

pXp analysis

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Overview

1. Changes in the anaRP code:

- more reasonable binning numbers
- included acceptance $A(t, \phi)$
- corrected plot titles
- changes saved in luianaRP.cc (how to commit it to the repository?)

2. Reprocessed data:

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

3. makeplot.cc important update

iSpy Event Display

Is it possible to see the events in the Roman Pots ?

Answer:

Thomas McCauley

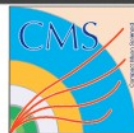
to me, Thomas, ispy-developers

Hi Luiz,

Not with iSpy WebGL. In-principle the geometry can be easily added but I must admit I have not given any thought on how to graphically depict the event.

Cheers, Tom

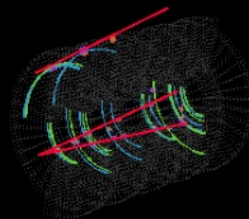
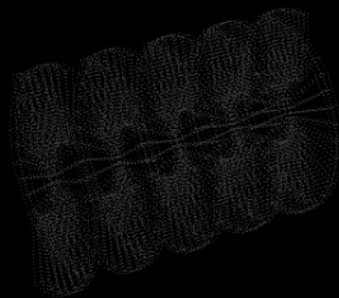
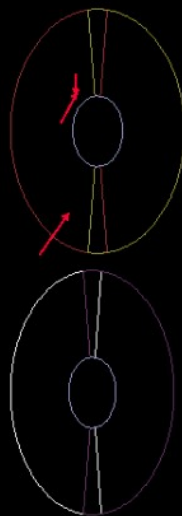
But there is a document http://cds.cern.ch/record/1525893/files/DP2013_004.pdf displaying the events...see next slide



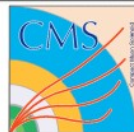
Run 198903 - Event 3478279

TOTEM Event 15322

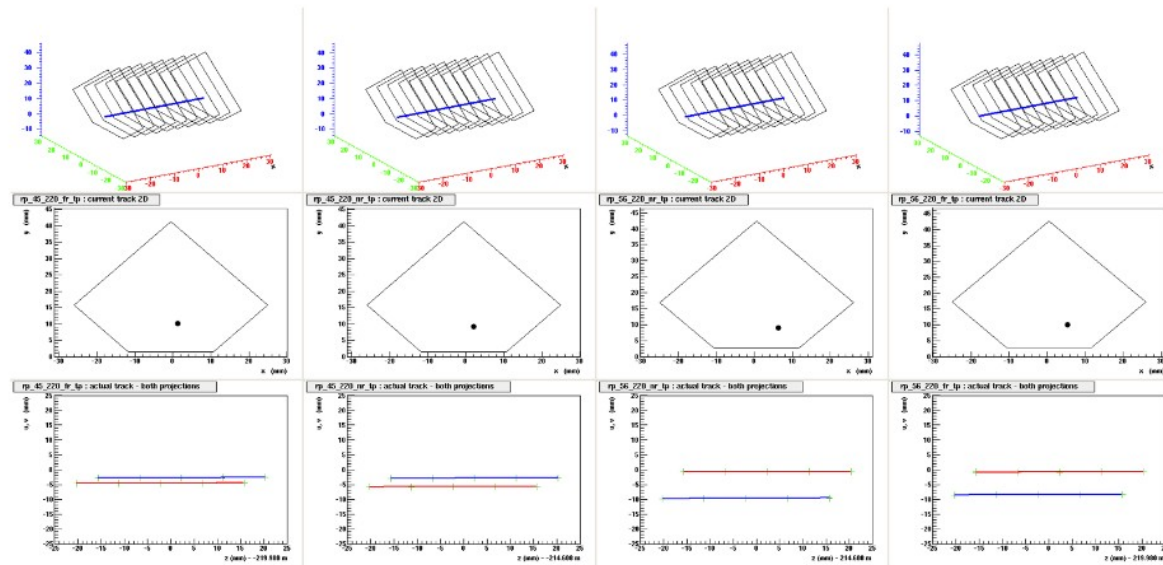
TOTEM T2 Telescope



Number of Tracks: 3



Run 198903 - Event 3478279



TOTEM Event 15322

need to find the FIREWORKS event display...

ok, coming up next Thursday

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 , p_T , ϕ , η :

a) Count how many are +- ($Q = 0$) and ++ and - - (useful for background information) and select $Q = 0$. (?) $\pi^+\pi^-$, K^+K^- , $p\bar{p}$

b) Plot distributions for $Q = +$ and $Q = -$ separately of p_T (probably 0 – 4 GeV/c is fine) and η (-3 to + 3 – we will likely select -2.5 to + 2.5 for definiteness) and ϕ (0 - 2π or $-\pi$ to $+\pi$, whatever).

We expect that +ve and -ve tracks have identical distributions but good to check.)

