

$B^+ \rightarrow \rho^+ \rho^0$ status

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Follow-up from Wednesday's report at b2hadronic meeting.

https://indico.belle2.org/event/8429/contributions/50766/attachments/20188/29889/B2Had_0111.pdf

Trieste Physics Meeting
January 13, 2023

A few more CS cuts

More CS cuts

Sample composition.

	CS > 0.95				CS > 0.96	CS > 0.97	CS > 0.98
PID	< 0.8	< 0.85	< 0.9	< 0.95	PID < 0.95		
Signal longi (ε)	823 (0.0791)	829 (0.0796)	835 (0.080)	842 (0.081)	769 (0.07385)	685 (0.06586)	573 (0.05506)
Signal trans (ε)	82 (0.151)	83 (0.152)	84 (0.153)	85 (0.154)	77 (0.1398)	68 (0.12448)	57 (0.10384)
BBbar bkg	2539	2592	2662	2767	2282	1817	1270
Cont bkg	3652	3707	3772	3870	2604	1538	678

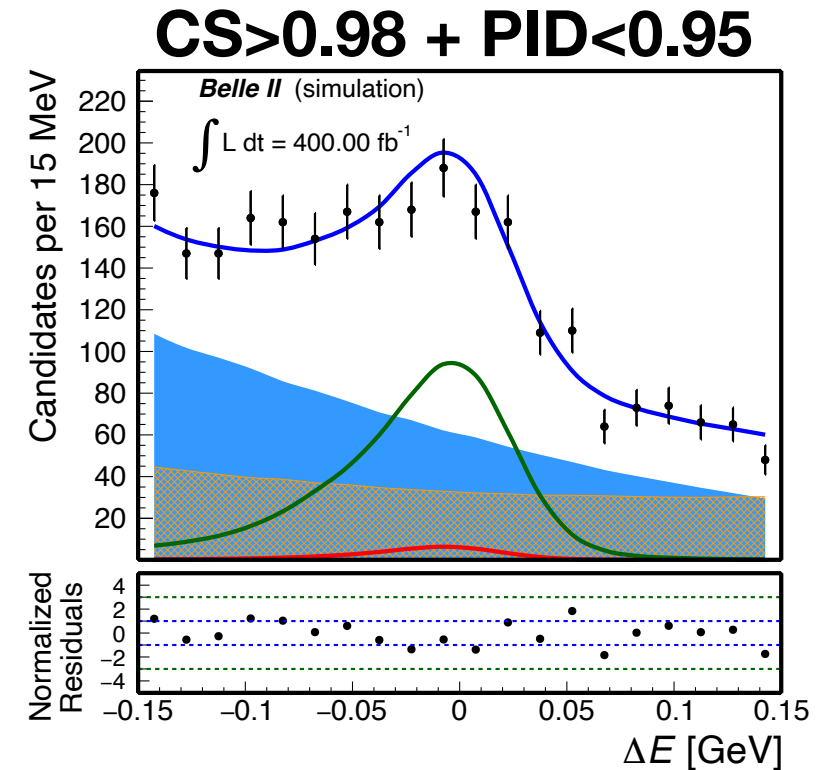
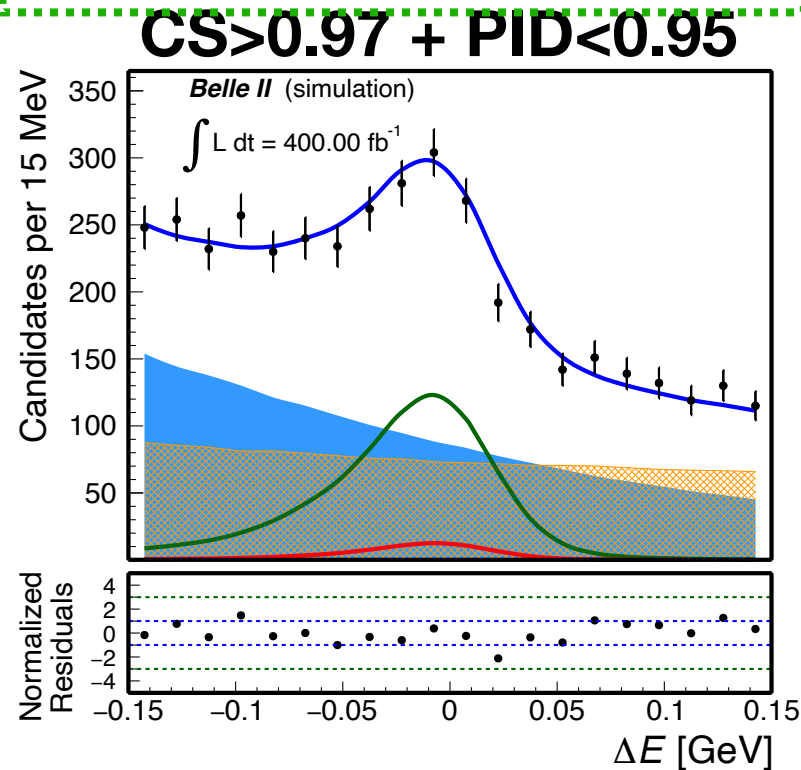
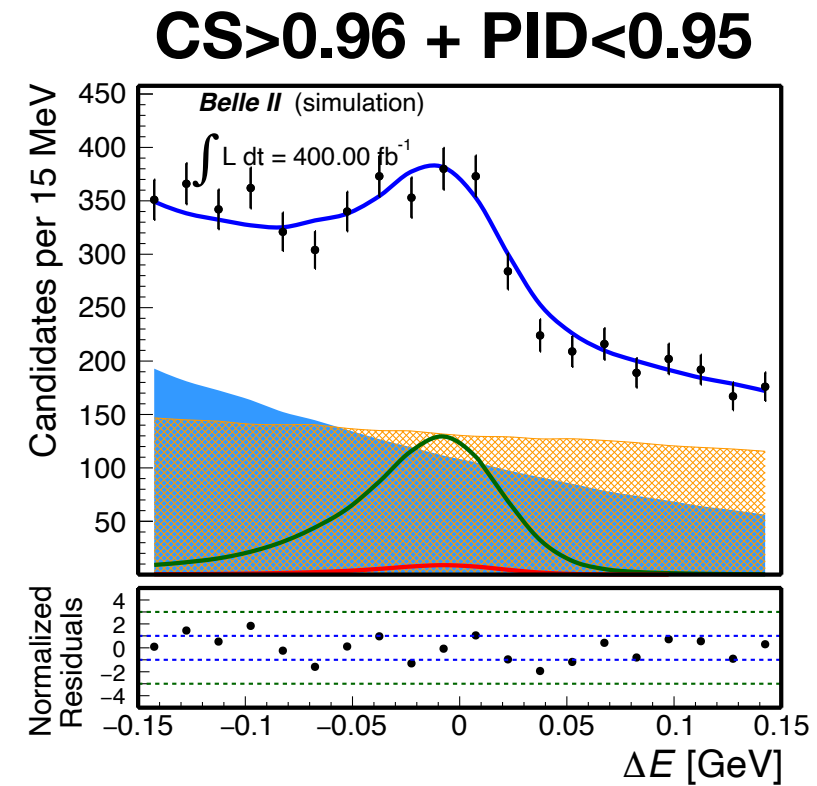
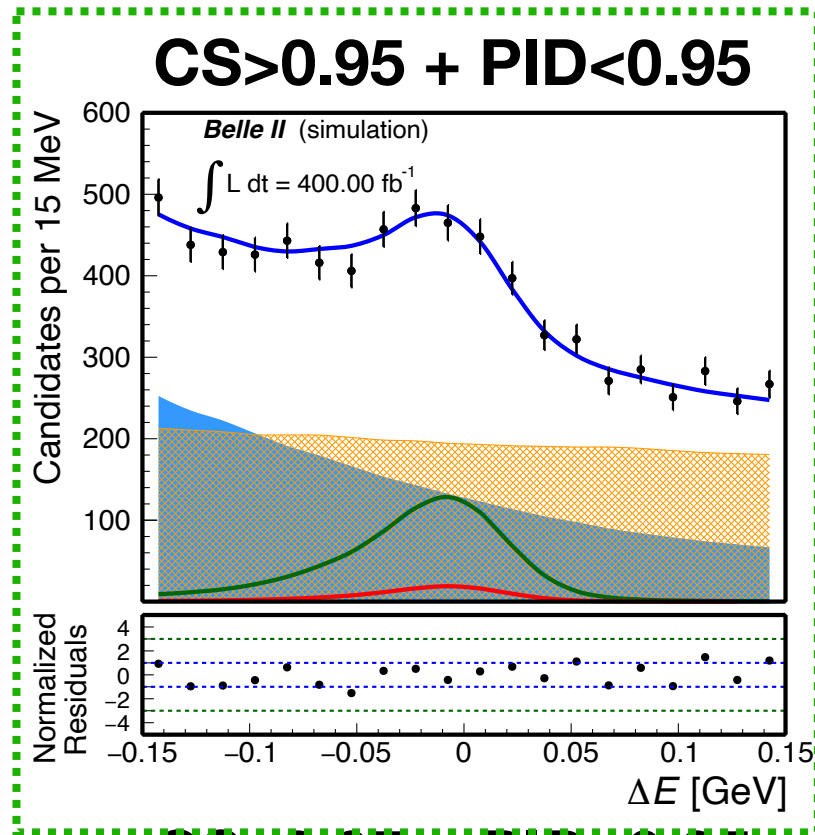
More CS cuts

