

CBM progress report

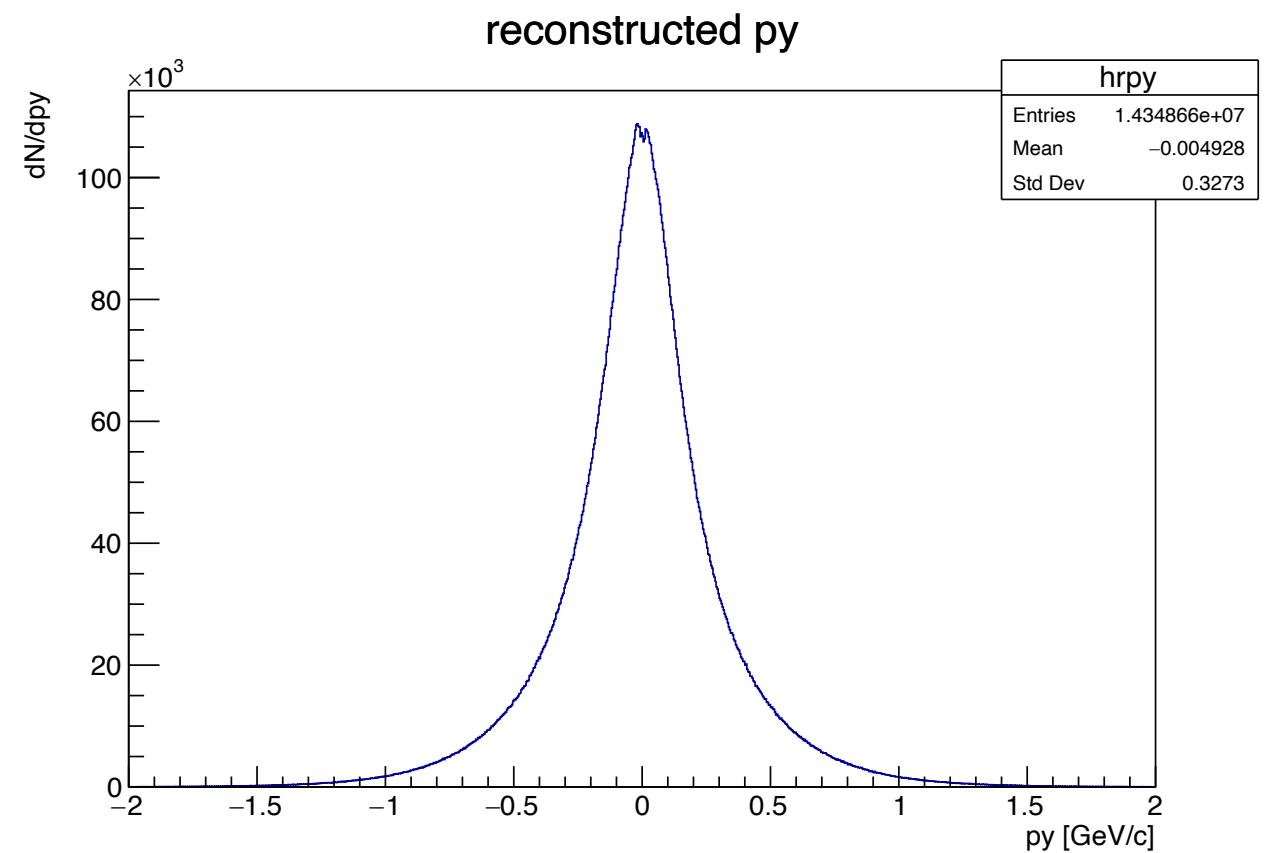
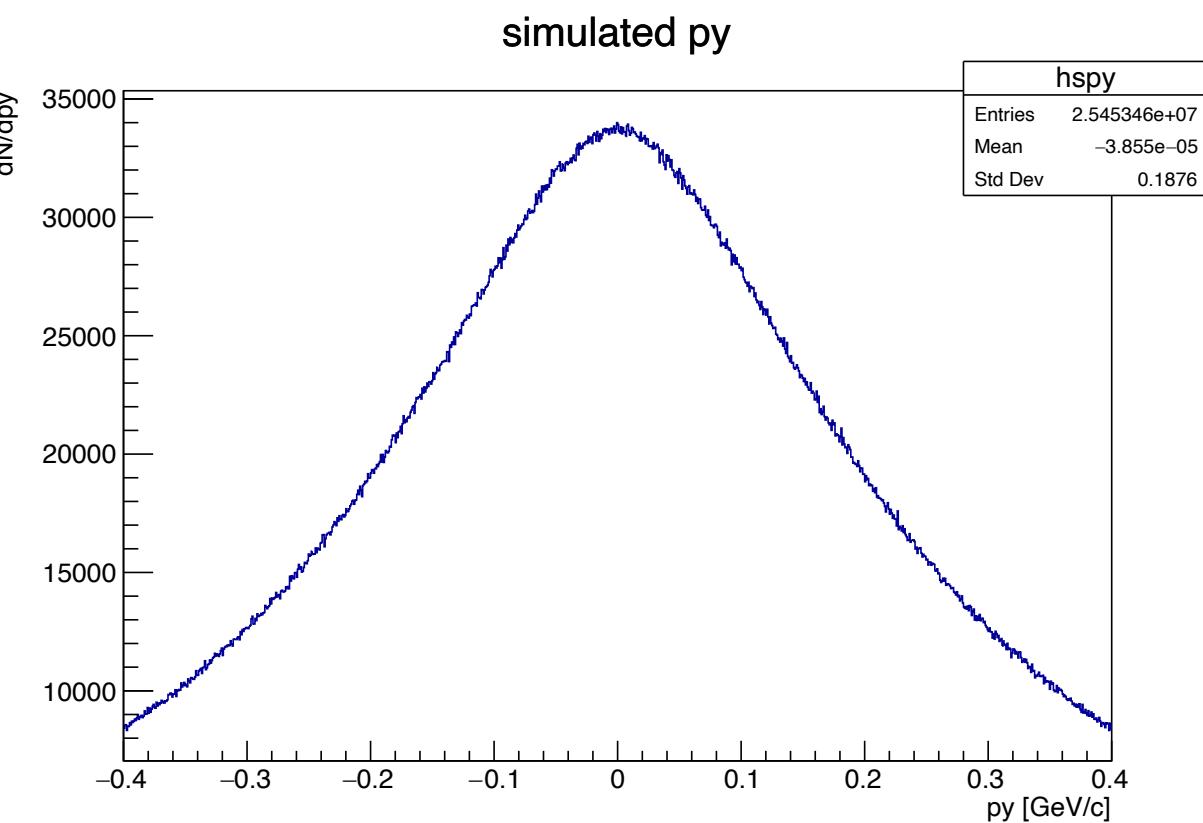
20 VII 2021