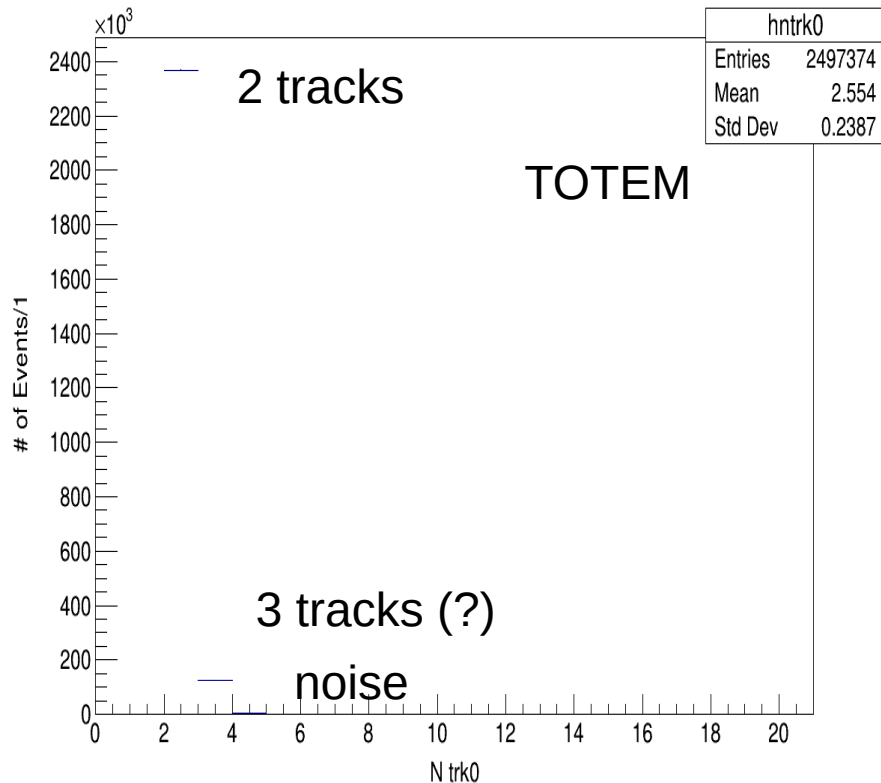
important to have this map in mind

TOTEM's RP map

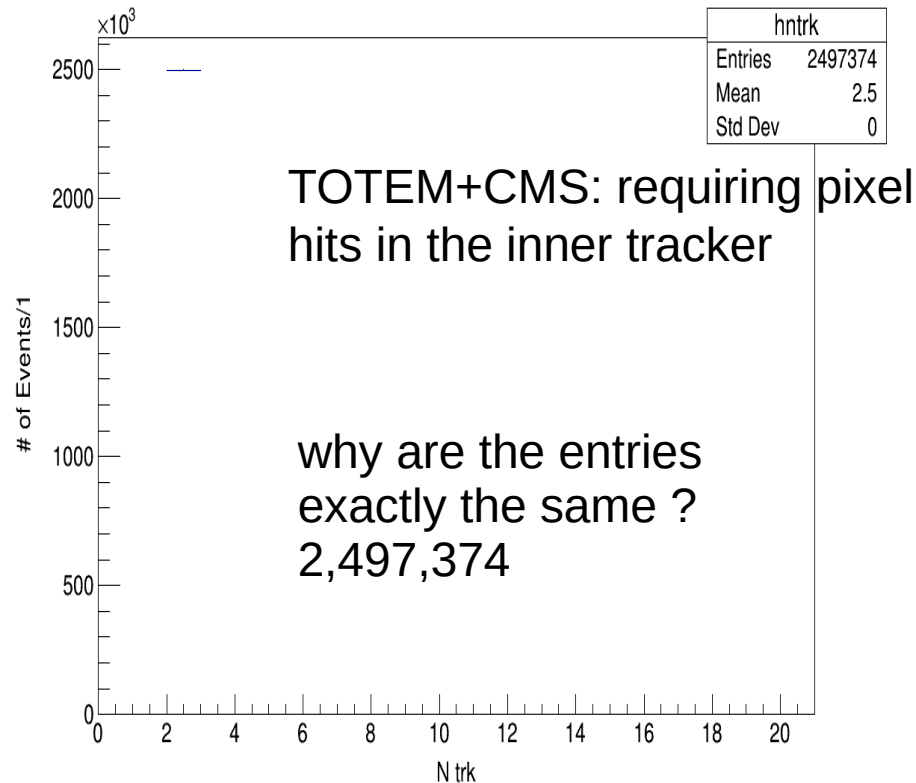
-z	IP	+z
sec45		sec56
top: 024 020		120 124
ver: 023 022		122 123
bot: 025 021		121 125
Left		Right