Precision

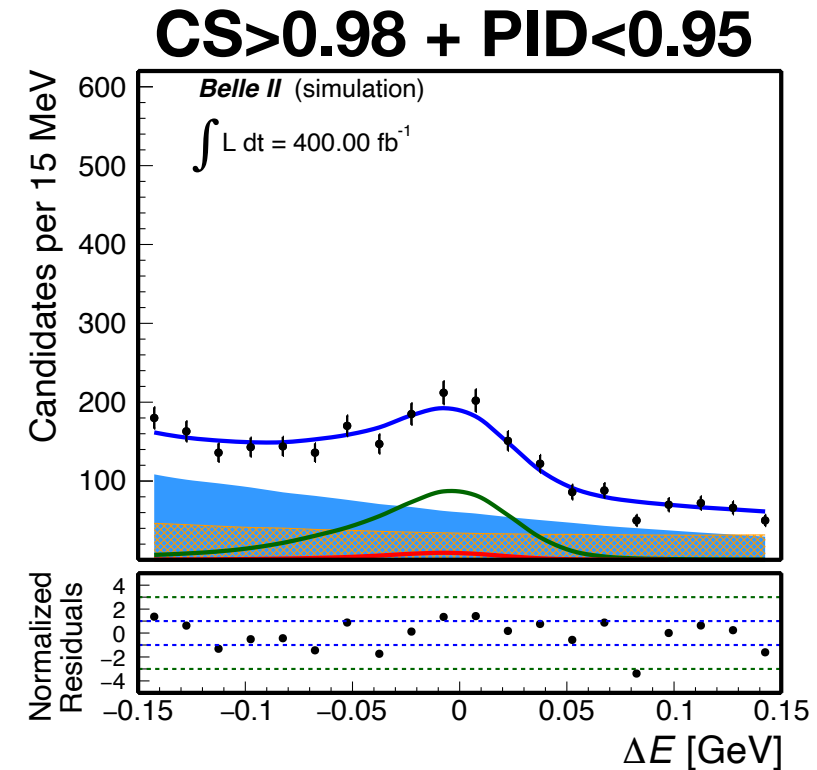
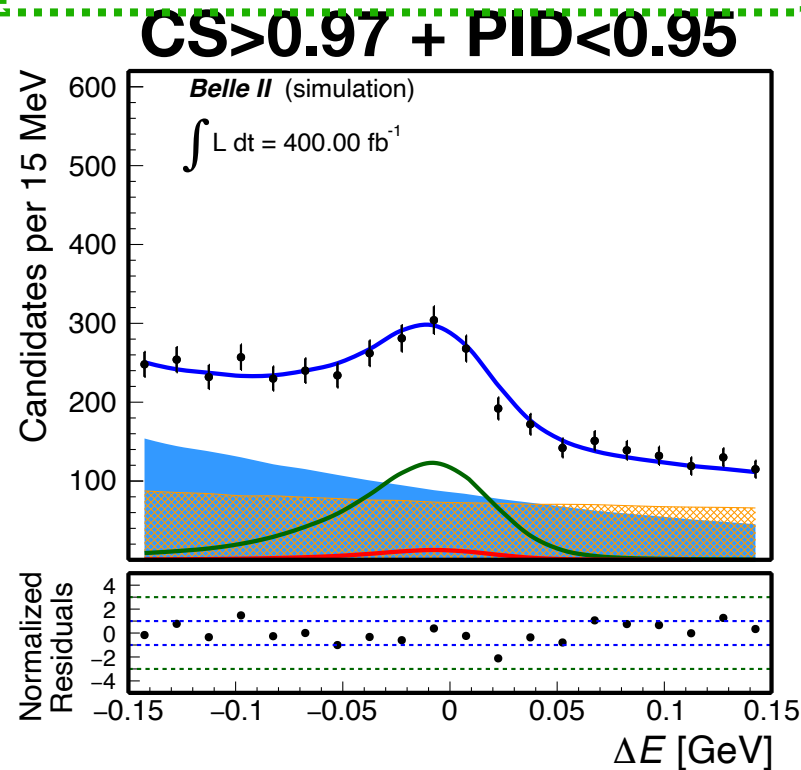
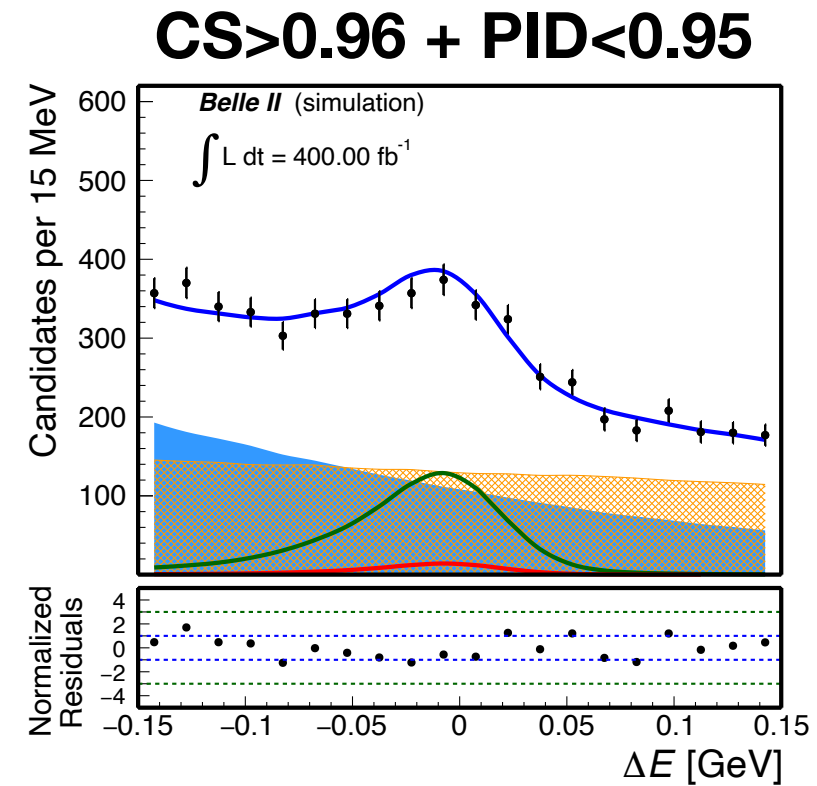
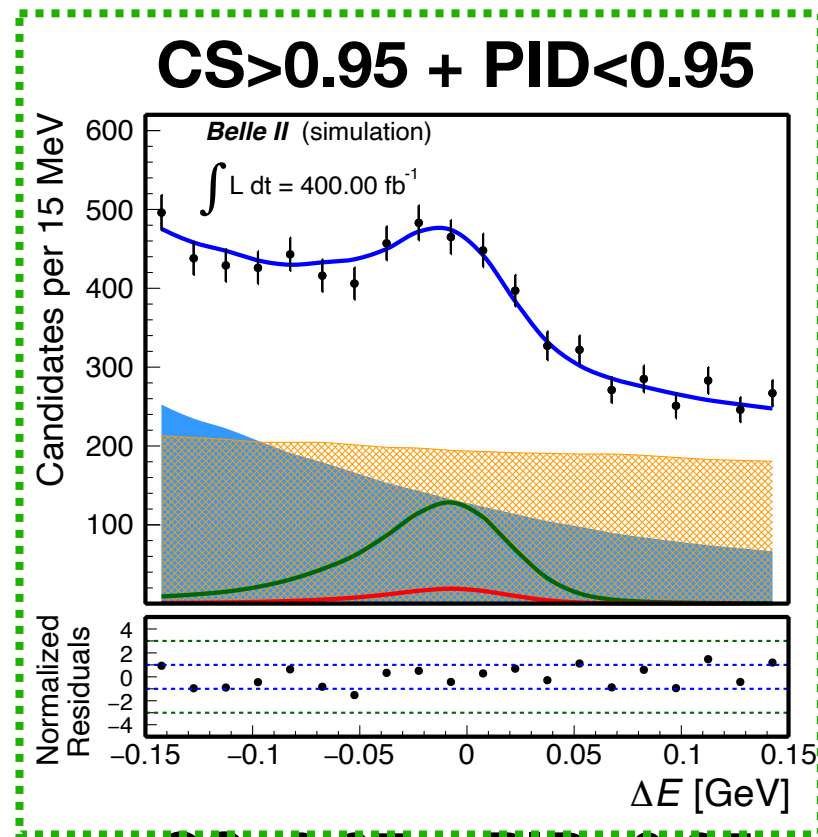
	CS > 0.95				CS > 0.96	CS > 0.97	CS > 0.98
PID	< 0.8	< 0.85	< 0.9	< 0.95	PID < 0.95		
BF [e-6]	1.05 ± 0.02	1.04 ± 0.02	1.05 ± 0.02	1.05 ± 0.02	1.06 ± 0.03	1.08 ± 0.03	1.11 ± 0.04
f_L	0.0130 ± 0.0003	0.0128 ± 0.0003	0.0130 ± 0.0003	0.0131 ± 0.0003	0.0129 ± 0.0003	0.0134 ± 0.0003	0.0139 ± 0.0004
A_{CP}	0.051 ± 0.001	0.051 ± 0.001	0.052 ± 0.001	0.051 ± 0.001	0.051 ± 0.001	0.053 ± 0.001	0.059 ± 0.002

