

Detector induced assymetry in CP violation measurements

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CP-asymmetry in the LHCb detector

DOWN	π	K	Soft π	$D^0 = \pi + K$	$D^* = s\pi + \pi + K$
N _{reco} pos	2674000	2626350	<u>2374360</u>	2253370	1737460
N _{reco} neg	2675660	2598950	2356980	2276140	1740180
UP	π	K	Soft π	$D^0 = \pi + K$	$D^* = s\pi + \pi + K$
N _{reco} pos	2669990	2620280	2352910	2249370	1720940
N _{reco} neg	2670540	2595820	<u>2371060</u>	2270520	1749450

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

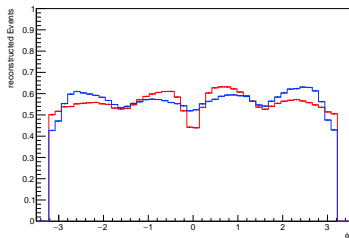
Polarity	π	K	soft π	D^0	D^*
UP	-0.1 ± 0.4	4.7 ± 0.4	-3.8 ± 0.5	-4.7 ± 0.5	-8.2 ± 0.5
DOWN	-0.3 ± 0.4	5.2 ± 0.4	3.7 ± 0.5	-5.0 ± 0.5	-0.8 ± 0.5

CP-asymmetry in the LHCb detector

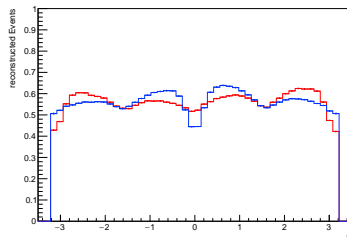
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<i>UP</i>	-0.1 ± 0.4	4.7 ± 0.4	-3.8 ± 0.5	-4.7 ± 0.5	-8.2 ± 0.5
<i>DOWN</i>	-0.3 ± 0.4	5.2 ± 0.4	3.7 ± 0.5	-5.0 ± 0.5	-0.8 ± 0.5

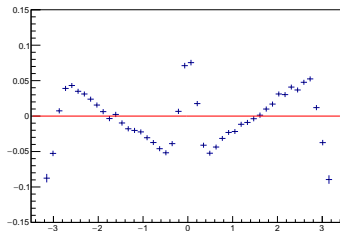
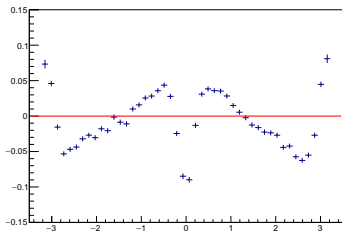
- $D_{soft\pi}$ & D_{D^0} cancel partially in *DOWN*,
but add up in *UP*
- $|A_{CP,D^*}|$ much bigger for the *UP*-polarity

Comparison - $D^*\phi$ 

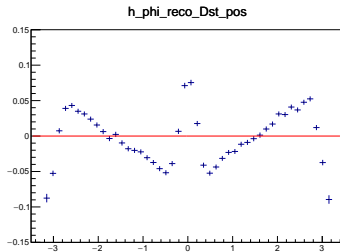
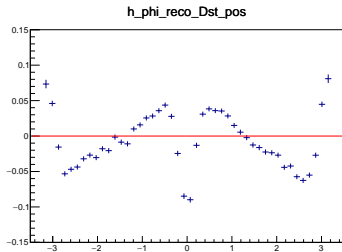
h_phi_reco_Dst_pos



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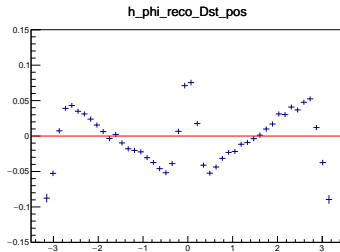
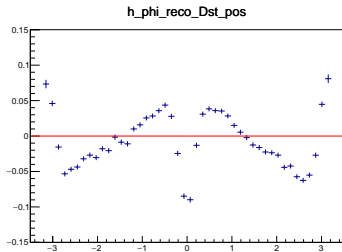


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- A_{CP} dependent on direction in the detector
 → detector induced CP -asymmetry due to rectangular shape

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- A_{CP} dependent on direction in the detector
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- add together samples with different magnet polarisation

D^* asymmetry UP+DOWN