@Julian Nowak

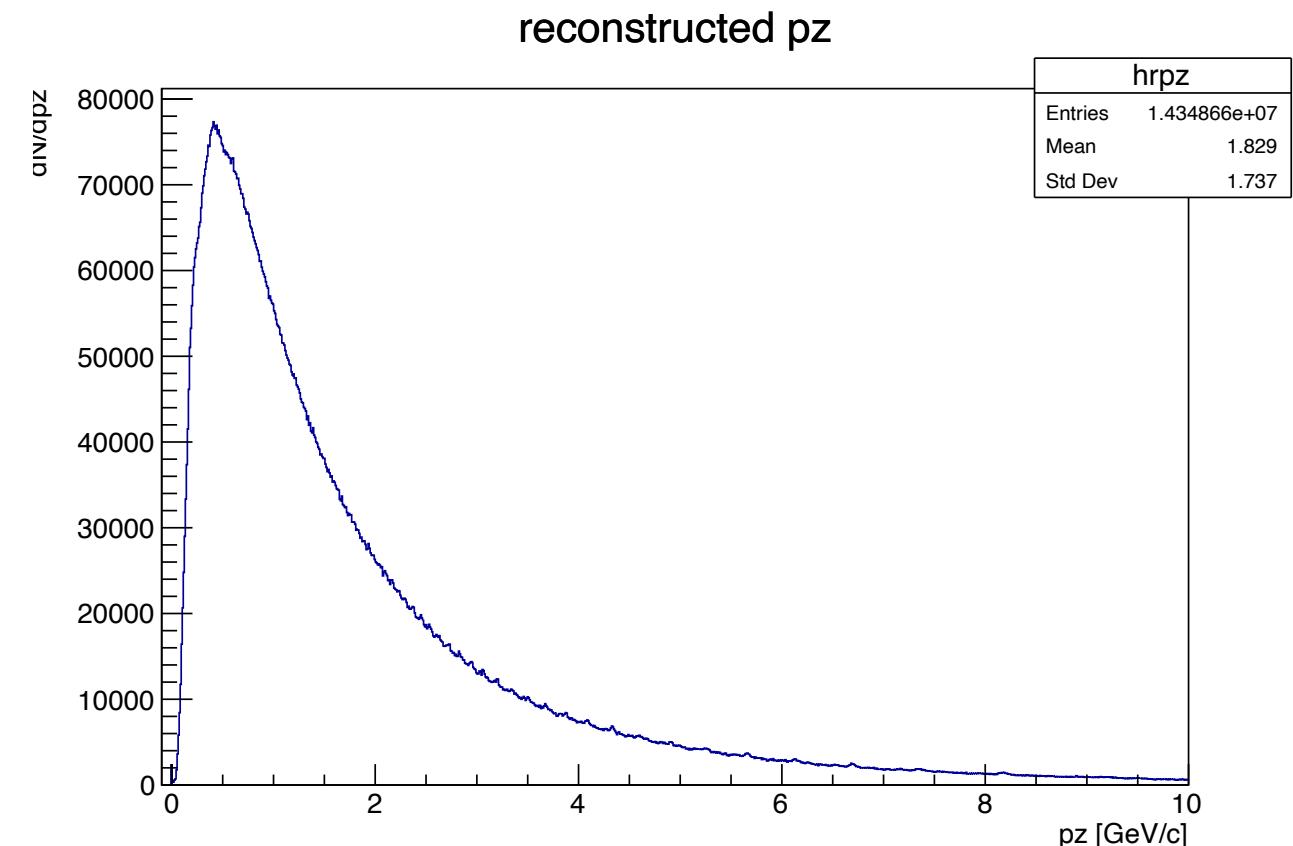
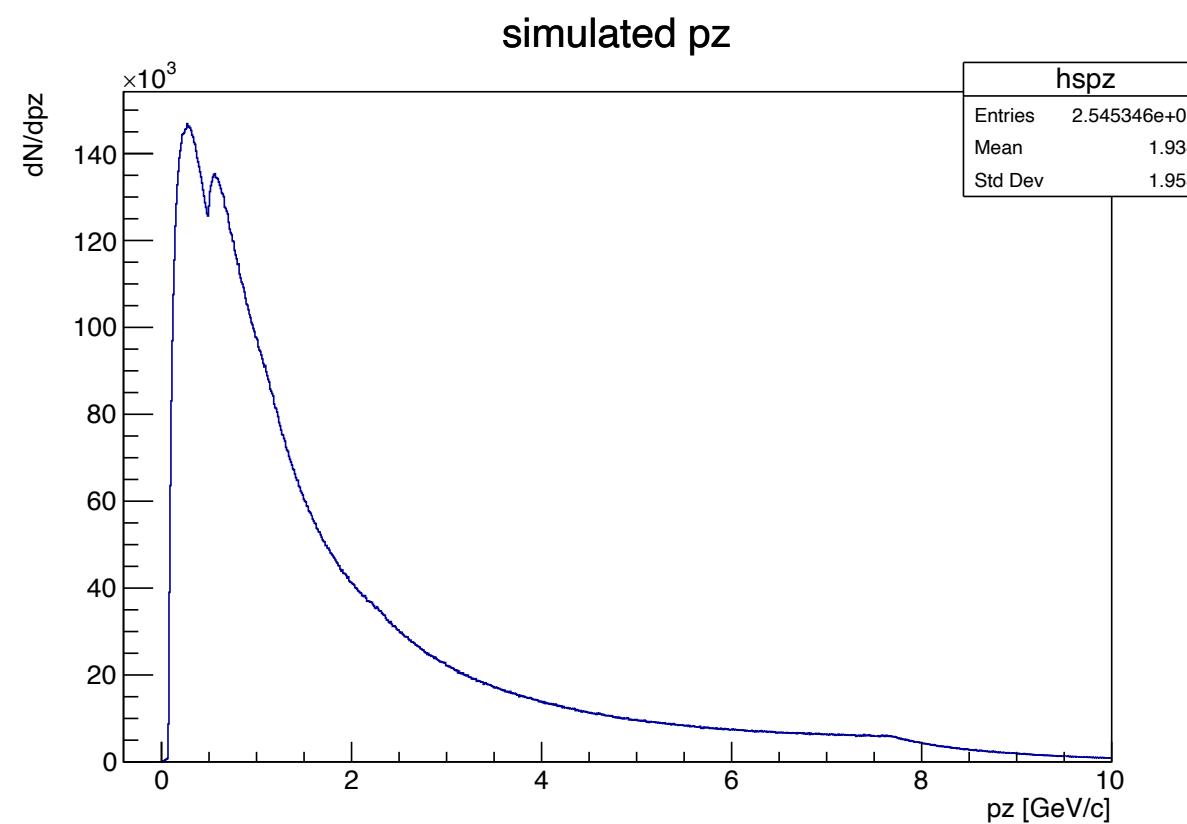
1. Analysis Tree

- Installing software
- Making first histograms from GEANT4 simulations
(/lustre/cbm/users/lubynets/cbm2atree/outputs/apr20_fr_18.2.1_fs_jun19p1/dcmqgsm_smm_p
luto/auau/12agev/mbias/sis100_electron_target_25_mkm/AT2)
- Running our own macros via ssh