Increasing CS cut shows worsening trend. But maybe CS>0.96 is still fine.

Compare sample compositions



Compare sample compositions

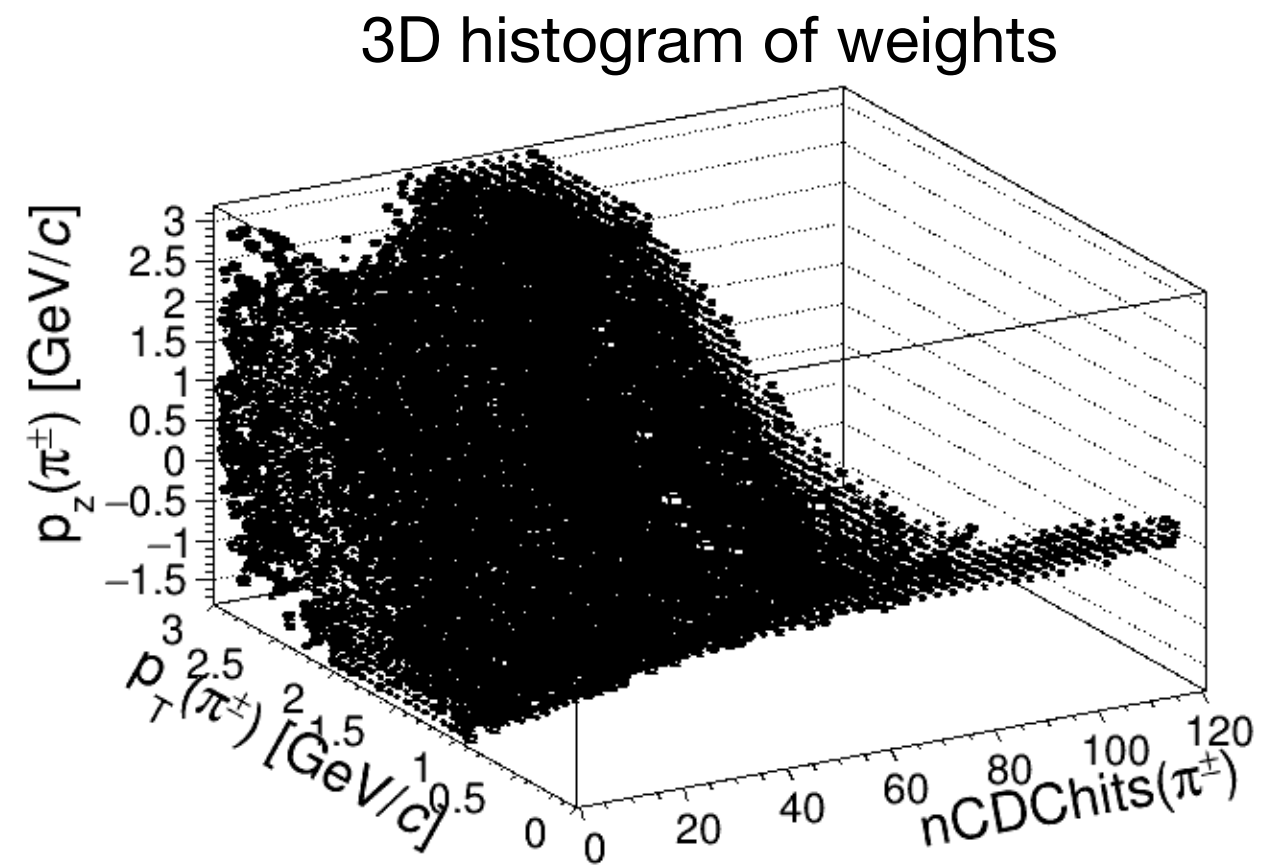
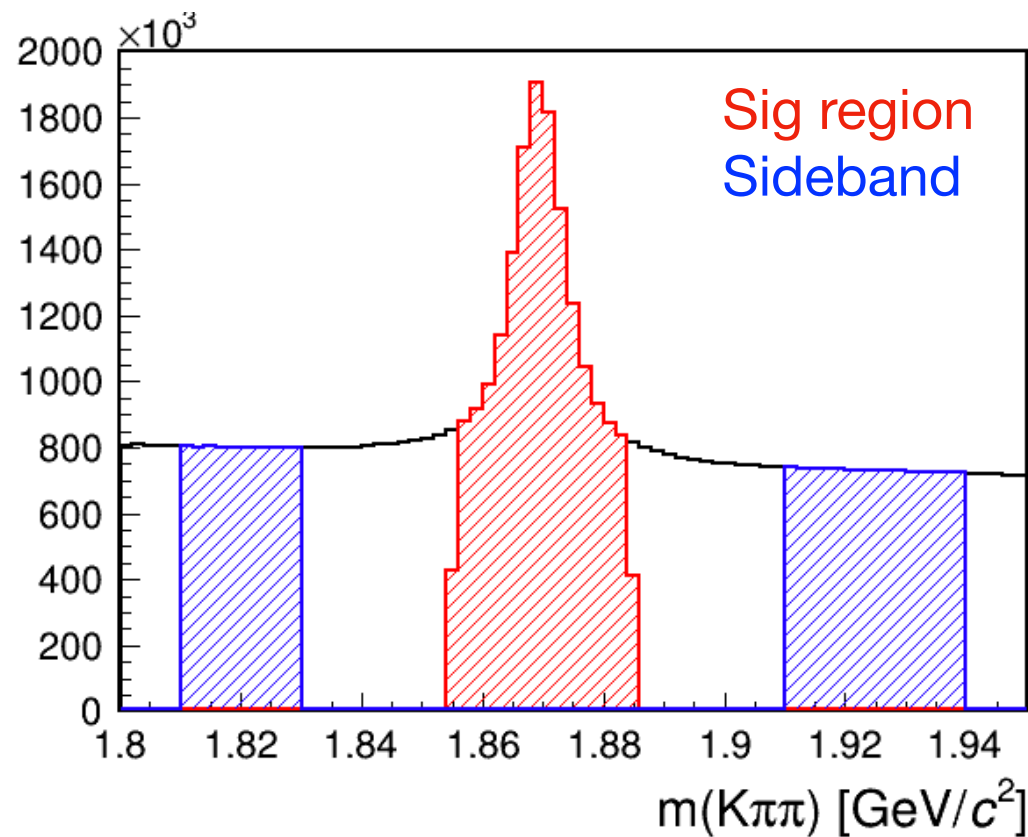


Could consider increasing cut to 0.96.

