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

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Trieste Physics Meeting
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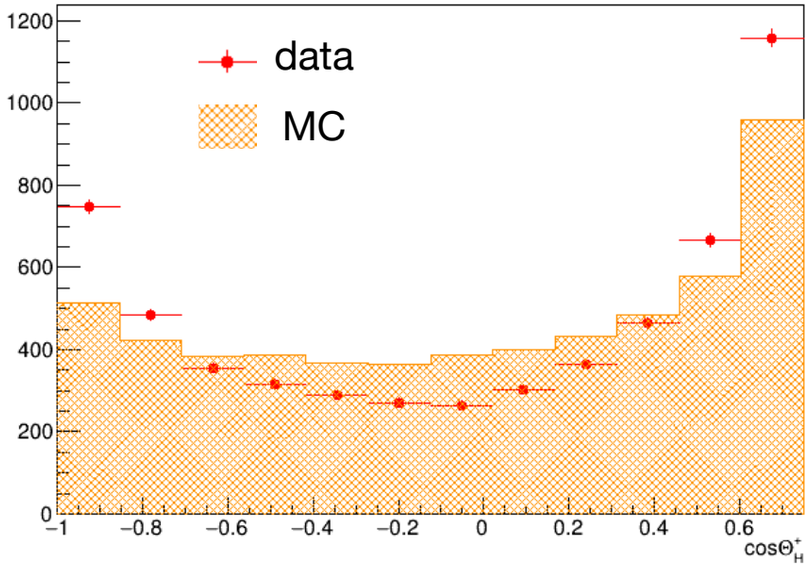
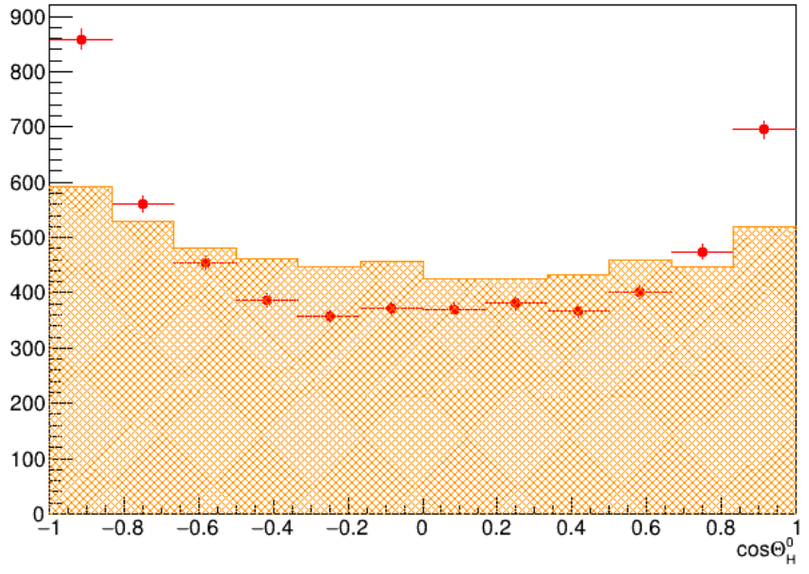
The situation

Pure continuum: off-resonance data with loosen CS cut (CS>0.85).





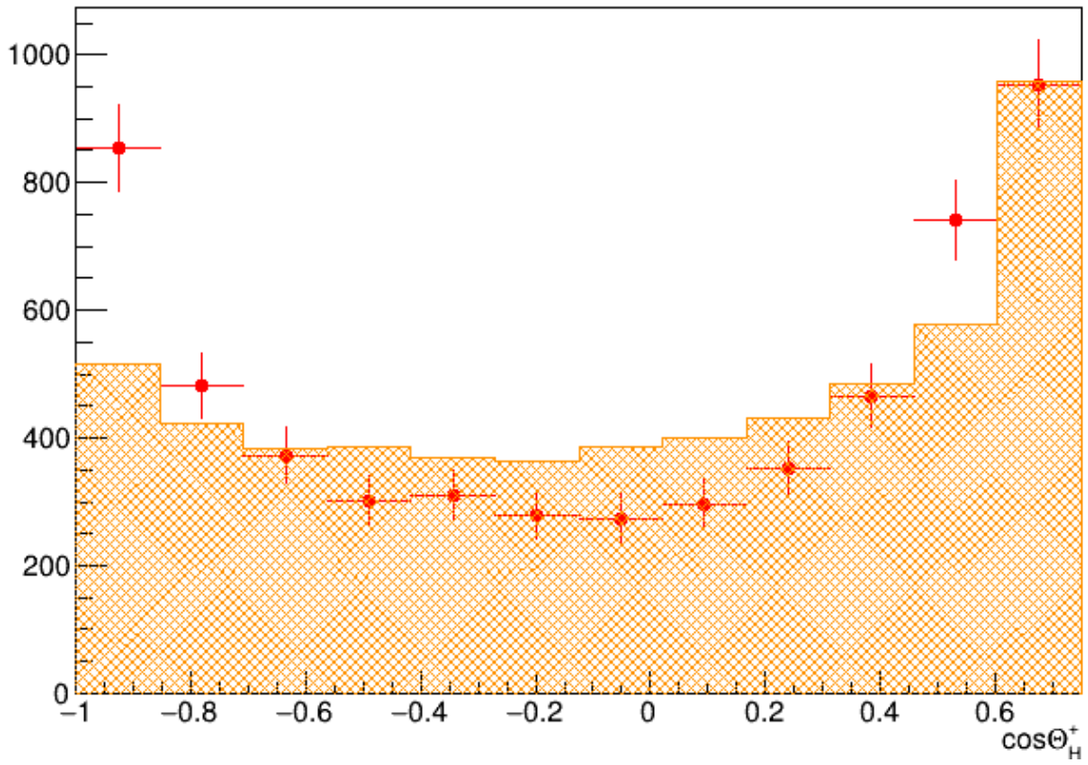
Mismodeling also present in BBbar.

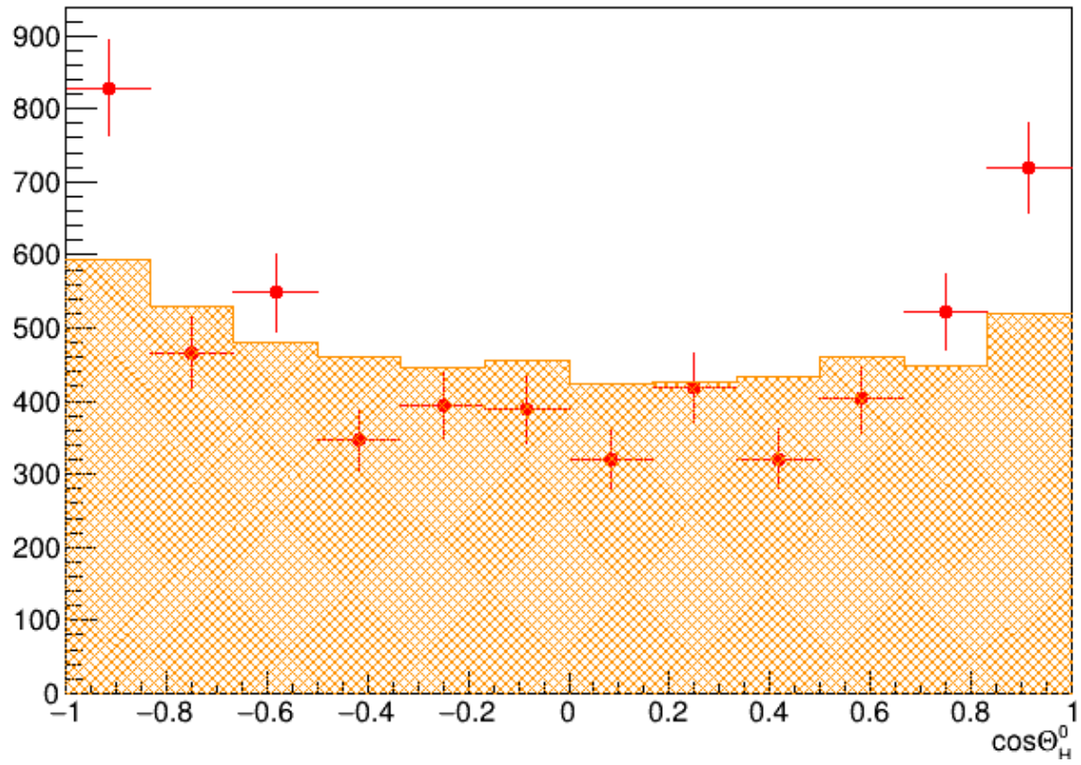
Possible causes:

- plotting bug: checked everything, I am plotting the correct things ✓
- CS-extension assumption: it's valid within the offres statistics available ~
- wrong generator models (something similar to the mass bug? Related to ? composition)
- sample composition non correctly reproduced ?
- acceptance mismodeling ?

Check with CS>0.97 only

Discrepancies are large: should be visible even with low data statistics.

