pXp analysis

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Overview

1. Changes on the anaRP code:

 - more reasonable binning numbers
 - include acceptance A(t,phi)
 - corrected plot titles
 - changes saved in luianaRP.cc

2. Reprocessed data:

 - full 2015 single track events (except run#9998)
 - 2-track events only
 - 4-track events only

3. makeplot.cc important update

Task-B

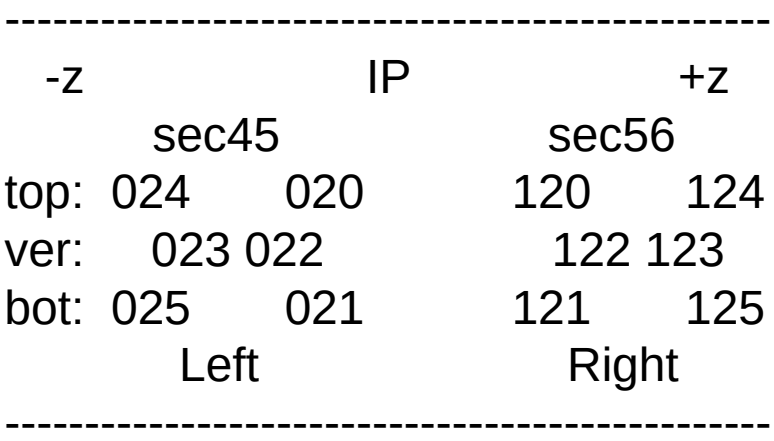
B) Central track plots (these do not depend on particle type so ignore dE/dx identification.):

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.

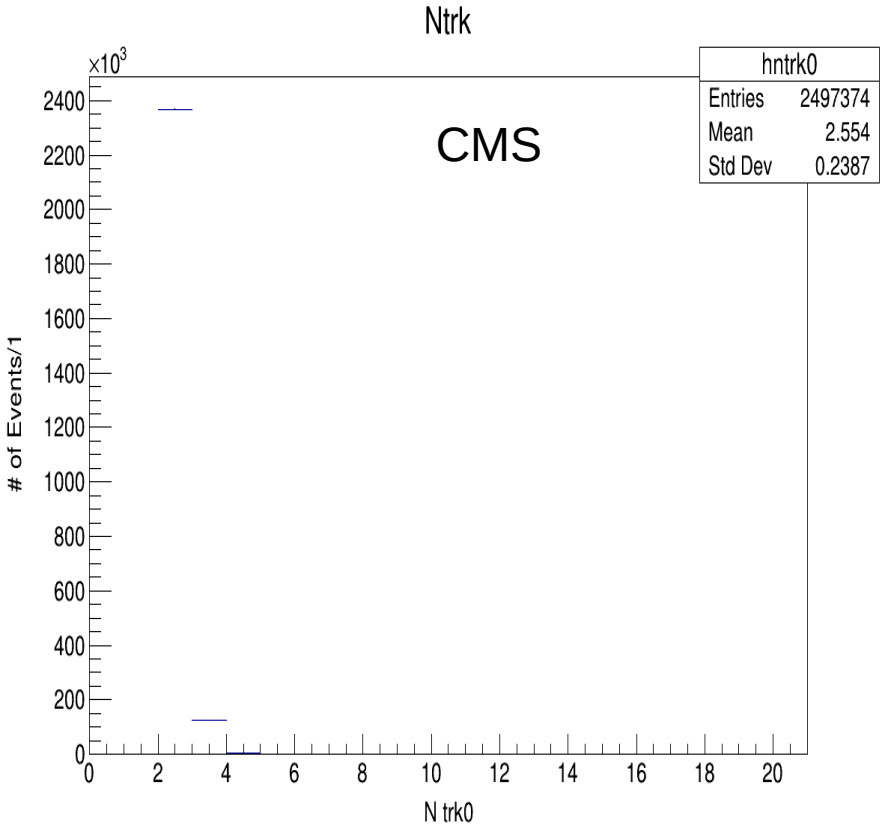
B2: Require exactly two tracks in CMS. Each track has charge Q, pT, phi, eta:
a) Count how many are +- (Q = 0) and ++ and - - (useful for background information) and select Q = 0. (?) pi+pi-, K+K-, e+e-
b) Plot distributions for Q = + and Q = - separately of pT (probably 0 – 4 GeV/c is fine) and eta (-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.)

