

# 2016 alignment update (study of wrong $z_0$ )

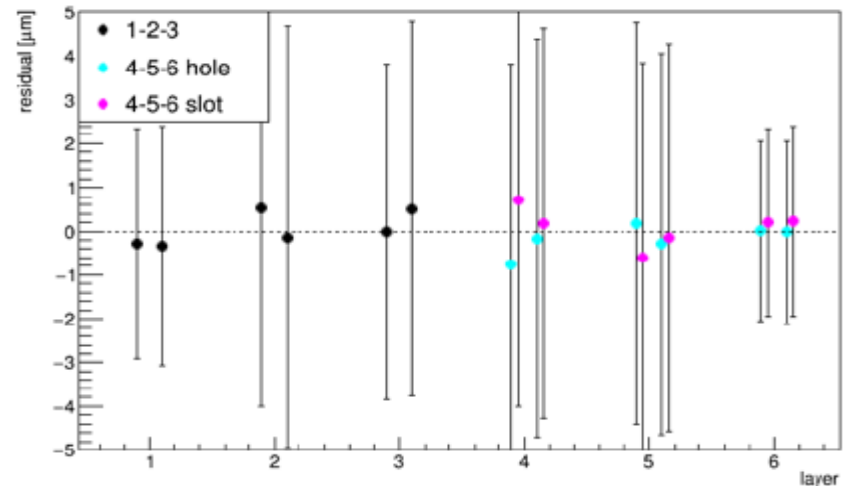
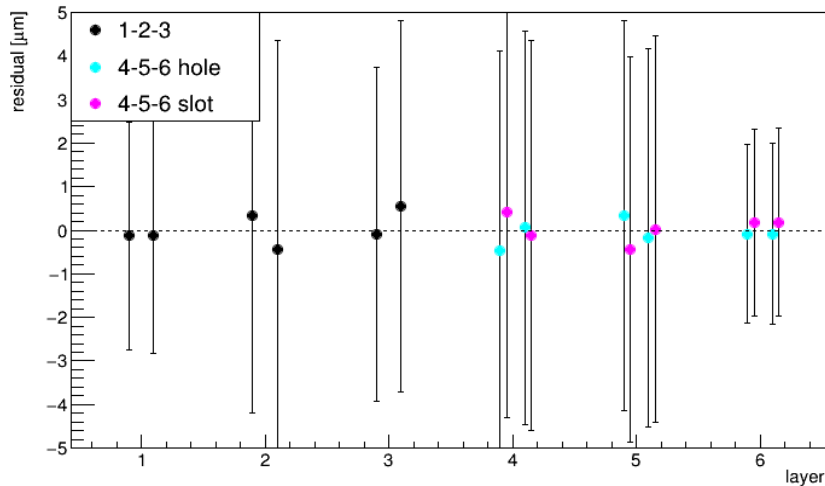
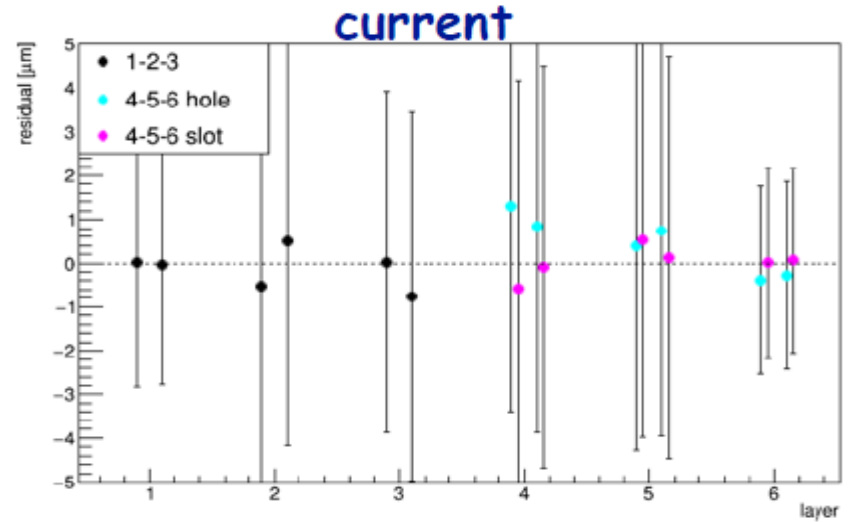
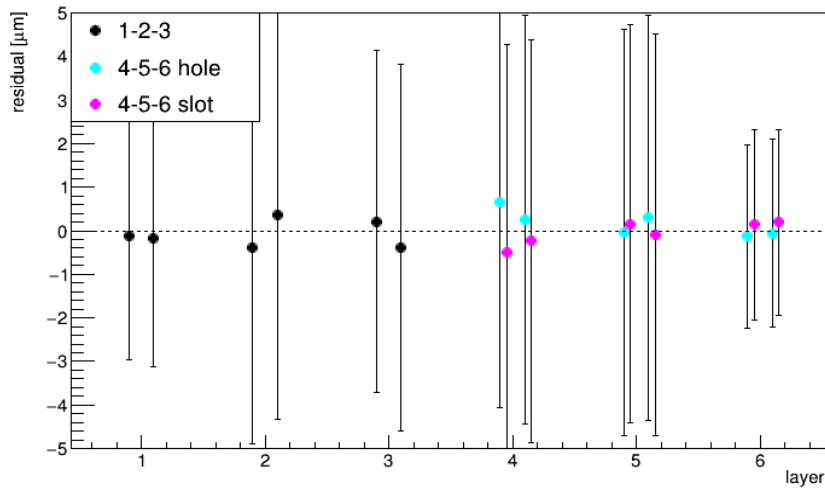
Alessandra Filippi  
INFN Torino  
Dec 18, 2017

