TOP-BOTTOM ASYMMETRY INVESTIGATIONS

MIRIAM DIAMOND

FEB 5 2018
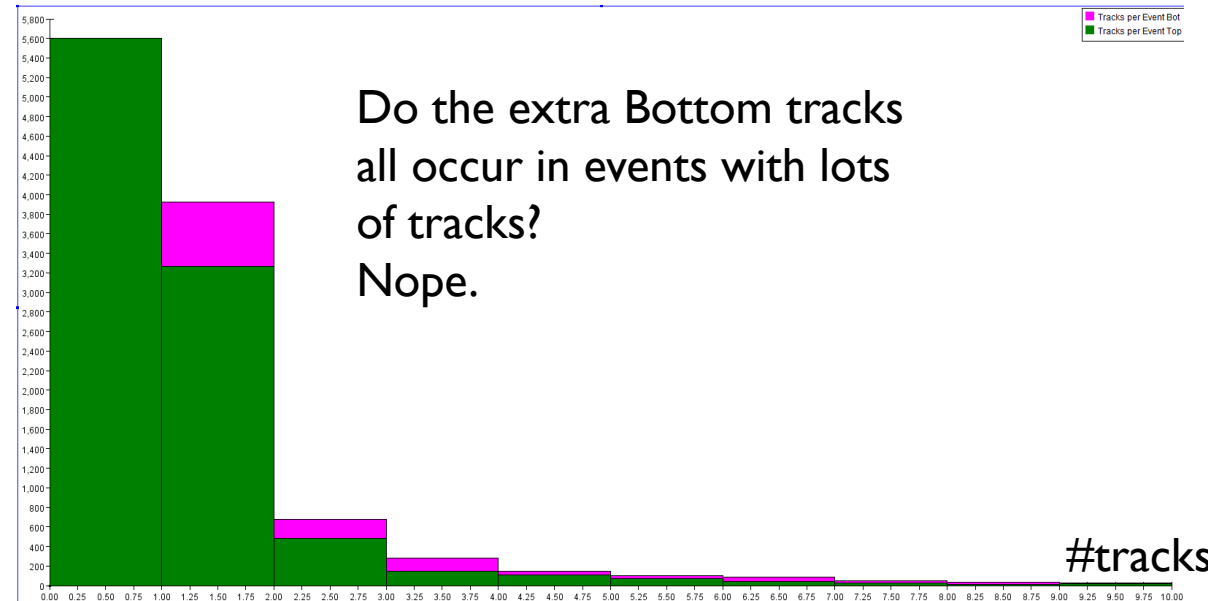