Multiplicity – 2-track events (reduced2) only – except run#9998

Ntrk

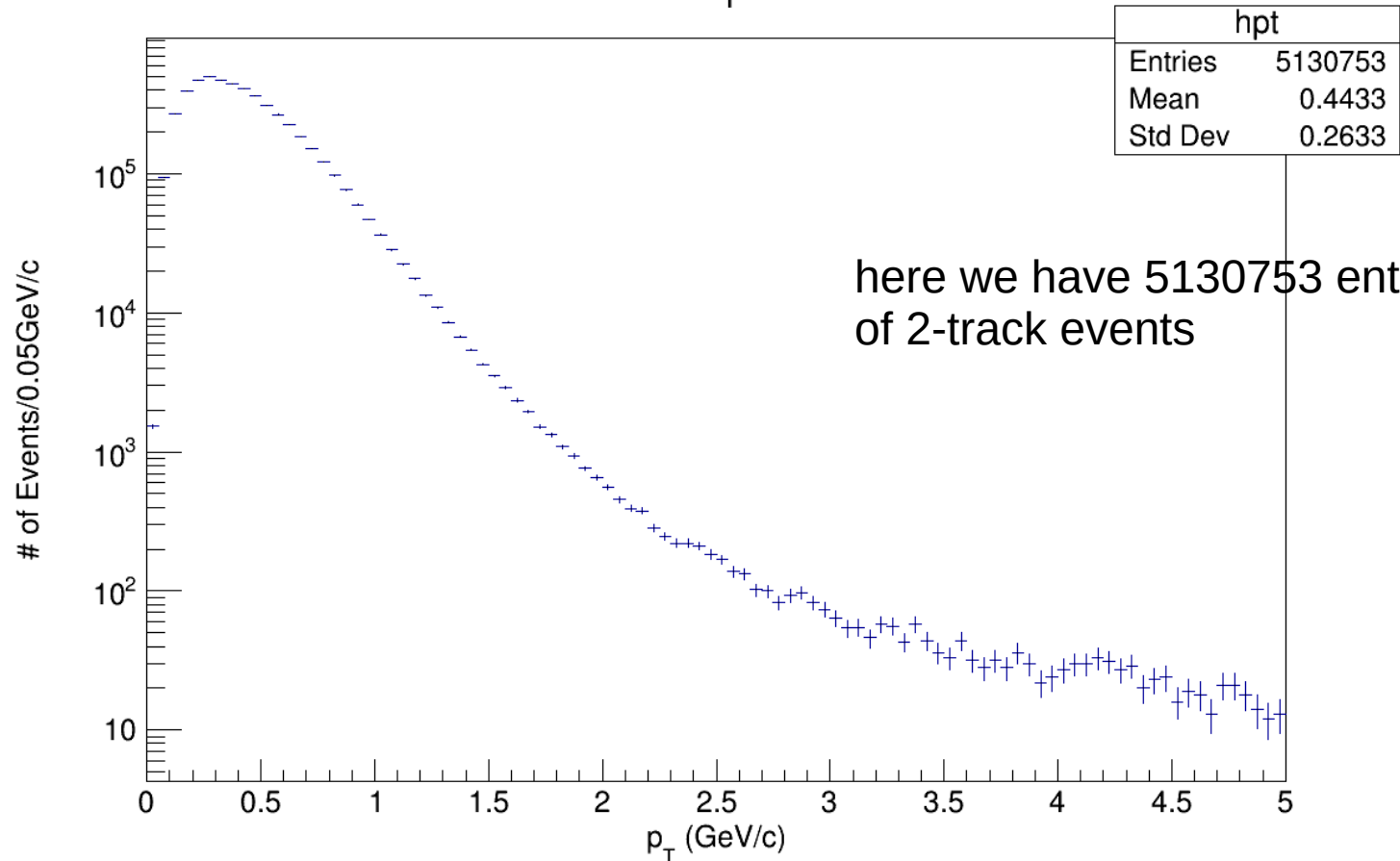


Ntrk for nPixelHits>0

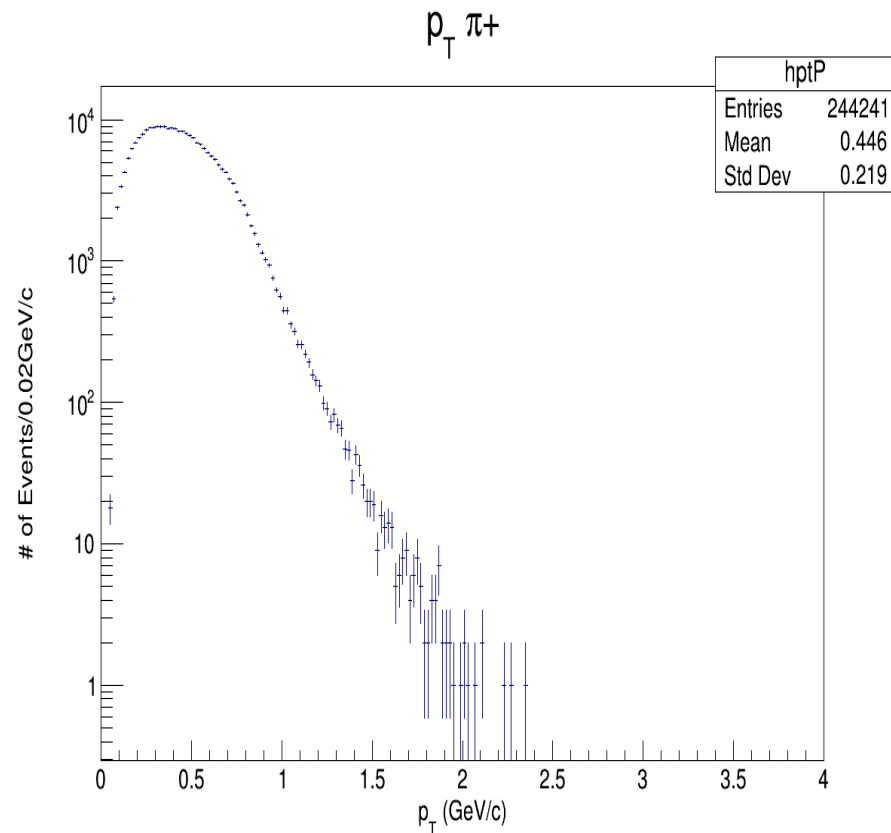
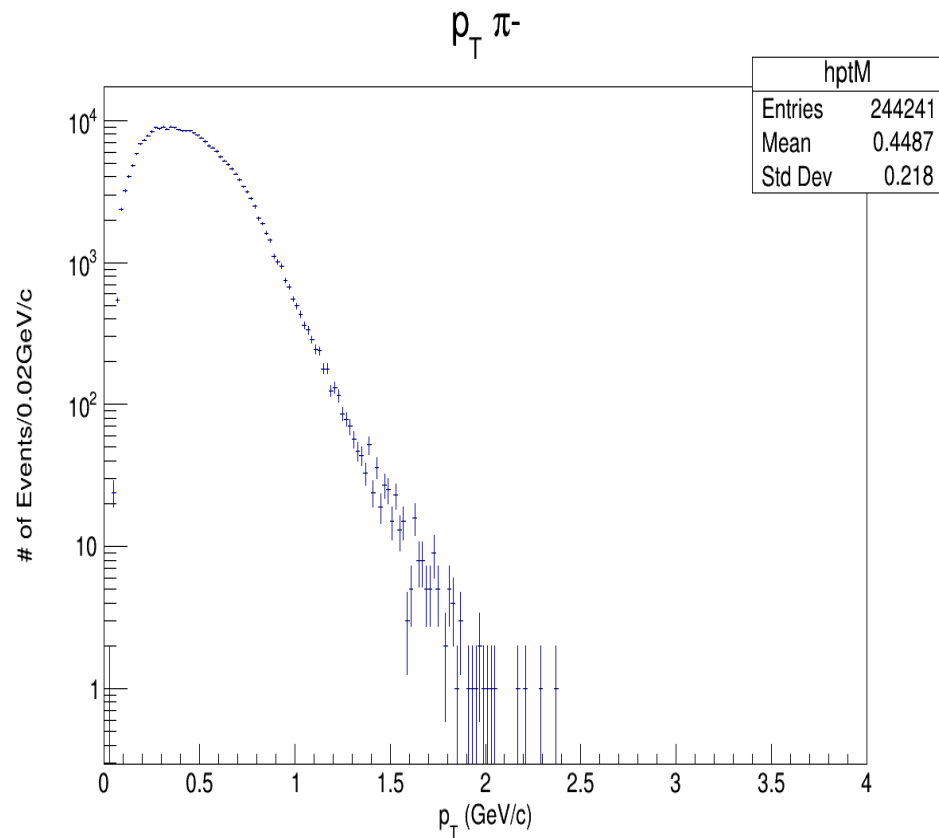


2-track events only - except run#9998

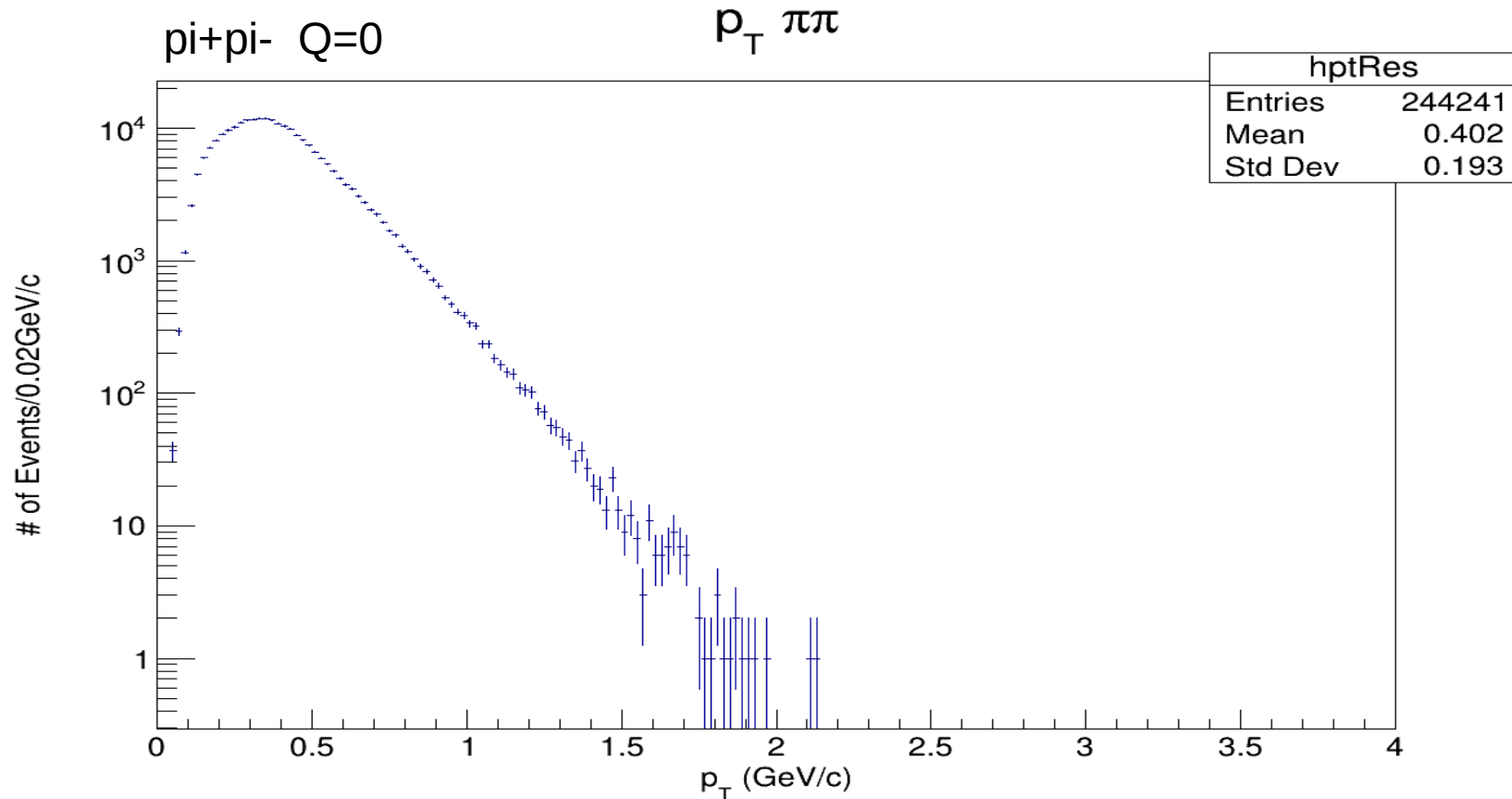
p_T



2-track events only - except run#9998: from 5.1 million of 2 track events we have only 244241 of $\pi^+\pi^-$ pairs