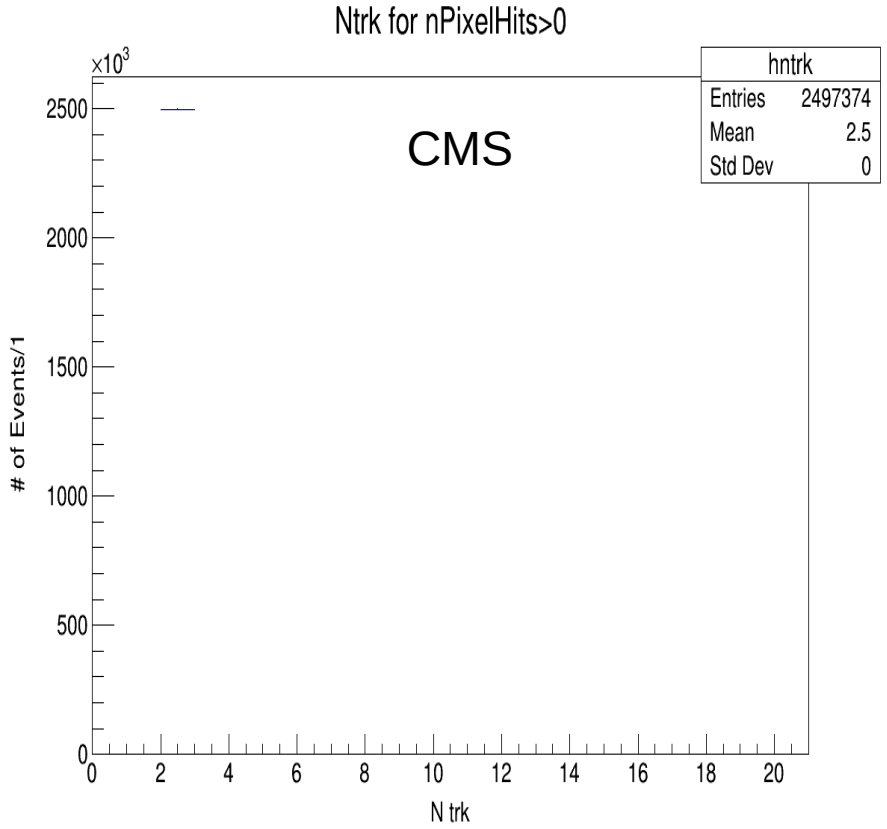
important to have this map in mind

TOTEM’s RP map

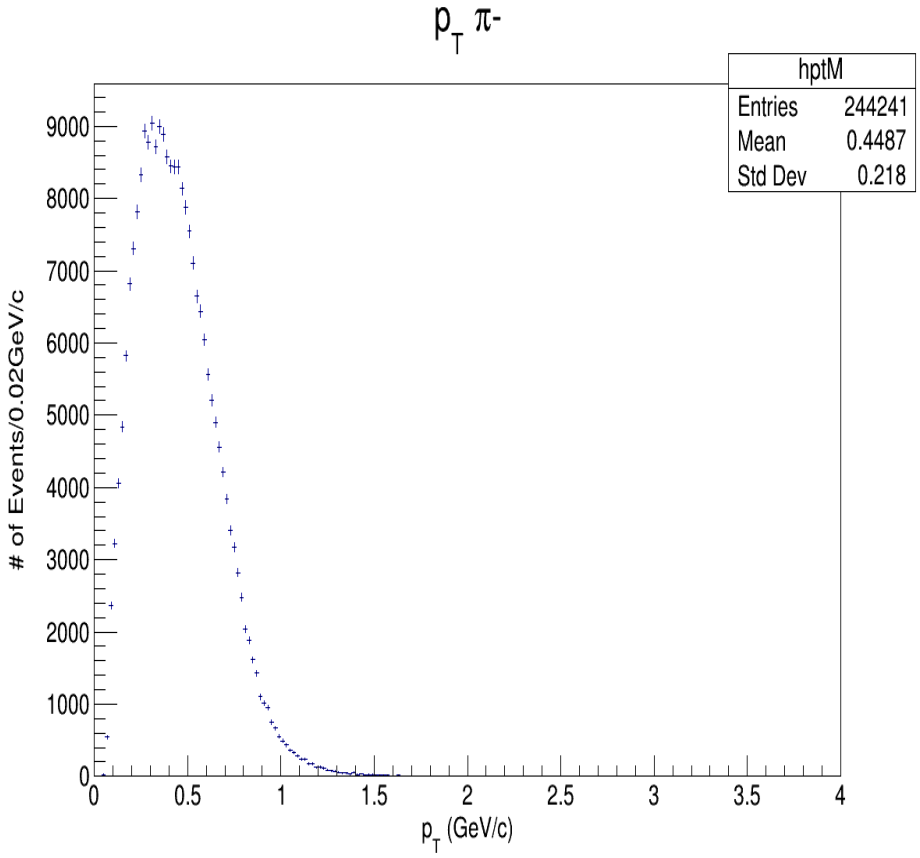


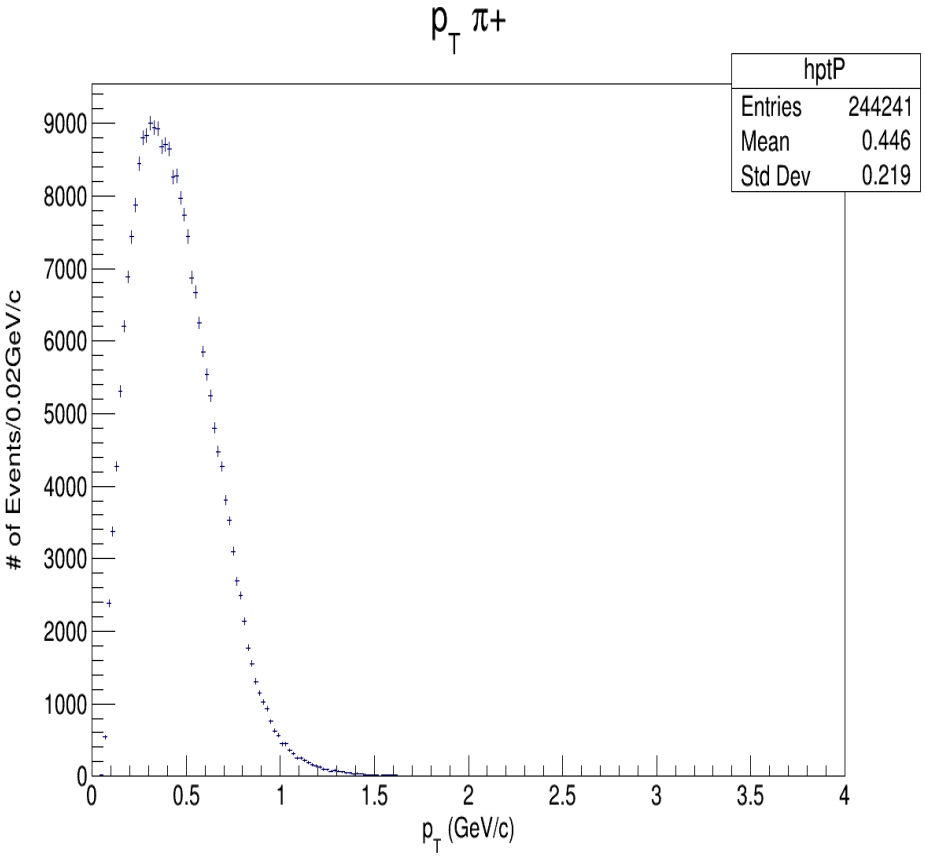
Multiplicity – 2-track events (reduced2) – all 2015 data – except run#9998