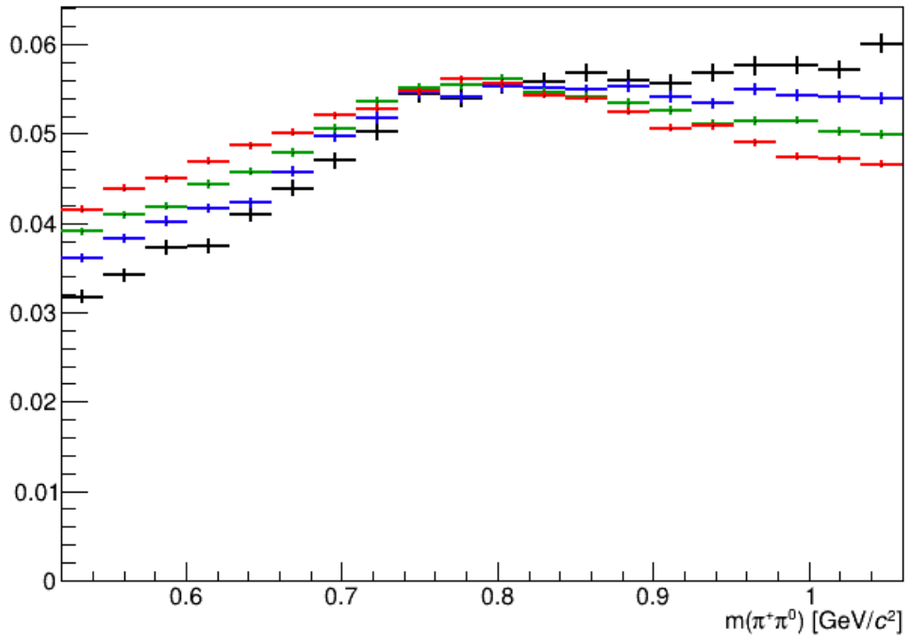


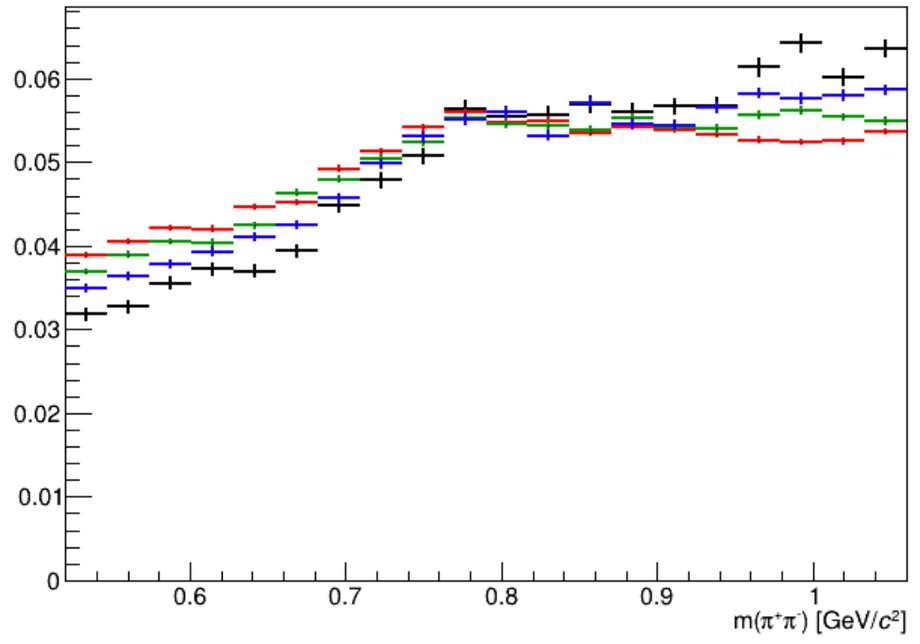


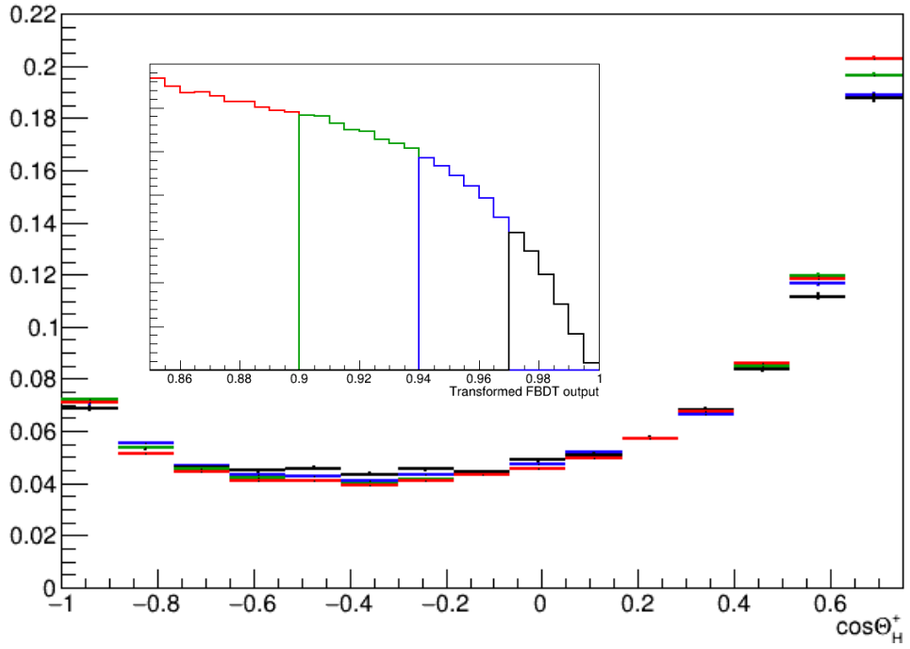
Disagreement still there.

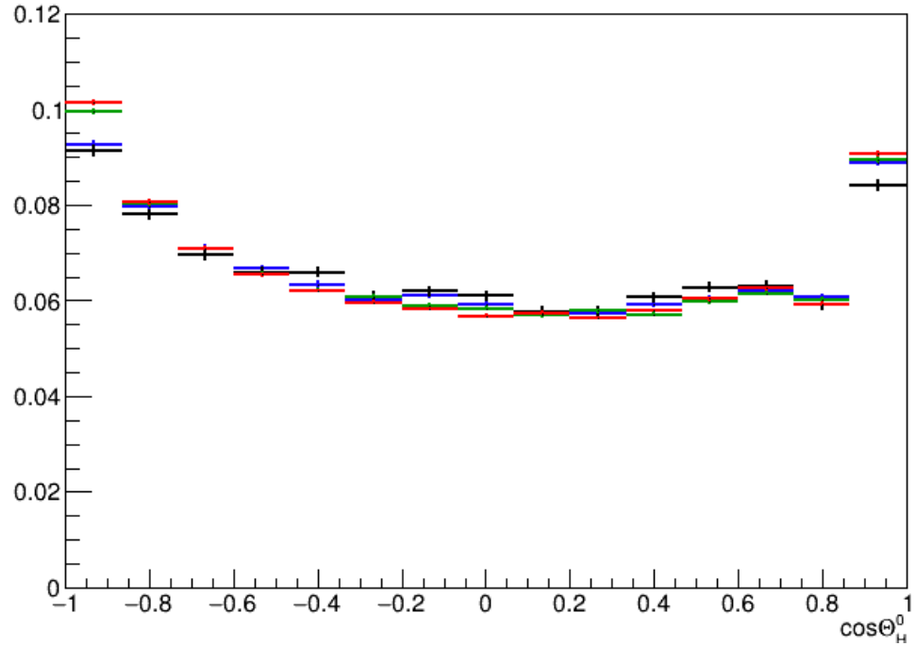
Validate CS-extension on MC

(more in backup)





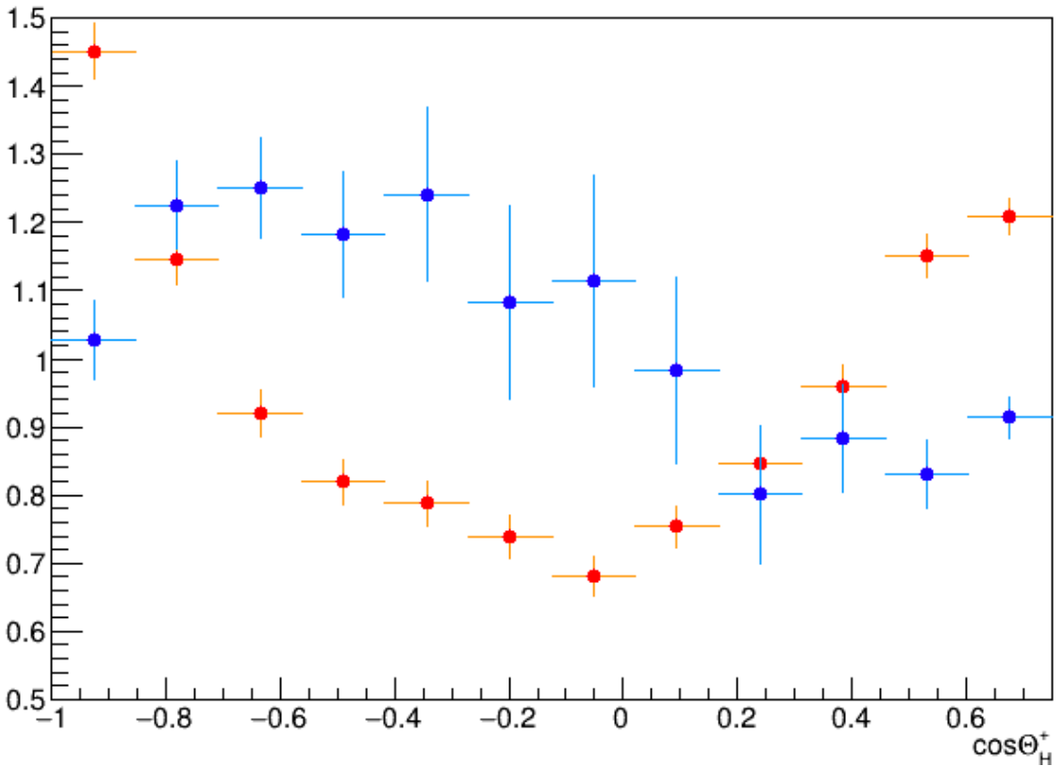


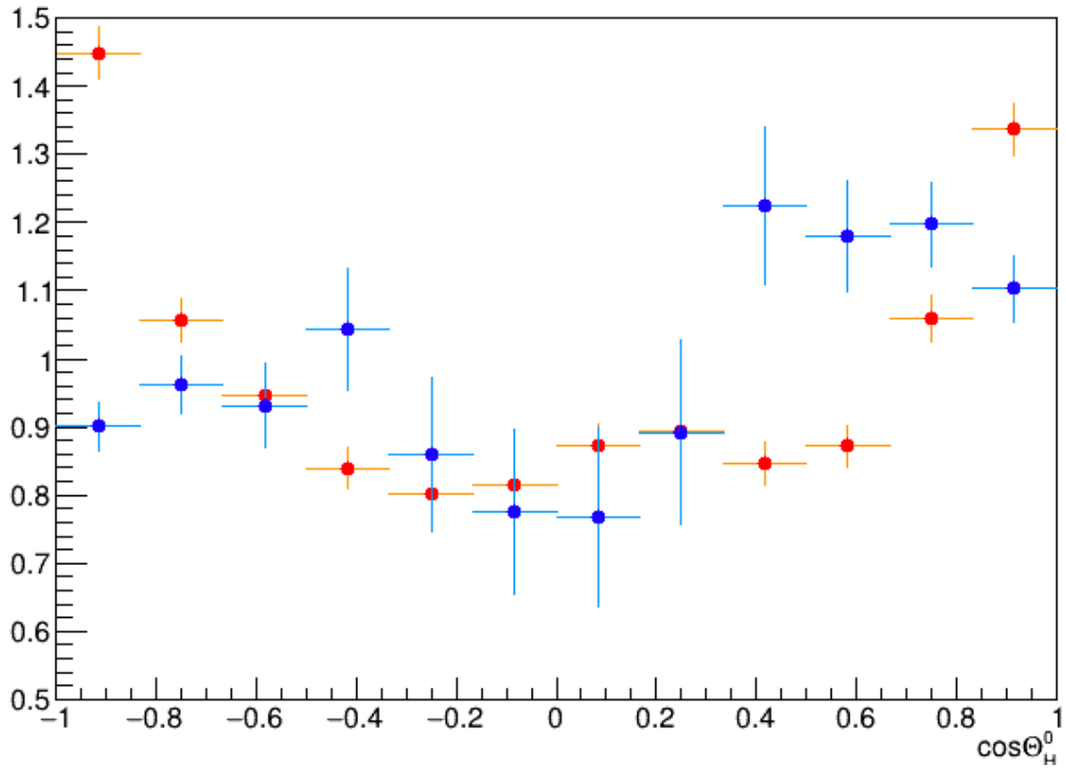


Angles look fine, could consider using only CS>0.94 region (black + blue).
Mass are different, but are also completely different wrt data.

Data/MC ratios

Pure continuum: the off-resonance data with loosen CS cut (CS>0.85).
Subtract from sideband (out of ΔE-Mbc box, CS>0.97) to have pure BBbar.