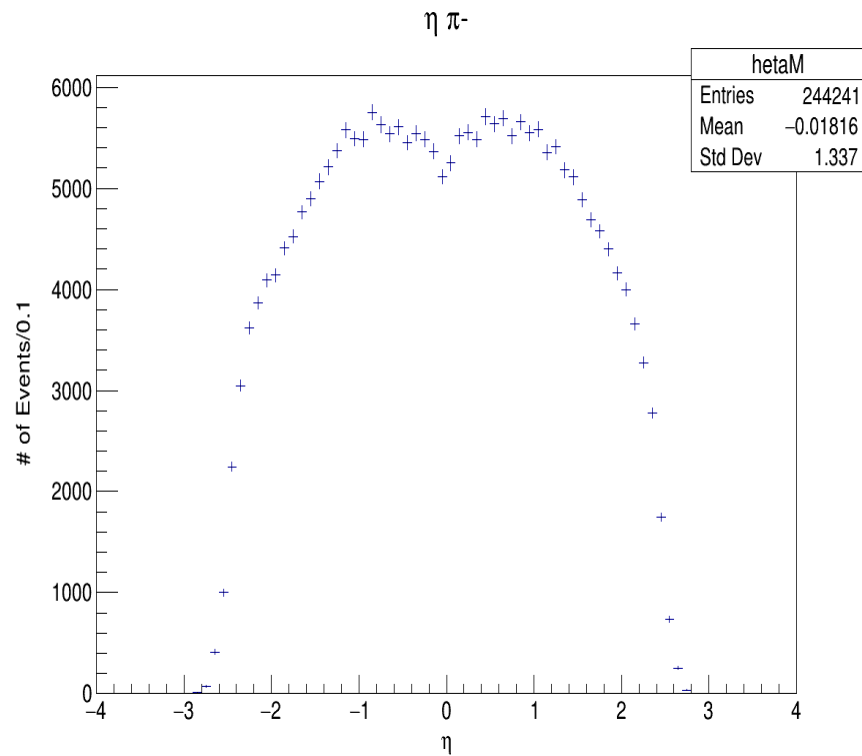
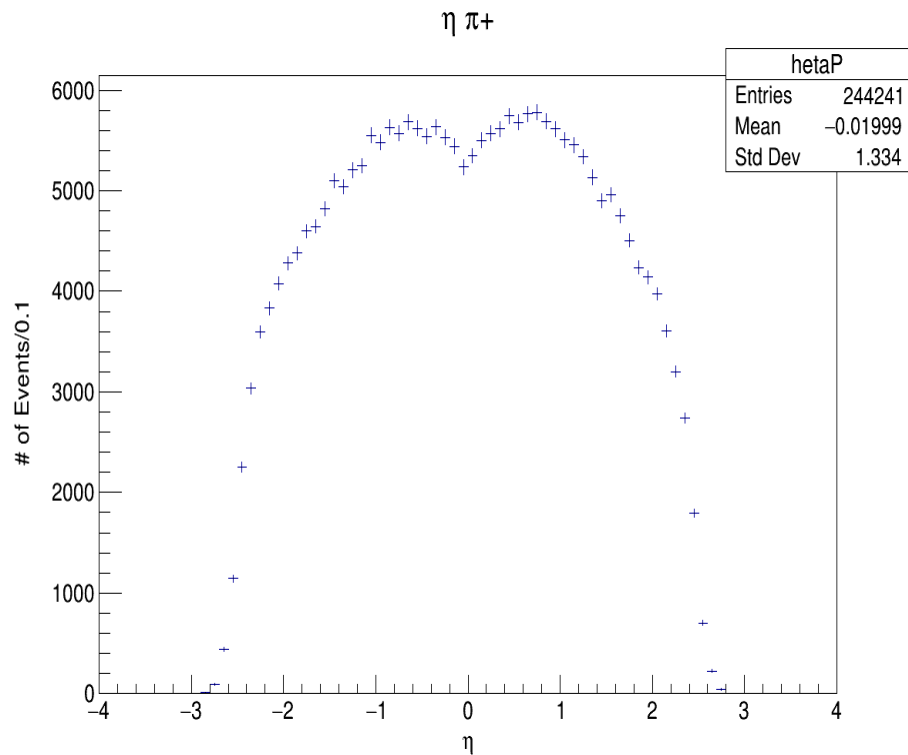


2-track events only - except run#9998: from 5.1 million of 2 track events we have only 244241 of $\pi^+\pi^-$ pairs