# Study of internal alignment on run 7479

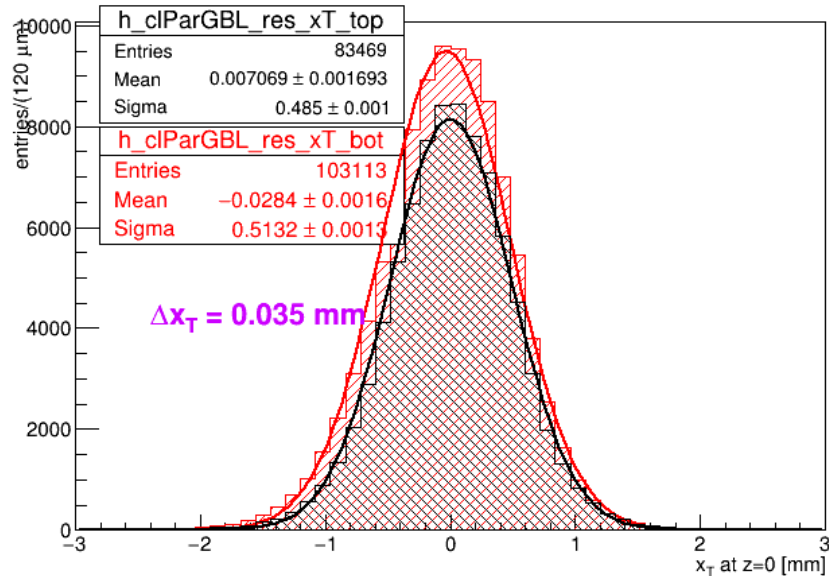
- FEE selected tracks: 6 hits per track + one Ecal hit
- Together with Mariangela: repeat the steps followed for 2015 alignment (starting from the best 2015 detector, global alignment offsets excluded)
  - Add u translation for most internal sensors
  - Add u translations for 2+5
  - Add w translations for 3+4, 2+5
  - Add one w, u, v rotation at a time and check improvements/sensitivity
- Ongoing work, still some minor adjustments needed
  - As usual, sensor 4 is critical
- Focus on internal alignment + “coarse” global alignment
  - 2015 global alignment not acceptable (different momentum, ...)