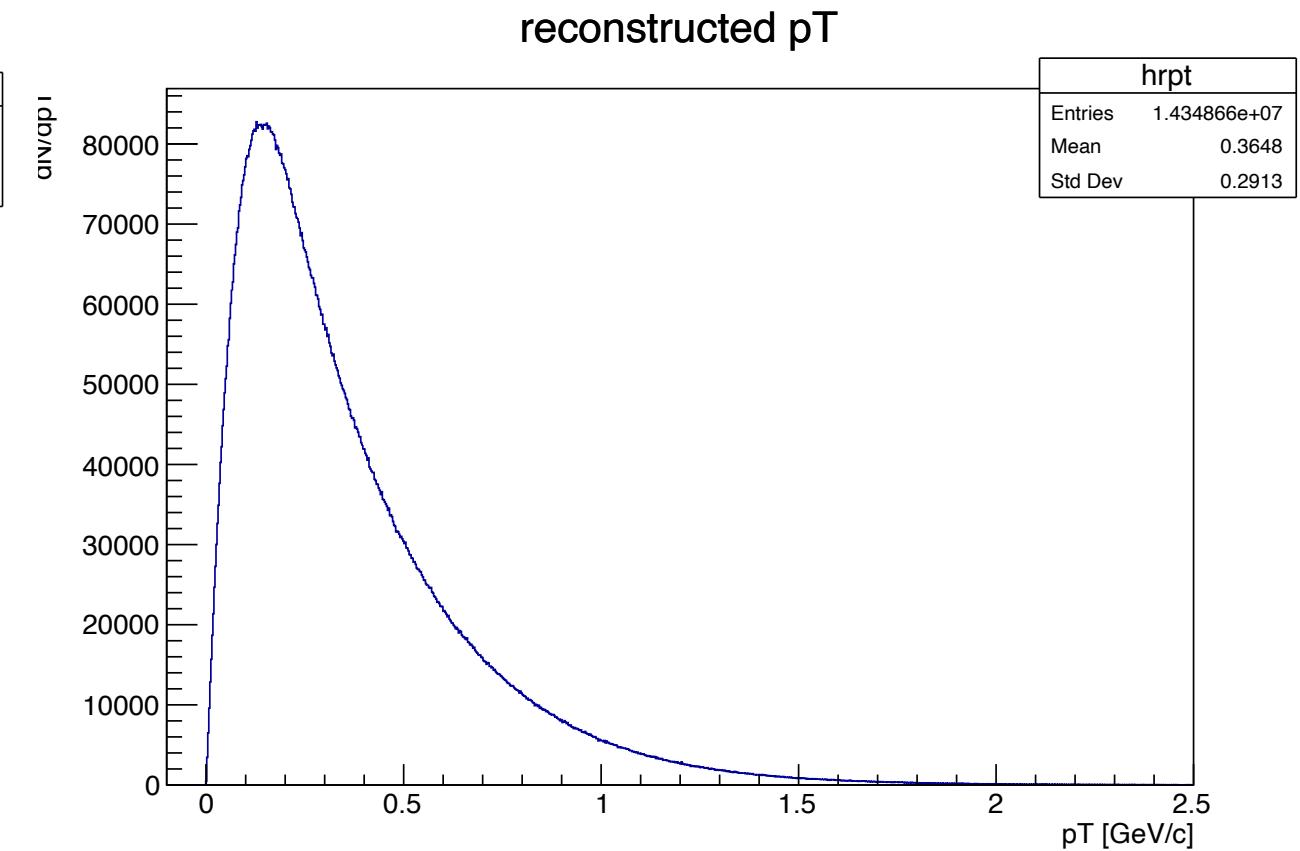
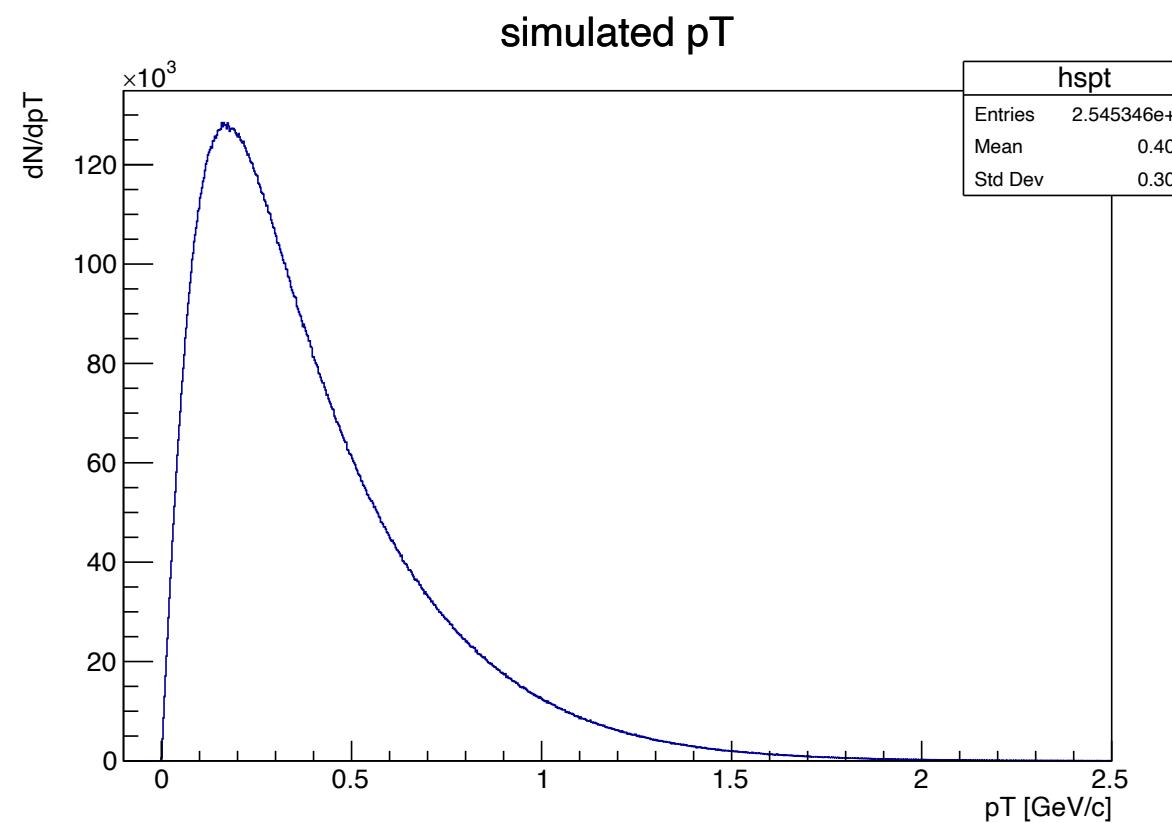
Momentums – e.g., p_y



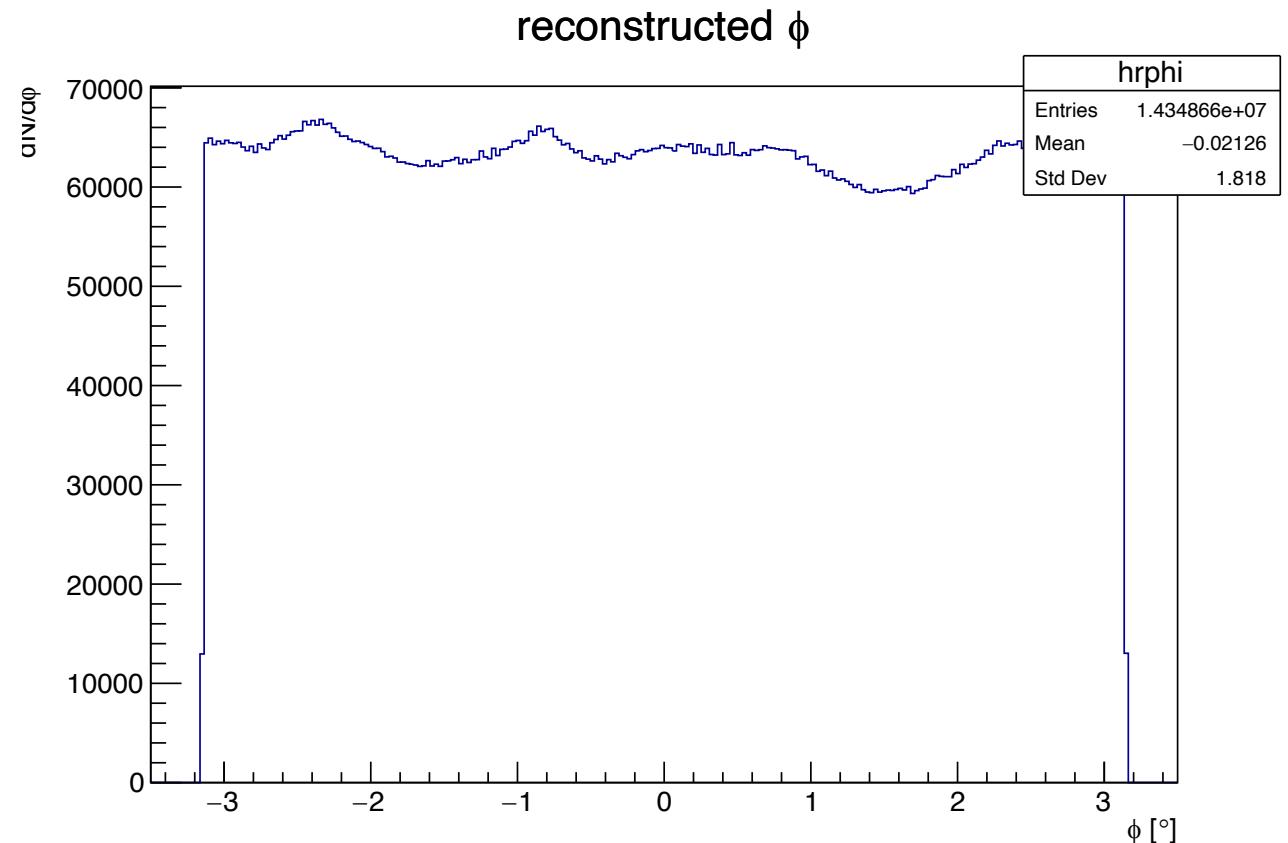
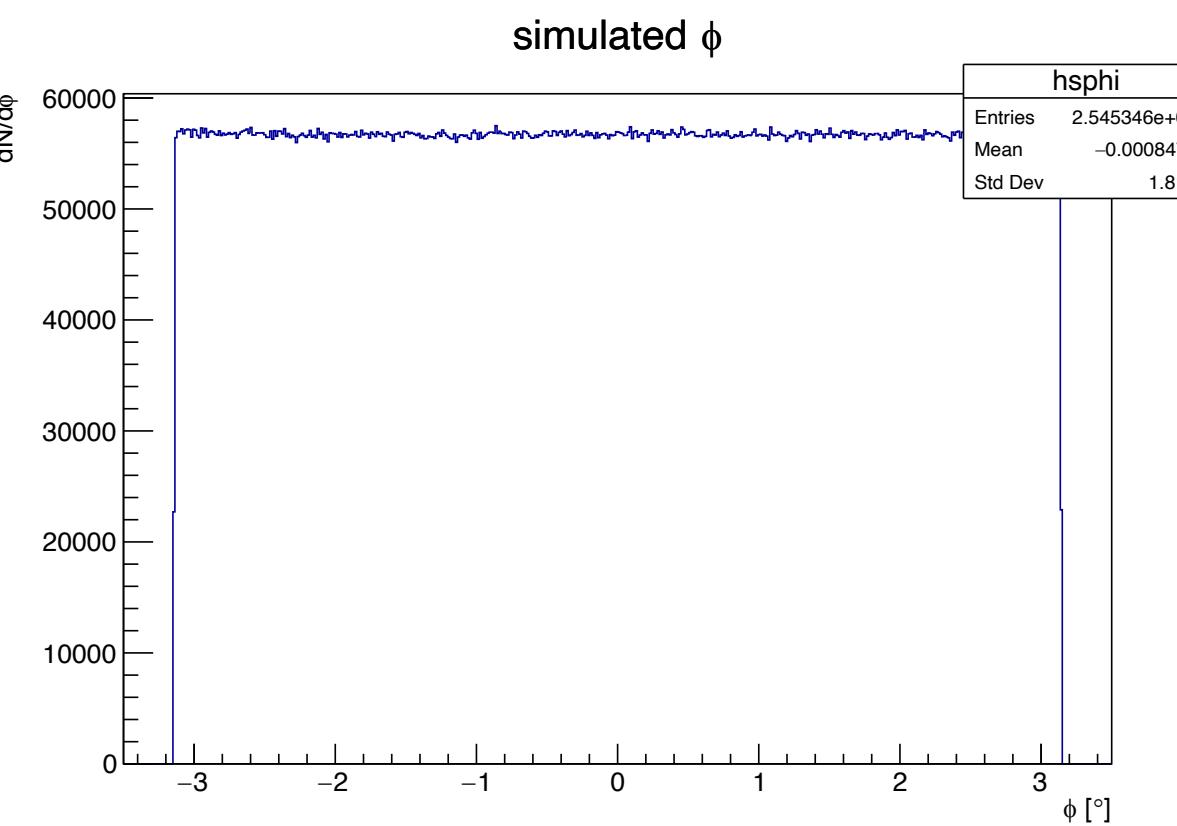
Momentums – e.g., p_z