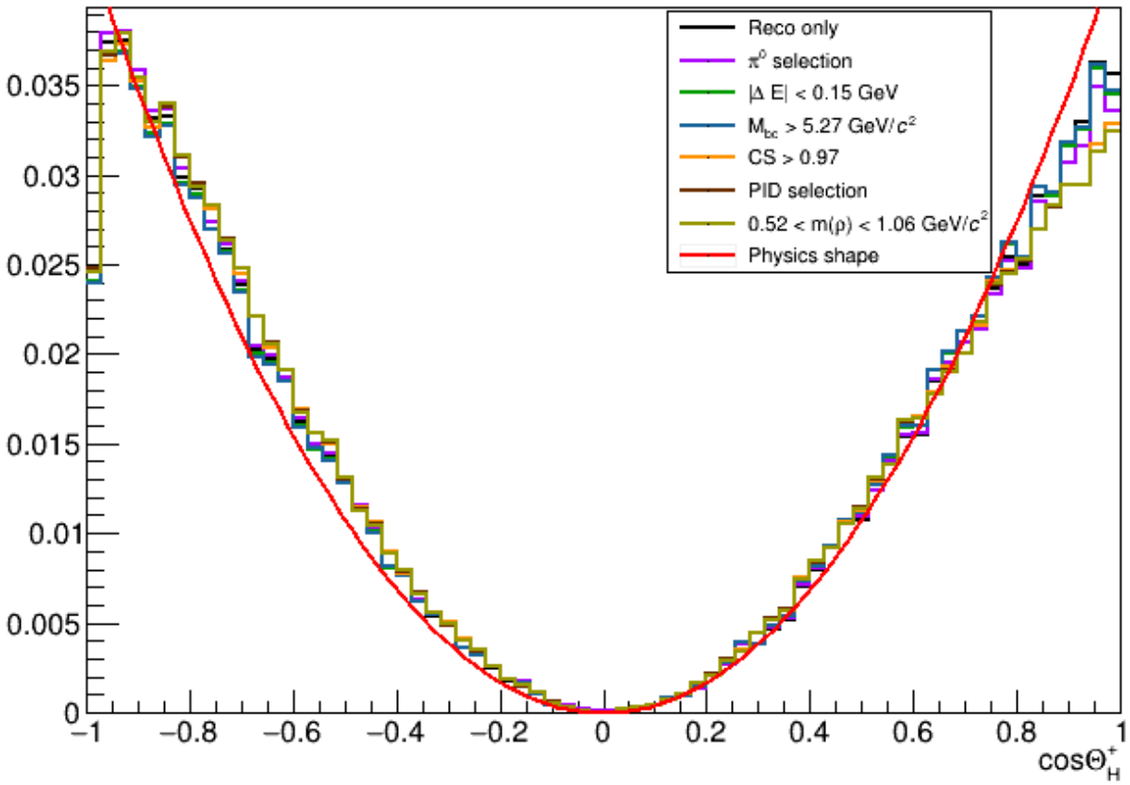


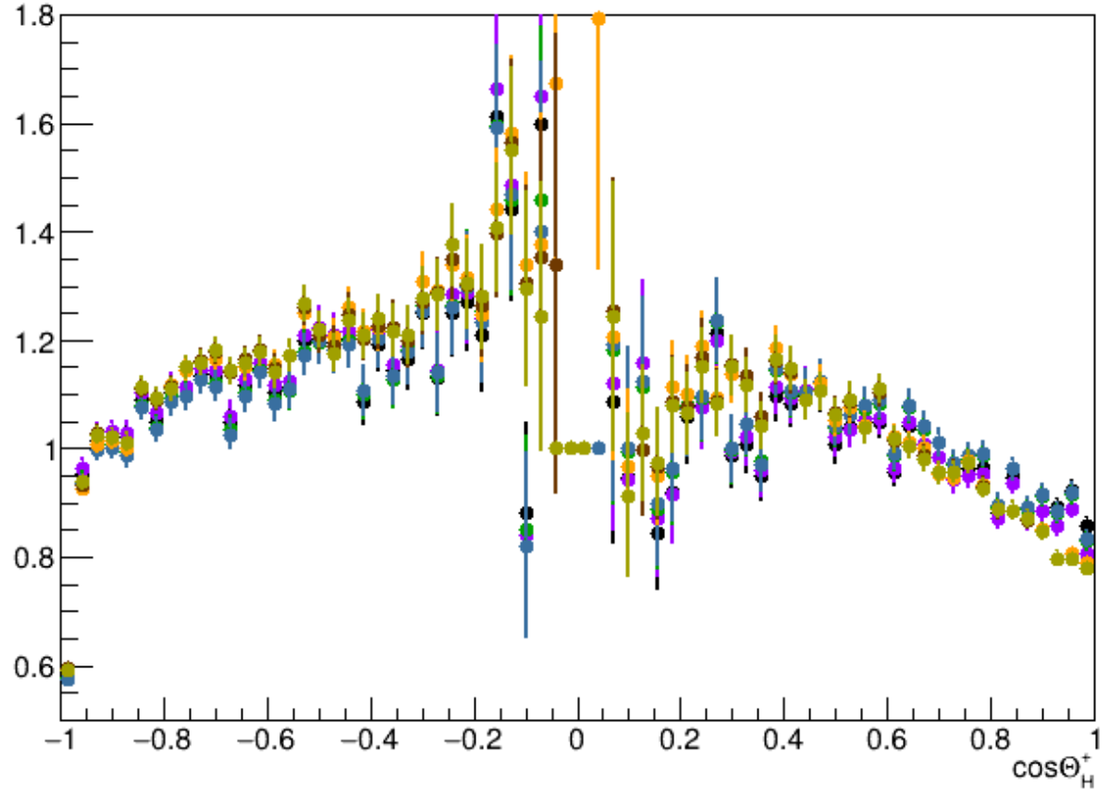


Larger continuum discrepancies on edges, same in the central part.

Acceptance variation vs cut (I)

Take $B \to D\rho$ isSignal=1 MC angle distribution and the predicted shape ($\propto \cos^2\theta$).
Compute acceptance as ratio of MC/physics shape, for every selection step.
Hope to find one variable that sculpts the acceptance and look at it in data.

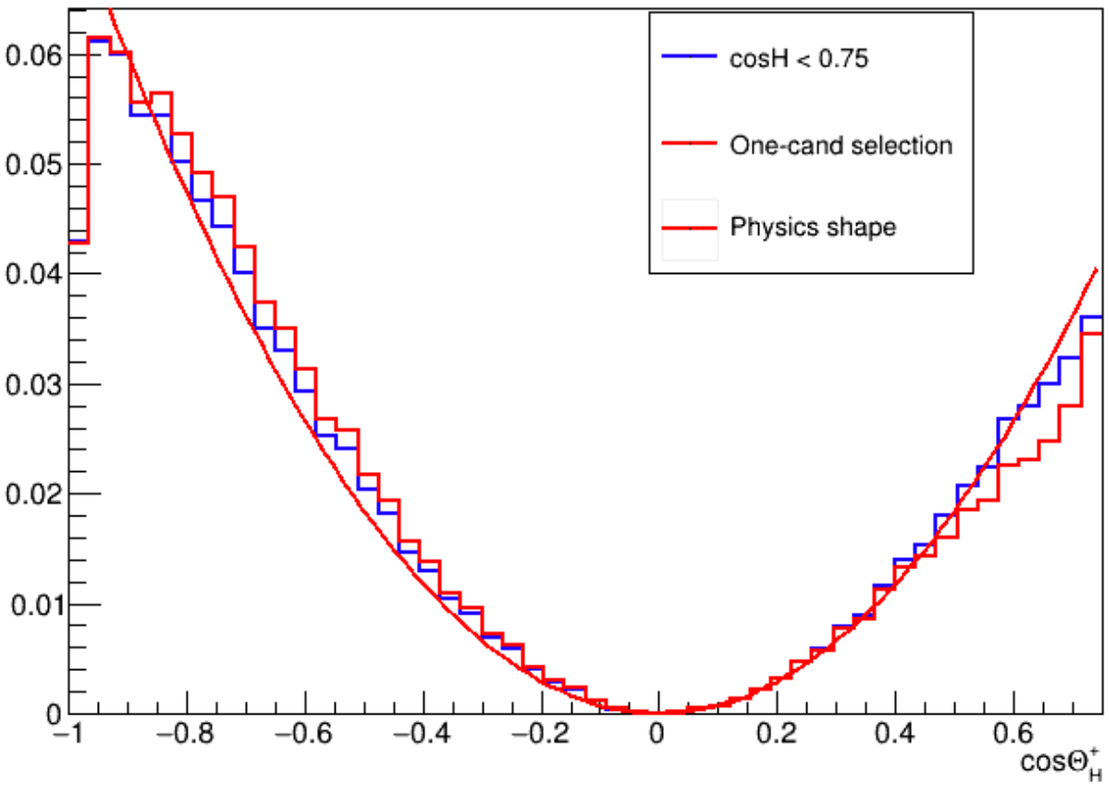


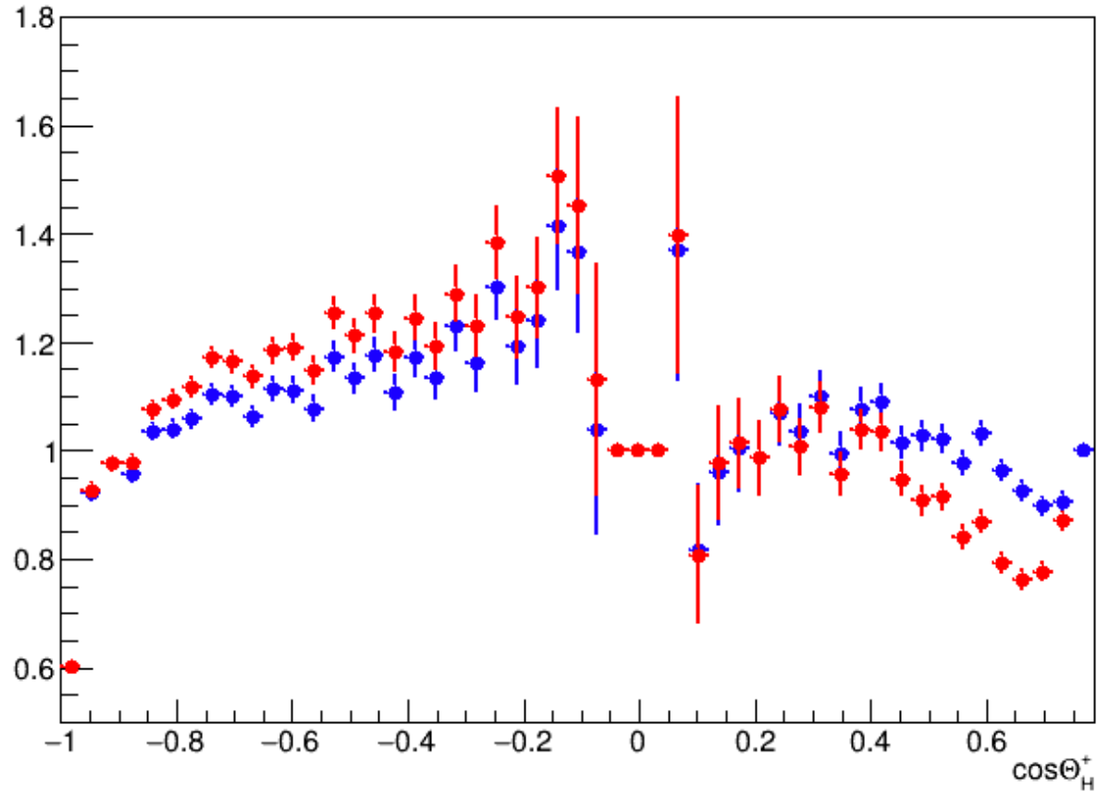


No evidence of a selection sculpting the acceptance.

Acceptance variation vs cut (II)

Mistake in normalization (cosHel range changes) spotted right before the meeting, for now showing two different plots. Here only final steps shown.





One-candidate selection sculpts a bit over 0.5.

Summary — action items

Checks on MC and using CS>0.97 data only show that off-resonance extension is valid — might think to cut at 0.9 instead that 0.85.

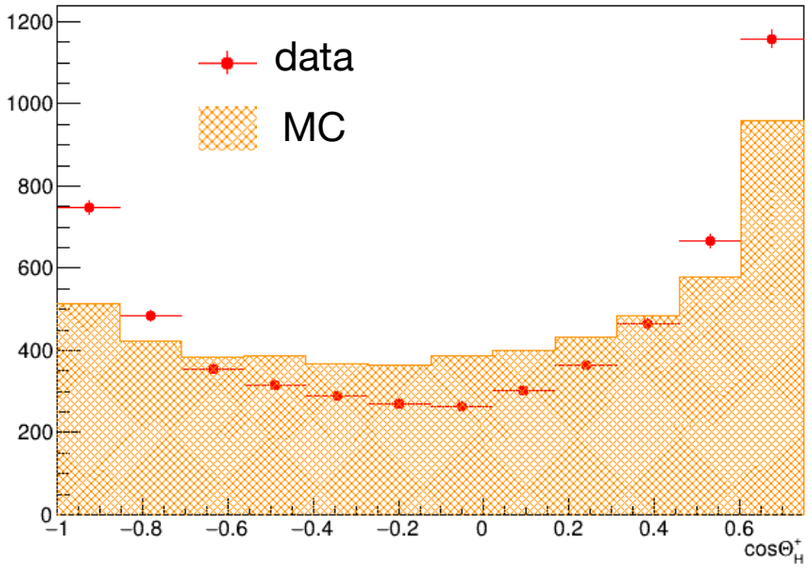
Discrepancies also in BBbar: can we estimate the acceptance mismodelling?