2-track events - except run#9998

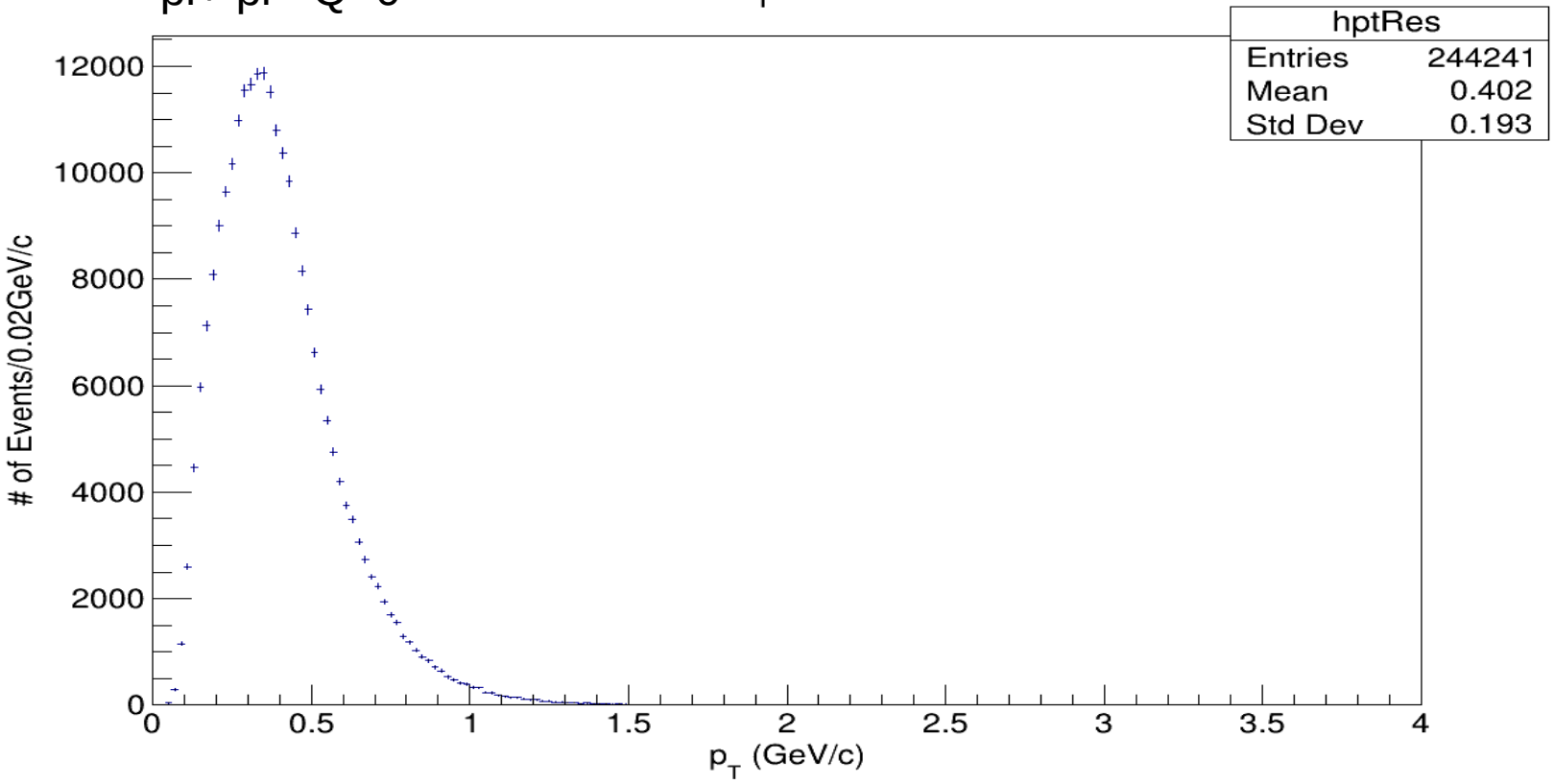




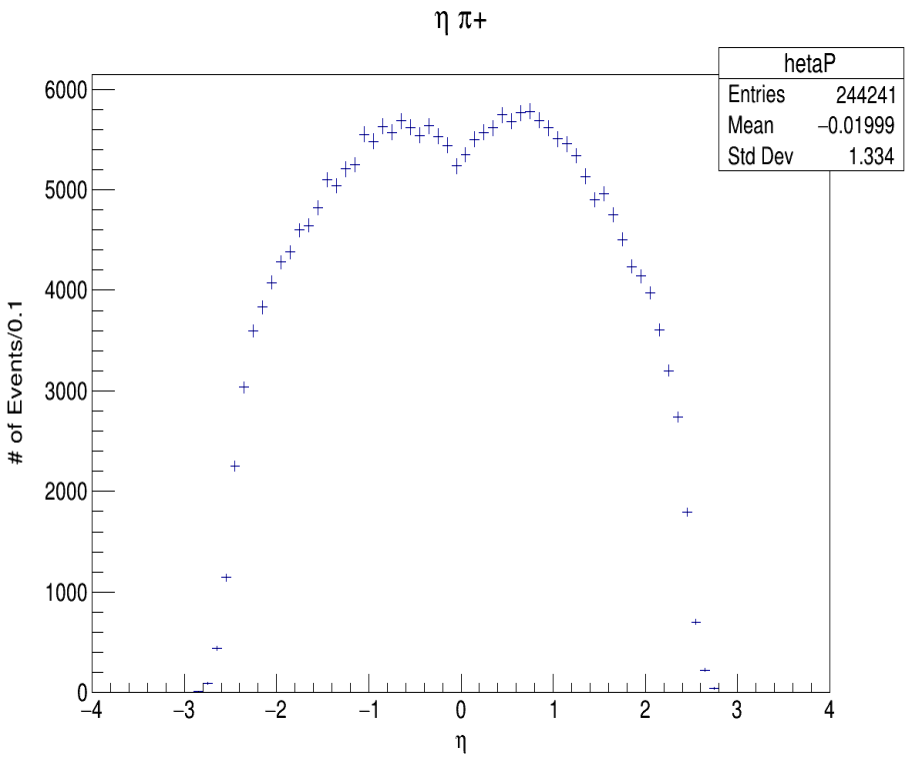
2-track events

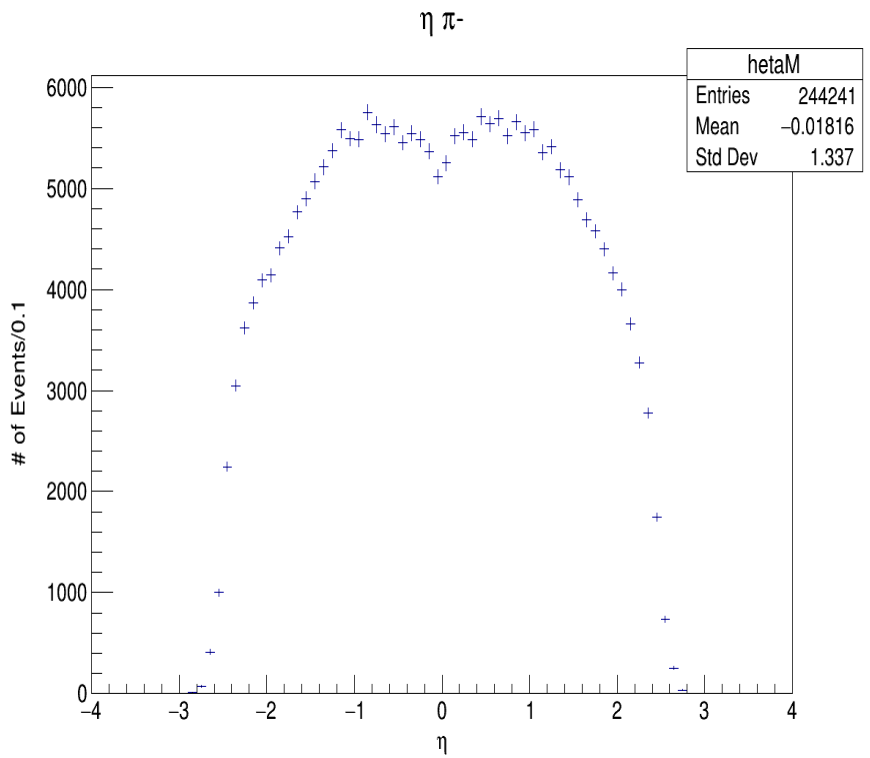
p_T $\pi\pi$

pi+ pi- Q=0