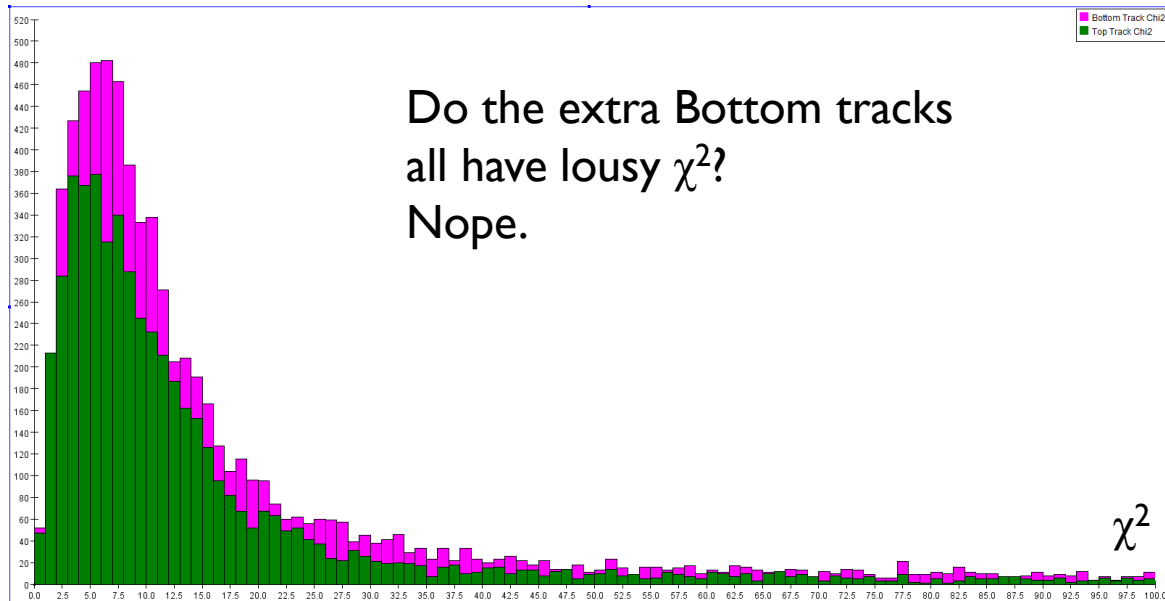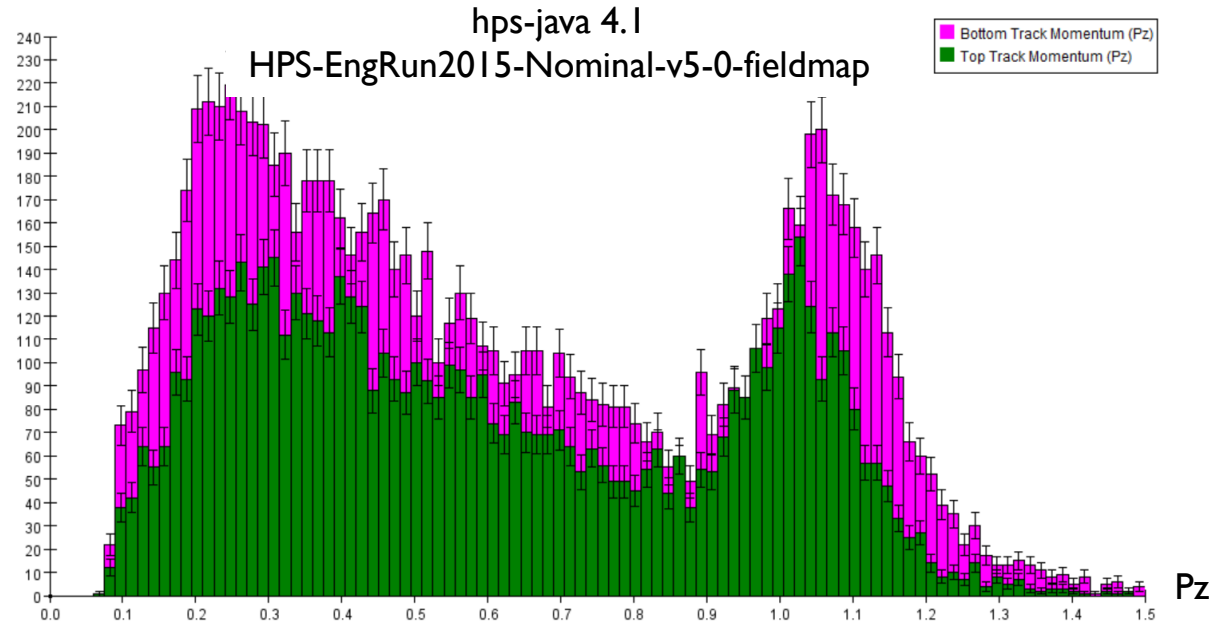
Groundhog hole!
6 more weeks of tracking software work