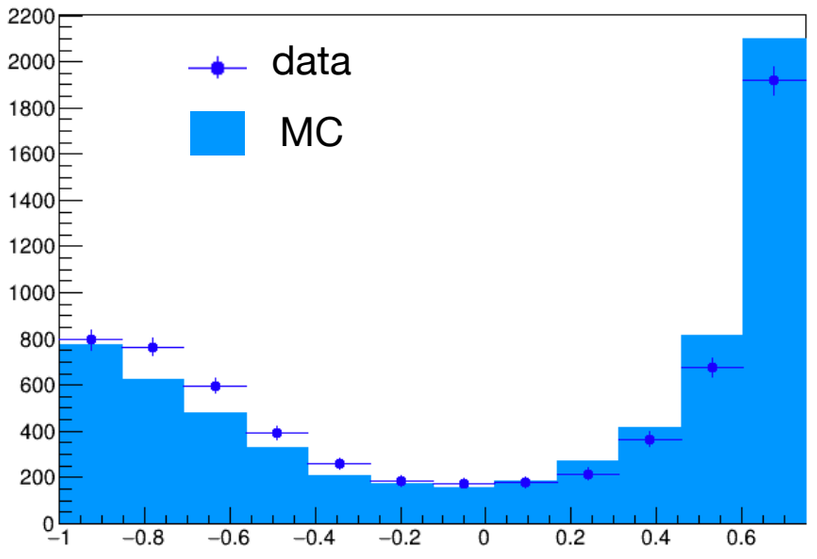
No selection seems to sculpt the acceptance in signalMC, maybe the one-candidate choice only. To do: check π^0/B vertices in data and MC, or any other indication of treeFitter performing differently in data and MC.

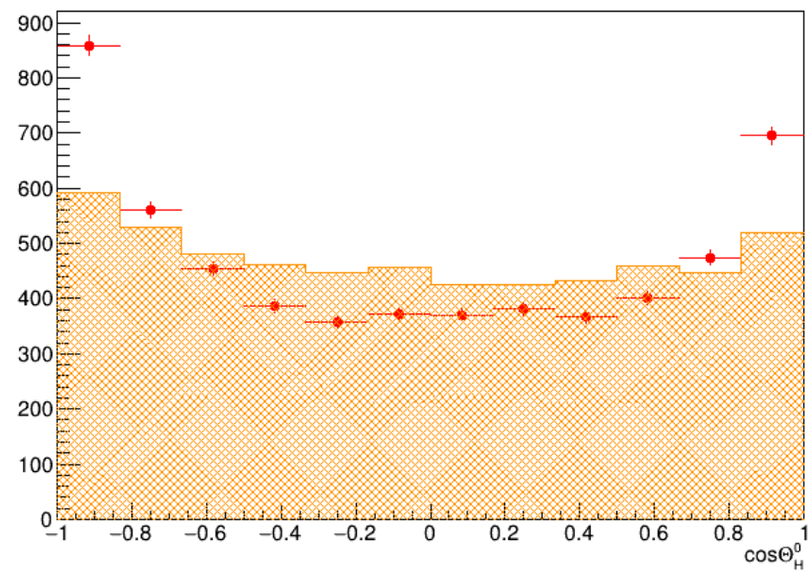
backup

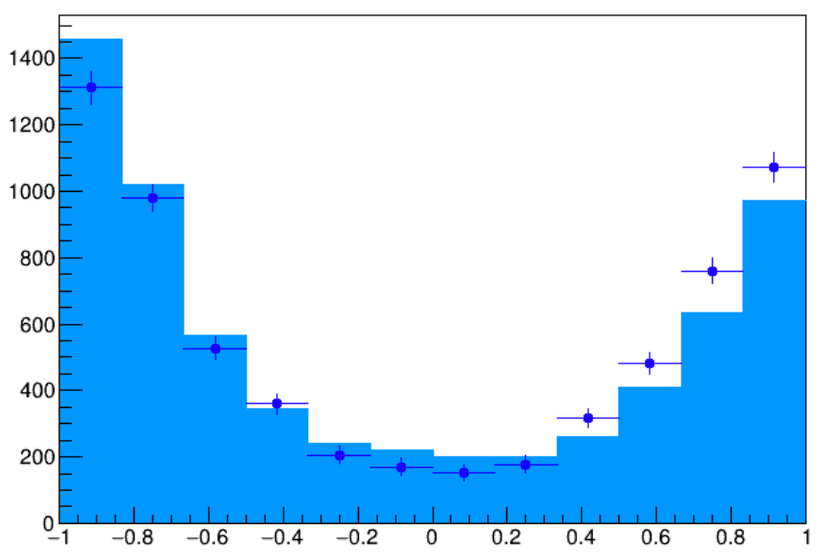
Pure components — angles

Pure continuum: the off-resonance data with loosen CS cut (CS>0.85).
Subtract from sideband (out of ΔE-Mbc box, CS>0.97) to have pure BBbar.
Use proportions from sideband fit.



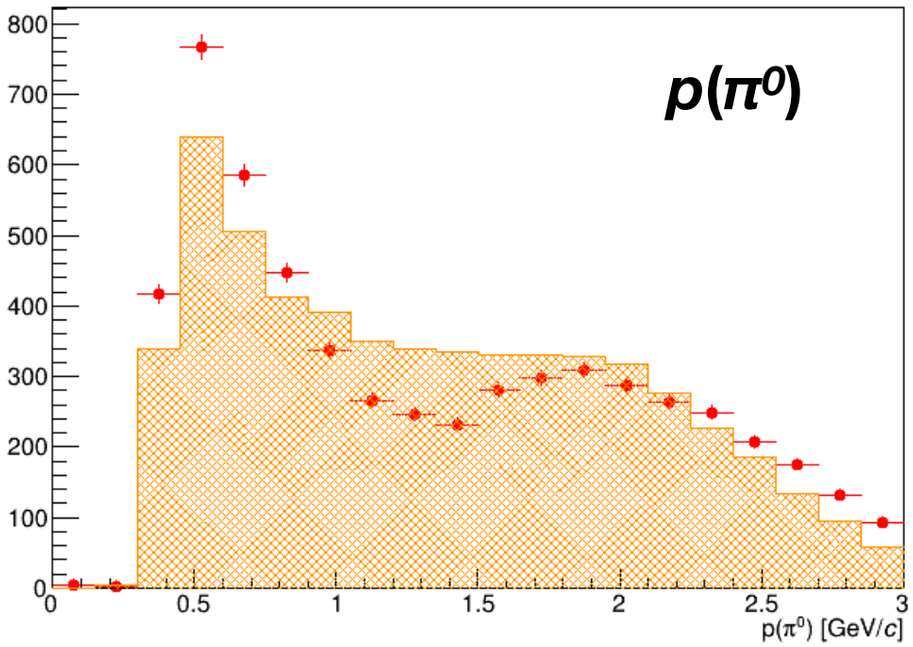


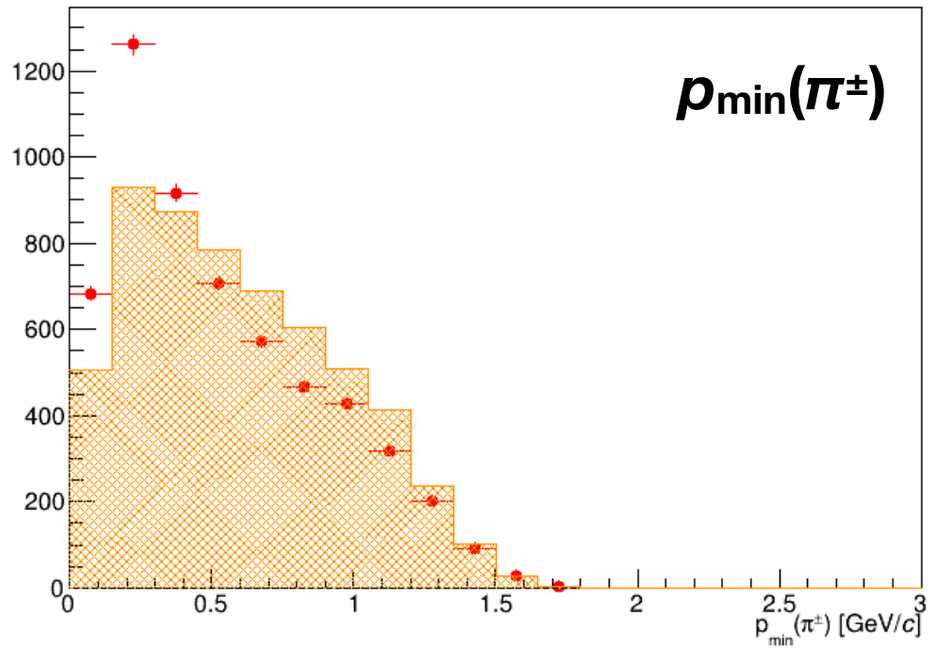


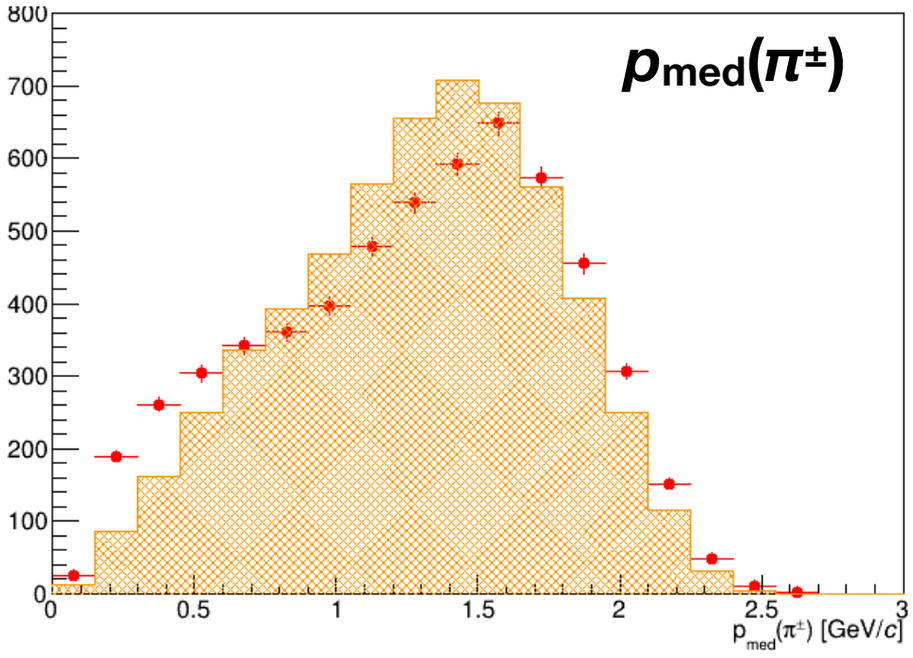


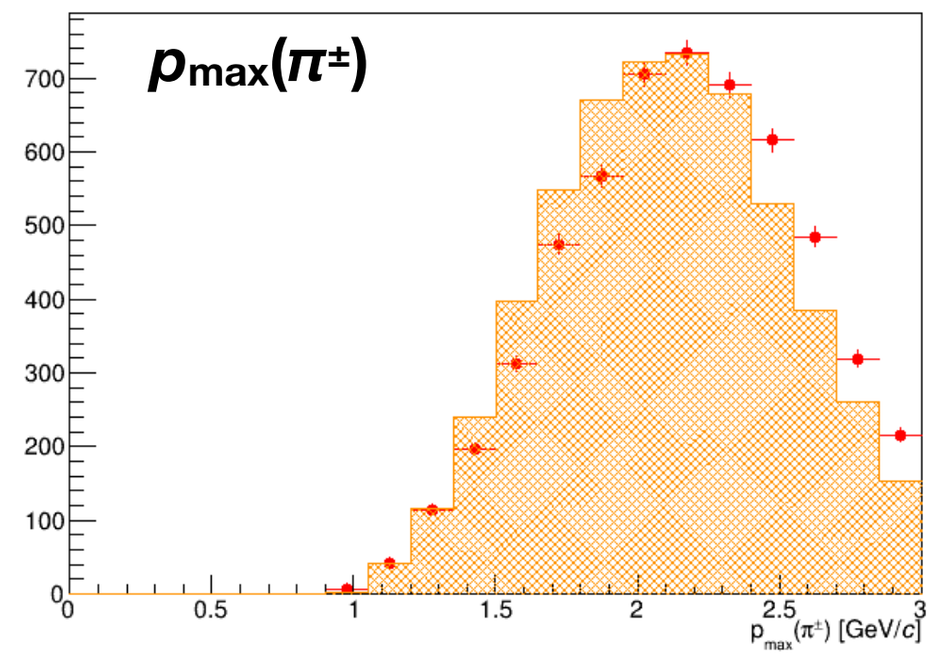
Huge discrepancies in continuum, less but still discrepant BBbar too.