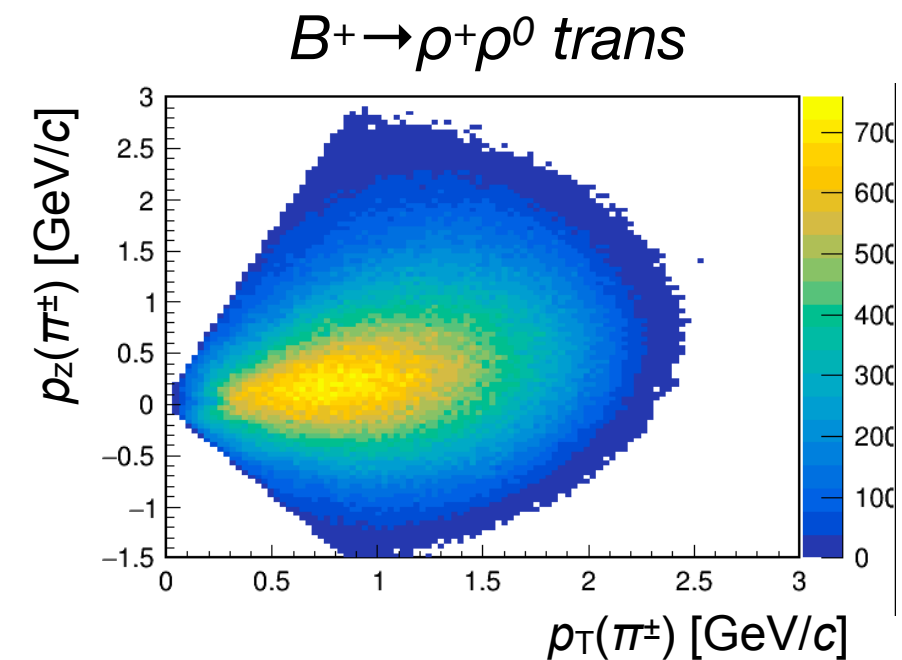
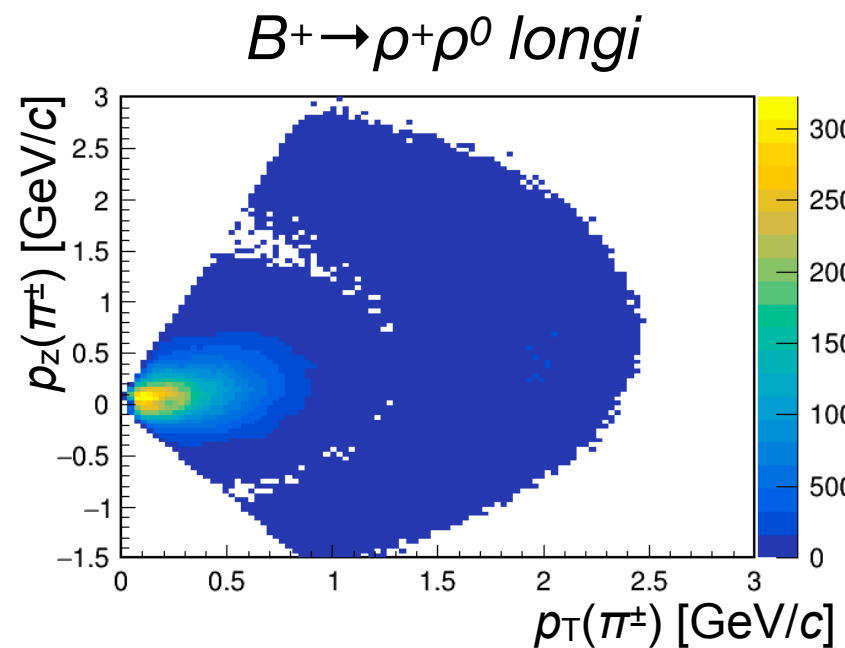
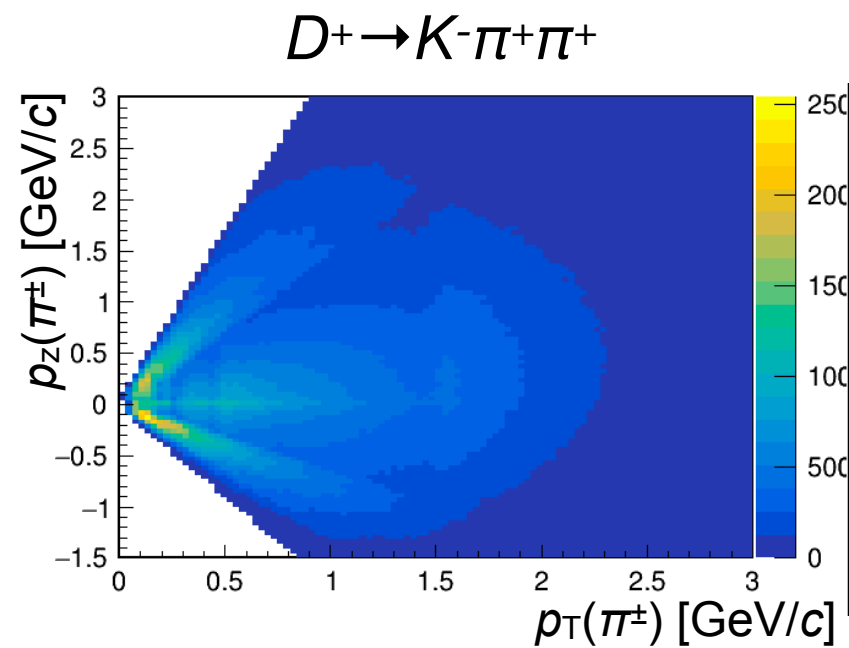
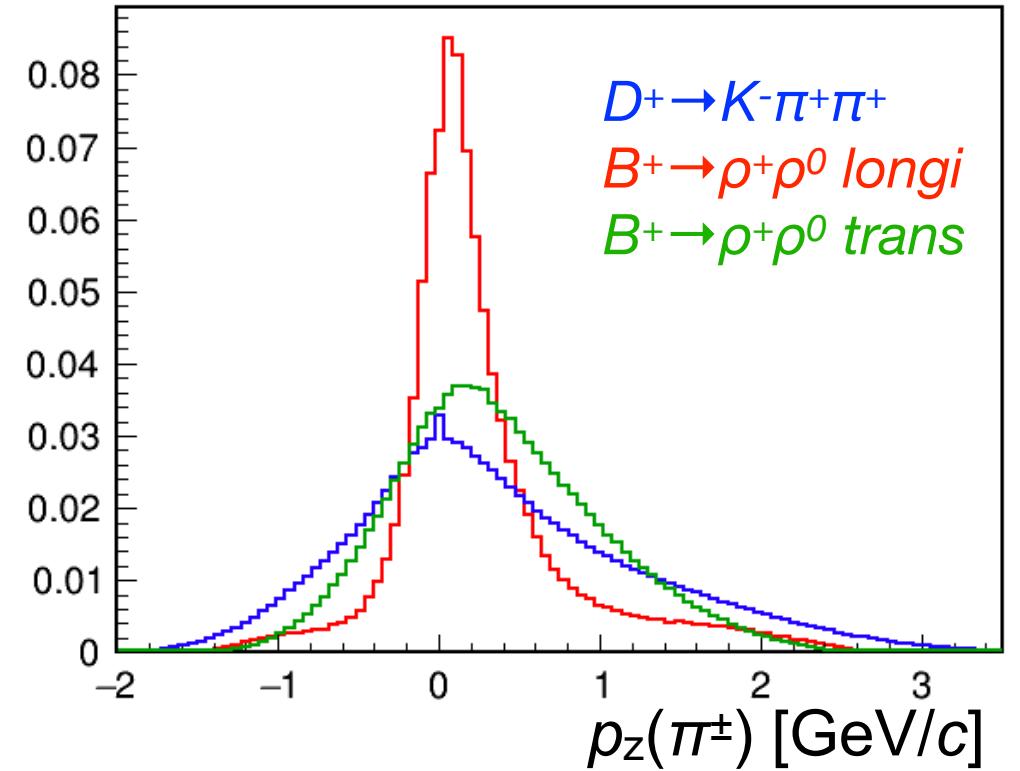
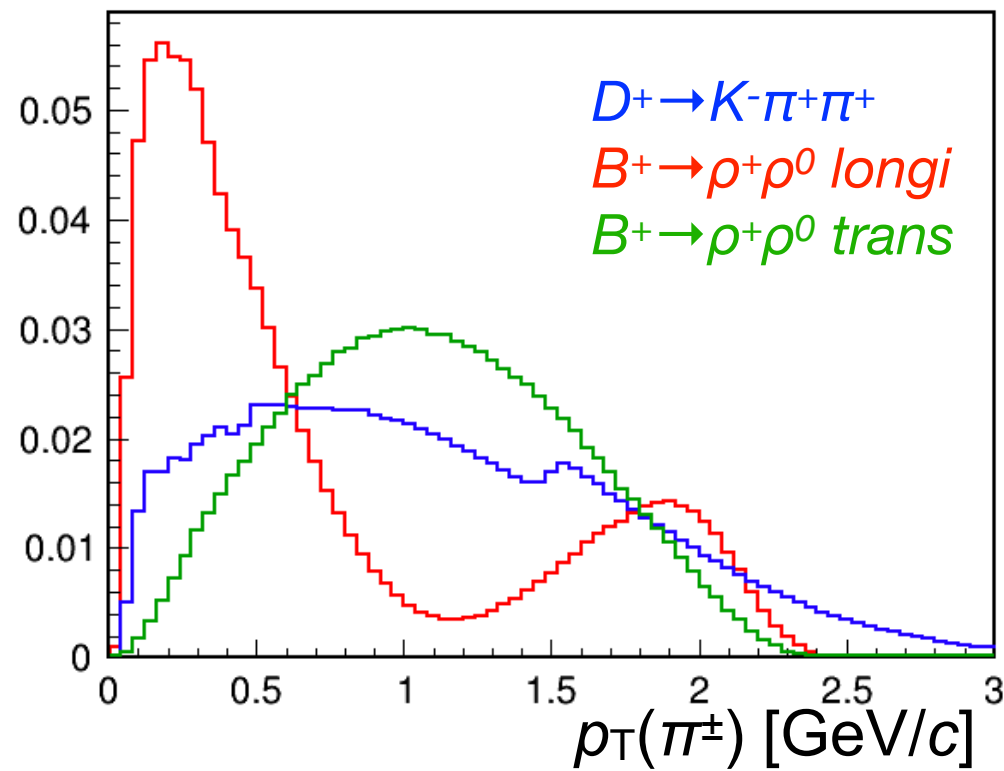
Mismodelling