2-track events

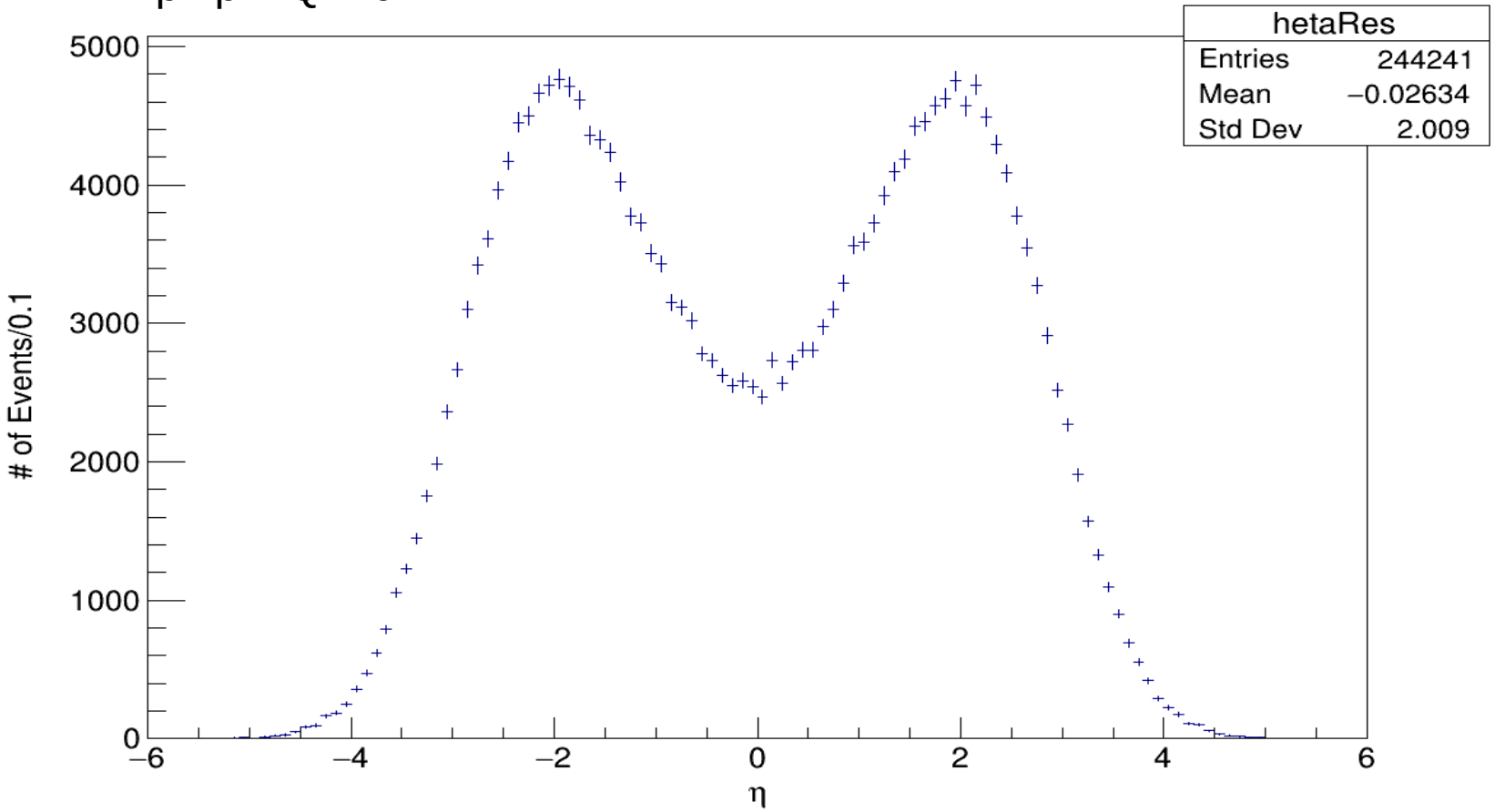




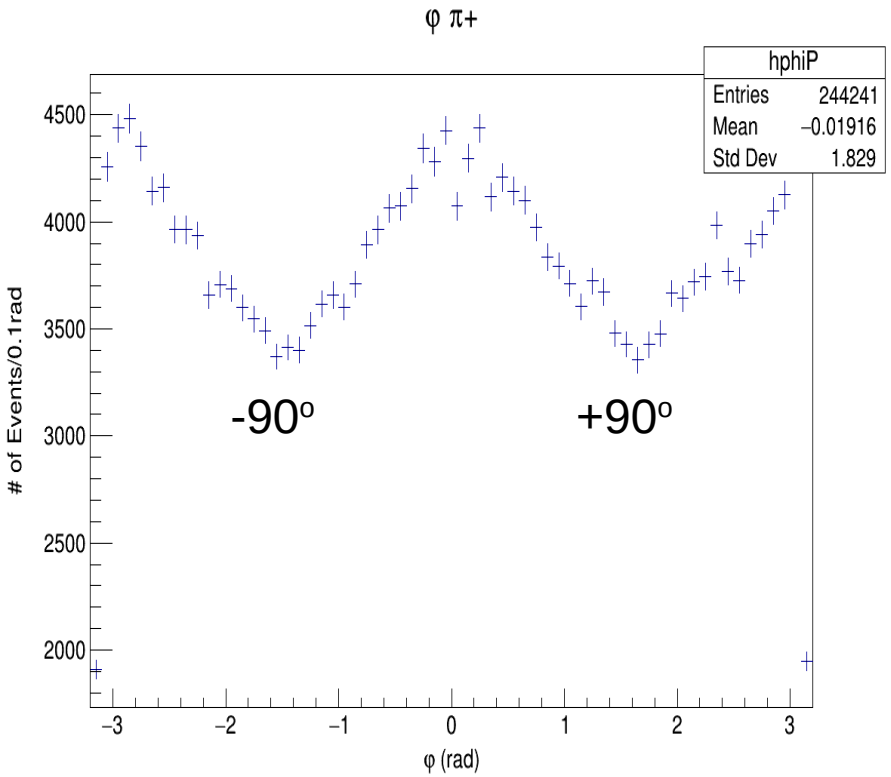
2-track events

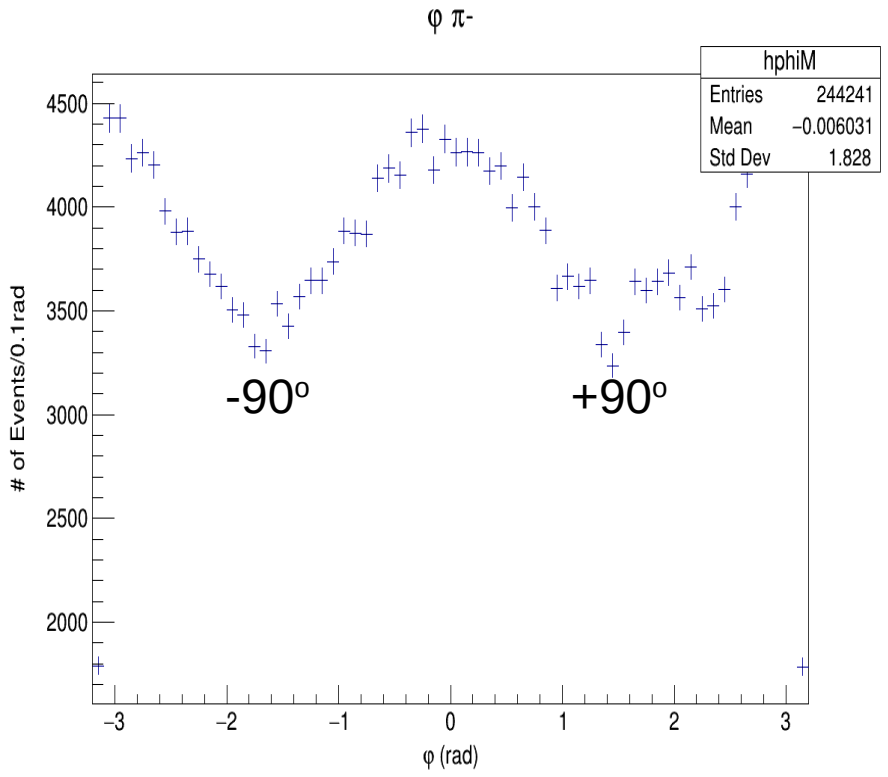
$\eta\ \pi\pi$

pi+pi- Q = 0