Check momenta





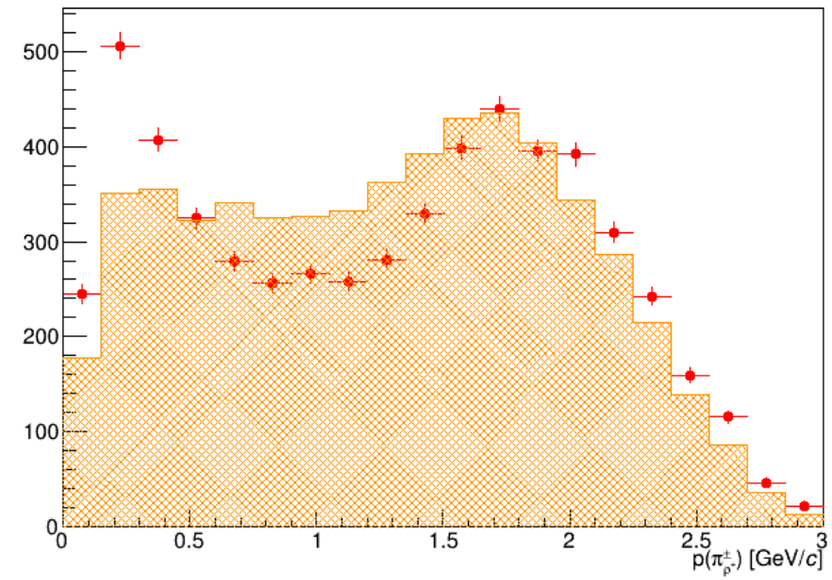


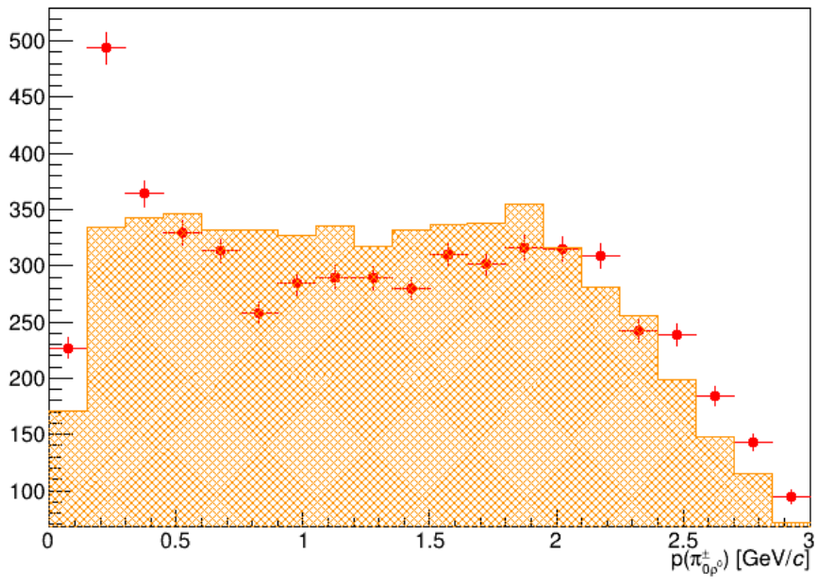


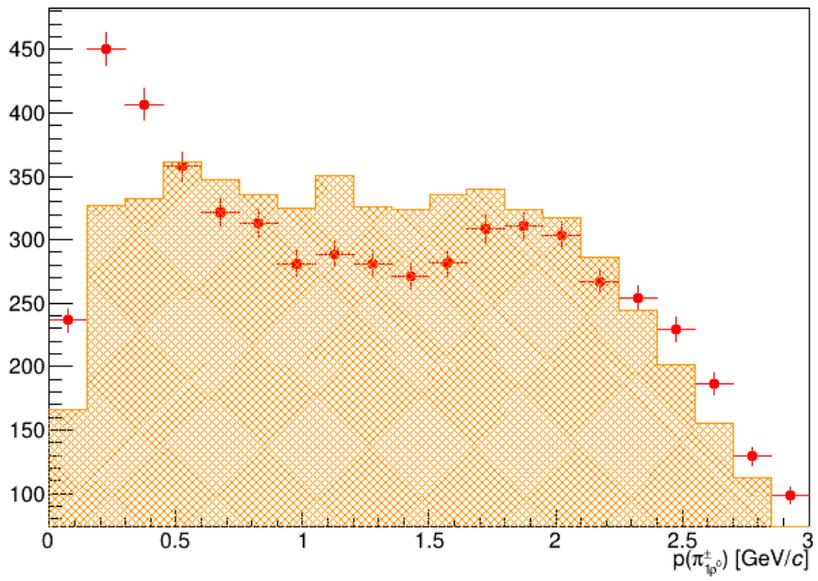
Discrepancies in π0 and in low-p track momenta.

Check momenta (I)

Additional check to verify that mismodeling is in low-p range for tracks.





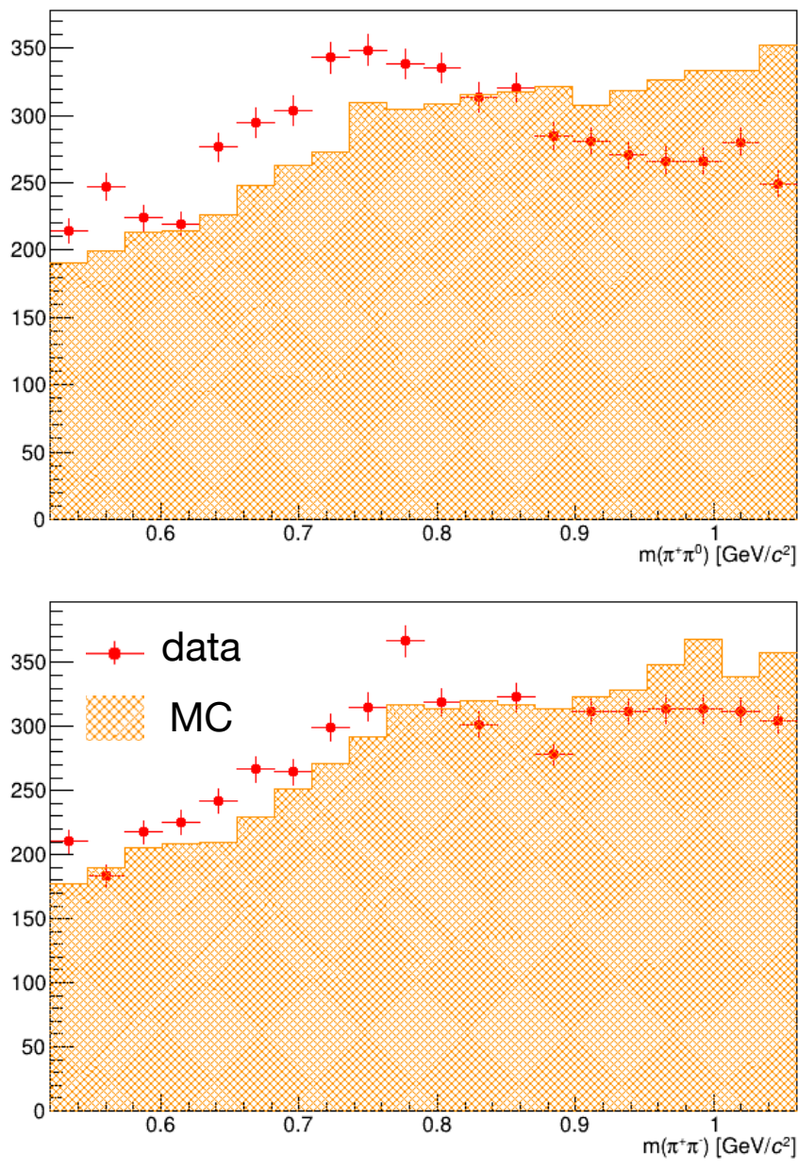


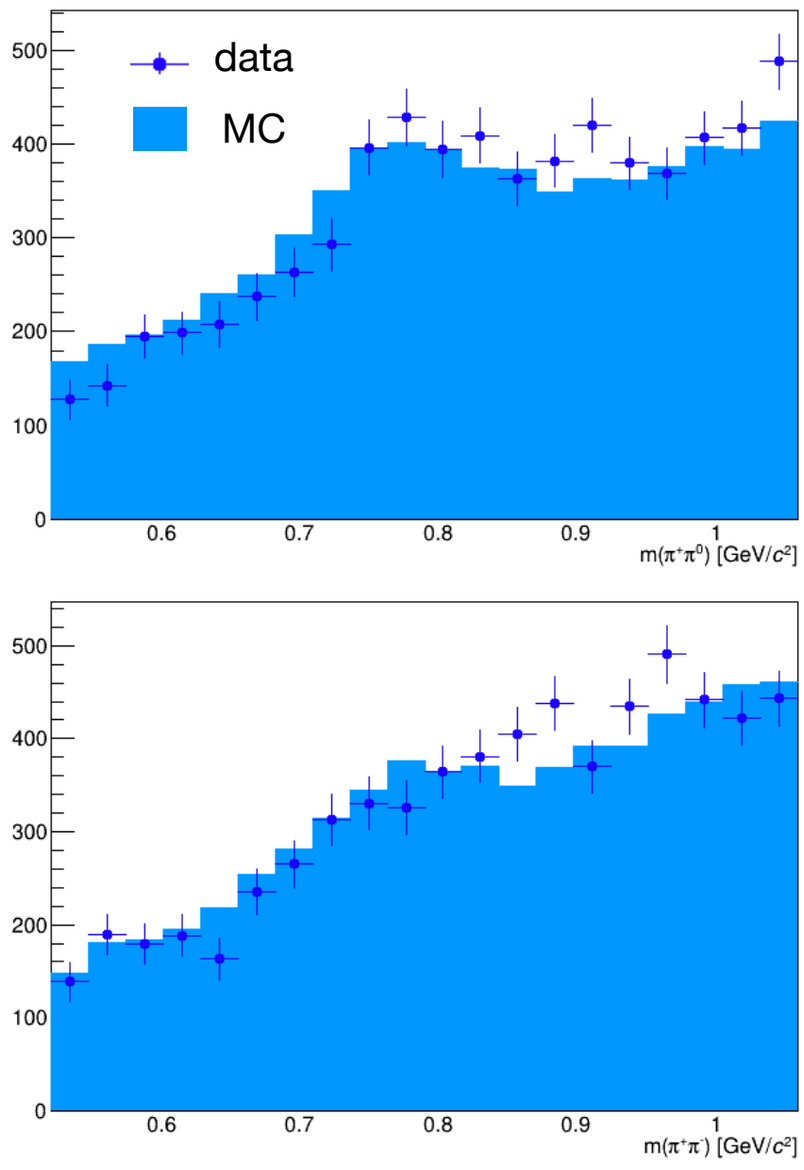
MC wrt data look similar to $p(\pi^0)$: lower peak at low p, flat at ~1.5 GeV/c^2.

