pXp analysis

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Overview

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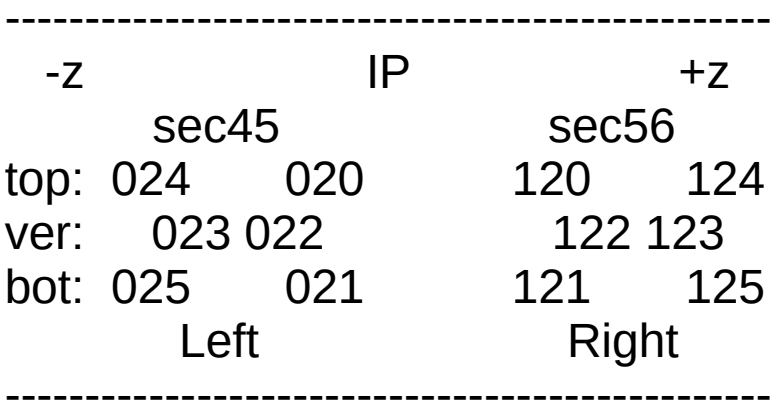
TOTEM’s RP map

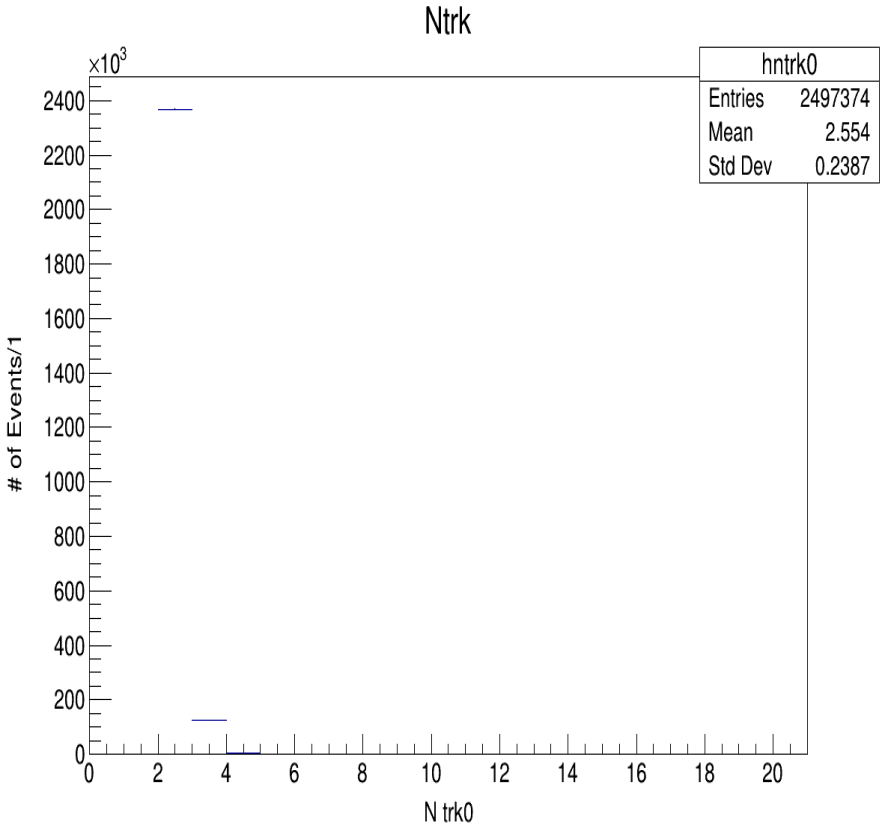


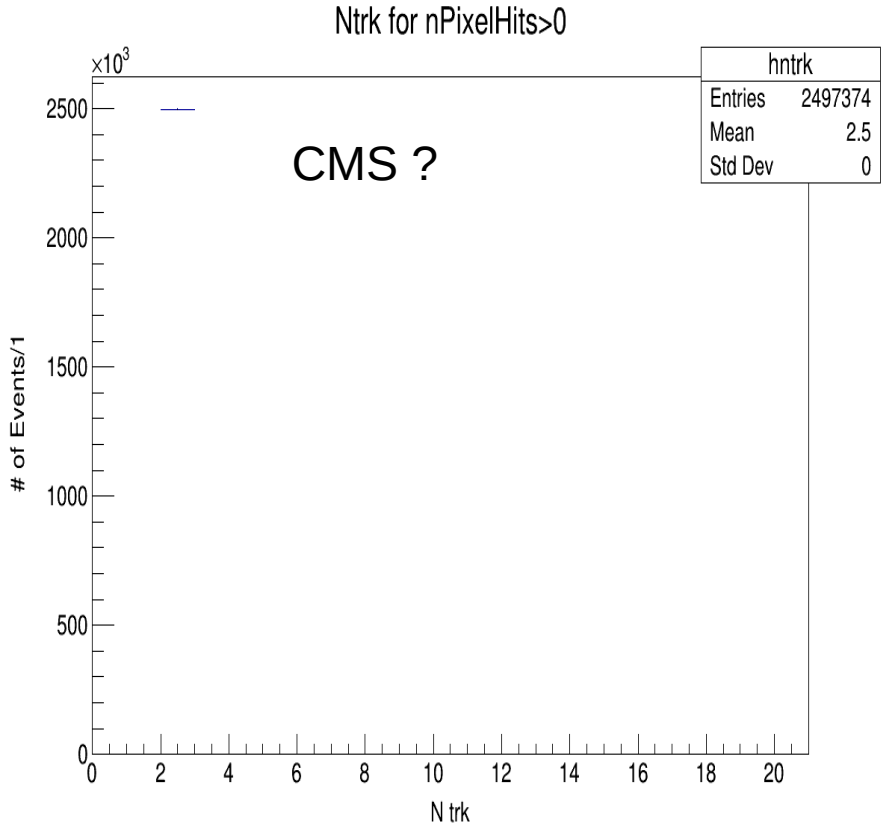
B) Central track plots (these do not depend on particle type so ignore dE/dx identification.):
B1: Plot central (CMS) track multiplicity distribution (for events with the two protons).
Integer bins to see contents of 0, 1, 2, …. 20 or so.

