0.02$	$84.27 \pm 0.02$	$76.34 \pm 0.02$	$73.72 \pm 0.03$	$56.36 \pm 0.02$

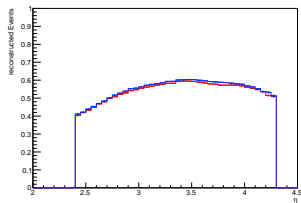
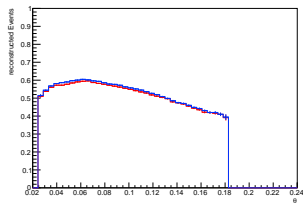
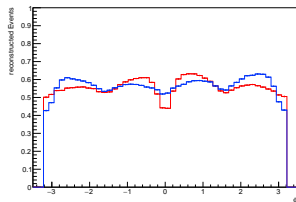
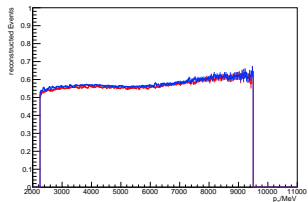
# Asymmetry

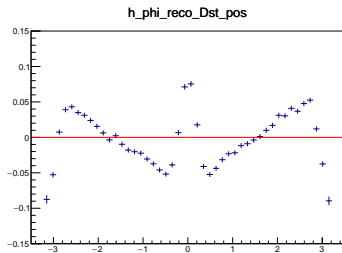
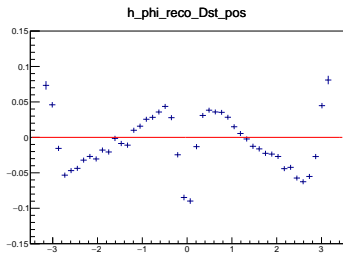
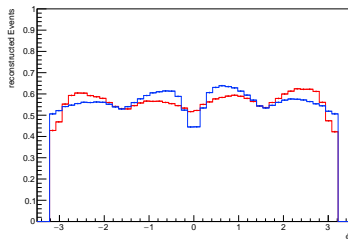
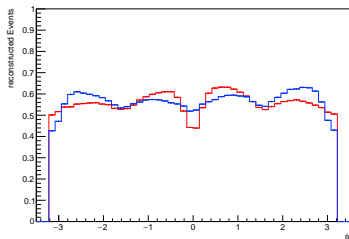
Table: The asymmetry  $\frac{N_+ - N_-}{N_+ + N_-} / 10^{-3}$

Polarity	$\pi$	$K$	$soft\pi$	$D^0$	$D^*$
<i>UP</i>	$-0.1 \pm 0.4$	$4.7 \pm 0.4$	$-3.8 \pm 0.5$	$-4.7 \pm 0.5$	$-8.2 \pm 0.5$
<i>DOWN</i>	$-0.3 \pm 0.4$	$5.2 \pm 0.4$	$3.7 \pm 0.5$	$-5.0 \pm 0.5$	$-0.8 \pm 0.5$

- $D_{soft\pi}$  &  $D_{D^0}$  cancel partially in *DOWN*,  
but add up in *UP*
- $|A_{CP,D^*}|$  much bigger for the *UP*-polarity

# Comparison of different charges with $UP$ polarity - $D^*$



Comparison -  $D^*\phi$ 

# $D^*$ asymmetry UP+DOWN