Recap: weight from charm decays

$D^+ \rightarrow K^- \pi^+ \pi^+$: momentum covers the $B \rightarrow \rho \rho$ signal distributions.
Restrict in D mass peak, subtract scaled bkg from sidebands.
Get 3D weights from the nCDChits, p_T and p_z distributions.
Add also cut on nCDChits > 20.



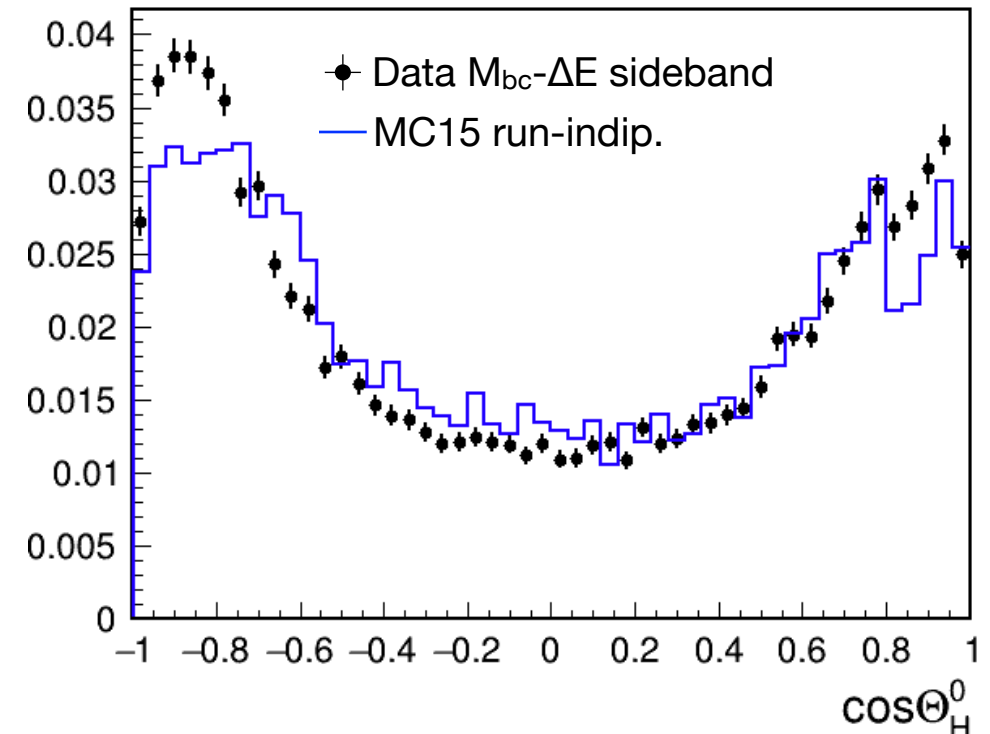
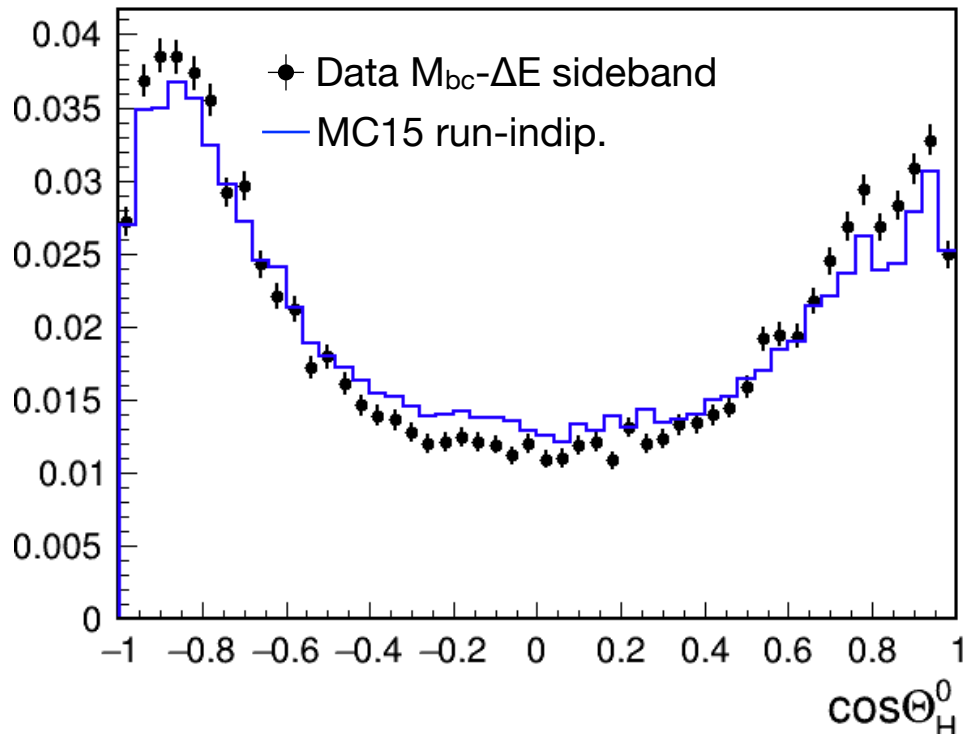
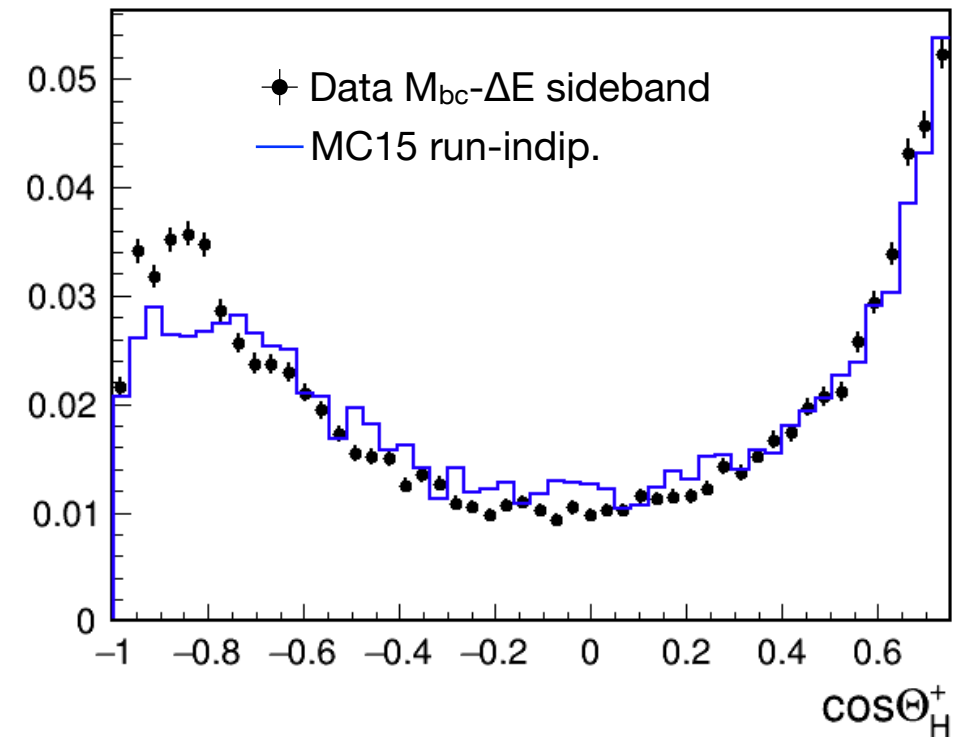
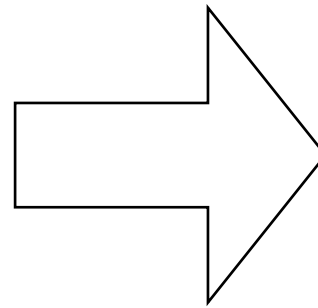
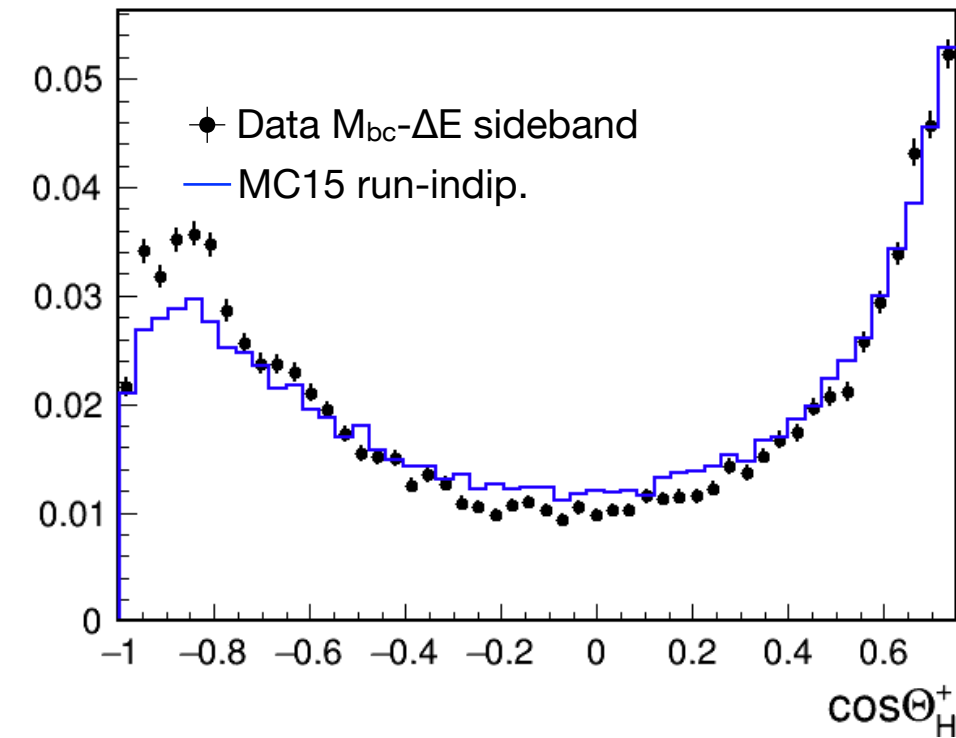
Recap: kinematic coverage