B2: Require exactly two tracks in CMS. Each track has charge Q, pT, phi, eta. Count how many are +- (Q = 0) and ++ and - - (useful for background information) and select Q = 0.

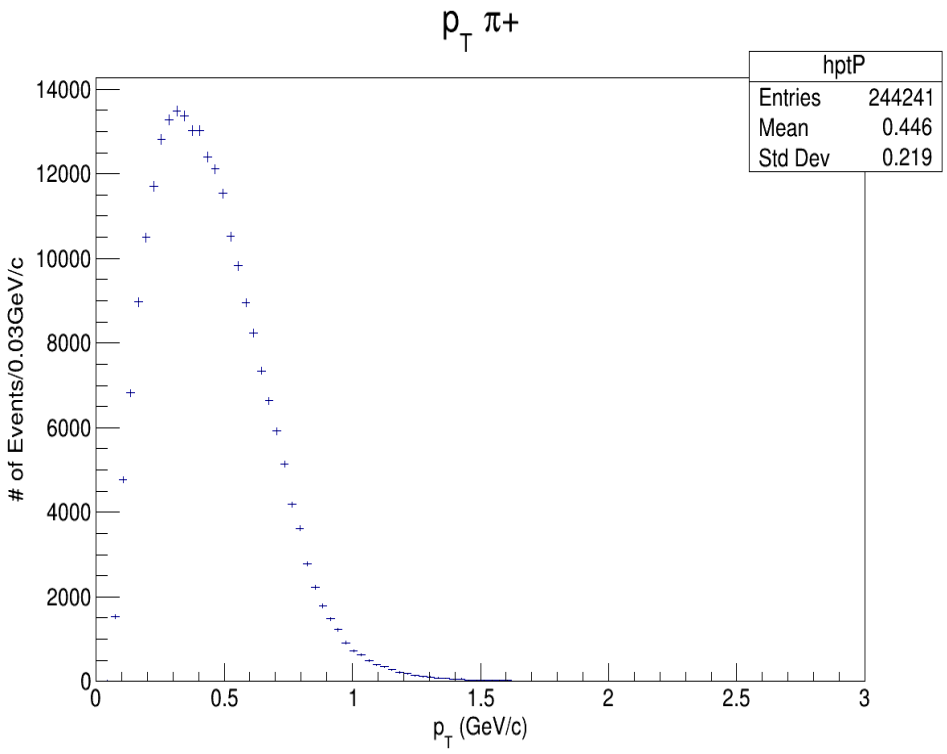
B3: Plot distributions for Q = + and Q = - separately of pT (probably 0 – 4 GeV/c is fine) and eta (-3 to + 3 – we will likely select -2.5 to + 2.5 for definiteness) and phi (0 - 2pi or -pi to +pi, whatever).
We expect that +ve and -ve tracks have identical distributions but good to check.)