coming up...rapidity y

2-track events only

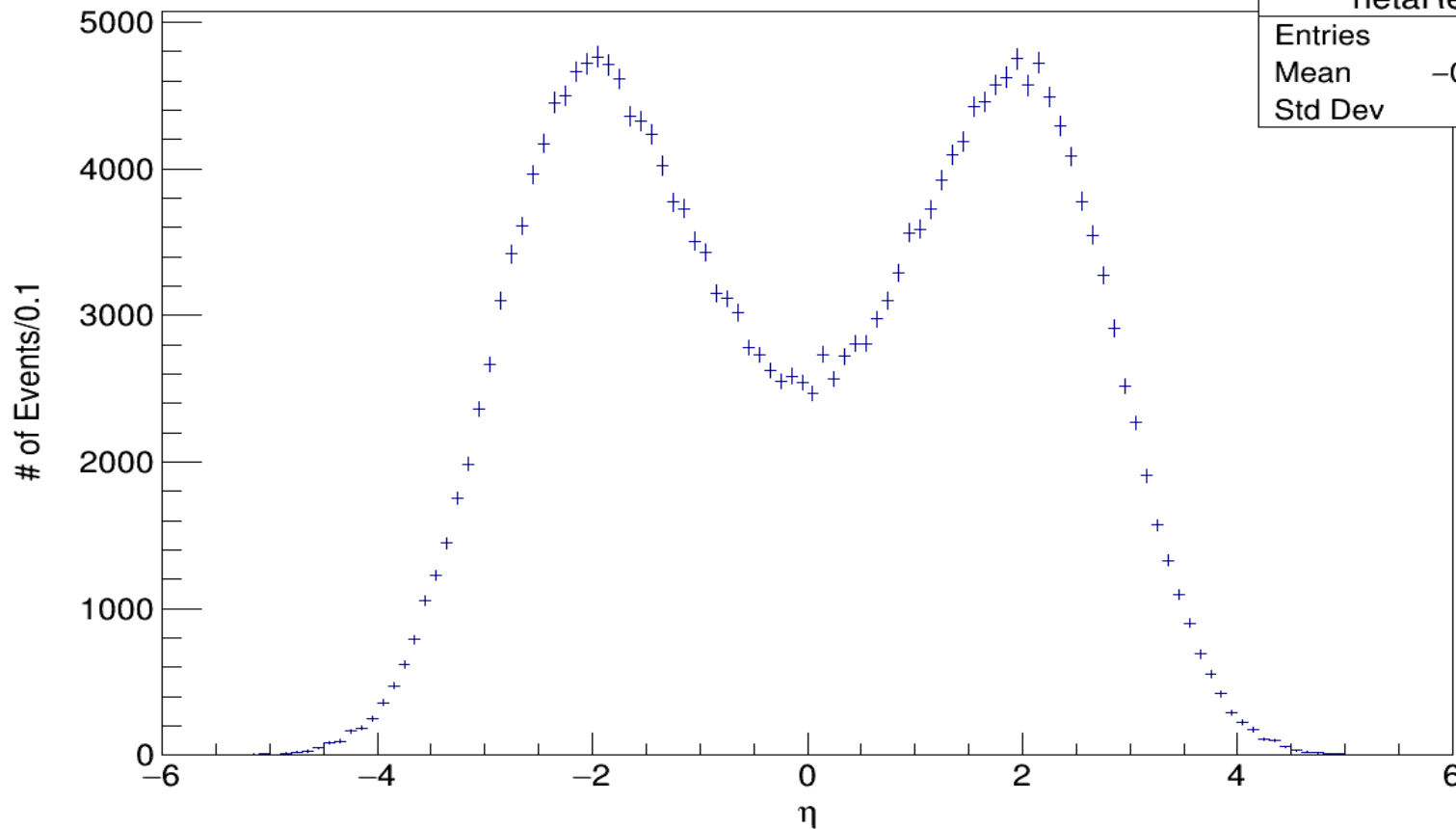


coming up...rapidity y

2-track events only

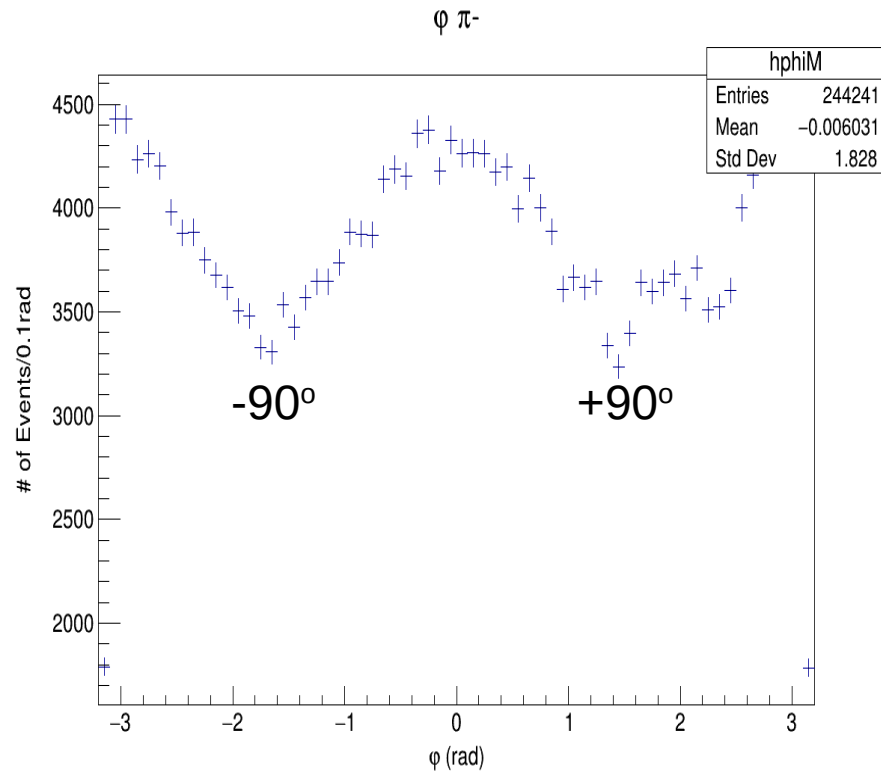
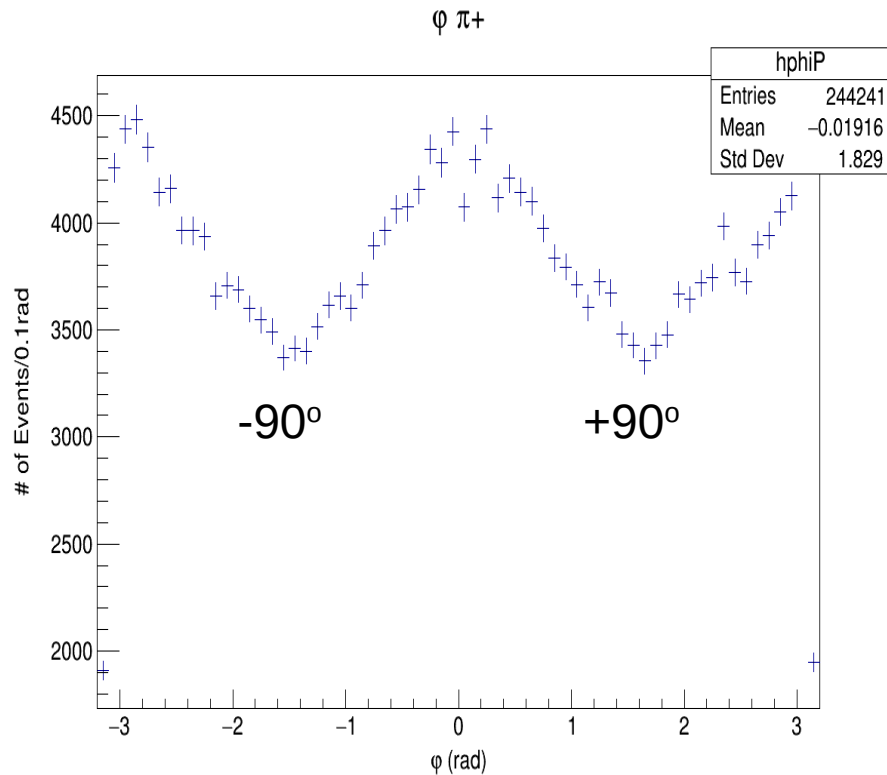
$\pi^+\pi^-$ $Q = 0$

η $\pi\pi$



hetaRes	
Entries	244241
Mean	-0.02634
Std Dev	2.009

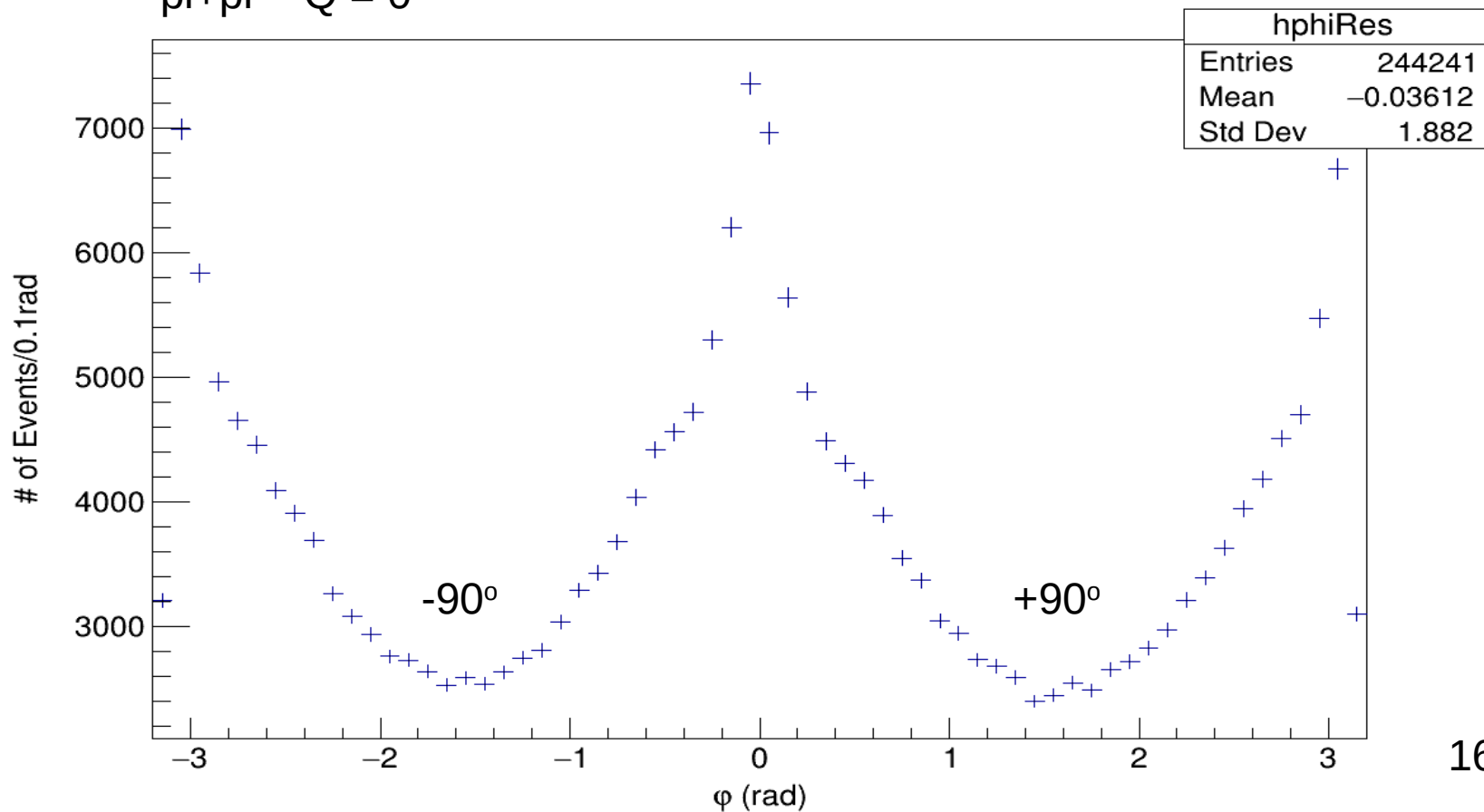
azimuthal angle: 2-track events only, correlation with the p system