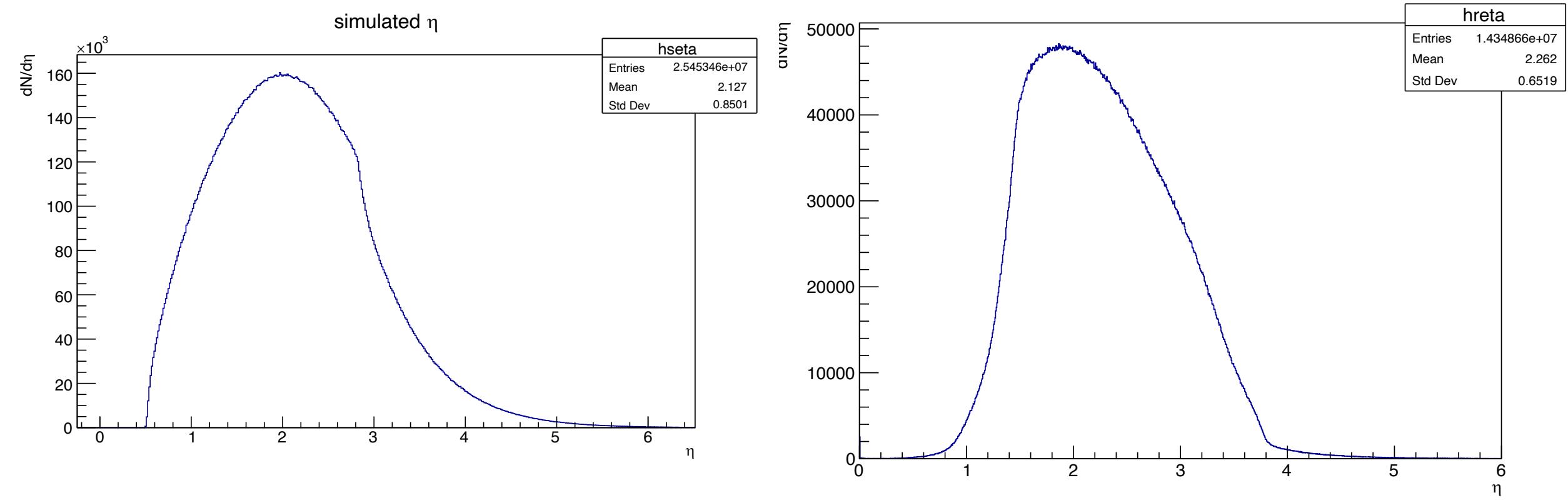
Momentums – e.g., p_T



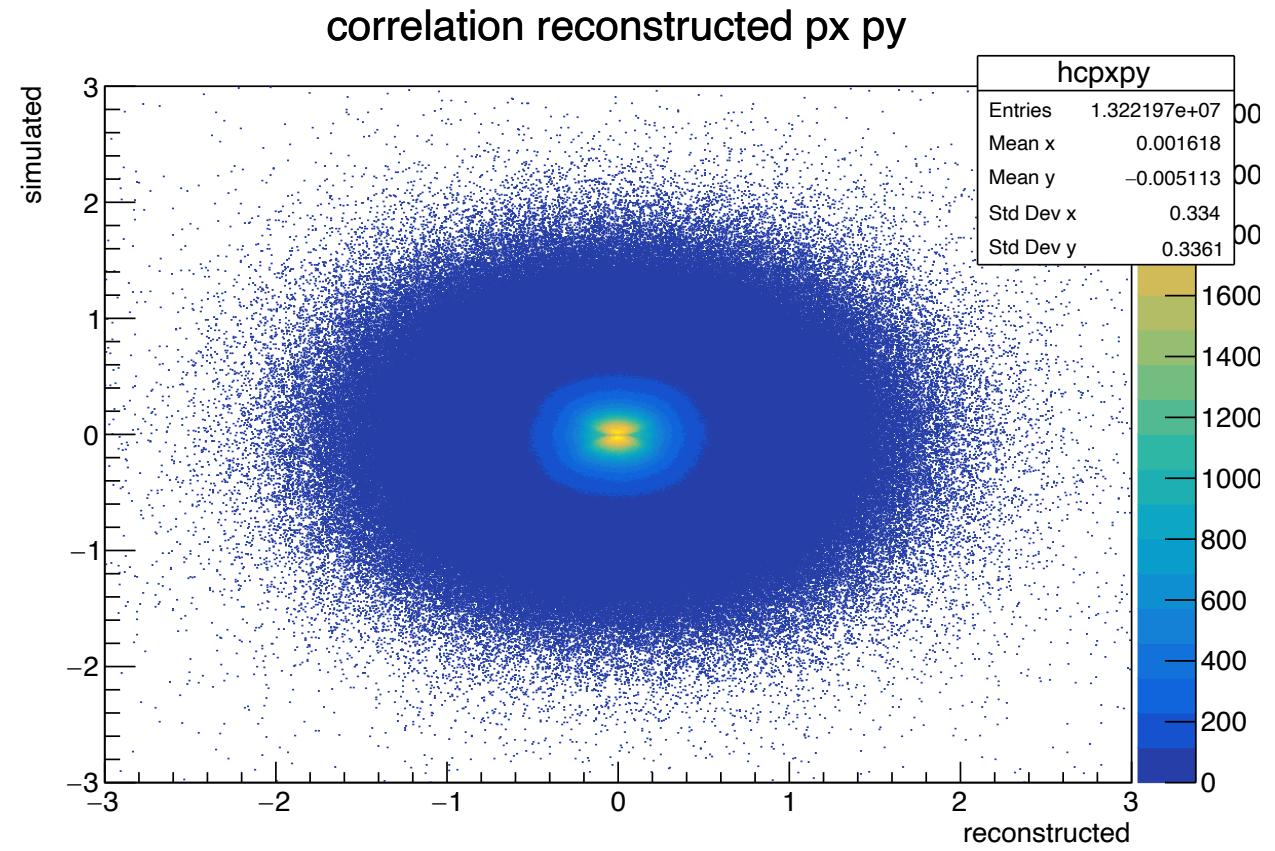
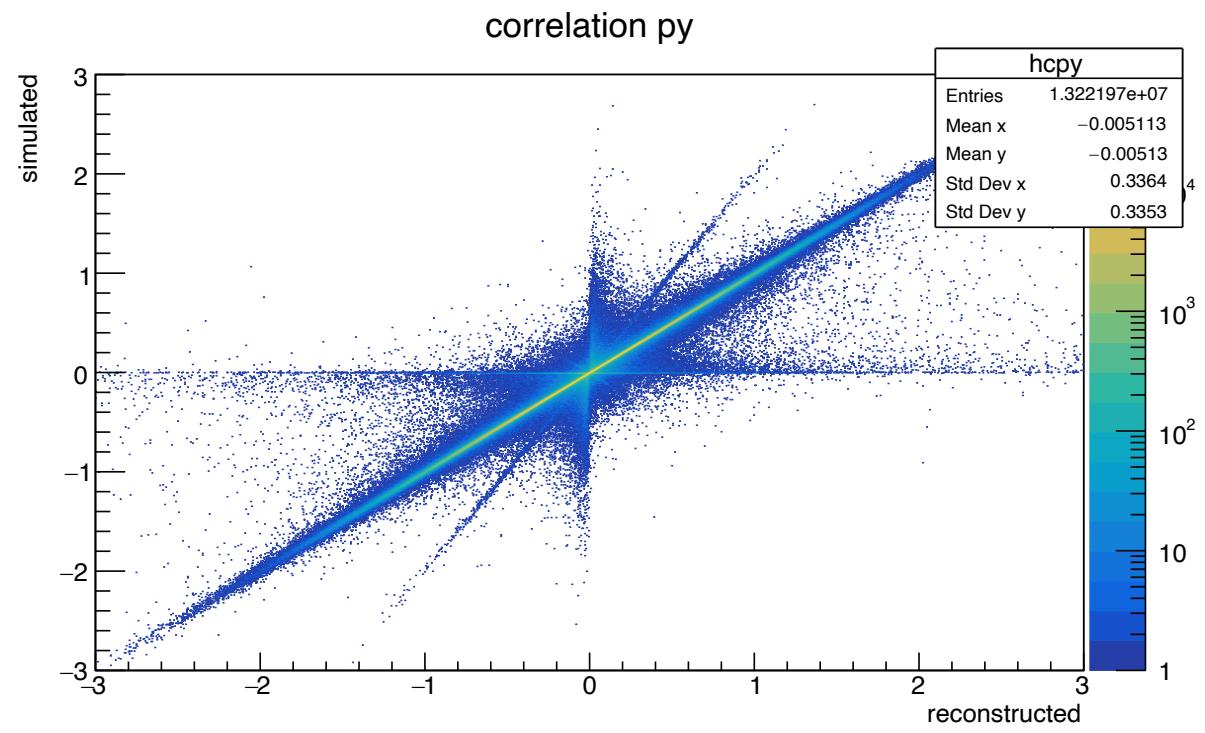