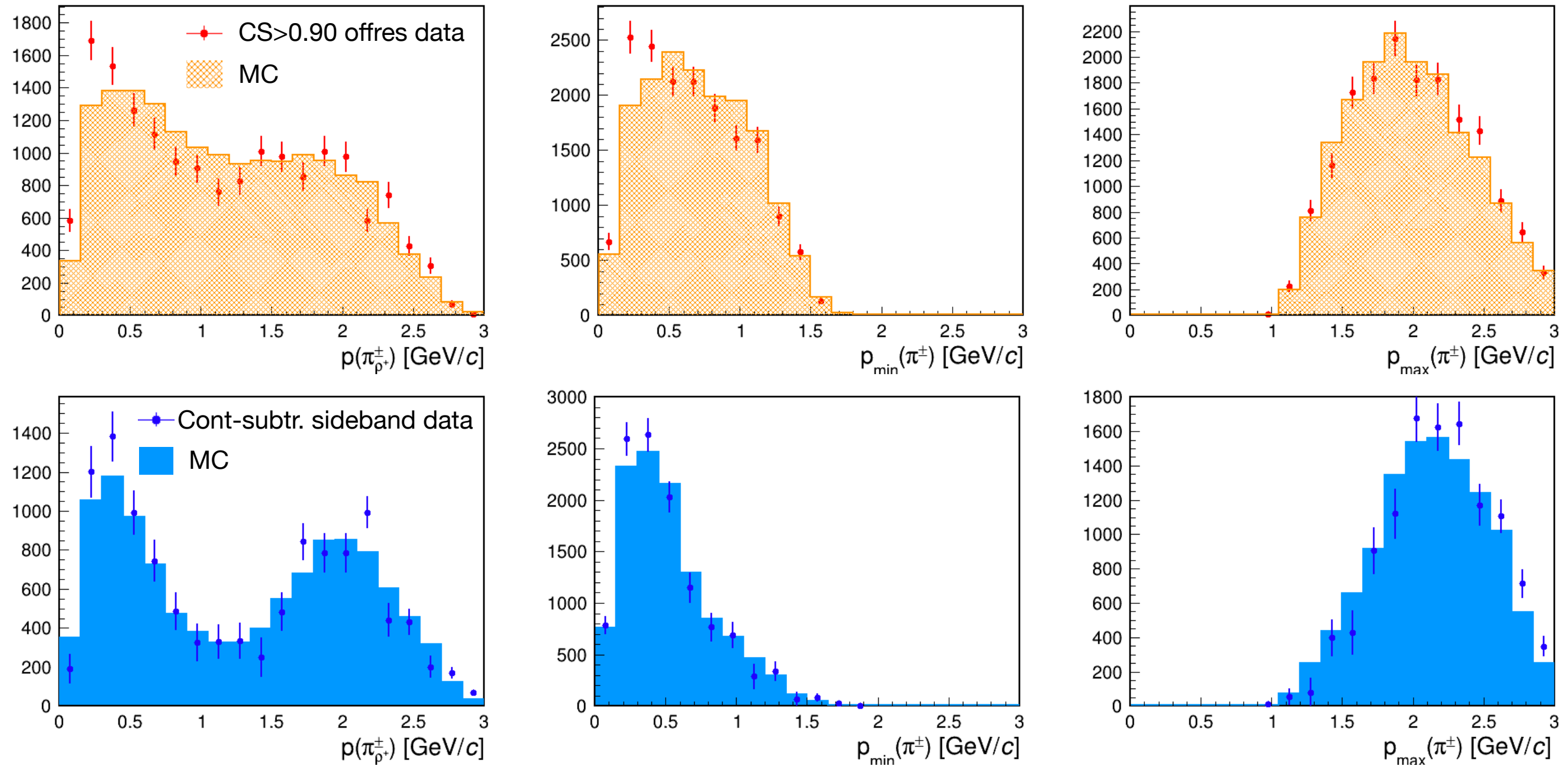
Good kinematic overlap with signals.

Mismodelling

New selection doesn't change the main message: correcting for $\varepsilon(\pi^0)$ + reweighting on p_T - p_z -nCDChits doesn't fix discrepancies. Probably still low- p tracks mismodelled.