# Typical best alignment results

Small but sensible improvements, several iterations needed  
some small tunings still to be applied to improve sensor 4

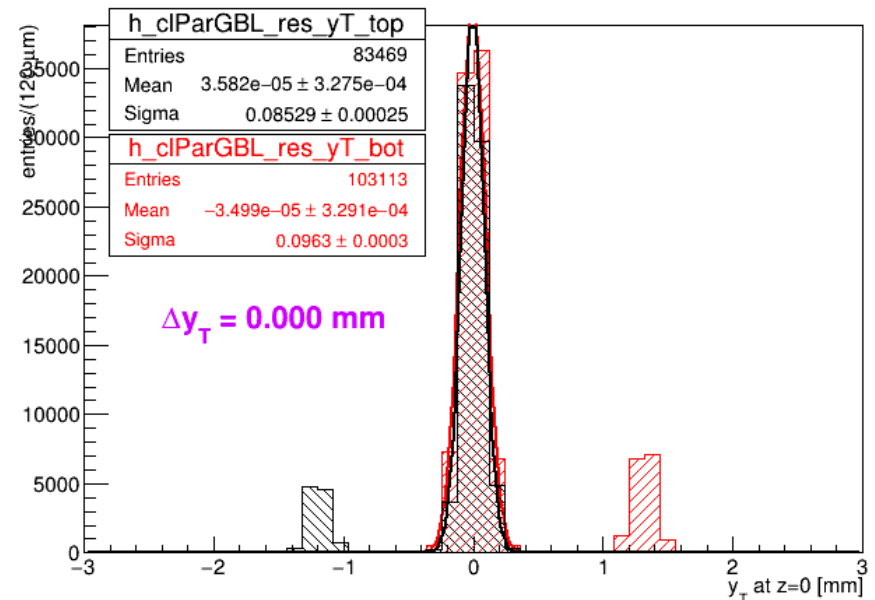


# 2016 global alignment (step0): beamspot coordinates

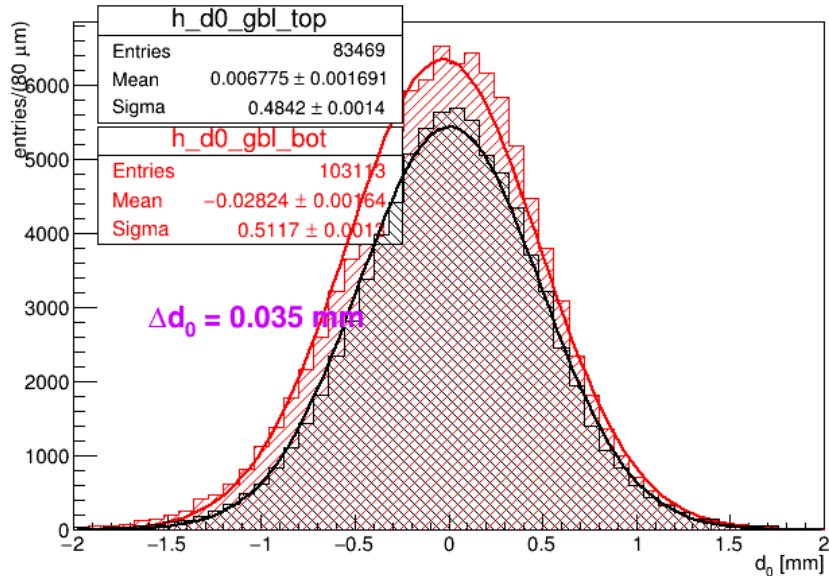


- These two (off)-peaks have visible consequences on the  $z_0$  impact parameter

- Still to be understood: difference in recon efficiency top vs bottom
- x and y coordinates @z=0
- About ok for  $x_T$
- Two strange off-peaks for  $y_T$ 
  - Not exactly symmetric wrt 0
  - Top: negative y
  - Bottom: positive y