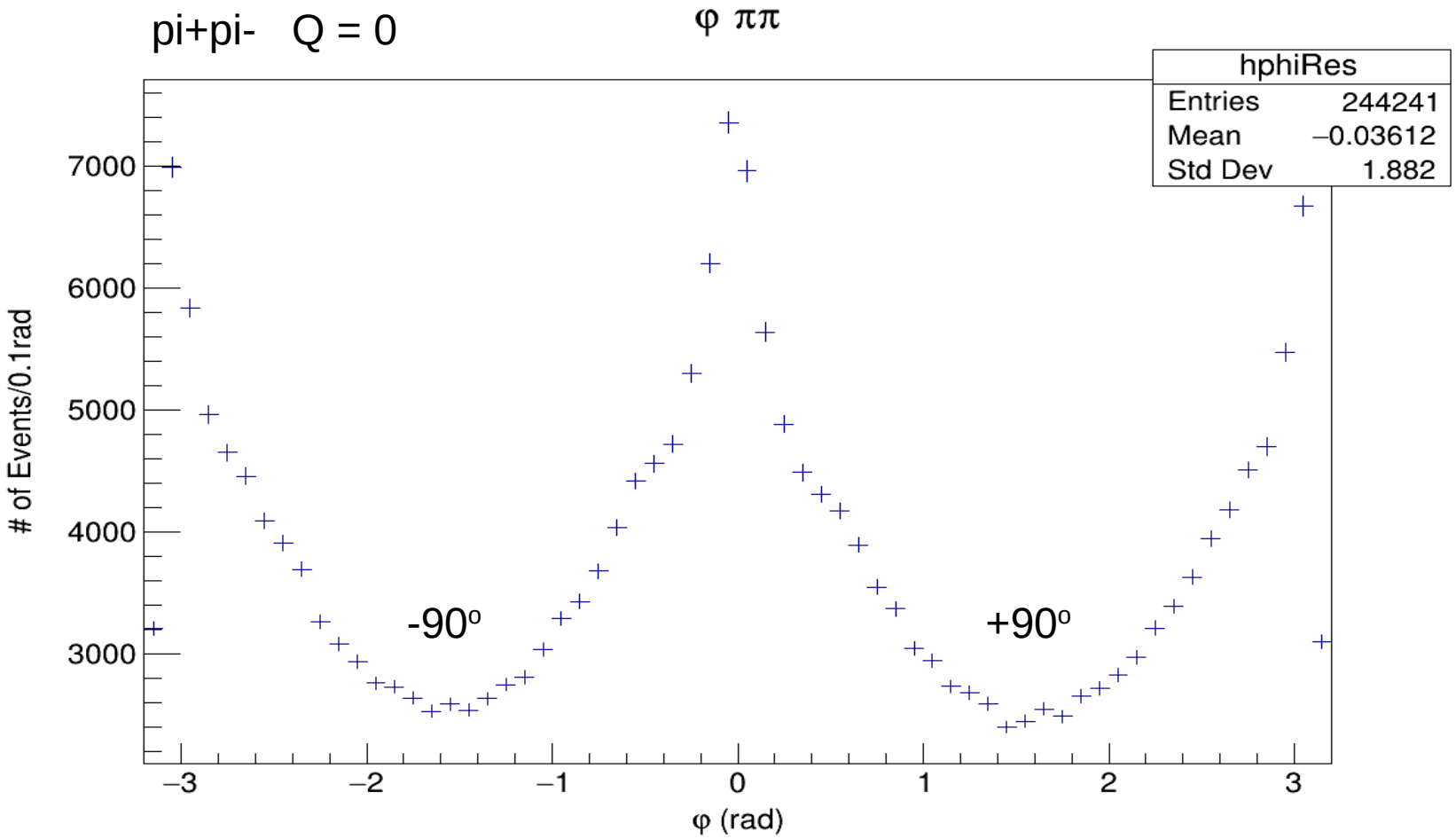


azimuthal angle: 2-track events, correlation with the p system





azimuthal angle: 2-track events, correlation with the p system



Do the same for K+K- and e+e- ?