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

$\pi^+\pi^-$ $Q = 0$

$\phi \pi\pi$



Do the same for K^+K^- and $p\bar{p}$?

coming up...

Task-C

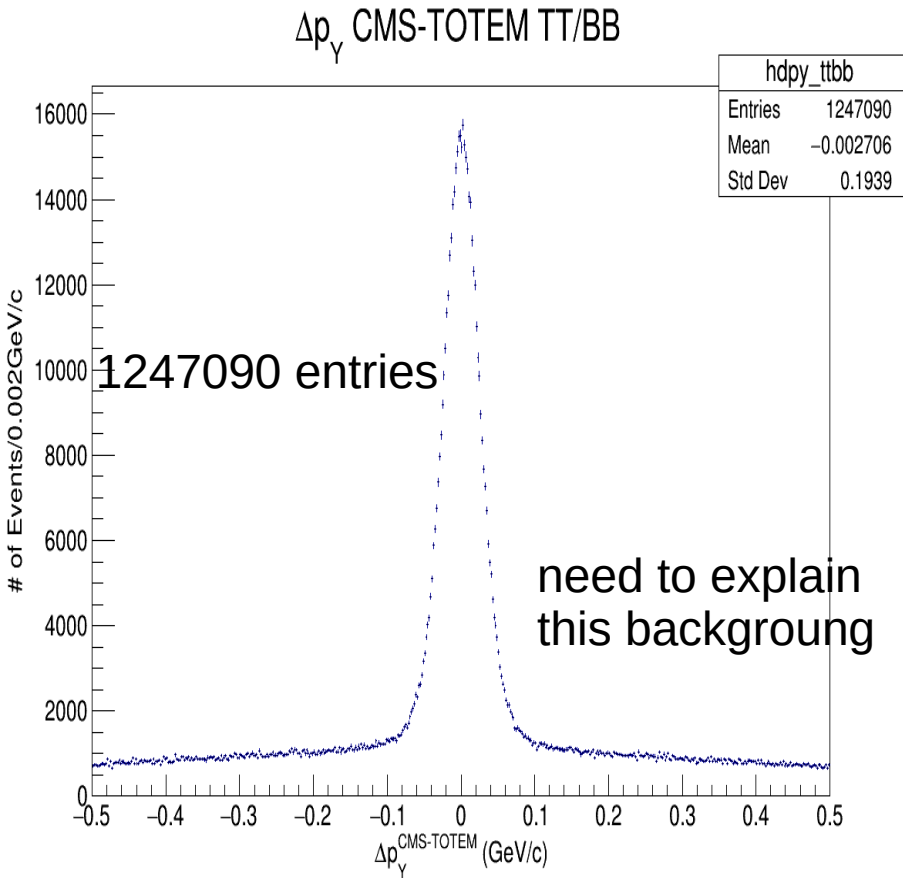
Combined CMS+TOTEM plots

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

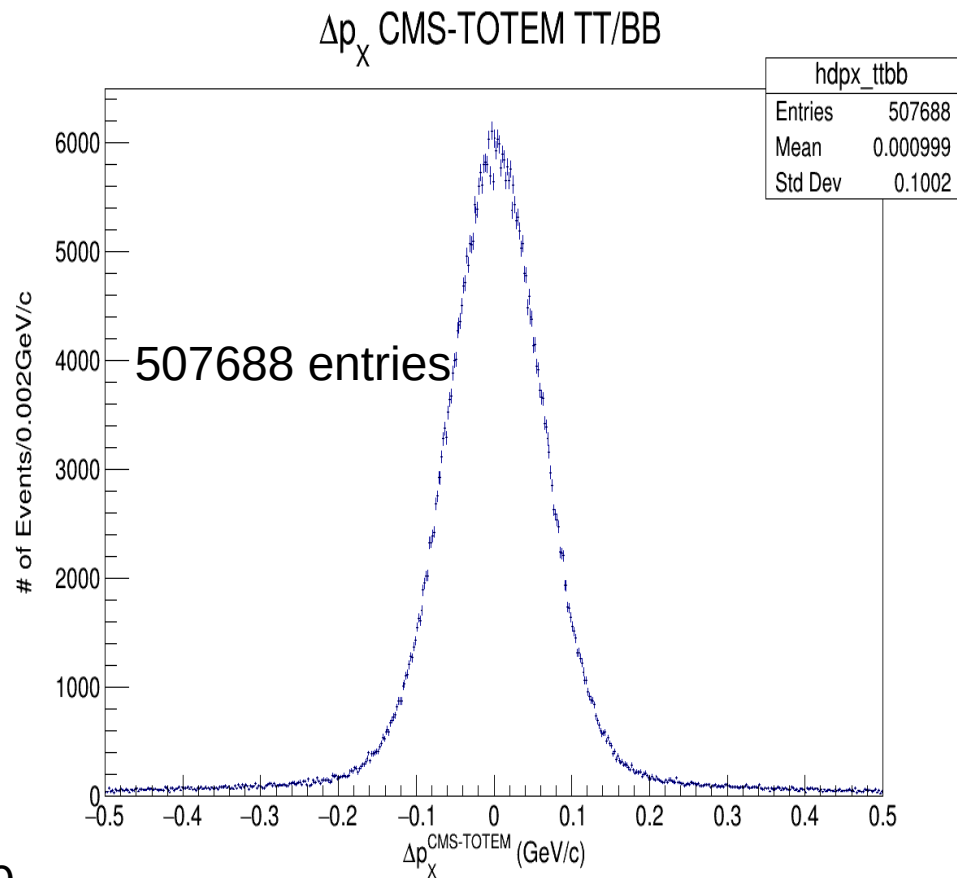
Anyway the plot you showed of Δp_X CMS-TOTEM TT/BB peaks at 0 and that must mean balance, and a selection of $-0.2 \text{ GeV}/c$ to $+0.2 \text{ GeV}/c$ (I suppose) will keep nearly all the good balanced events and just remove a few that may have missing or badly measured tracks. **Do same thing for p_Y 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 $0.005 \text{ GeV}/c$ if the statistics allows it to look smooth.