TOP/BOTTOM GBL TRACKS
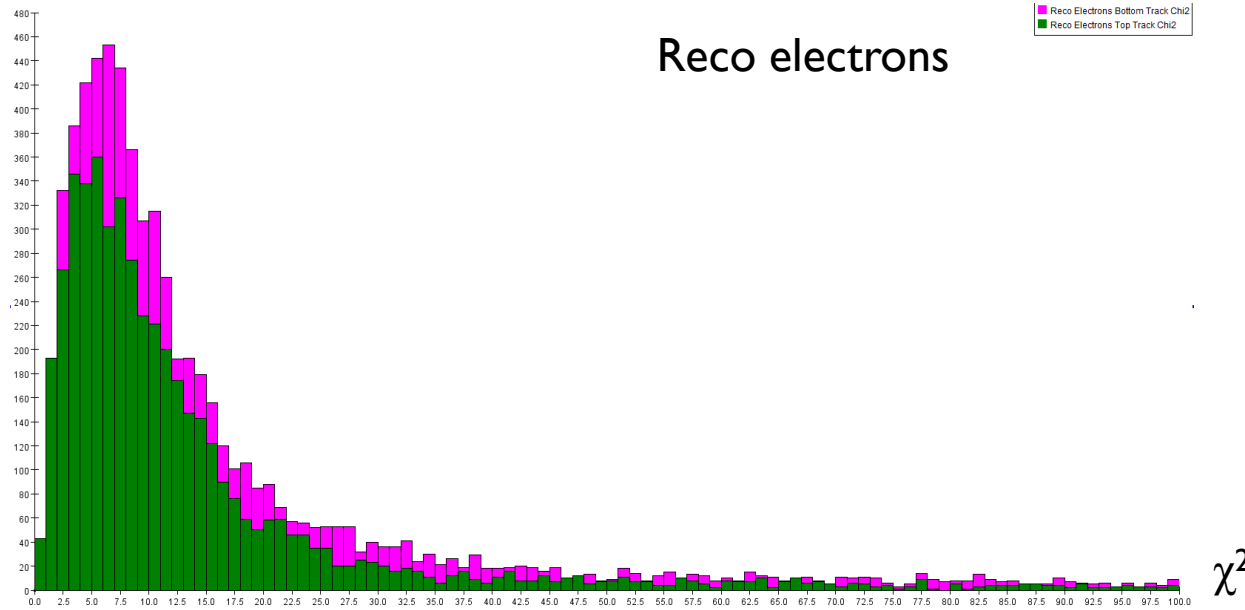
- Alessandra reported large top/bottom asymmetry in reco efficiency (~30%) that she hadn't seen with previous reconstructions, in 2015 data