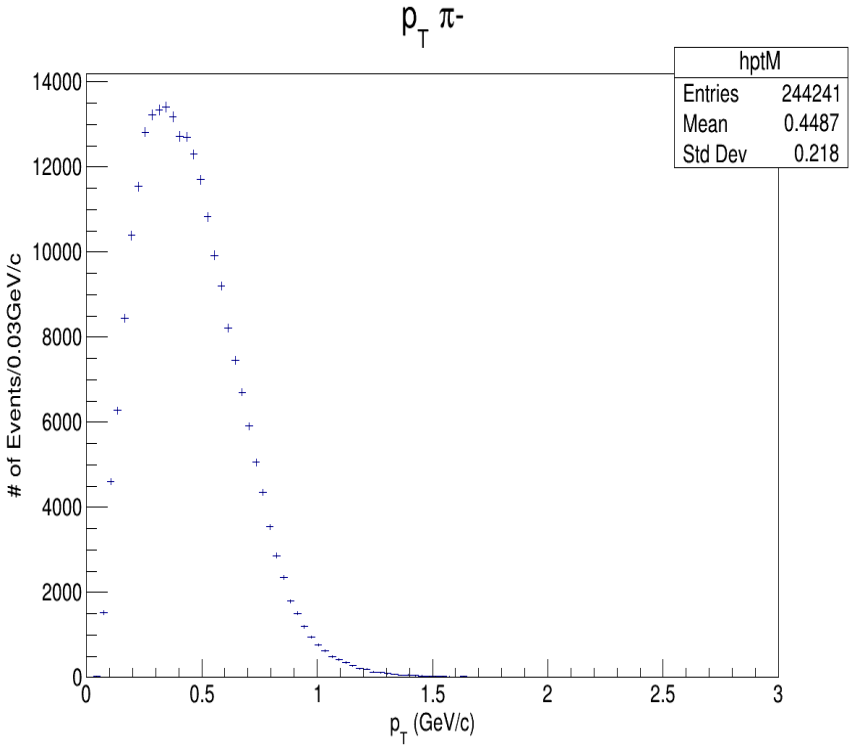
Multiplicity – 2-track events (reduced2) – all 2015 data – except run#9998