What is the origin, angles or momenta?

Pure components — masses

Pure continuum: the off-resonance data with loosen CS cut (CS>0.85).
Subtract from sideband (out of ΔE-Mbc box, CS>0.97) to have pure BBbar.

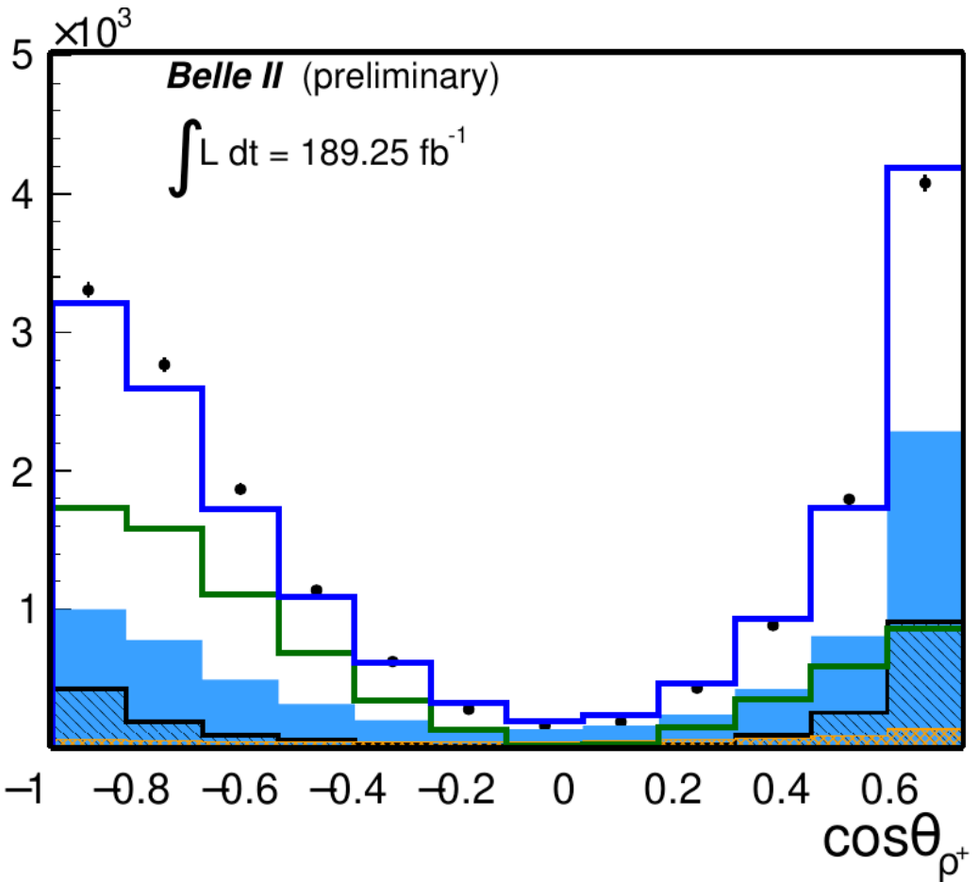


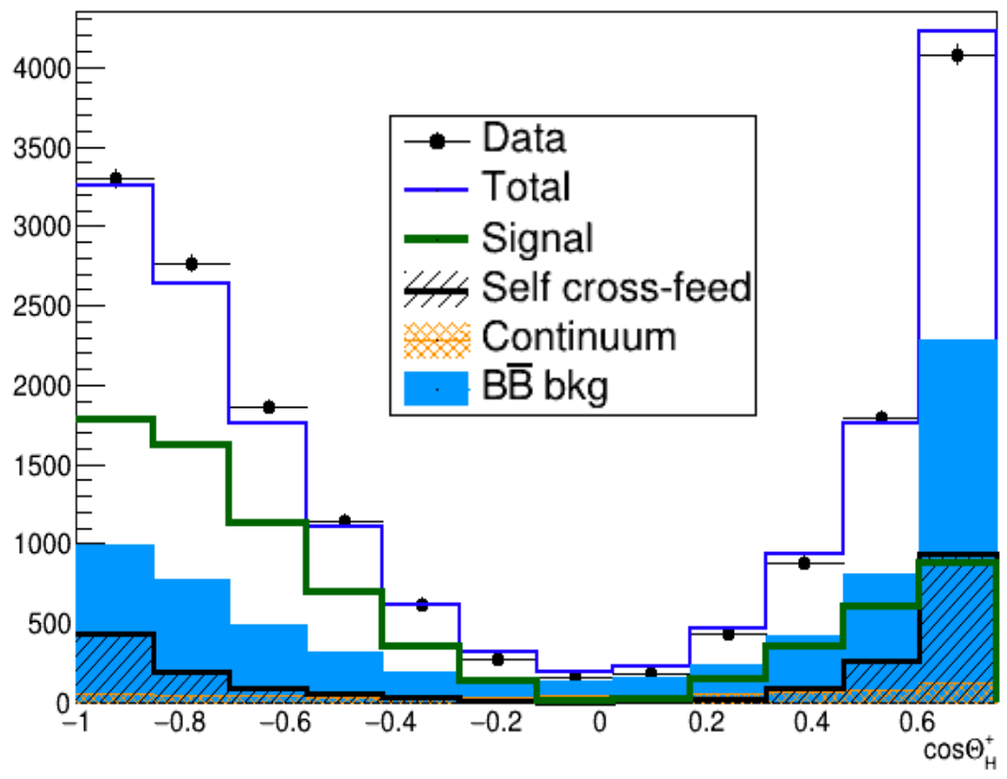


Continuum known to be buggy, differences in BBbar too.

“Fixed projections”

Now projecting 3D histograms, not sampling anymore. Re-checked normalization in the plotting code, and it’s fine. Then spotted bug in the projections done “by hand”: full MC was not the sum of the components.

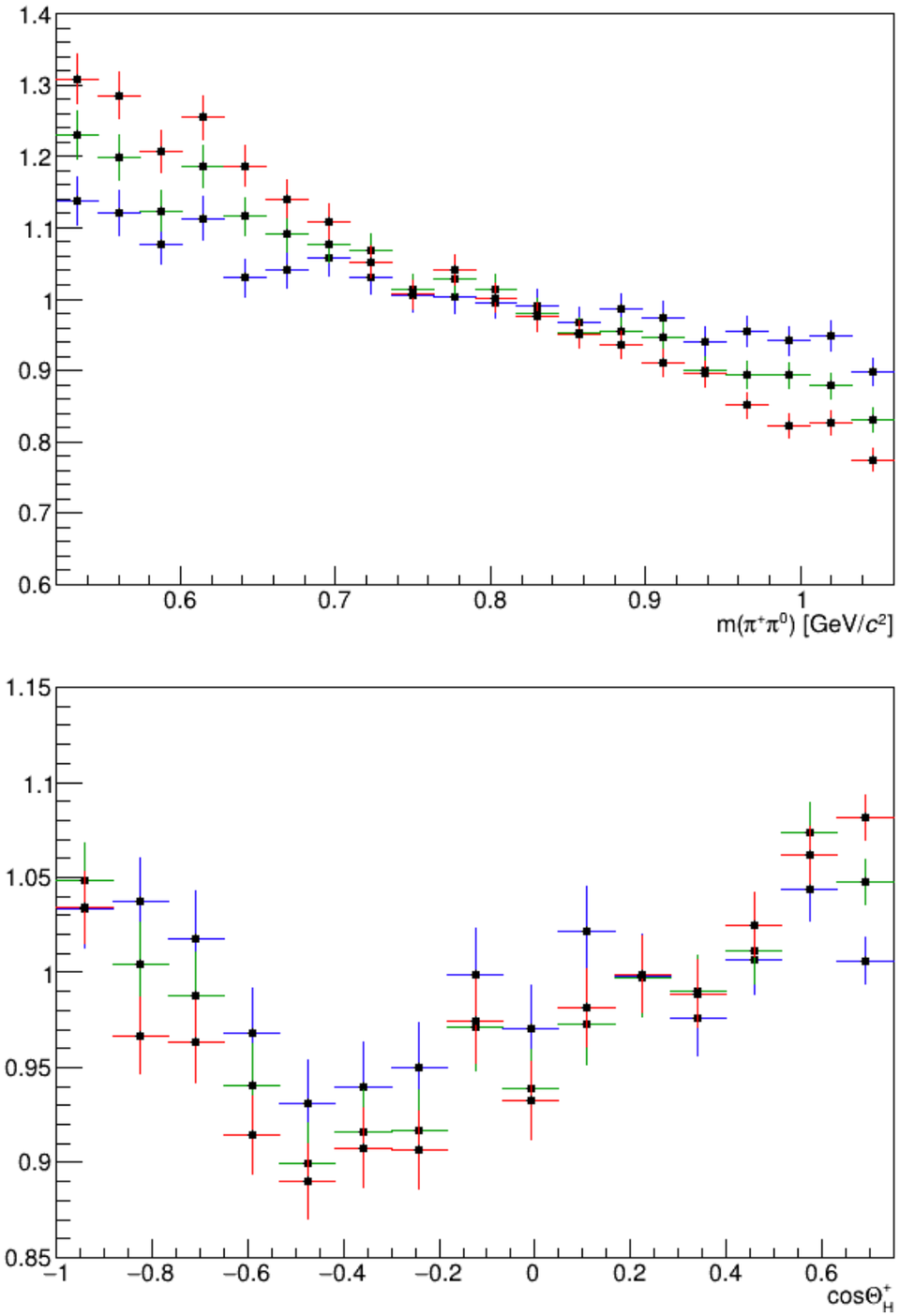


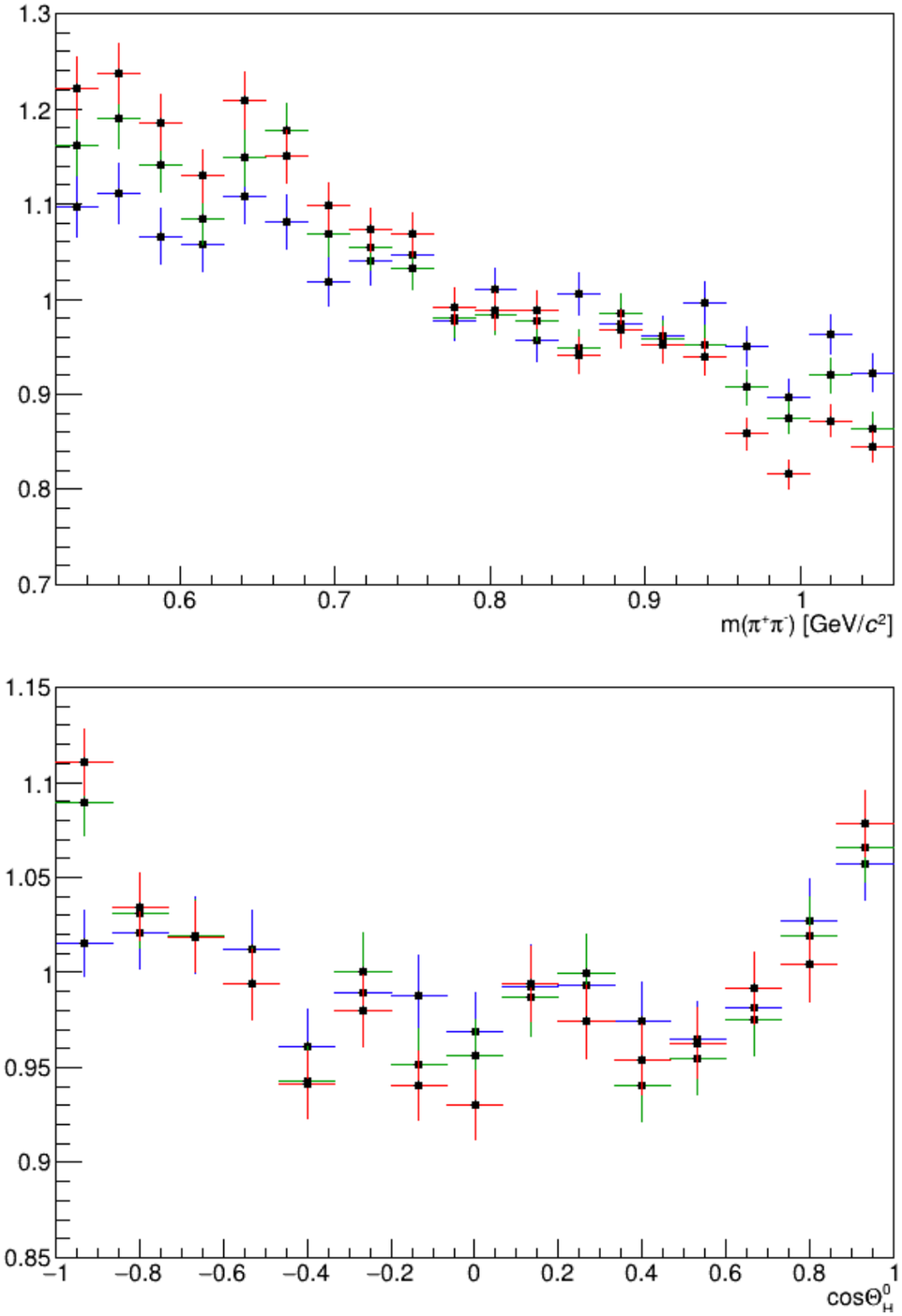


Additional evidence of angular mismodeling also in BBbar sample.

