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
 - \rightarrow final state detector efficiency

Efficiencies: Total, + and -

Table: Total reconstruction efficiencies

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

Table: D^{*+} reconstruction efficiencies

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

Table: D^{*-} reconstruction efficiencies

Polarity	ϵ_{π^-}	$\epsilon_{\mathcal{K}^+}$	$\epsilon_{\pi^-,s}$	$\epsilon_{ar{D}_0}$	ϵ_{D^*-}
UP	86.65 ± 0.02	84.25 ± 0.02	$\textbf{76.93} \pm \textbf{0.02}$	73.67 ± 0.03	56.76 ± 0.03
DOWN	86.66 ± 0.02	84.27 ± 0.02	76.34 ± 0.02	73.72 ± 0.03	$\underline{56.36 \pm 0.02}$

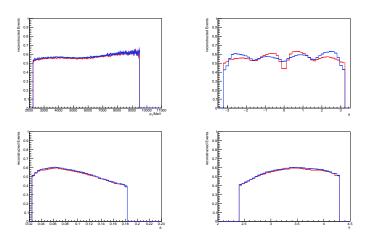
Asymmetry

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

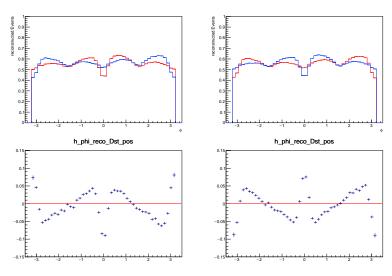
Polarity	π	К	$soft\pi$	D^0	D*
UP -	-0.1 ± 0.4	4.7 ± 0.4	-3.8 ± 0.5	-4.7 ± 0.5	-8.2 ± 0.5
DOWN -	-0.3 ± 0.4	5.2 ± 0.4	3.7 ± 0.5	-5.0 ± 0.5	-0.8 ± 0.5

- $D_{soft \pi} \& D_{D^0}$ 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 $\overline{\mathsf{UP}} + \overline{\mathsf{DOWN}}$