Azimuthal angle



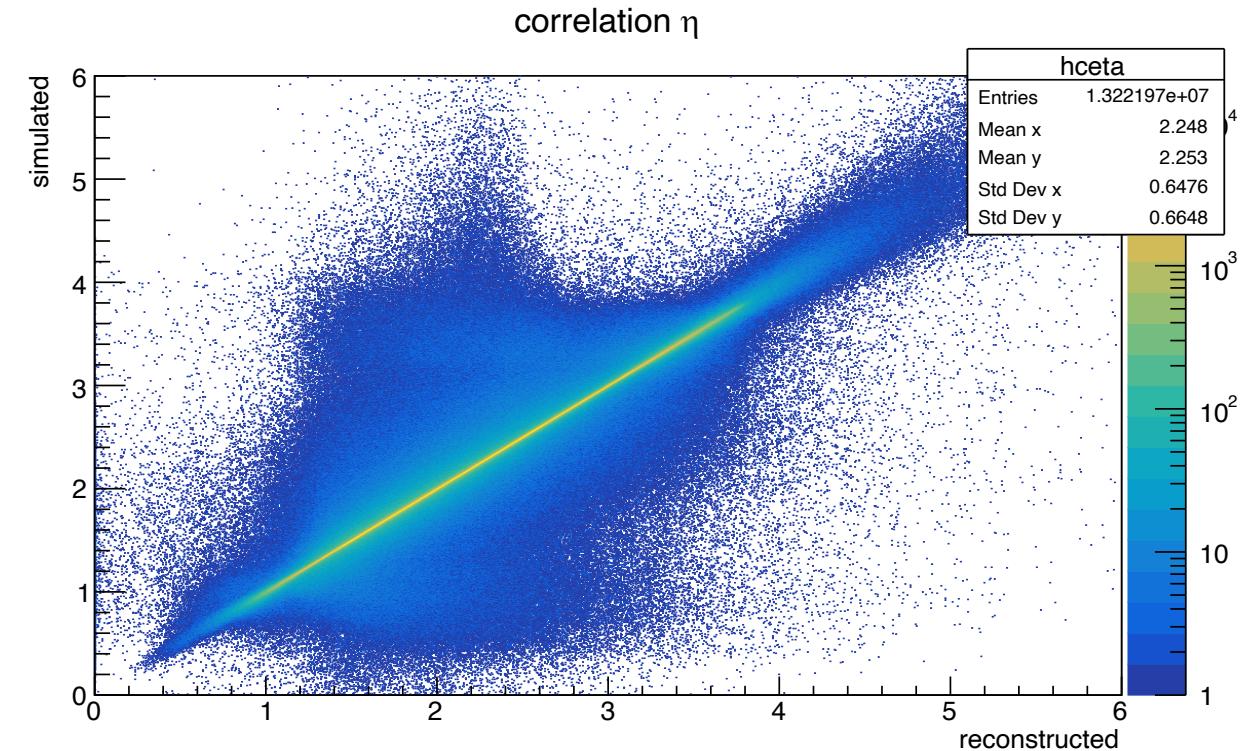
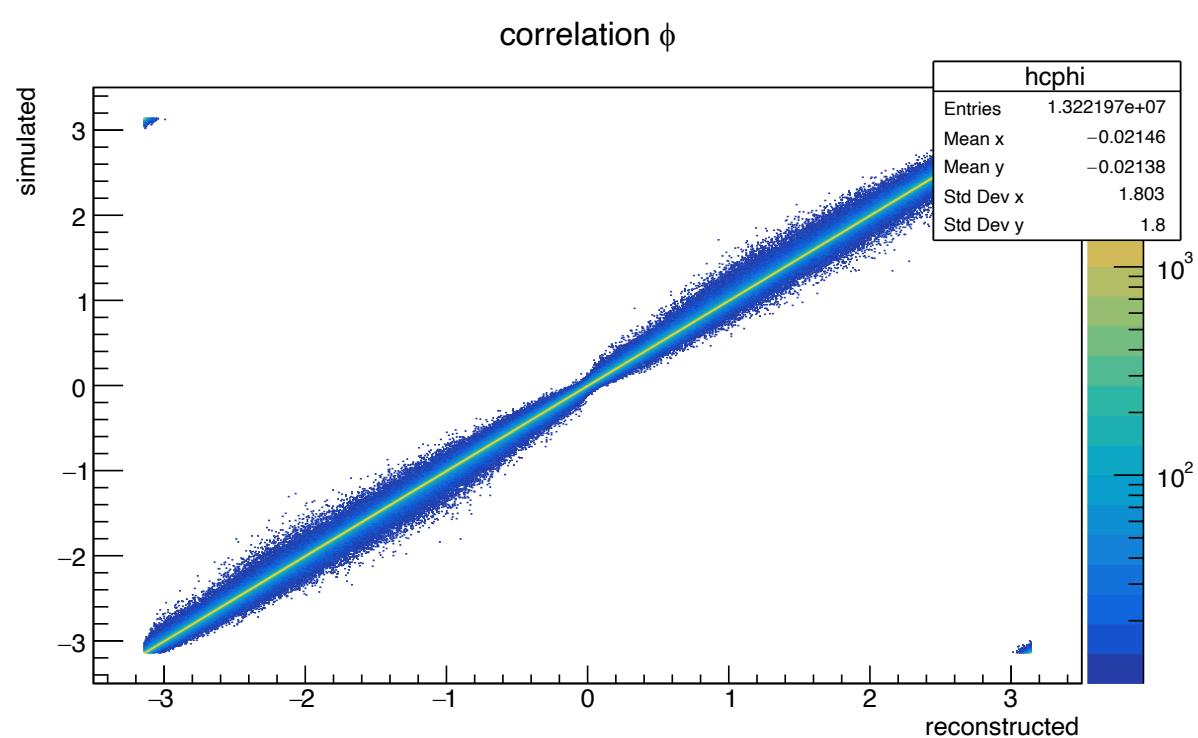
Pseudorapidity