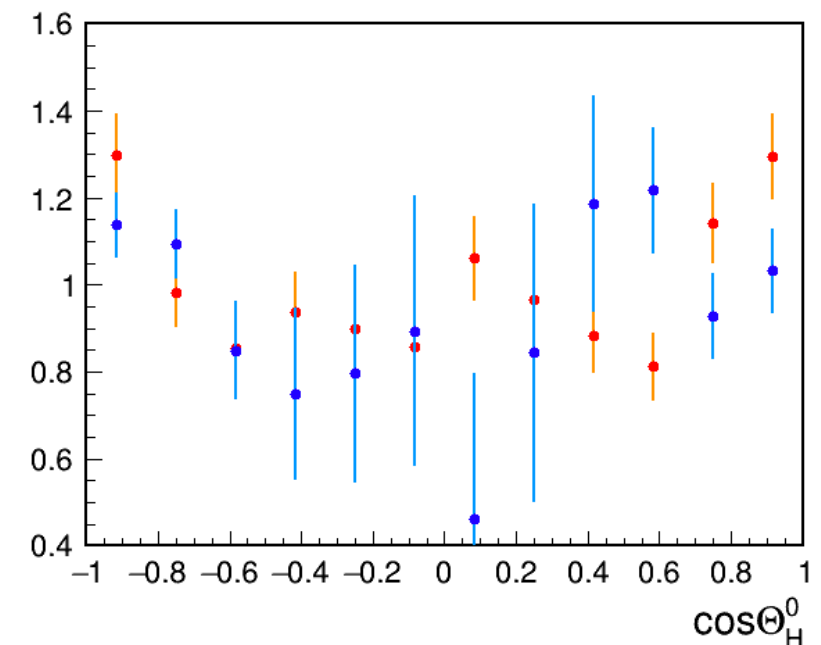
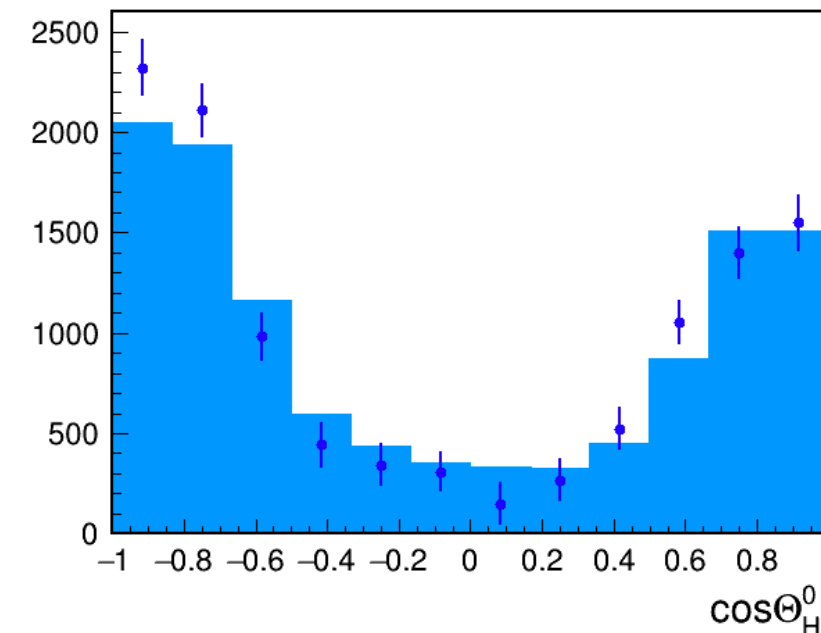
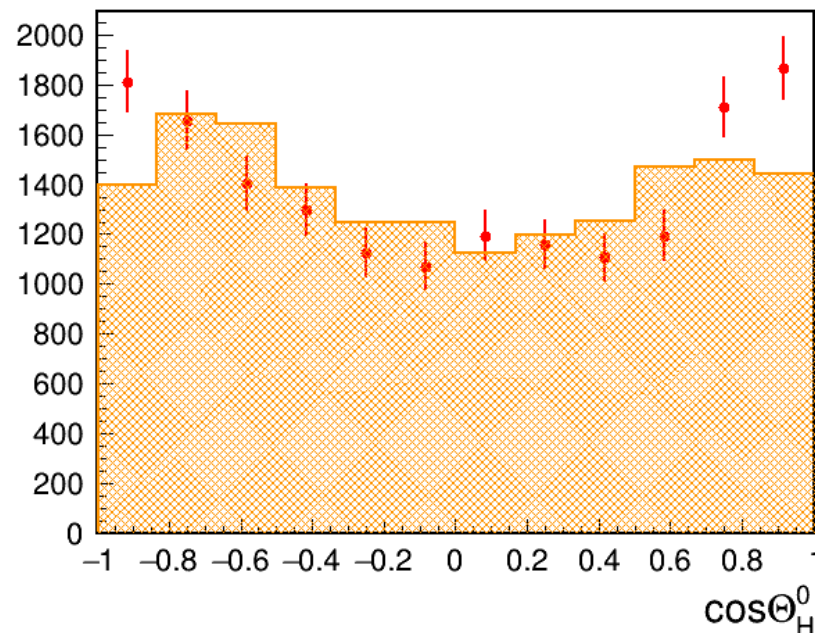
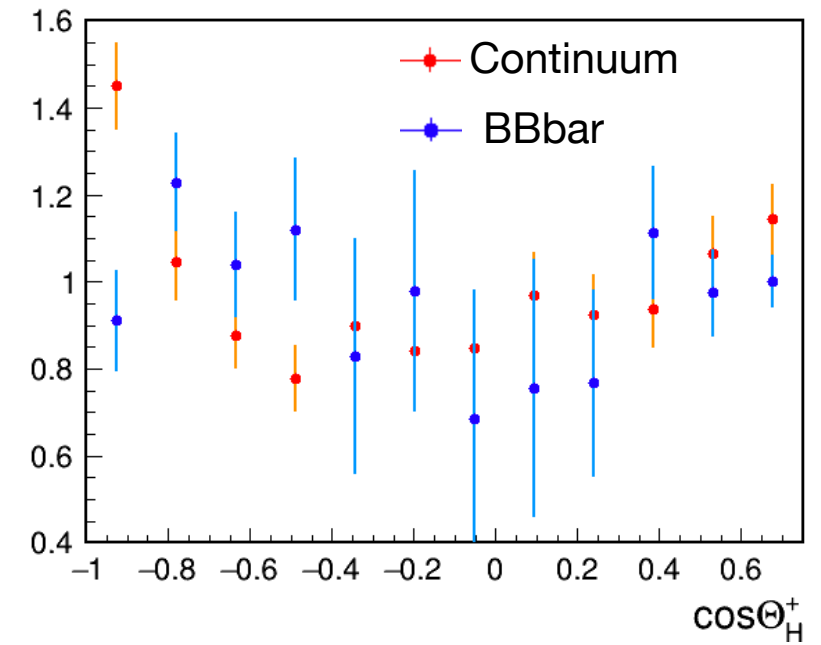
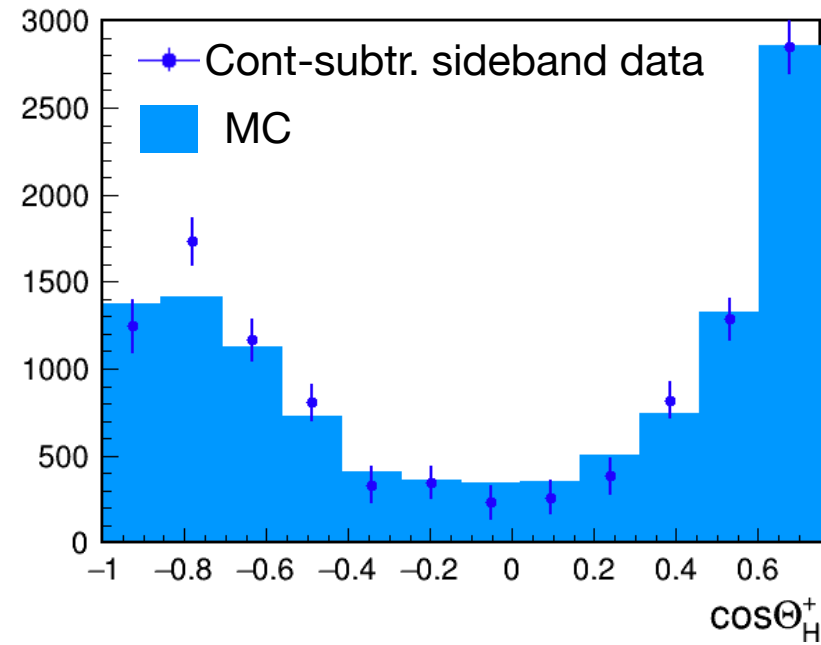
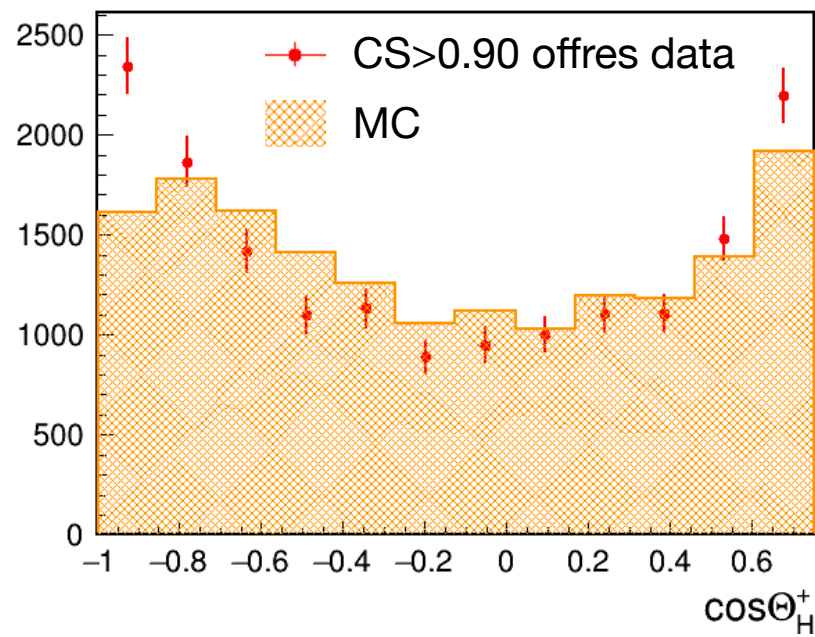