Validate CS-extension on MC

Ratios wrt CS>0.97 region (black distributions).

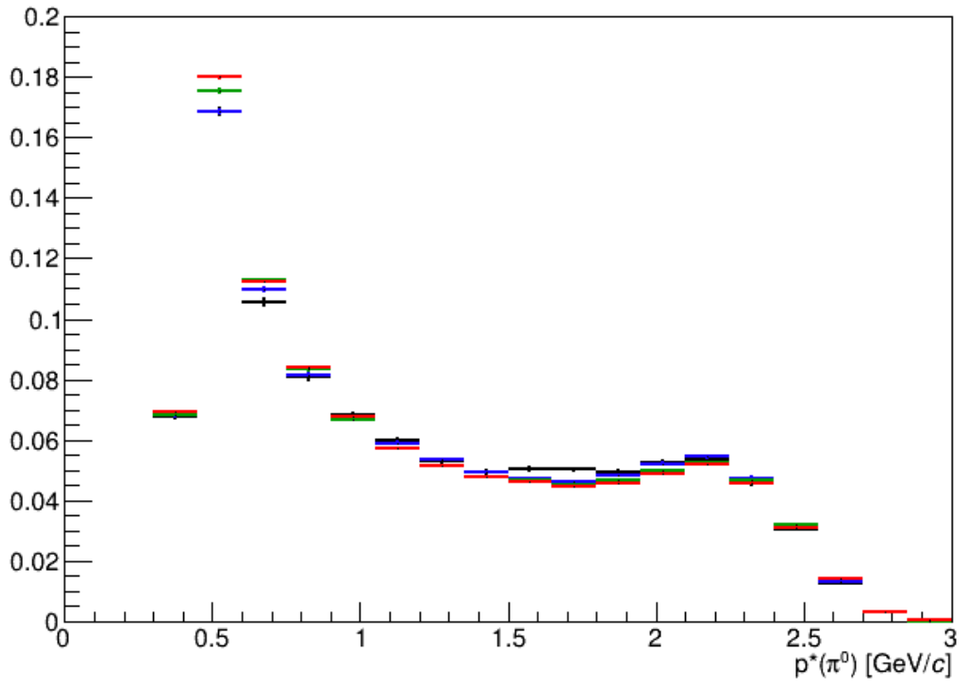


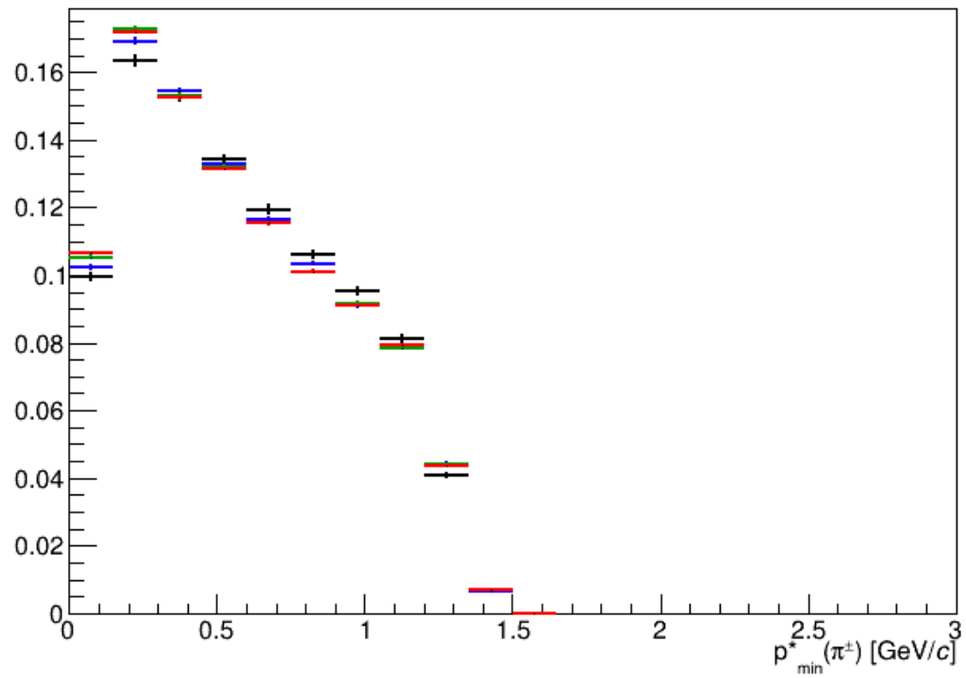


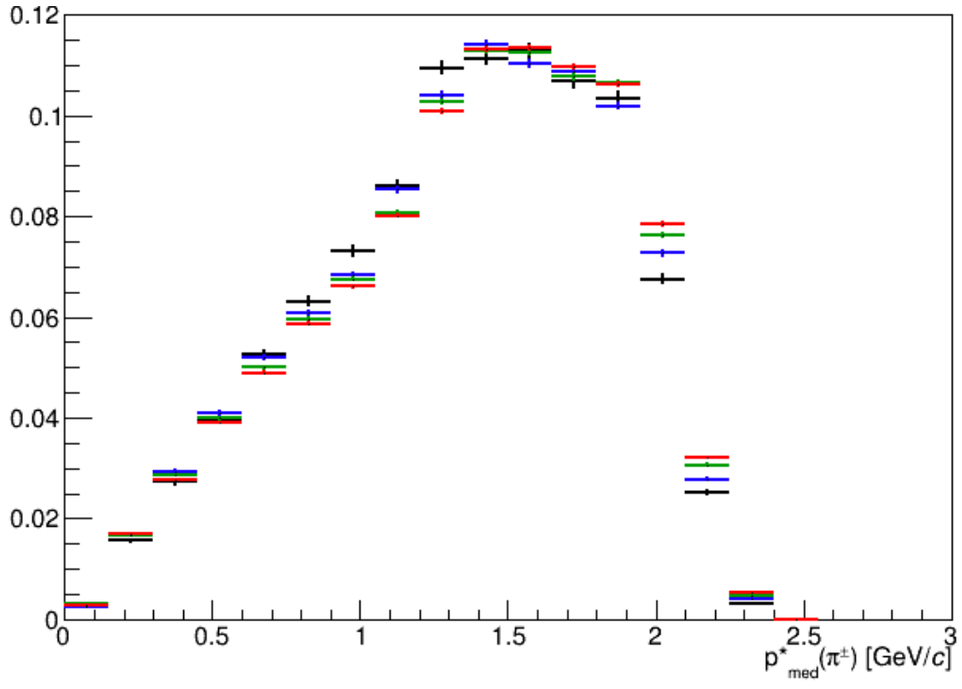
Ratios confirm what observed comparing distributions.

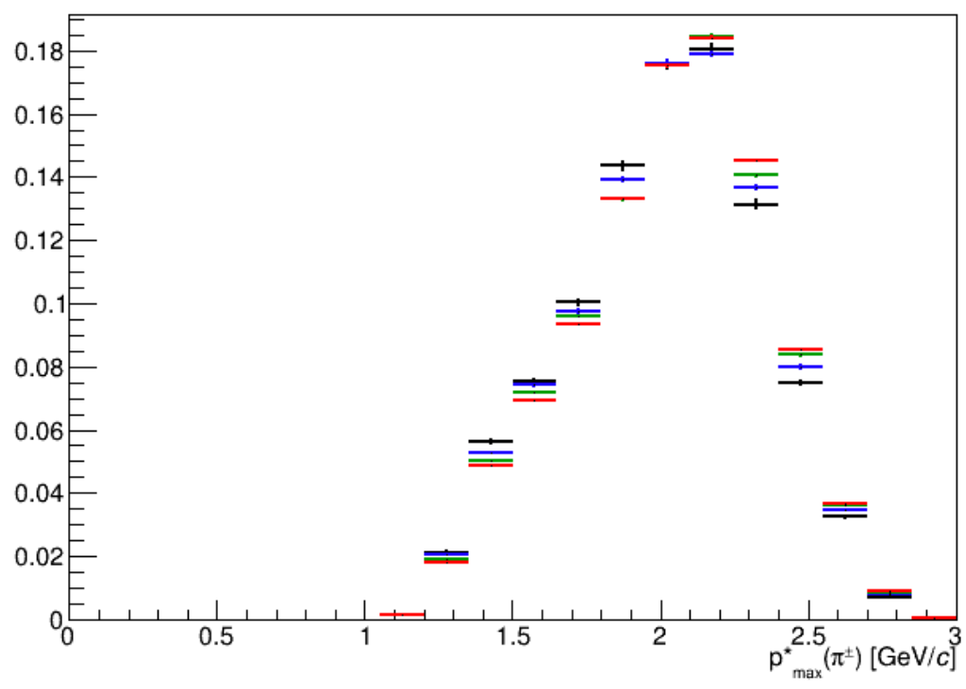
Validate CS-extension on MC

Momenta of π^0 and low-p, mid-p and high-p tracks.