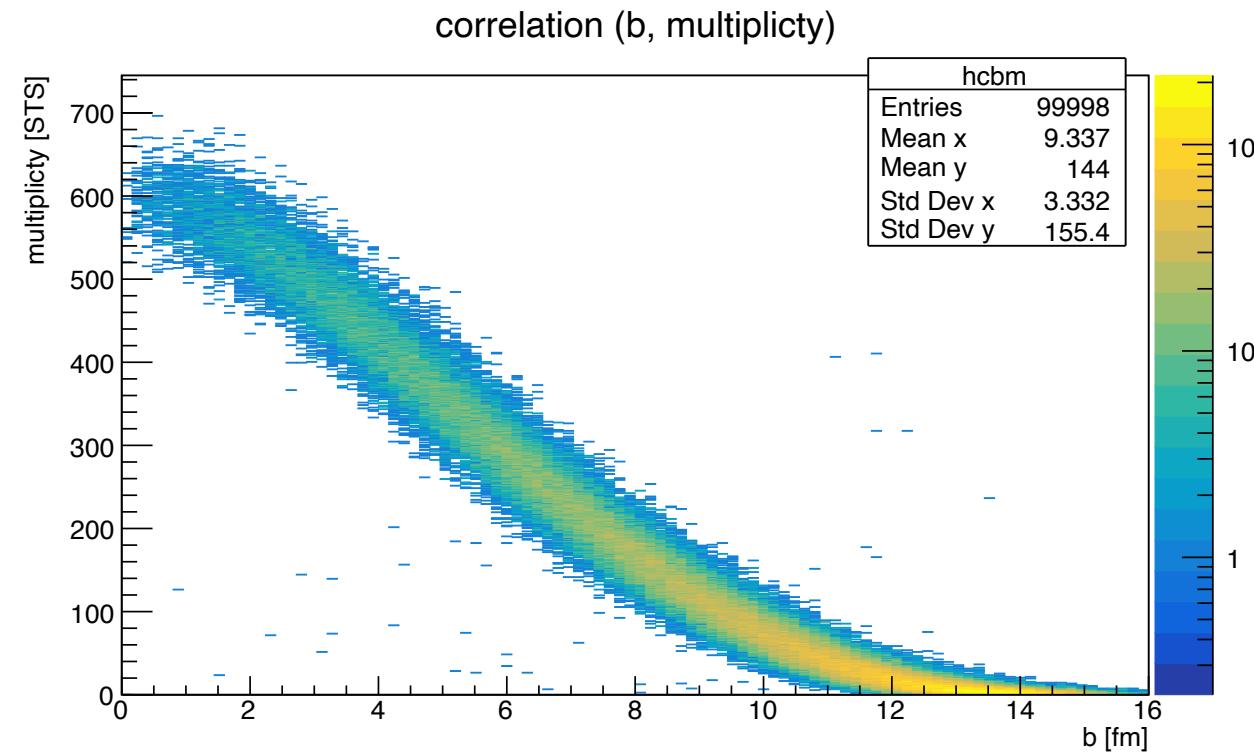
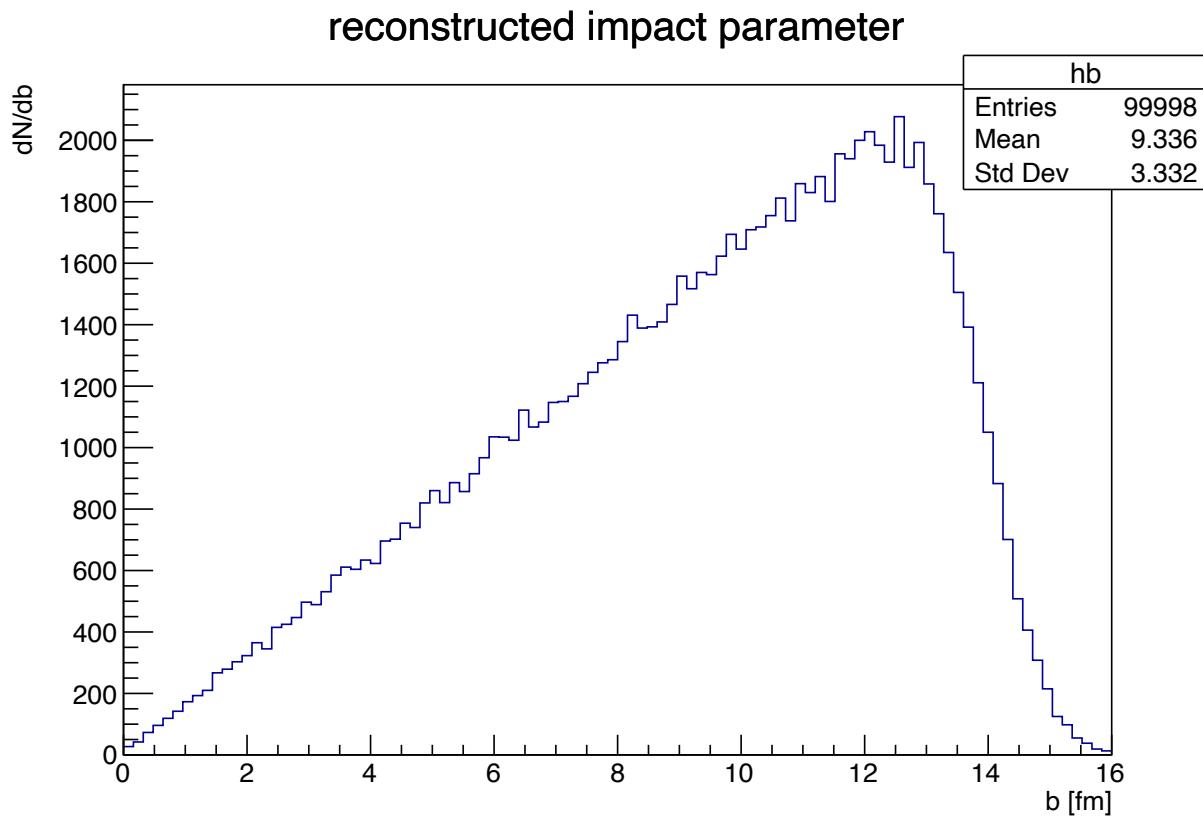
Correlations: sim-rec p_y , rec p_x - p_y