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



19

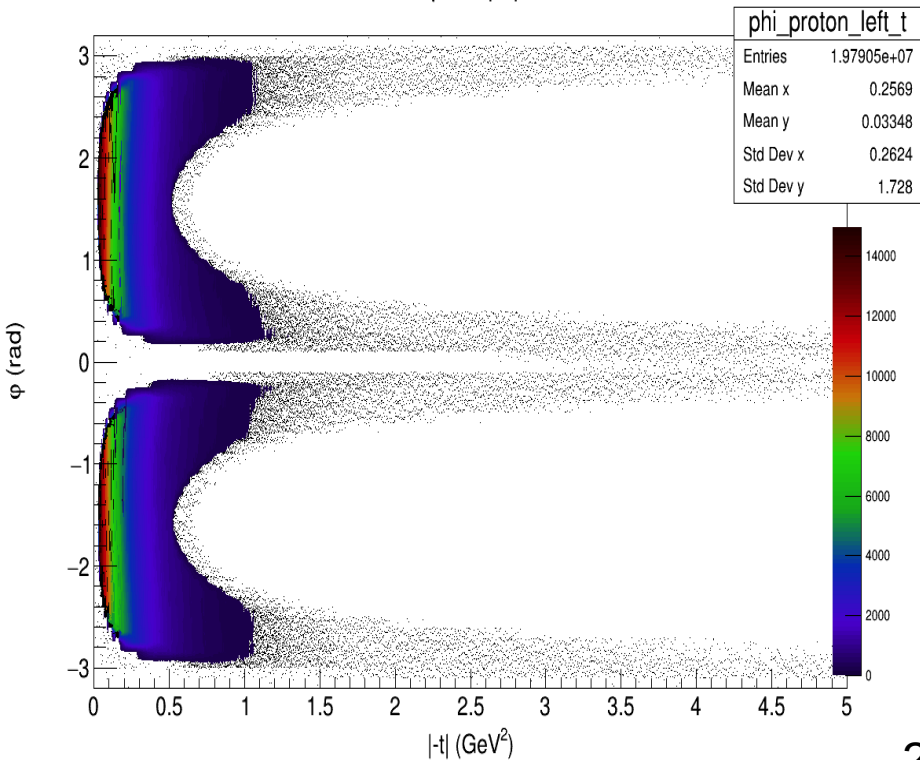


coming up TT, BB, TB+BT

Acceptance $A(t,\phi)$ protons - all 2015 data

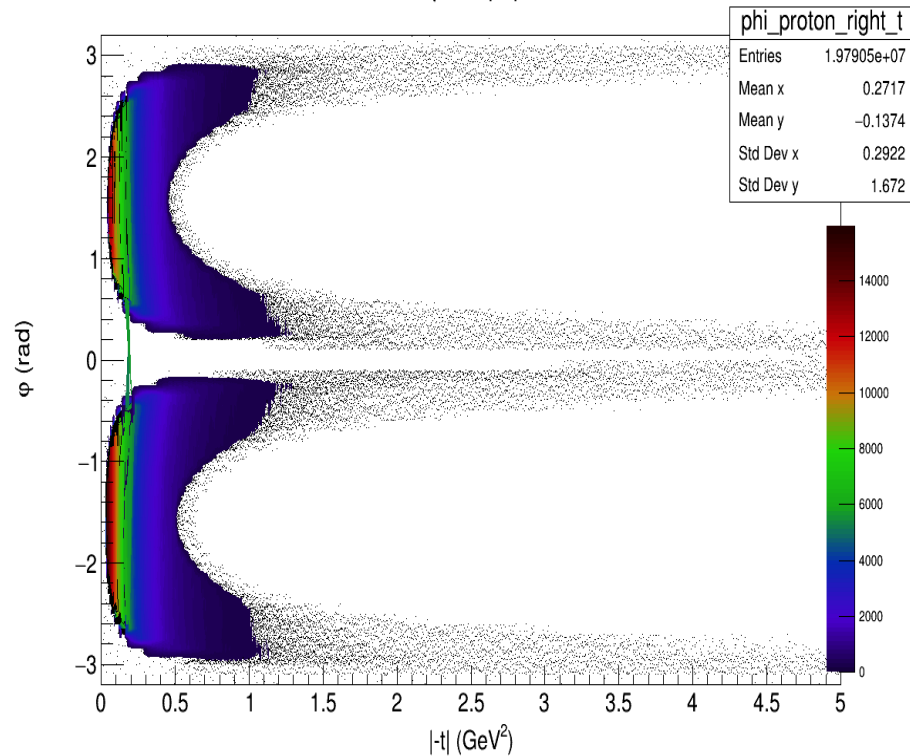
Left

ϕ vs $|-t|$



Right

ϕ vs $|-t|$



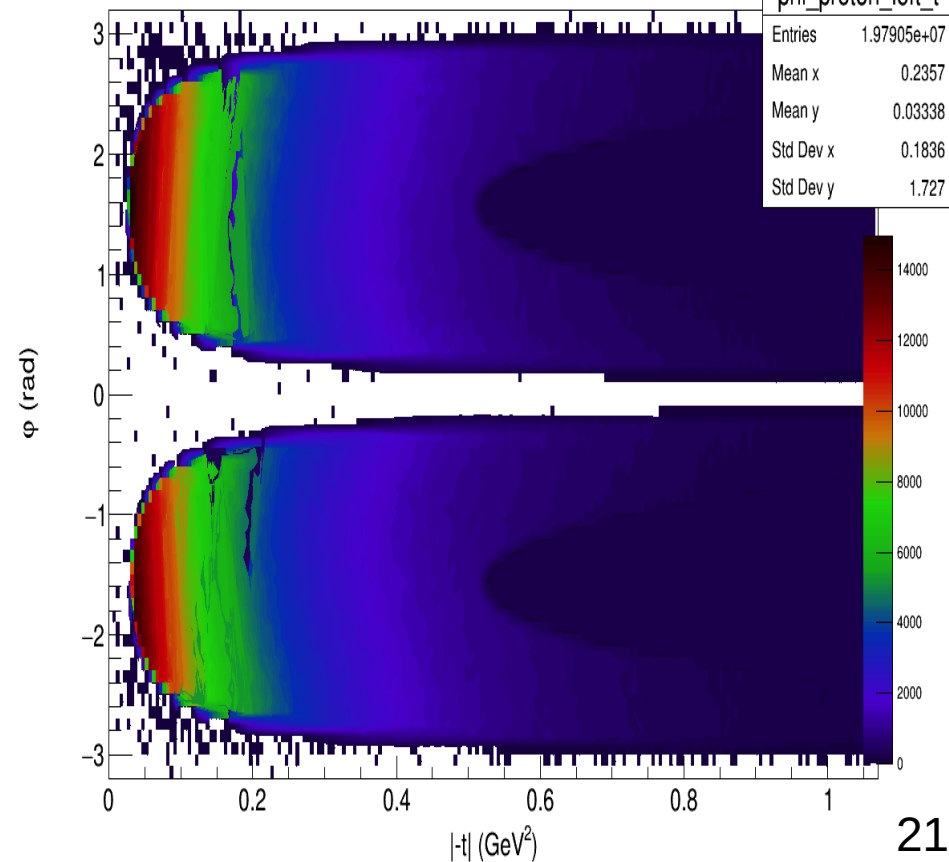
Acceptance $A(t,\phi)$: single track events