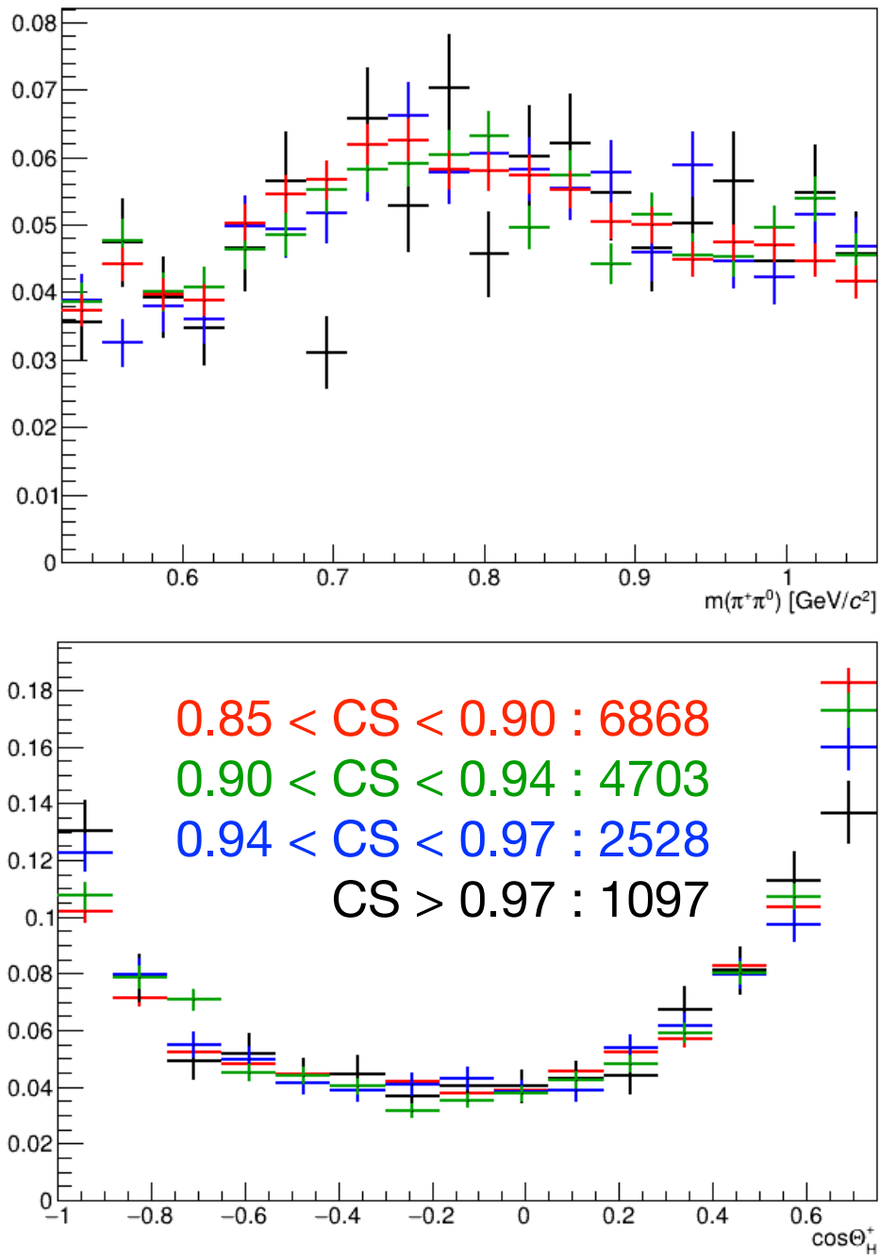


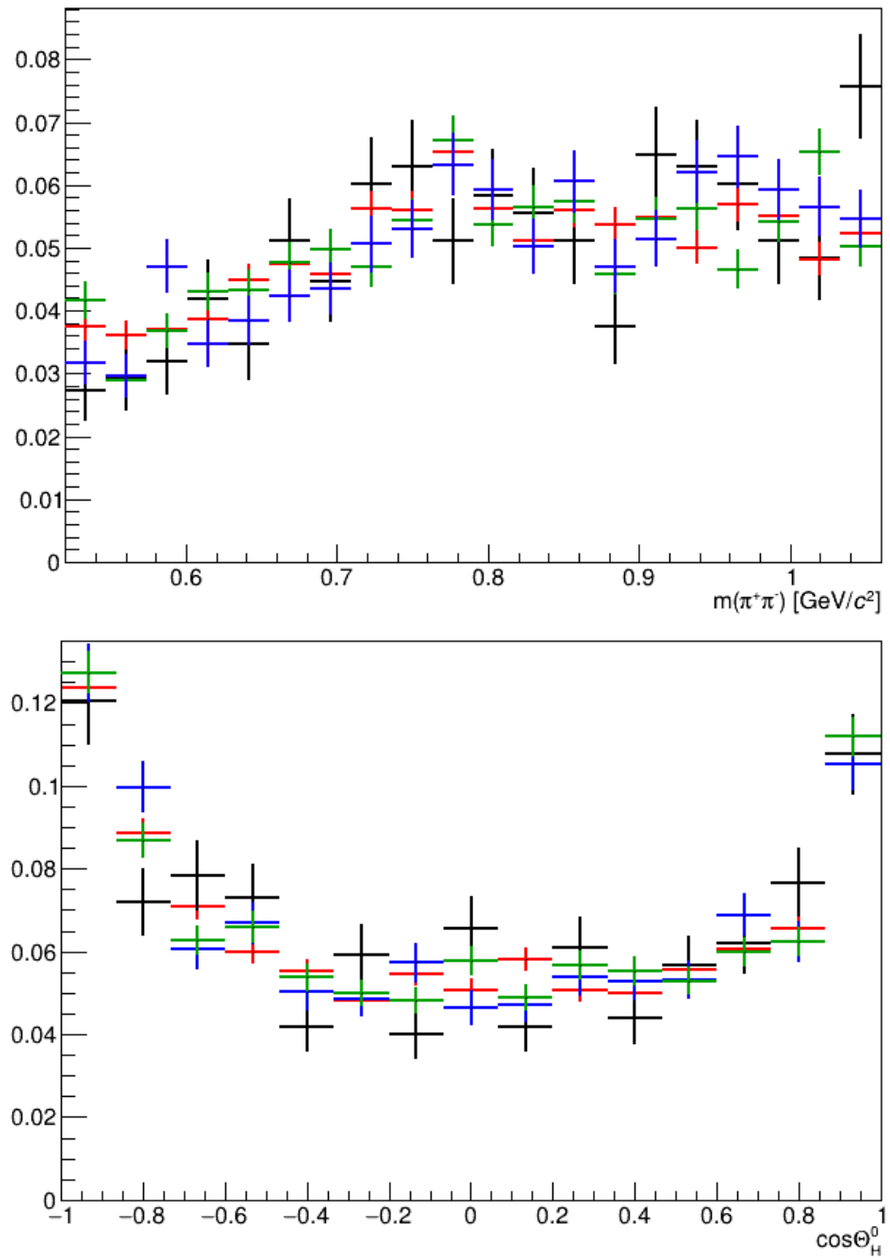


No large differences in the momenta.

Off-resonance data

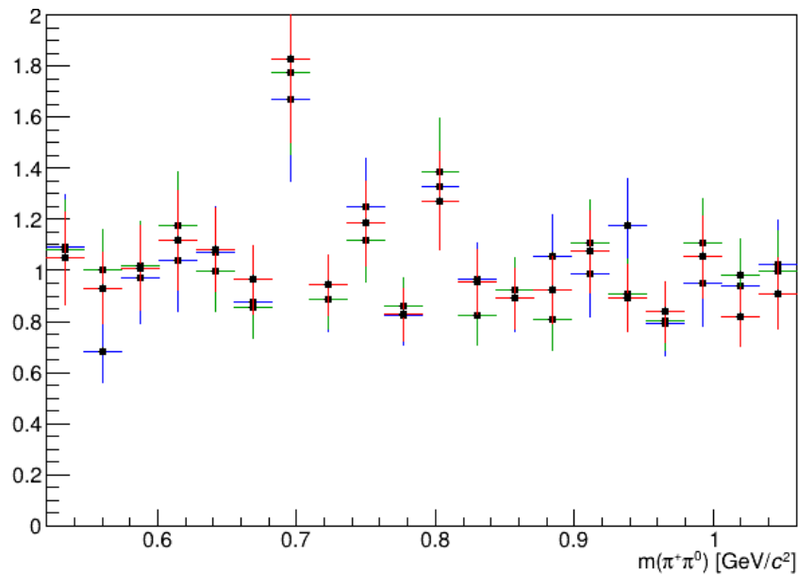
Recap: check if we can use other regions of CS directly from offres data.

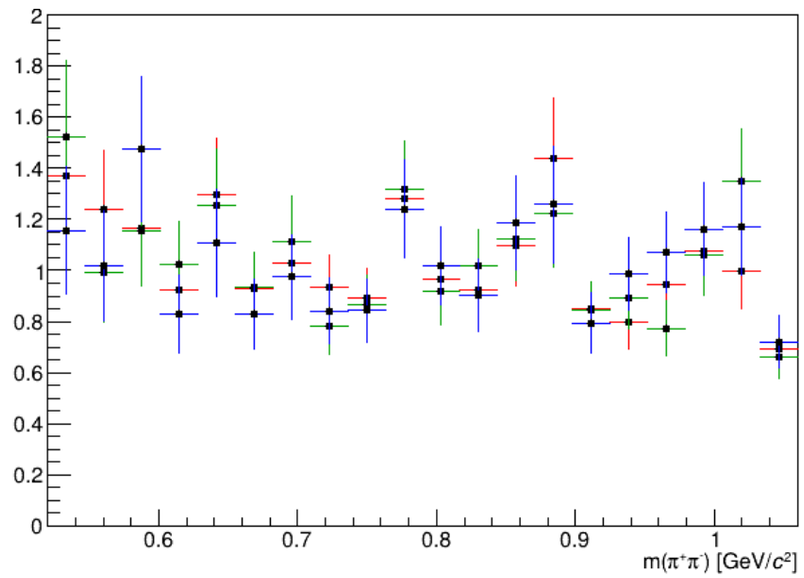


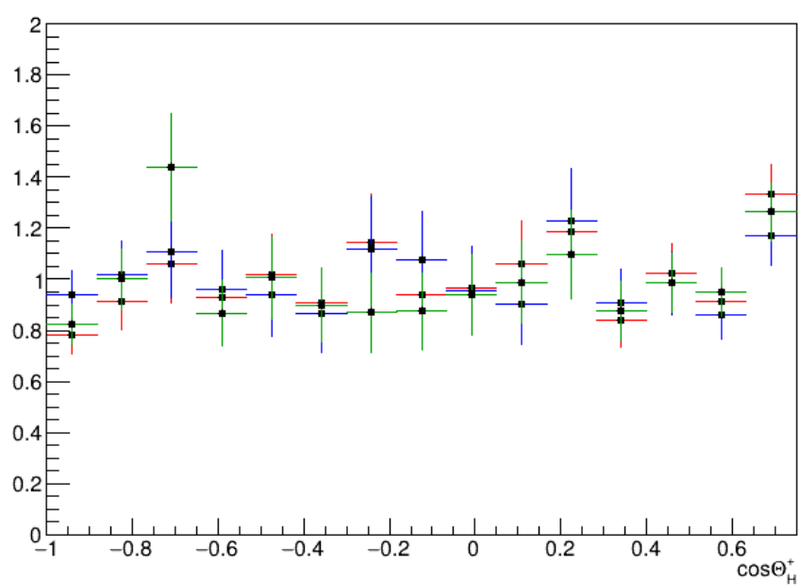


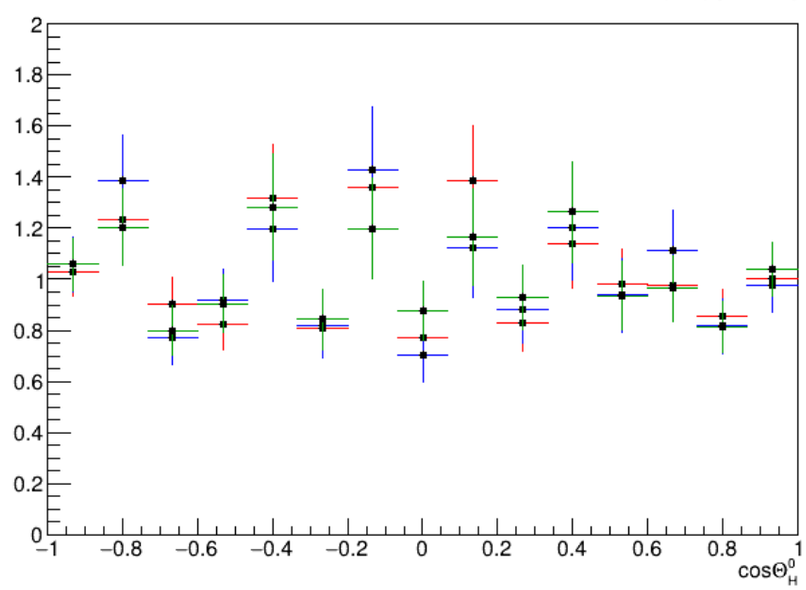
Consistent, although some bins look strange.

Off-resonance data (ratios)









Dominated by low-stat of CS>0.97 sample.