Correlations: sim –rec azimuthal angle, sim-rec psuedorapidity

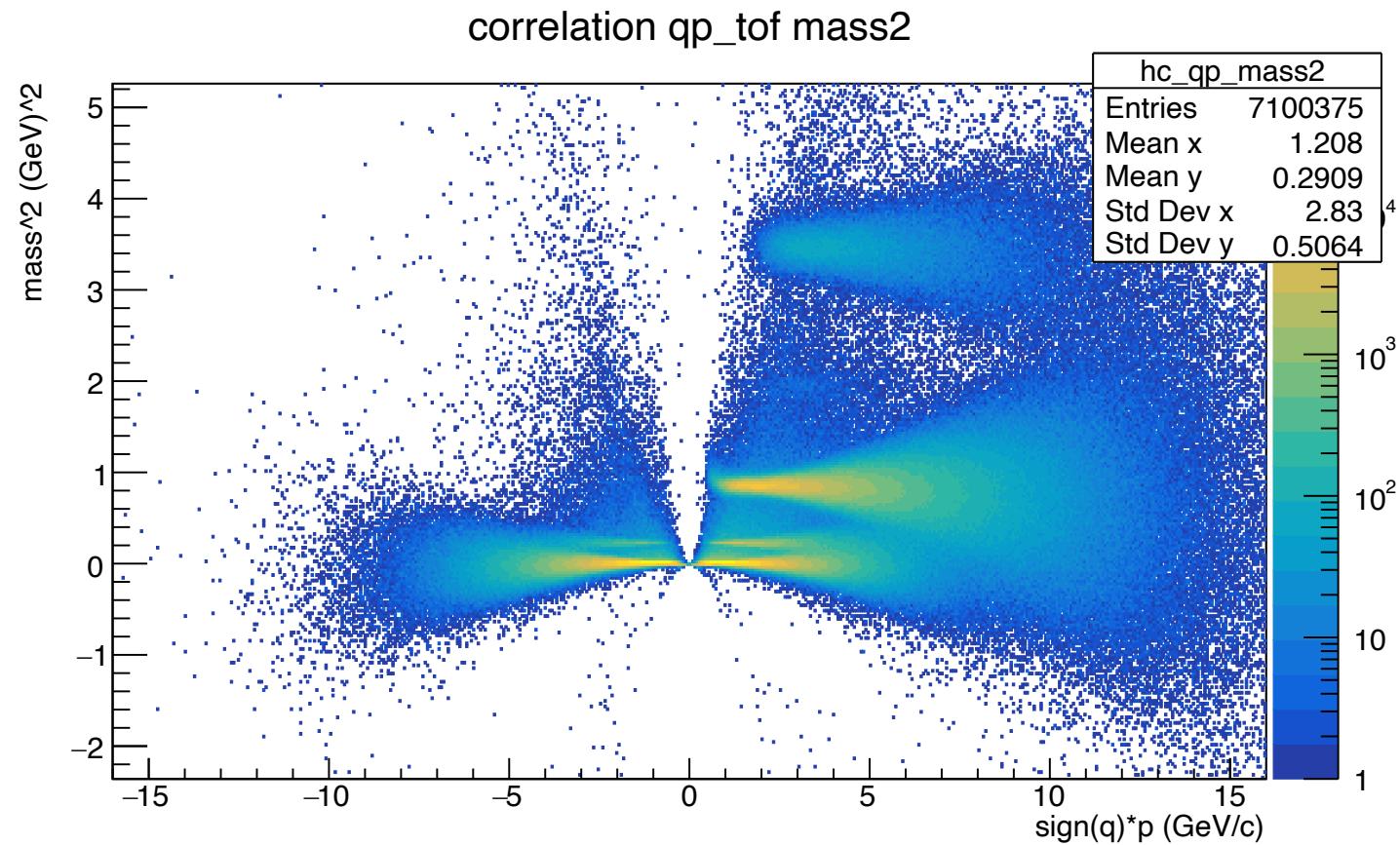


Correlations: impact factor - multiplicity



Correlations: sign(charge)*momentum – mass^2

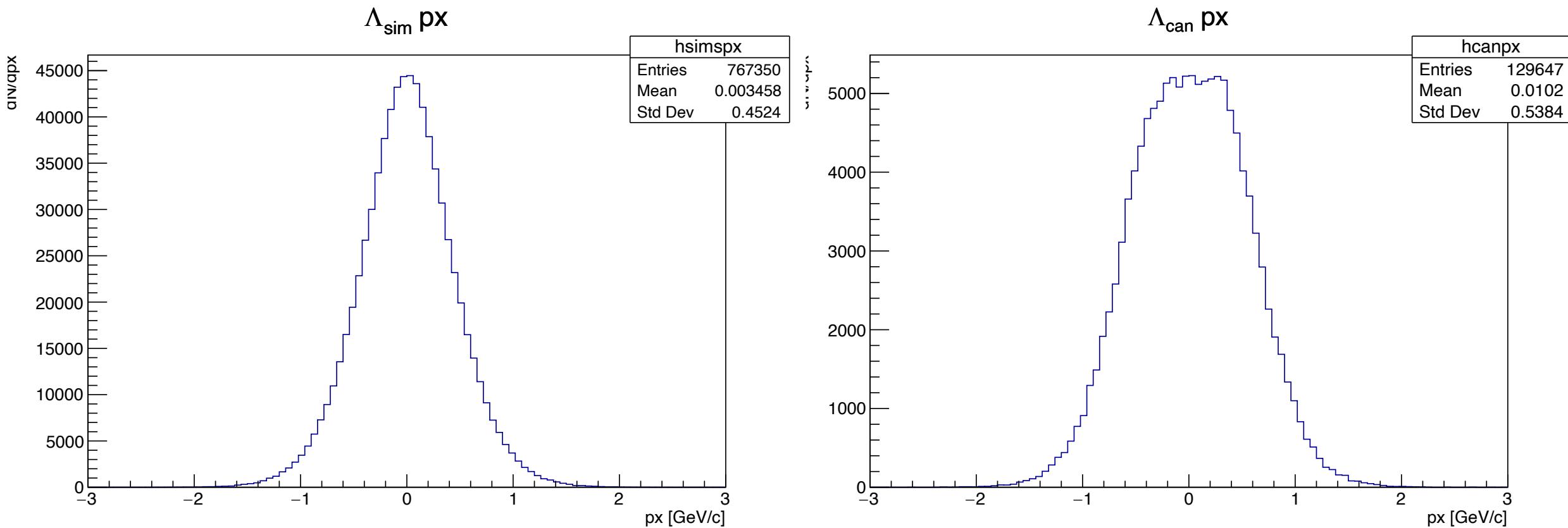
Important for reconstruction of charged particles (more in Jan's work)