Momenta after correcting



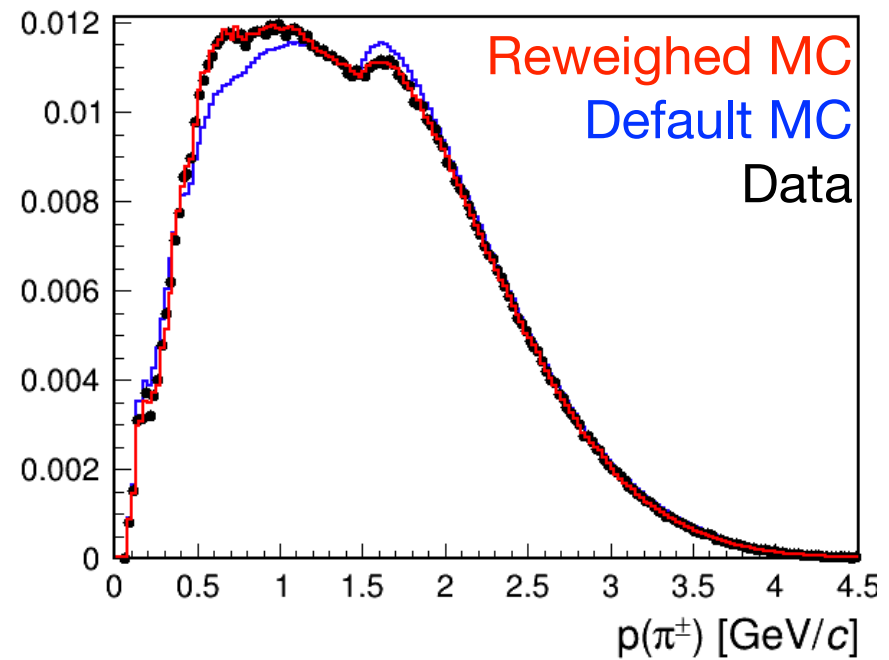
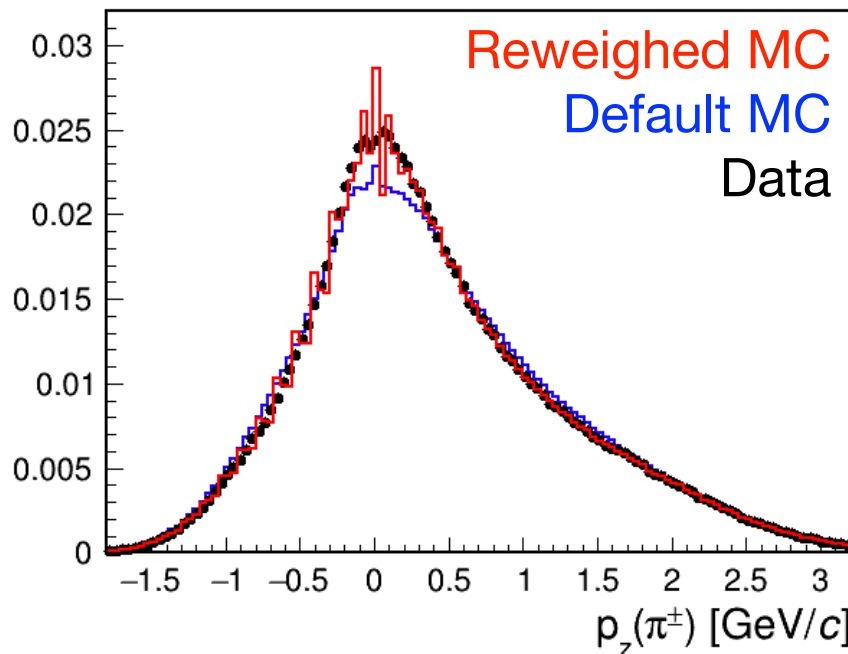
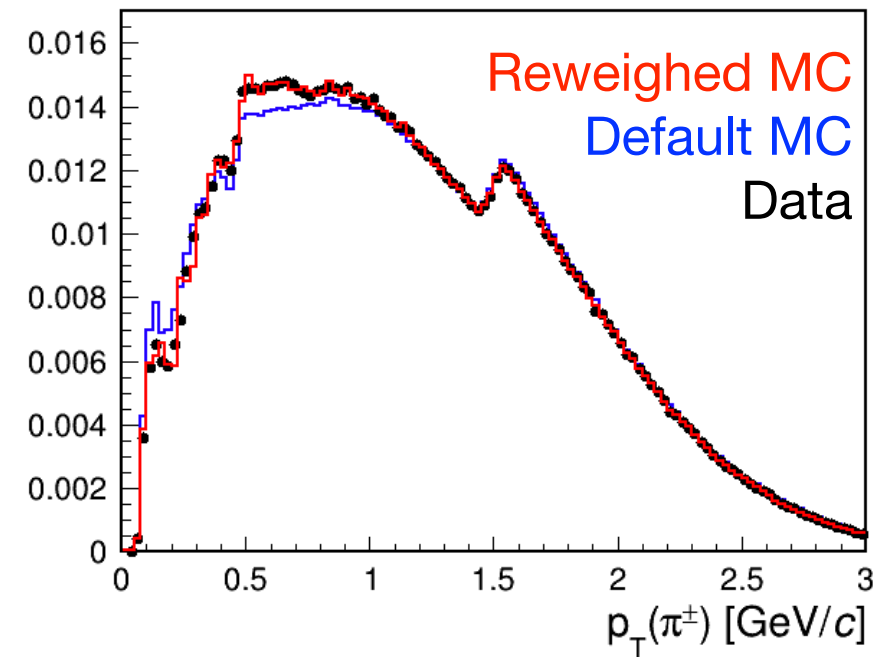
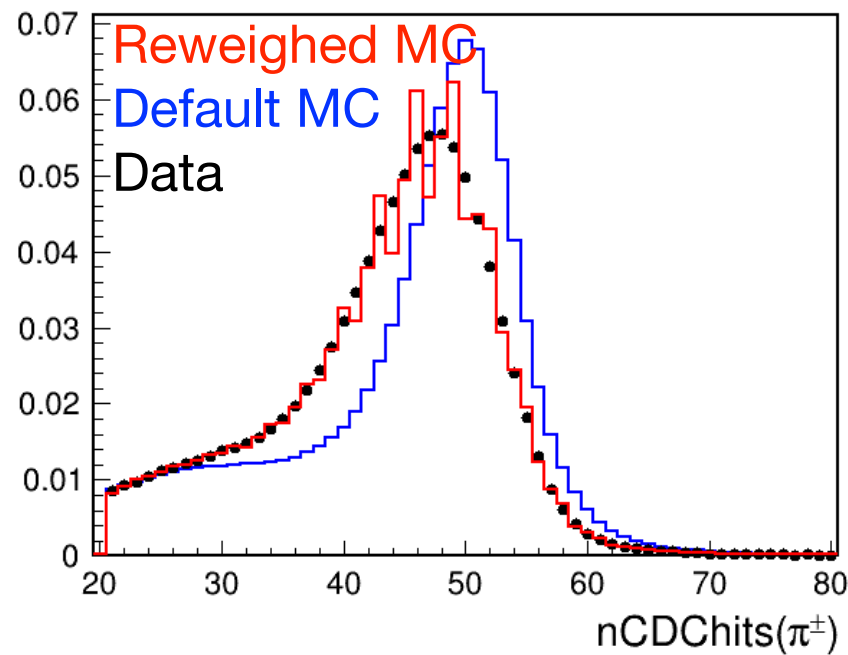
Mostly visible in the continuum, but BBbar is obtained subtracting with MC proportions.

Angles after correcting



Mostly visible in the continuum, but BBbar is obtained subtracting with MC proportions.

Verify reweighting works properly



**Reweighed $nCDChits$ looks still a bit off, while momenta are fine.
Additional check**

Next steps

Mismodelling:

- verify if independent per-track reweighing and 2D reweighing are different (do we need to account for pion momenta correlations) #1
- explore mismodeling charge-dependency #2

Fitt:

- review angular models — cure bias in f_L when fitting realistic MC #3
- check fit parameters correlations #4
- improve $\pi\pi$ invariant mass modeling

Technicalities:

- fit with conditional histograms #3
- add degrees of freedom to histograms
- add convolution to function library (I think Michele already did this)

backup