coming up TT, BB, TB+BT

ϕ vs $|-t|$

Left

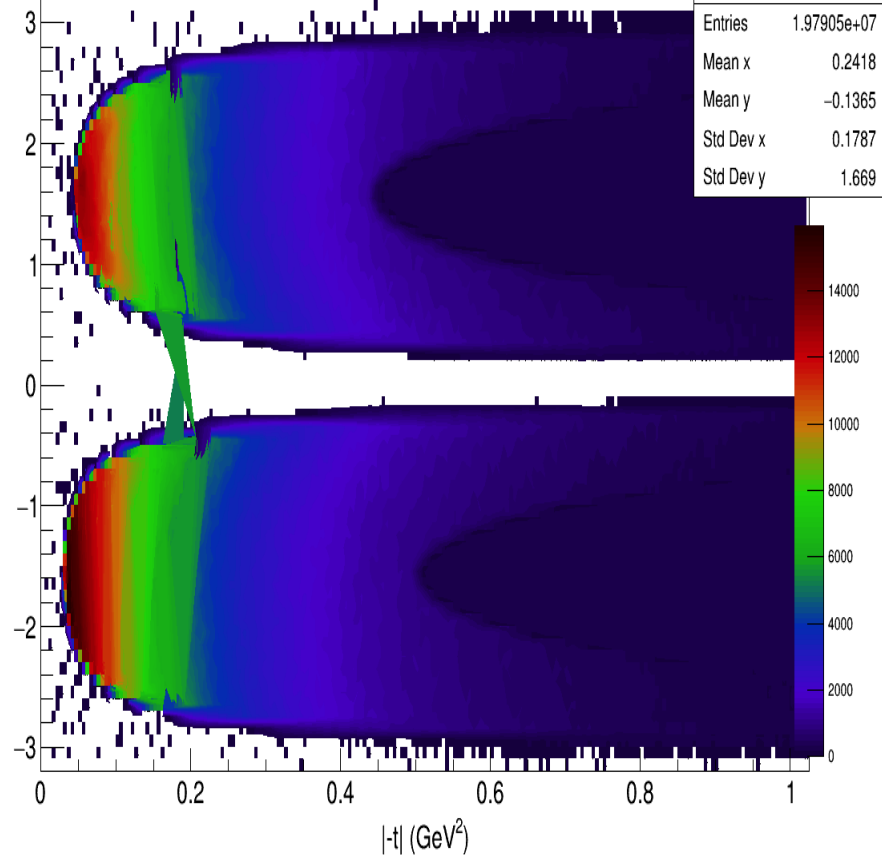
phi_proton_left_t	
Entries	1.97905e+07
Mean x	0.2357
Mean y	0.03338
Std Dev x	0.1836
Std Dev y	1.727



Right

ϕ vs $|-t|$

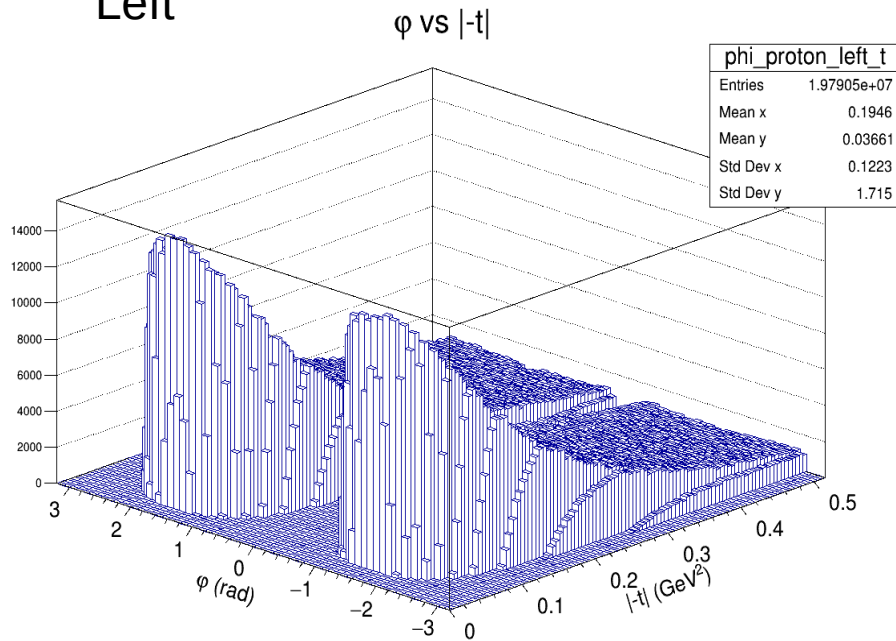
phi_proton_right_t	
Entries	1.97905e+07
Mean x	0.2418
Mean y	-0.1365
Std Dev x	0.1787
Std Dev y	1.669



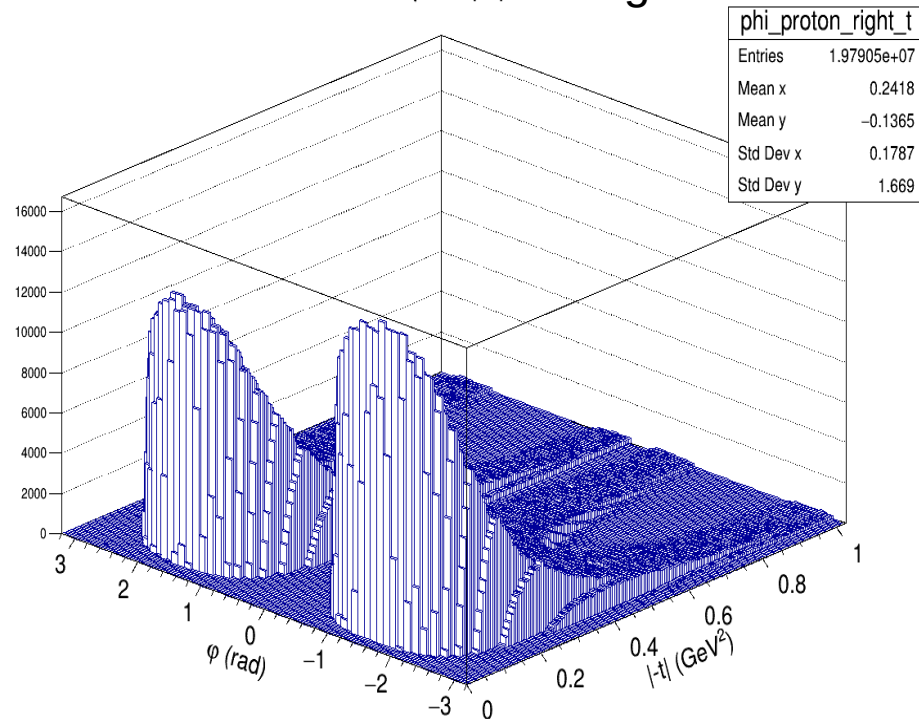
Acceptance $A(t,\phi)$: single track events

coming up TT, BB, TB+BT

Left



Right



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

Thank you for your attention

Have a nice 4th of July

Fireworks!