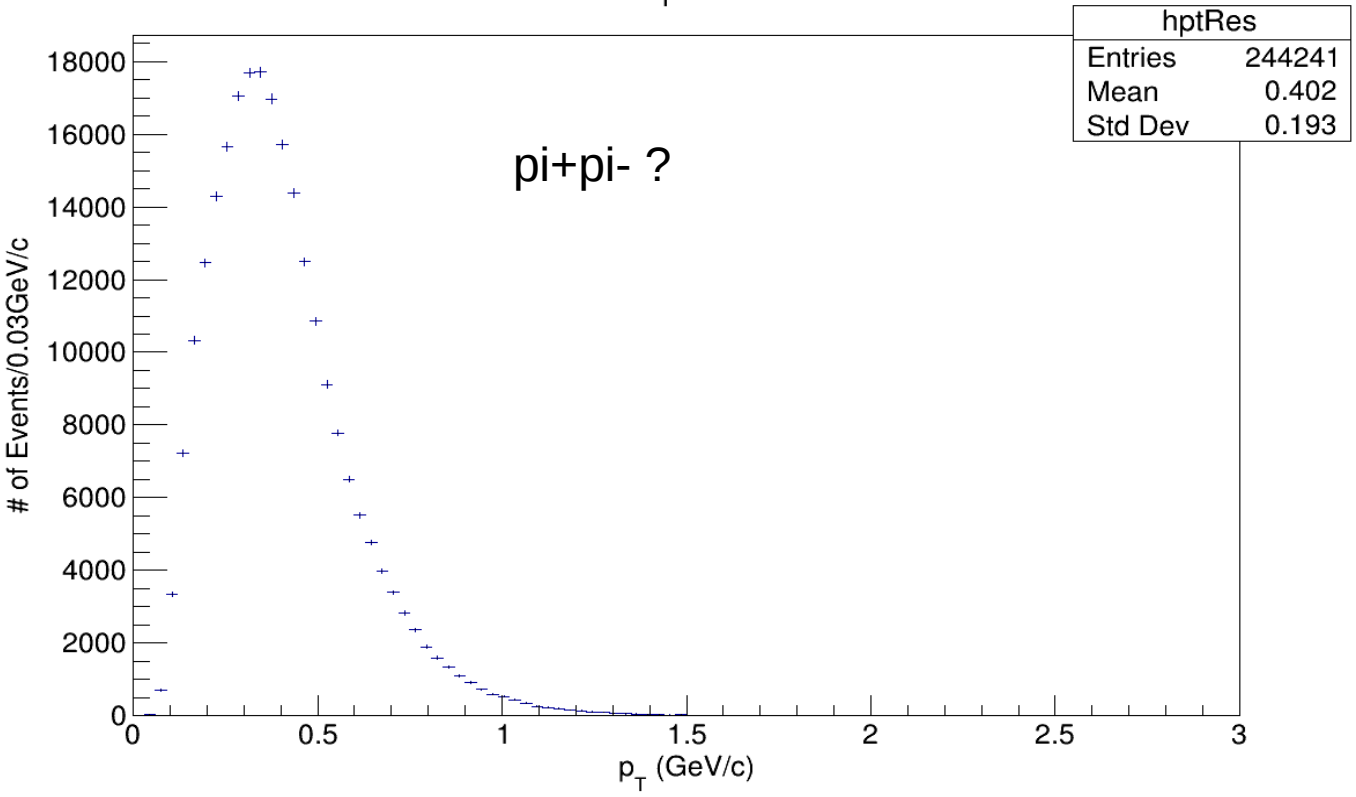
2-track events - except run#9998



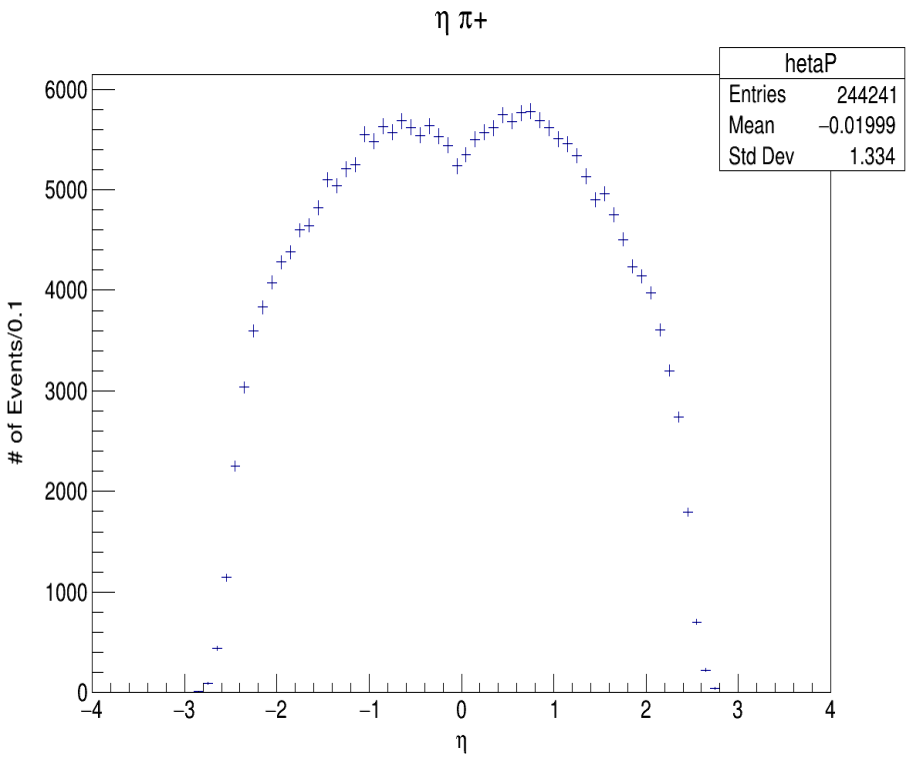


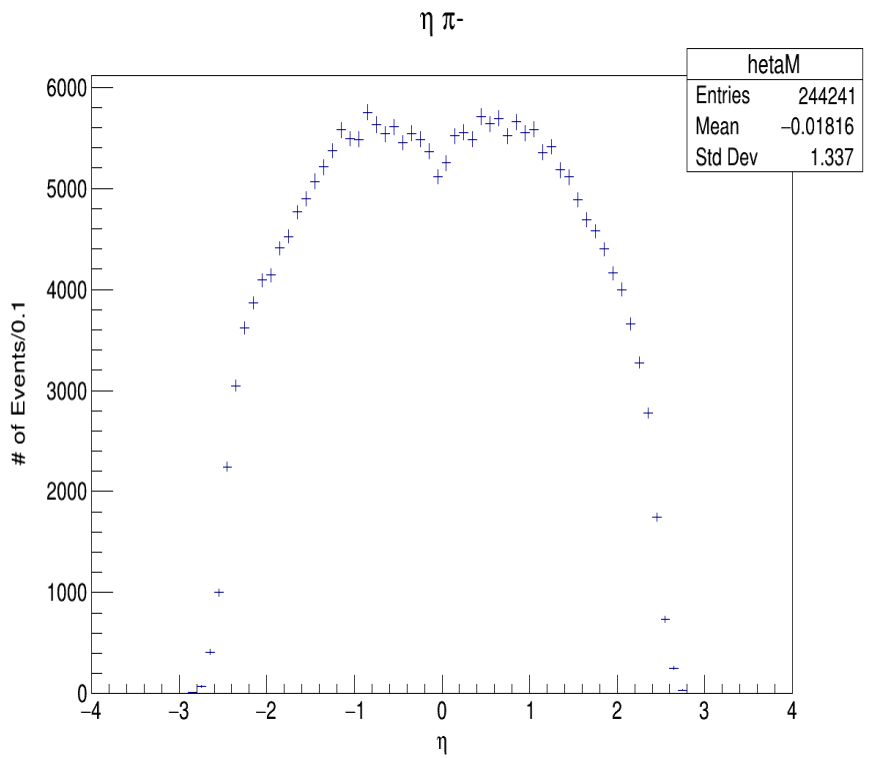
2-track events

p_T ππ



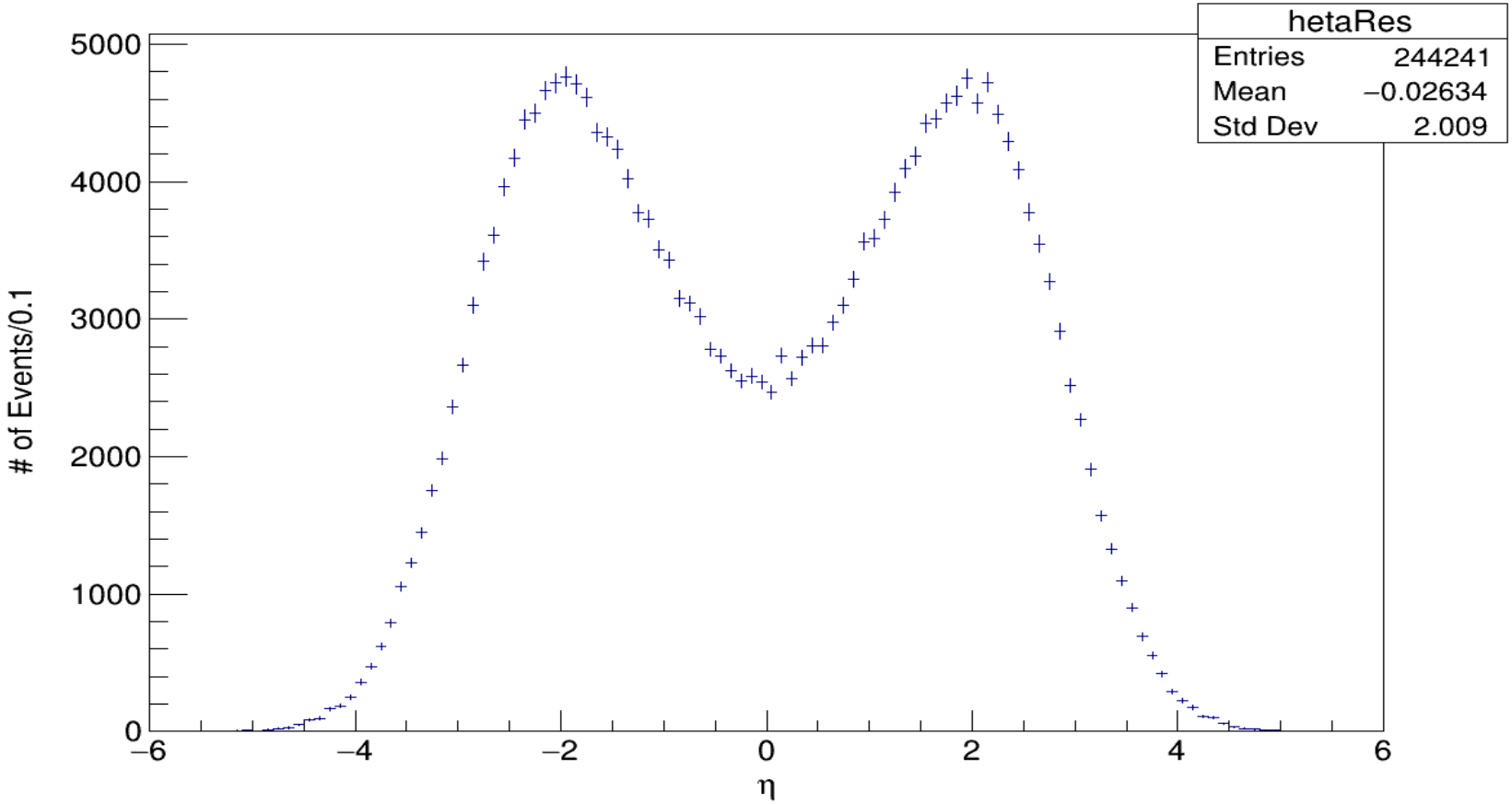
2-track events



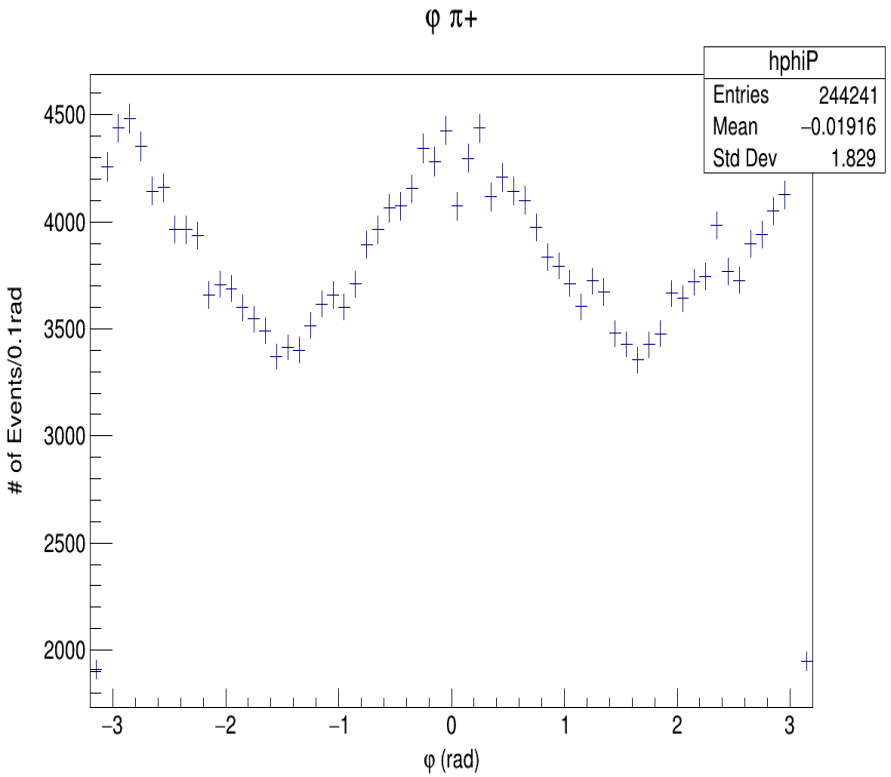


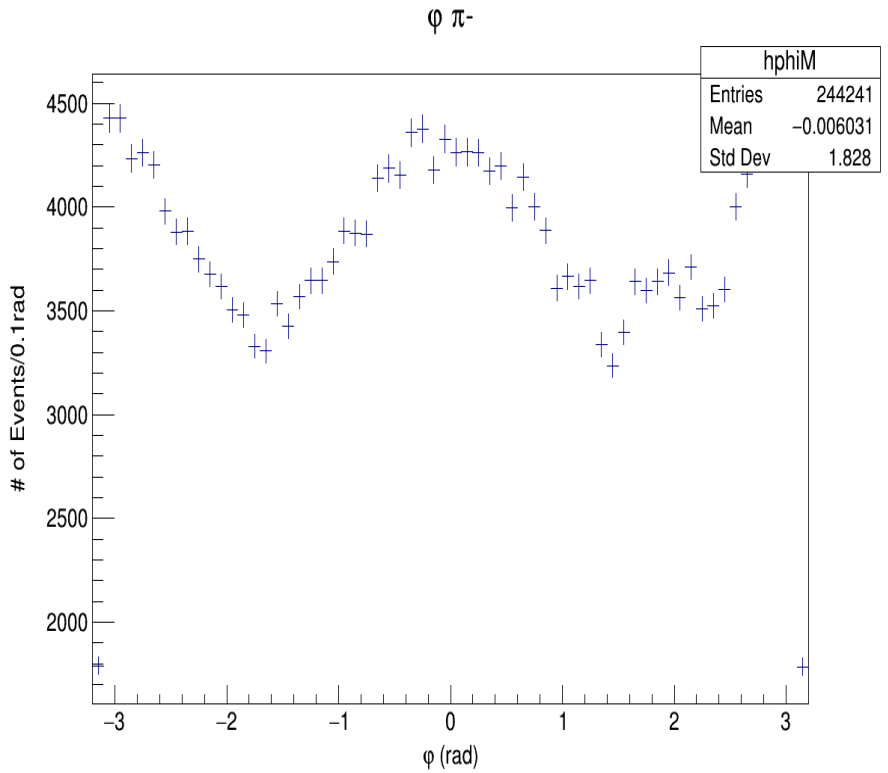
2-track events