Task-C

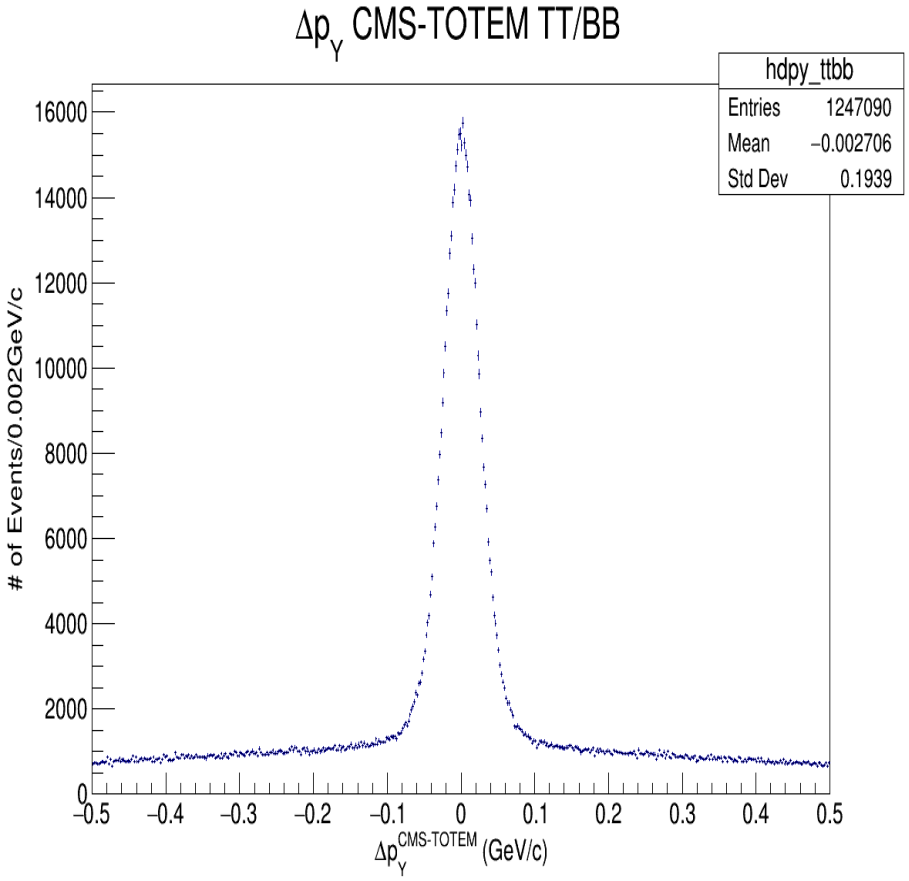
Combined CMS+TOTEM plots

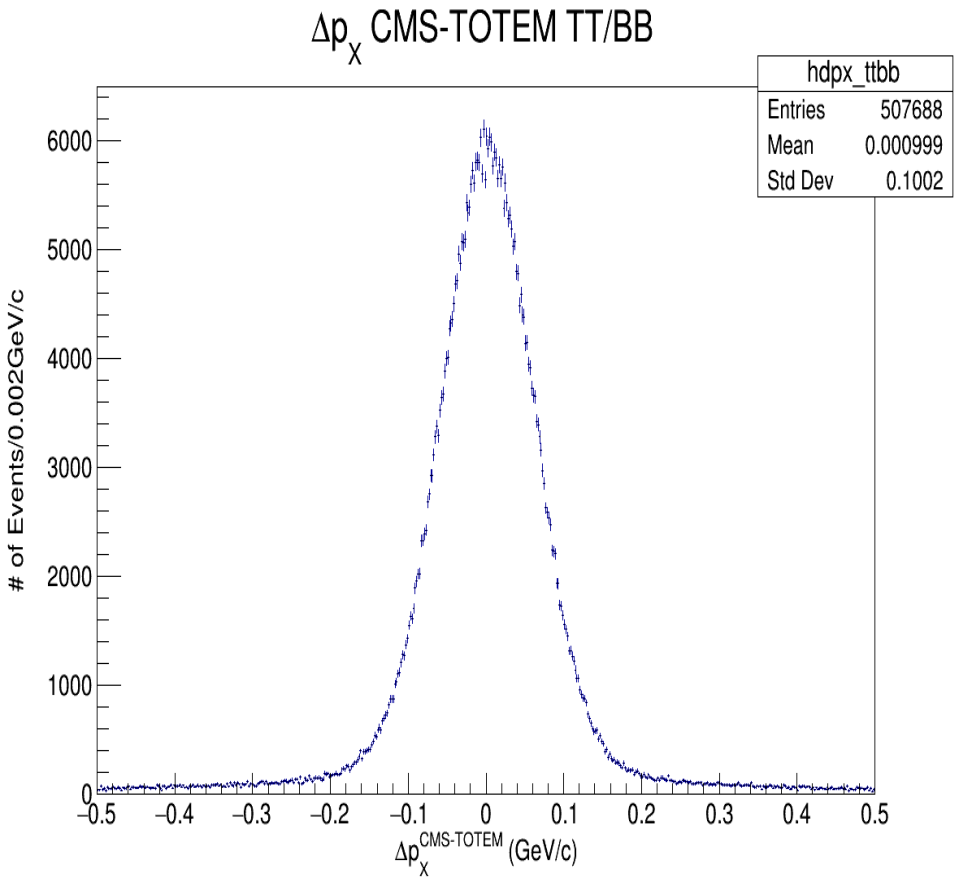
Balance in transverse momenta like Delta pX and Delta py. You showed one and I think that means px and py balance, but really it is the SUM of the four tracks pX and py (keeping signs) that should equal 0 for balanced events. We may still have a different coordinate system in CMS and TOTEM, beware!

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.