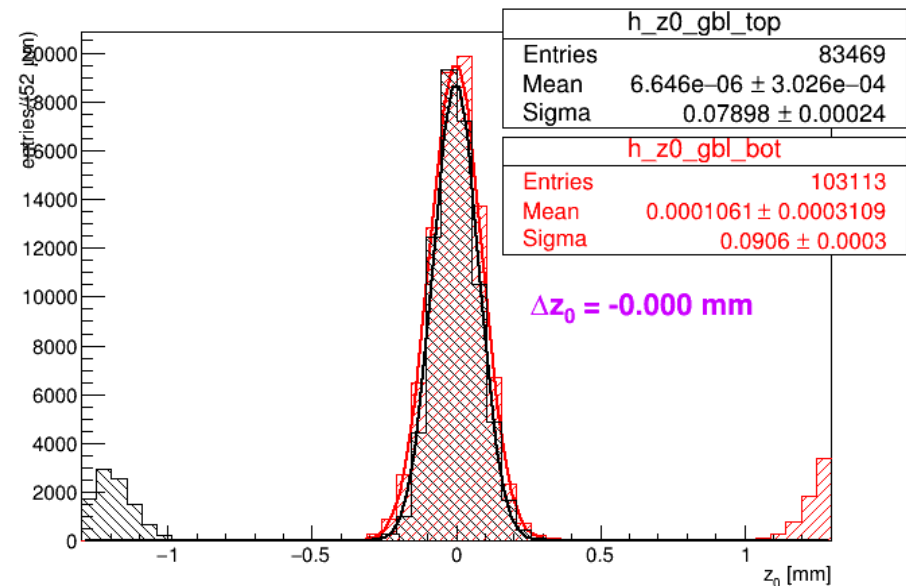


# 2016 global alignment (step0): impact parameters



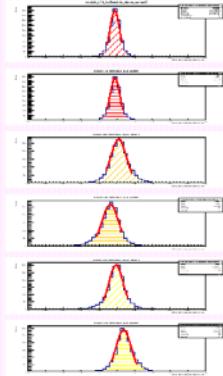
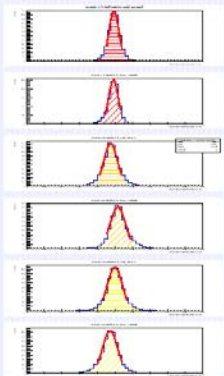
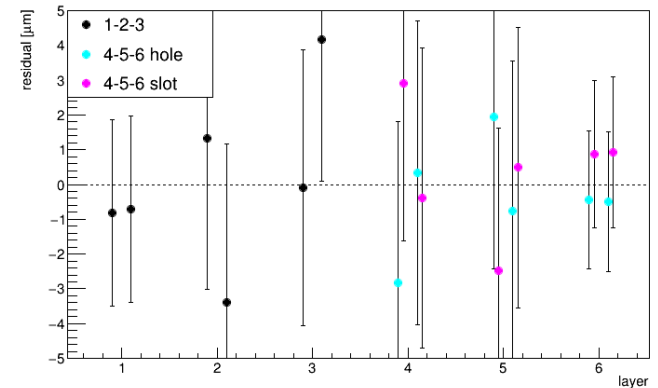
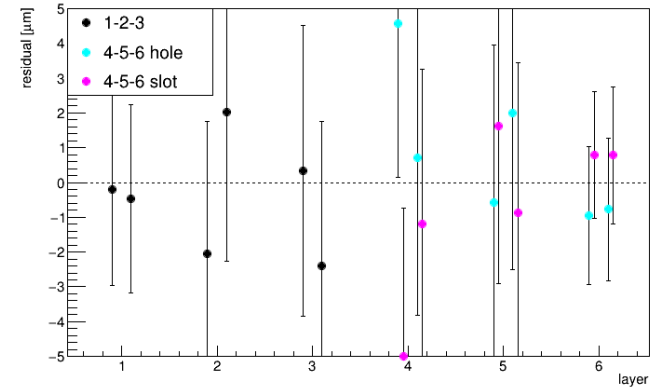
- Regular shape of  $d_0$  impact parameters ( $\sim$ along x axis)
- Two off-peaks clusterings in  $z_0$ 
  - Top: negative  $z_0$
  - Bottom: positive  $z_0$

- Mariangela spotted that these events are somehow clustered in a group of “close events”
- Where are these tracks coming from?



# Study of events with large $z_0$

- Requirement:  $|z_0| > 0.7$  mm
- Wild residuals!