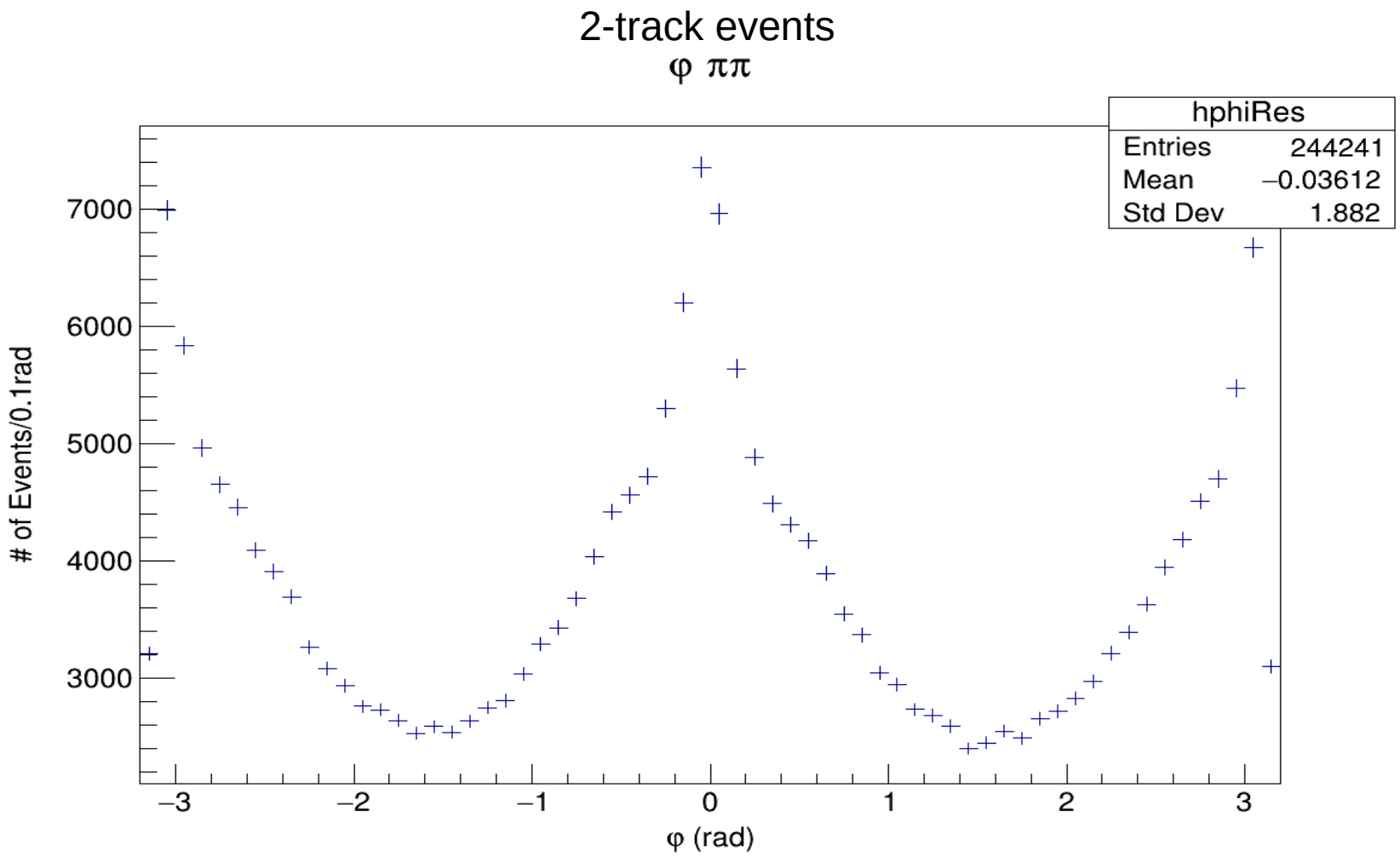
$\eta\ \pi\pi$



2-track events






2-track events
φ ππ
hphiRes
Entries 244241
Mean −0.03612
Std Dev 1.882
# of Events/0.1rad
7000
6000
5000
4000
3000
−3
−2
−1
0
1
2
3
φ (rad)

coming up...

C) Combined CMS+TOTEM plots

Balance in transverse momenta like Delta pX and Delta py. You showed one and I think that means px and py balance, but really it is the SUM of the four tracks pX and py (keeping signs) that should equal 0 for balanced events. We may still have a different coordinate system in CMS and TOTEM, beware!

Anyway the plot you showed of Delta px CMS-TOTEM TT/BB peaks at 0 and that must mean balance, and a selection of -0.2 GeV/c to + 0.2 GeV/c (I suppose) will keep nearly all the good balanced events and just remove a few that may have missing or badly measured tracks. **Do same thing for py balance.**

Note: For a plot of a quantity like that – having seen it I think a histogram (rather than points with statistical error bars) would be better, choosing a bin size like 0.01 or 0.005 GeV/c if the statistics allows it to look smooth.

coming up...

Acceptance A(-t,phi)

For the acceptance of the Roman pots we should just plot phi in many distinct bins of |t|. Since Nature is flat in phi, these plots should tell us the acceptance A(t, phi).

Conclusion:

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Thank you