Balance in transverse momenta: single track events, all 2015 data

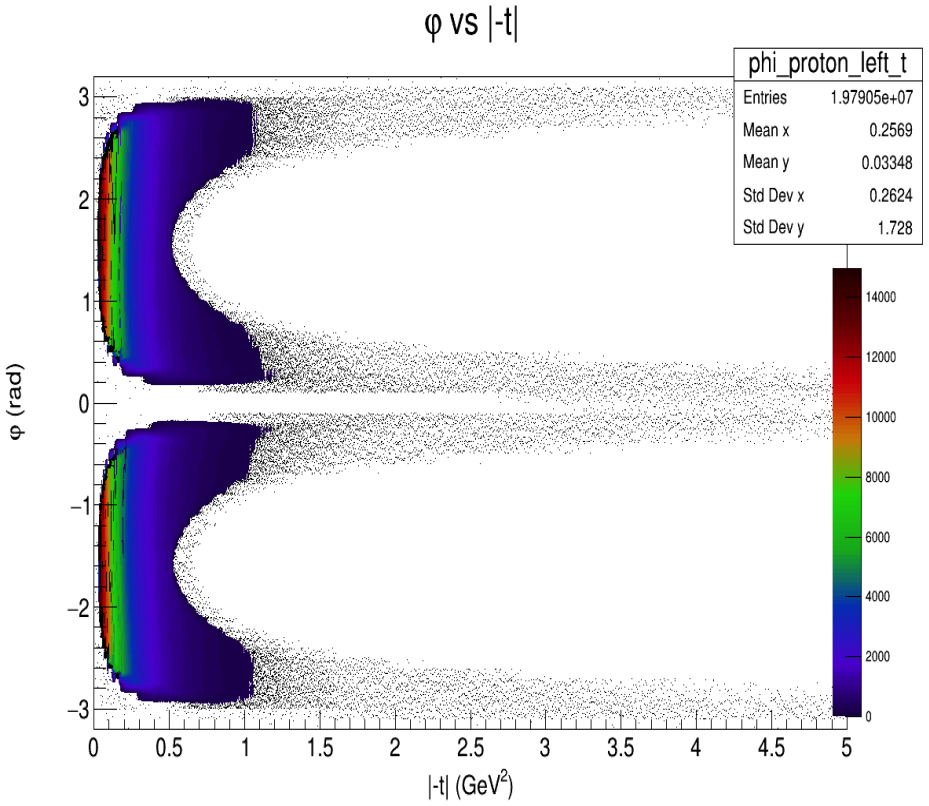




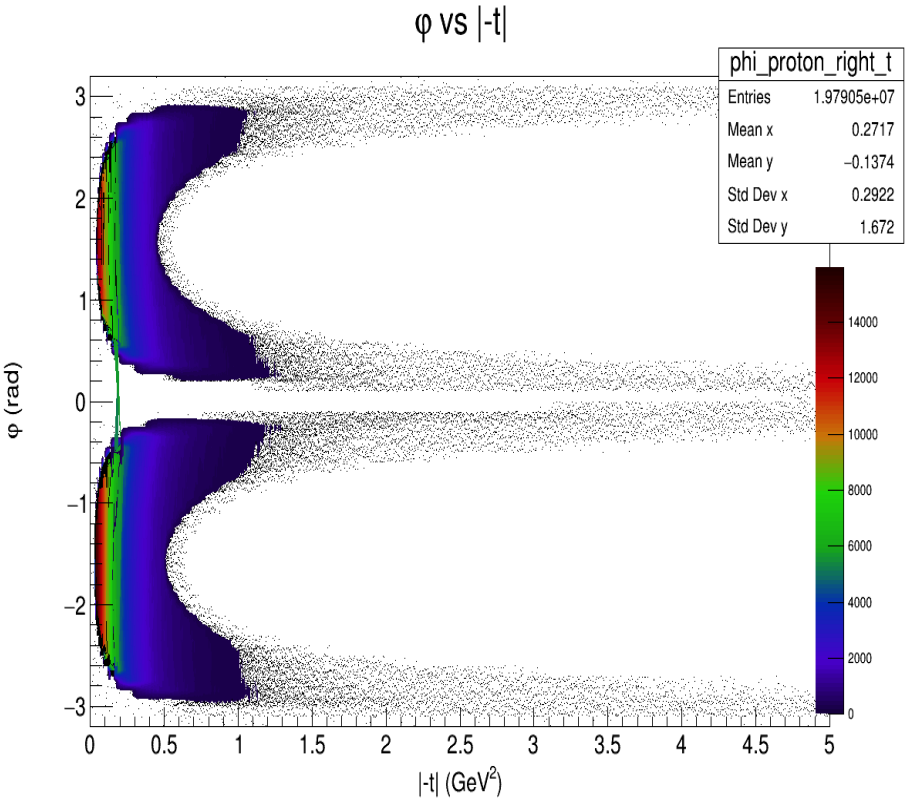
Acceptance A(t,phi)