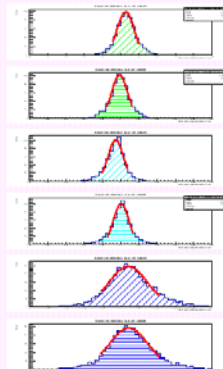
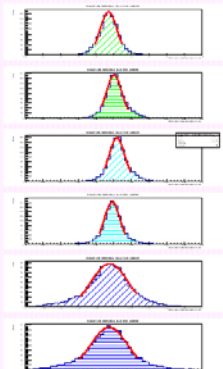
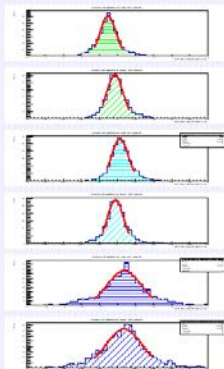
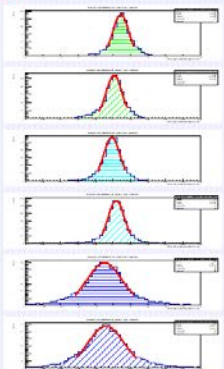


hole

slot

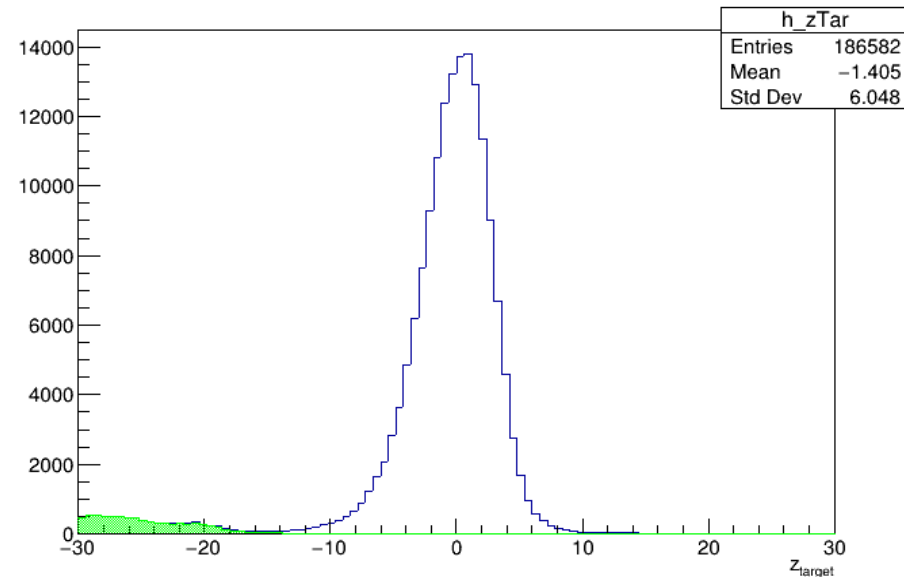
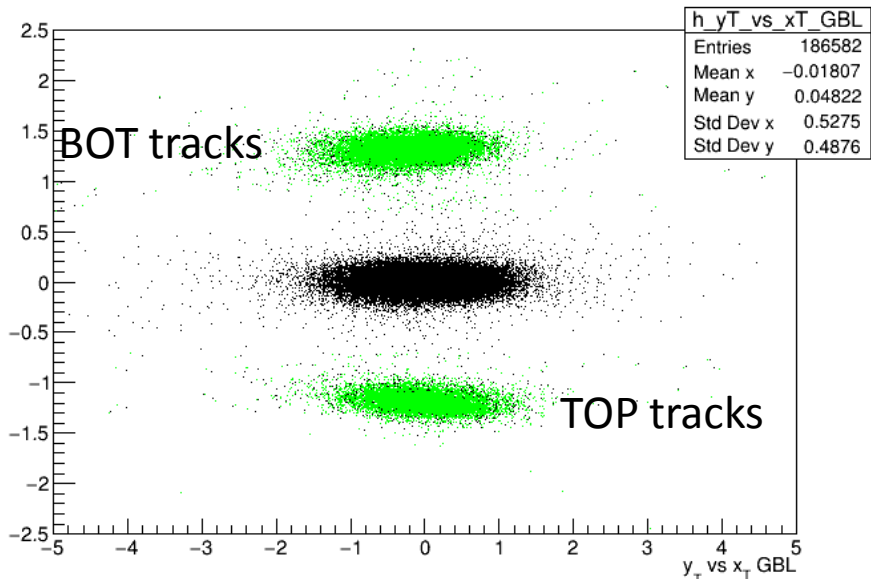
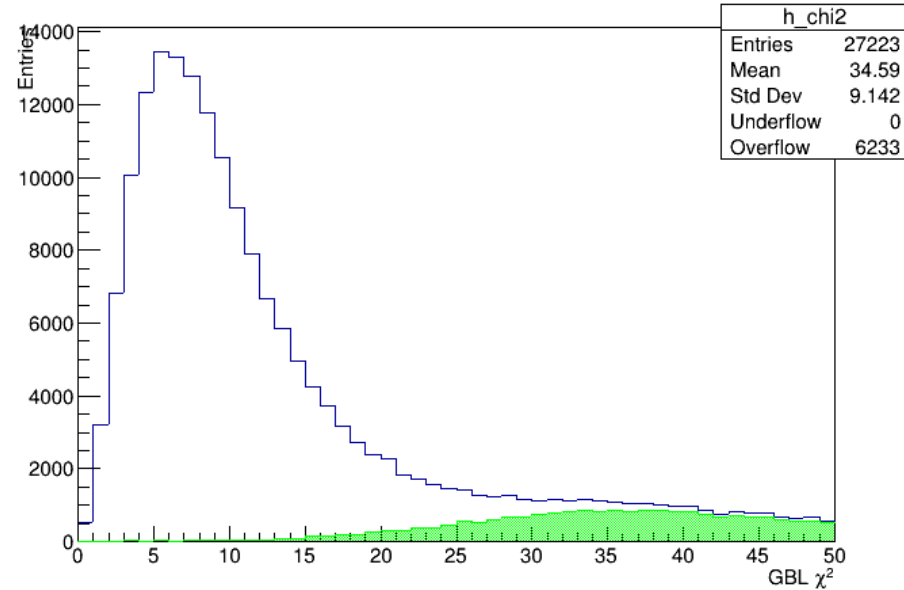
hole