- I used my tracking unit tests to plot all GBL tracks, right after track reco

- In data (5772) I saw same asymmetry as Alessandra, even with old hps-java versions / fieldmaps

- But not present in MC !

- Also not present in /nfs/slac/g/hps3/productionRecon/tweakpass6/output/run5772_3.11.slcio

  - Whatever recipe was used, I wasn't able to replicate it

- Now I follow the cut-flow: GBL → particle reco → FEE skimming

  - hps-java 4.1, HPS-EngRun2015-Nominal-v5-0-fieldmap, 10K events in 5772

GBL TRACKS

hps-java 4.1
HPS-EngRun2015-Nominal-v5-0-fieldmap

Bottom Track Momentum (Pz)
Top Track Momentum (Pz)

Pz

Bottom Track Chi2
Top Track Chi2

Do the extra Bottom tracks
all have lousy χ^2?
Nope.

χ^2

Tracks per Event Bot
Tracks per Event Top

Do the extra Bottom tracks
all occur in events with lots
of tracks?
Nope.

#tracks

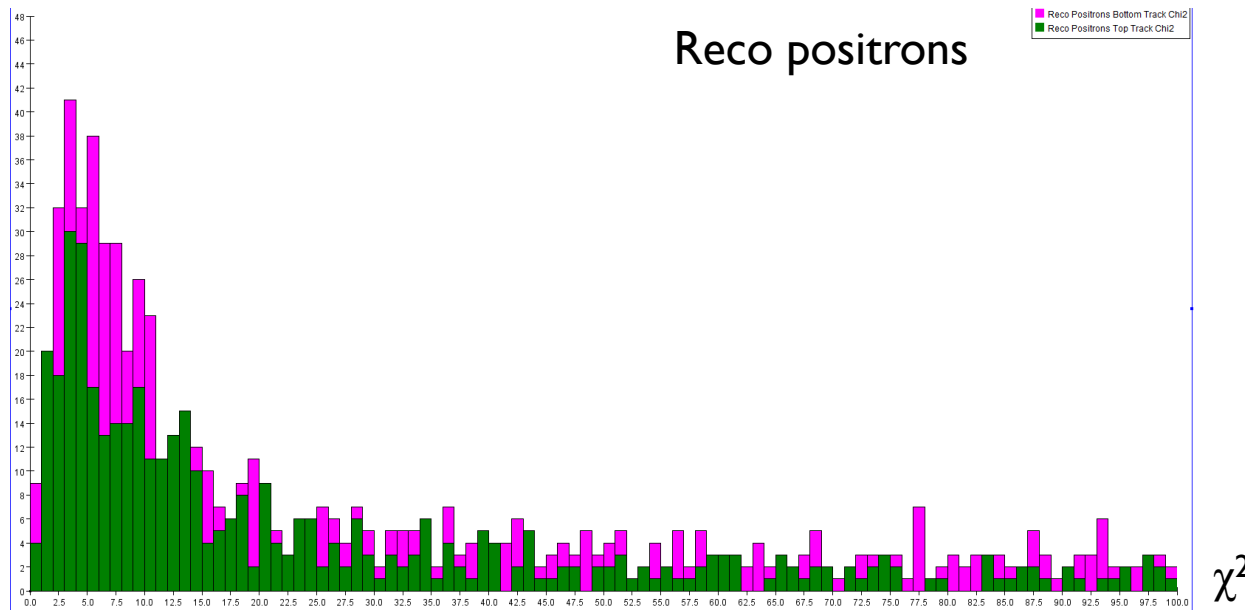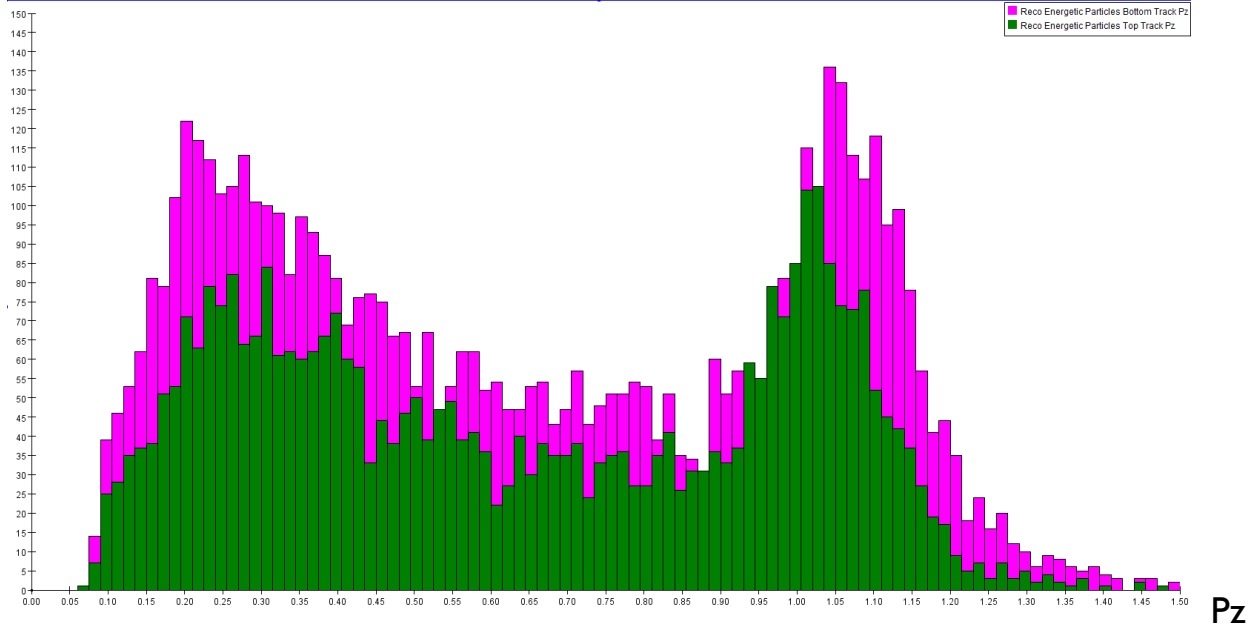Reco electrons

Reco positrons

Particle reconstruction:

- Applies some track-cluster matching and basic quality cuts. Maybe these cut out the extra bottom tracks?
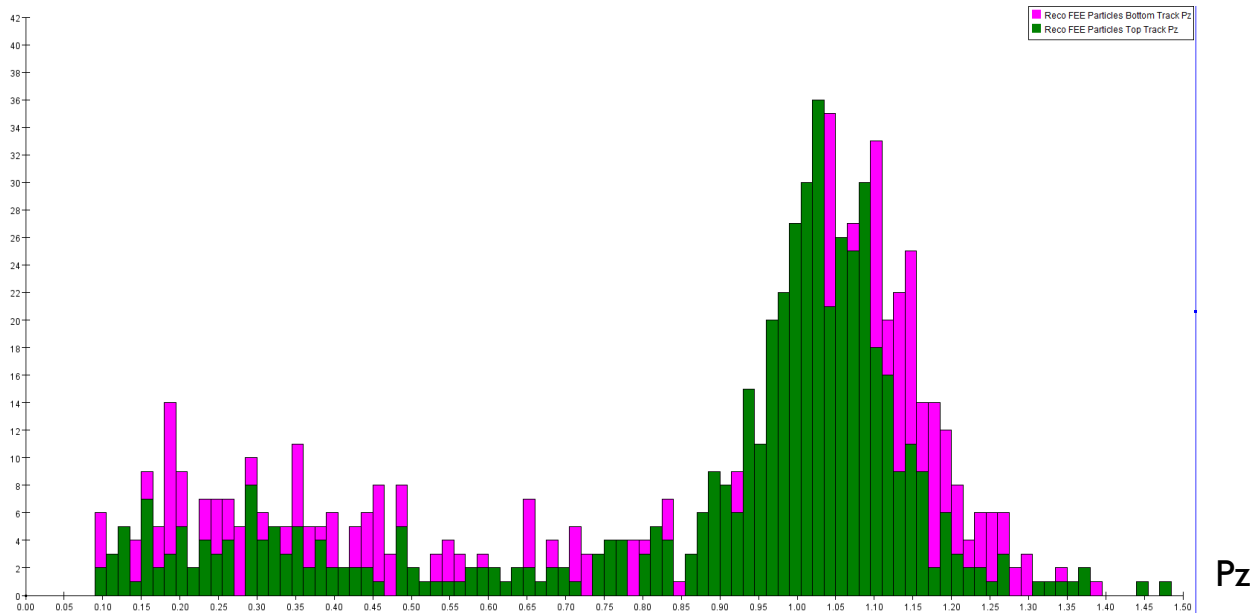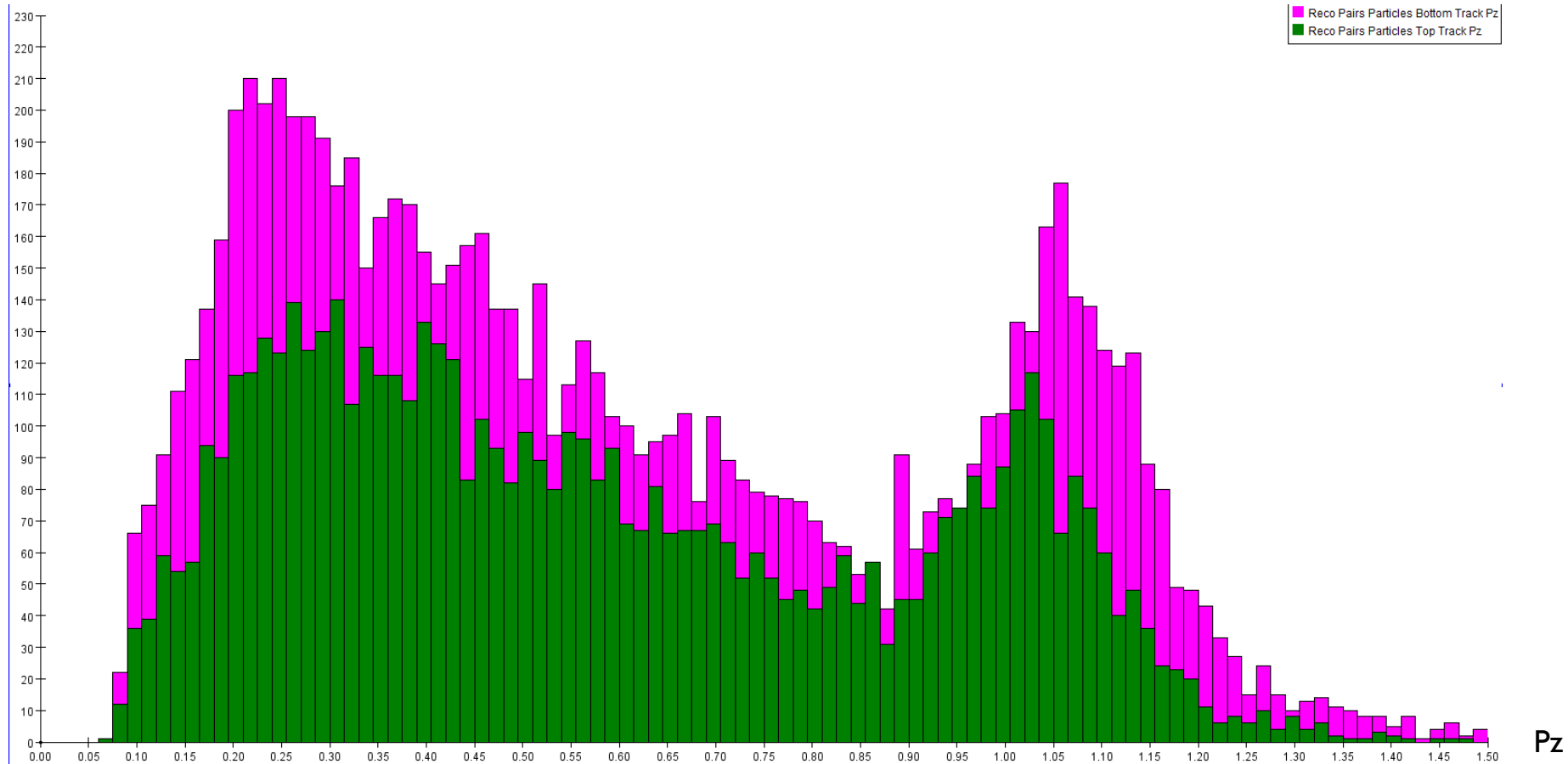- Maybe electrons have different asymmetry than positrons?