protons - all 2015 data

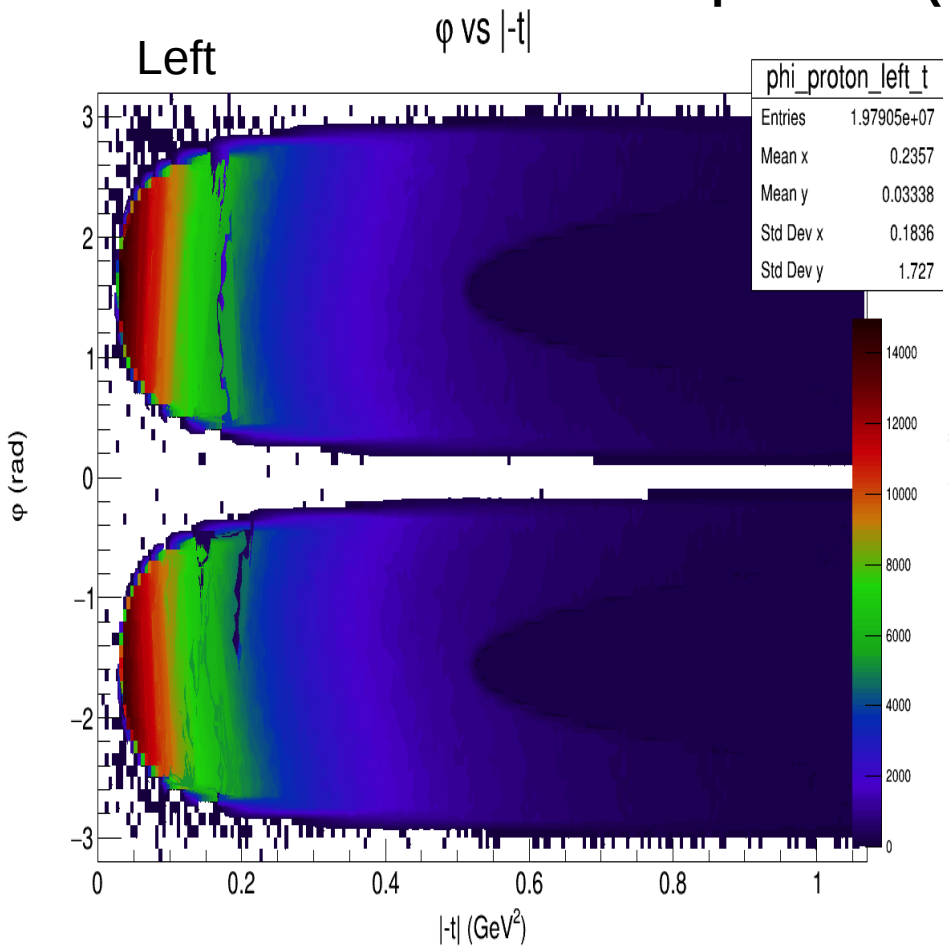
Left

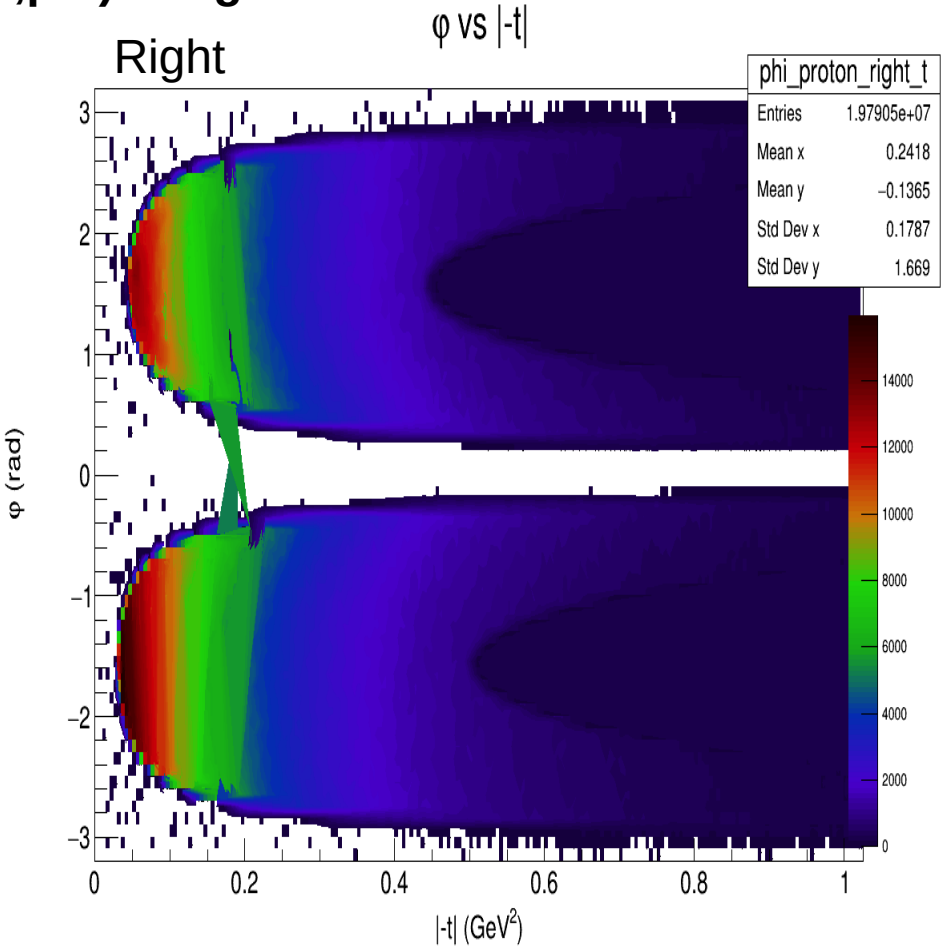


Right



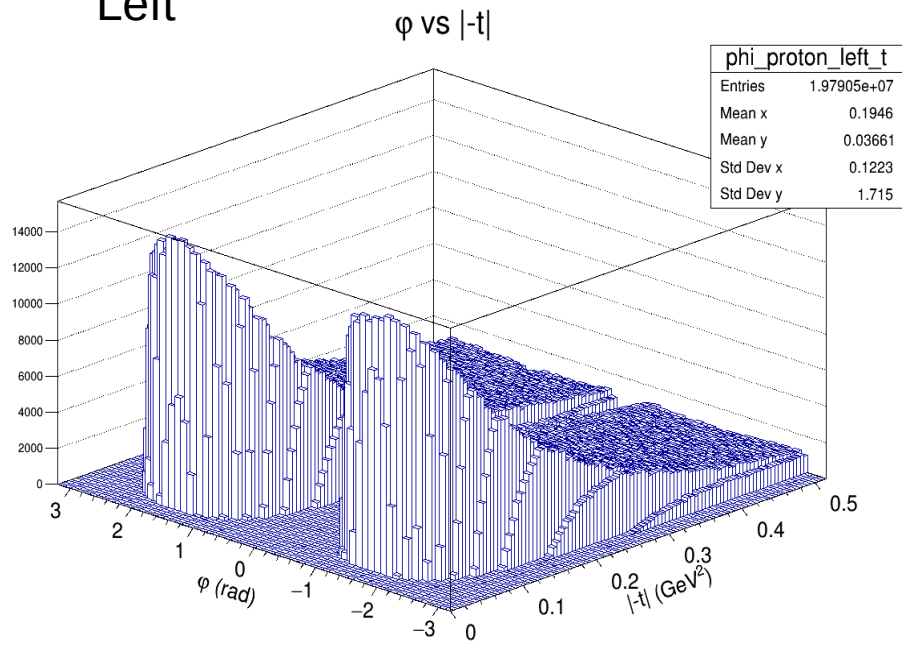
Acceptance A(t,phi): single tracks



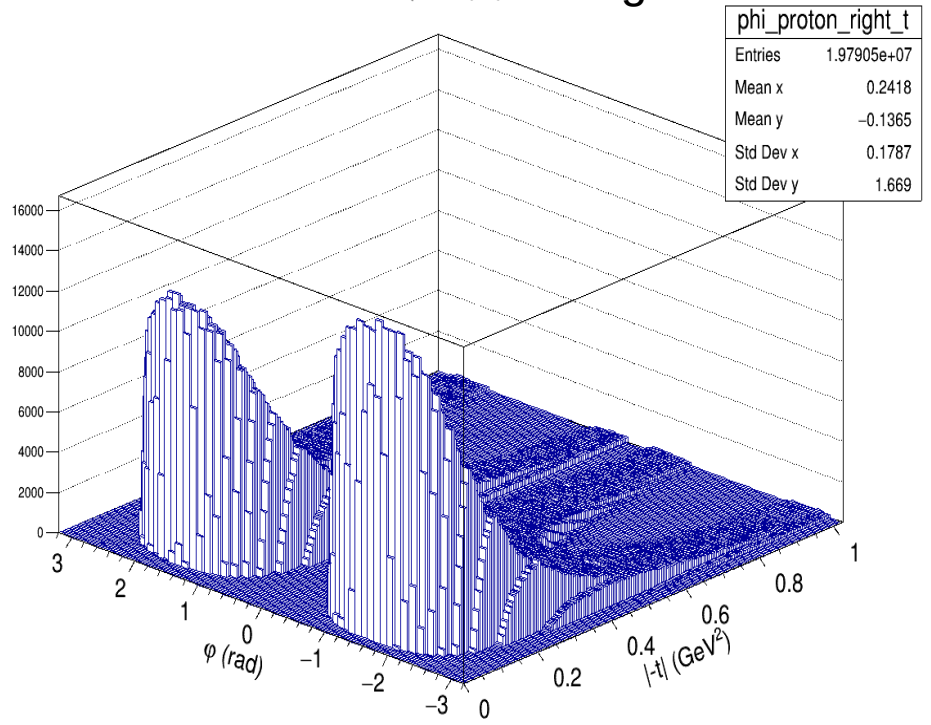


Acceptance A(t,phi): single tracks

Left



φ vs |-t| Right



- studying code’s logic: flowchart map
- updating TOTEM dictionary (version 6): binning changed in luianaRP

Thank you for your attention