slot



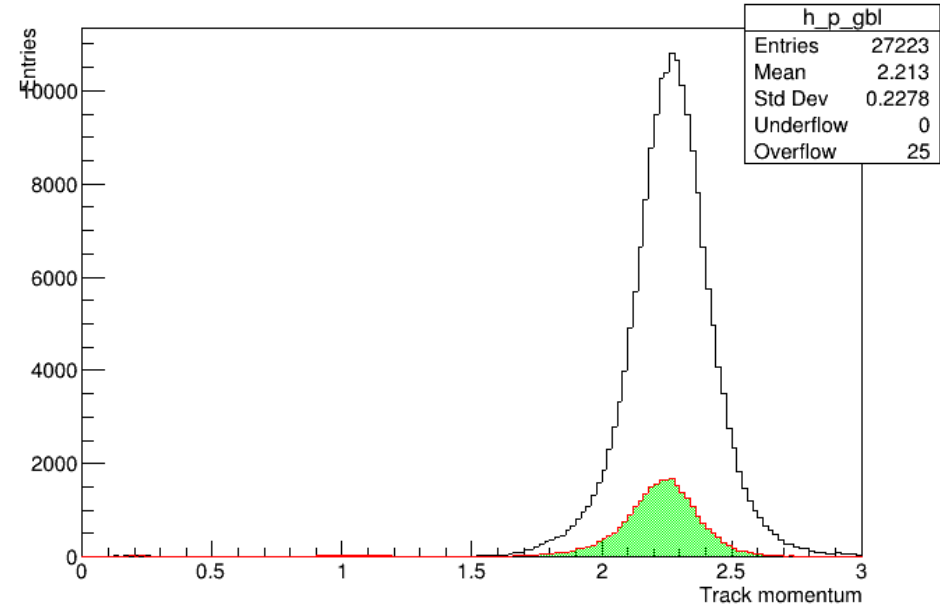
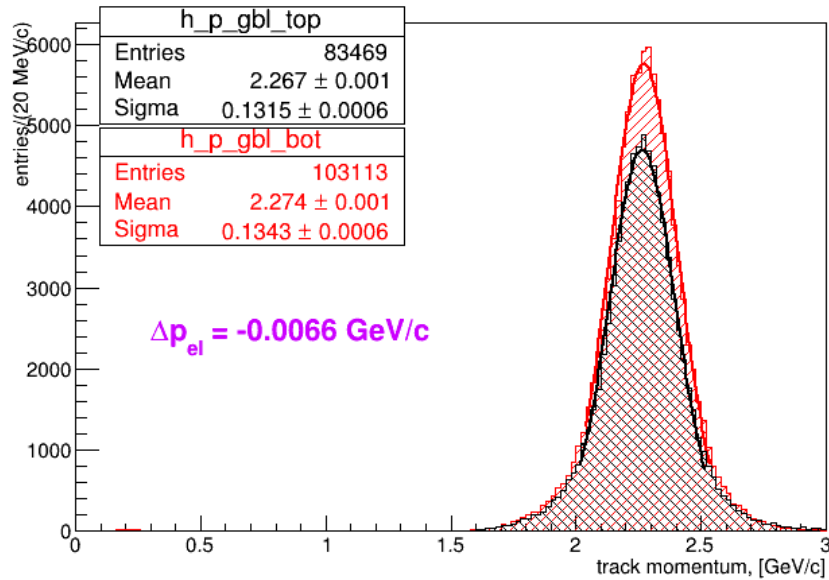
# Study of events with large $z_0$ (preliminary)

- Requirement:  $|z_0| > 0.7$  mm
- Wild residuals!
- Bad track  $\chi^2$ 
  - Good news: they can be eliminated by a proper cut
- Also effects on target localization (z coordinate much more upstream than expected)

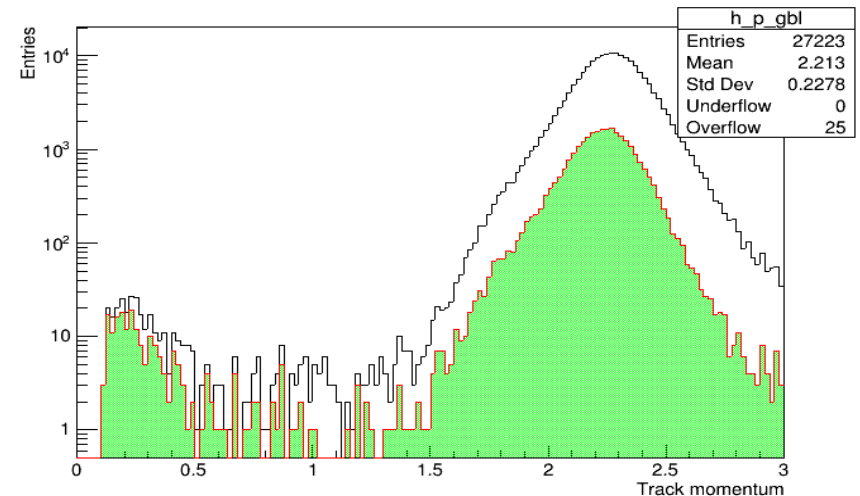


# What about momentum?

- Nothing special... everything seems to be ok



- In log scale: main origin of events with wrong (too low) momentum





# Work in progress...

- Next: study of sensor occupancies for these tracks
- Some hints that there could be noise on sensors 1-3 but need further tests (the analysis program needs changes, will discuss this with Mariangela in the next few days)
- **About 10% of tracks are affected**
- Never seen before
  - just an issue with this run?
  - Something related to latest changes in the reconstruction?
  - Something related with the requirement of a cluster in Ecal (never asked before?)
- Tracks can be removed by a cut on  $\chi^2$  (or  $z_0$ ) but we need to know if it is an accident or what else...