Nope.

FEE Skim requirements:

- Min cluster energy
    Does this reduce the asymmetry? Nope.
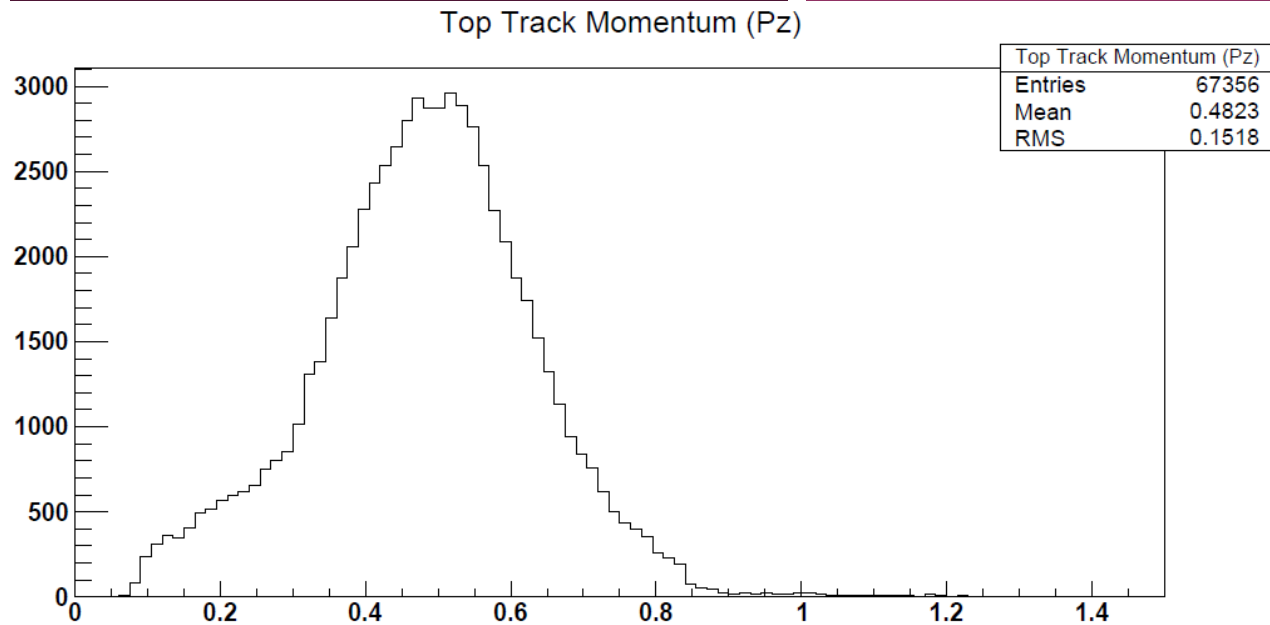
- Singles trigger
    Reduces asymmetry at medium/high Pz

Does the asymmetry show up in Pairs-triggered?
Yes.

Top Track Momentum (Pz)

Top Track Momentum (Pz)	
Entries	67356
Mean	0.4823
RMS	0.1518

Bottom Track Momentum (Pz)

Bottom Track Momentum (Pz)	
Entries	68660
Mean	0.4964
RMS	0.1616

Fetched from:
/nfs/slac/g/hps3/productionRecon/tweakpass6/
output/run5772_3.11.slcio

What was the magic recipe here?!