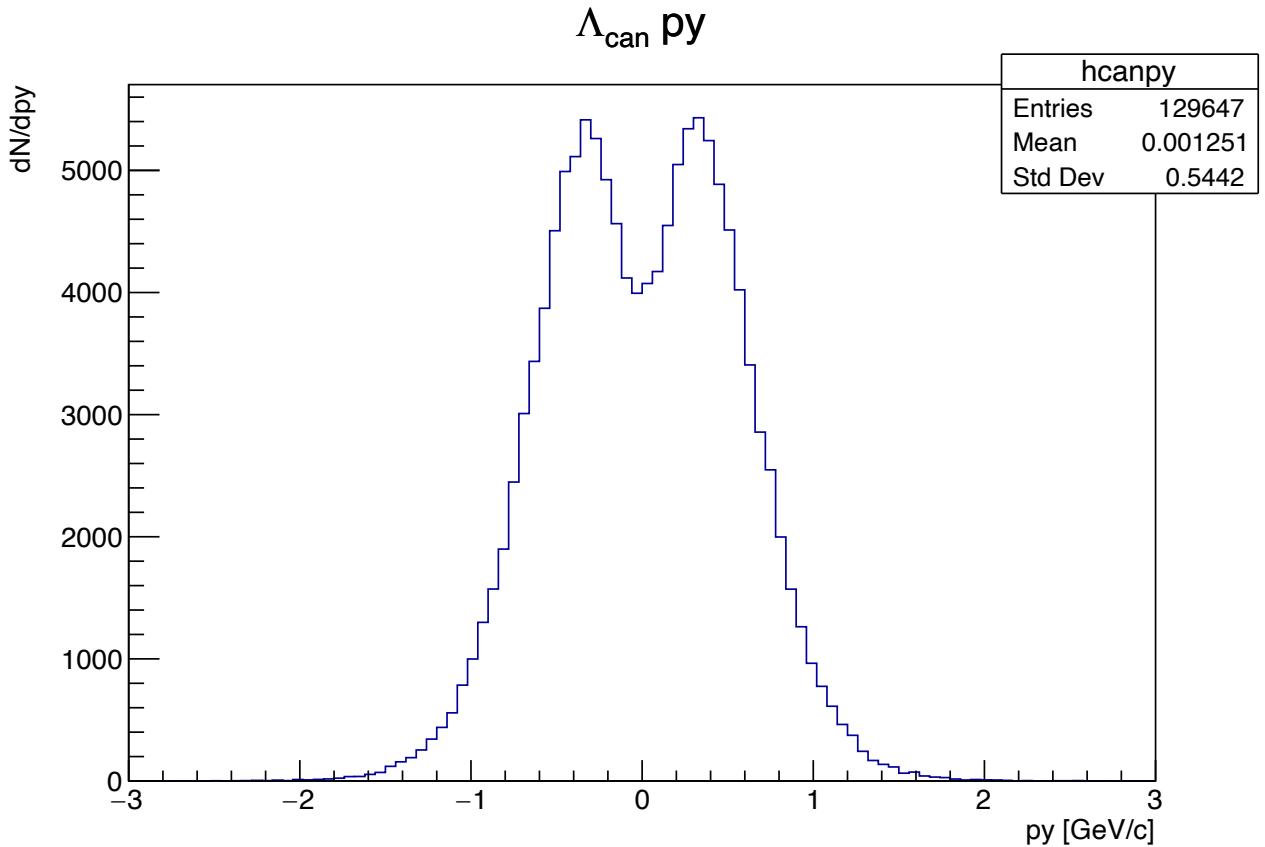
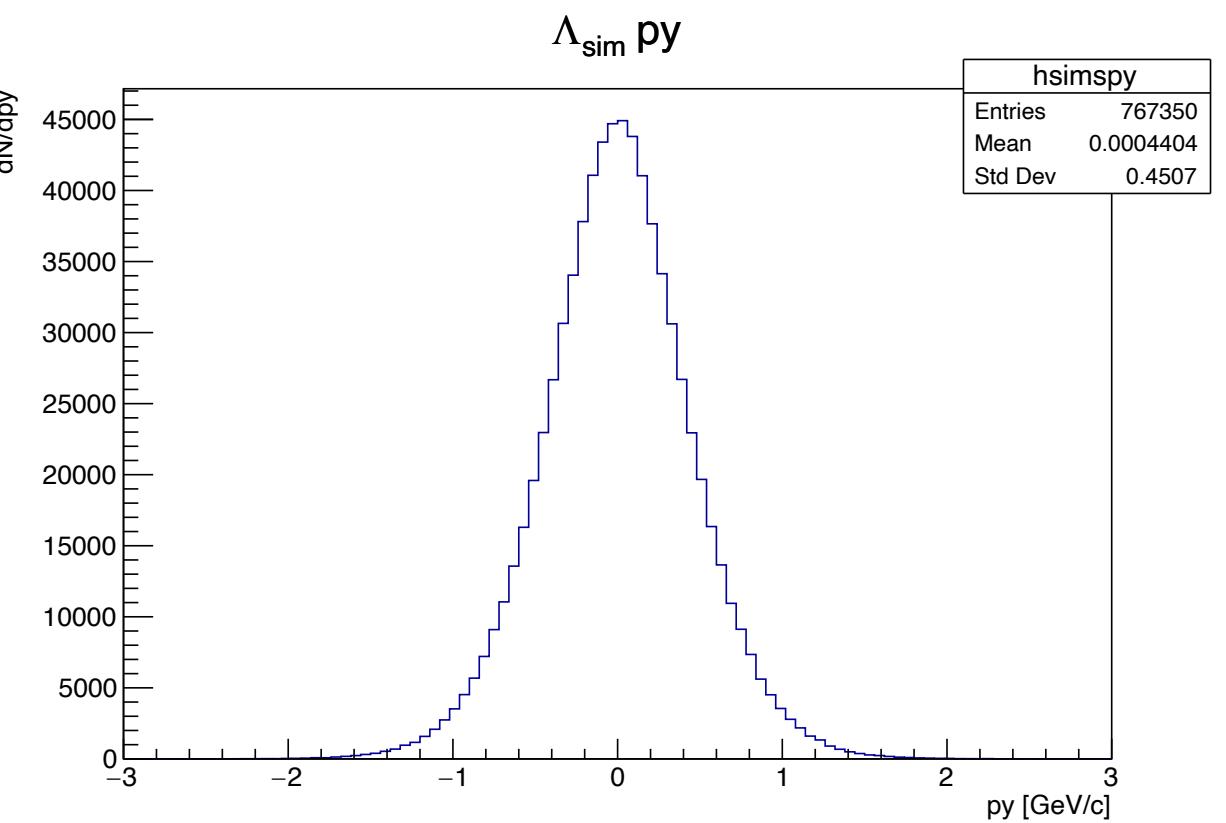
2. PFSimple – framework for short-lived particles reconstruction

- Installing software
- Making first histograms from GEANT4 simulations
(auau/12agev/mbias/sis100_electron_apr20_target_25_mkm/TGeant4) – for 100 files, each 1000 events – TBD: histograms from 5.000.000 events
- Running our own macros on batch farm (slurm)
- Histograms shown for 0.99825 cos cut

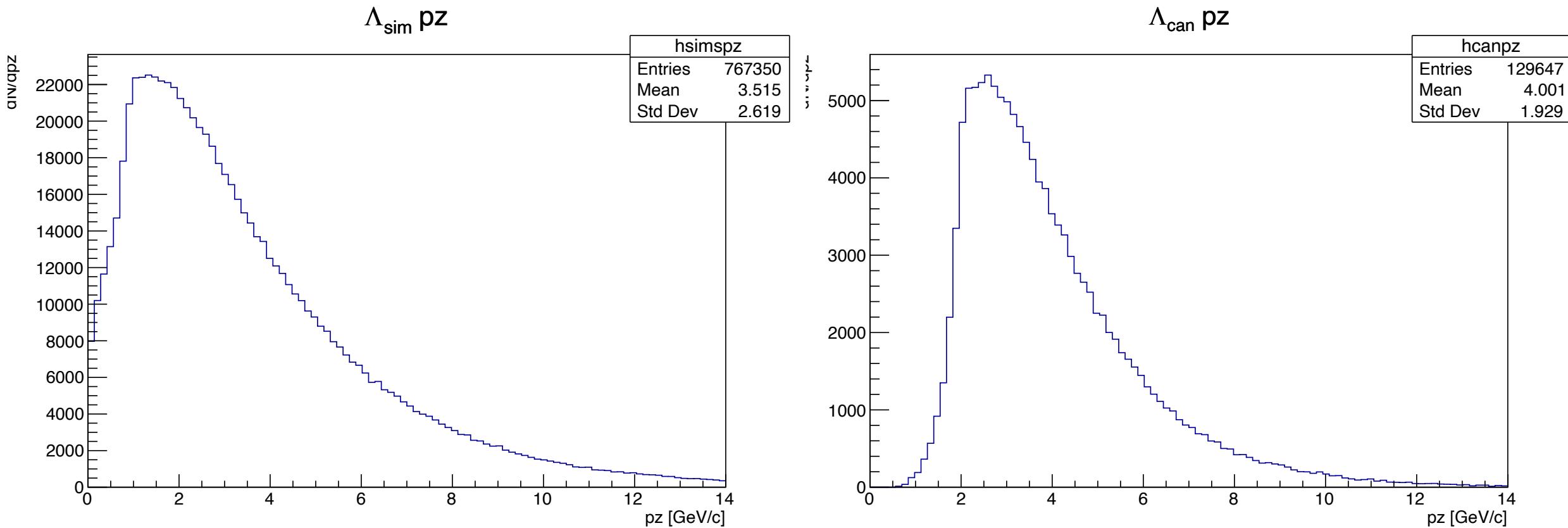
Momentums – e.g., p_x



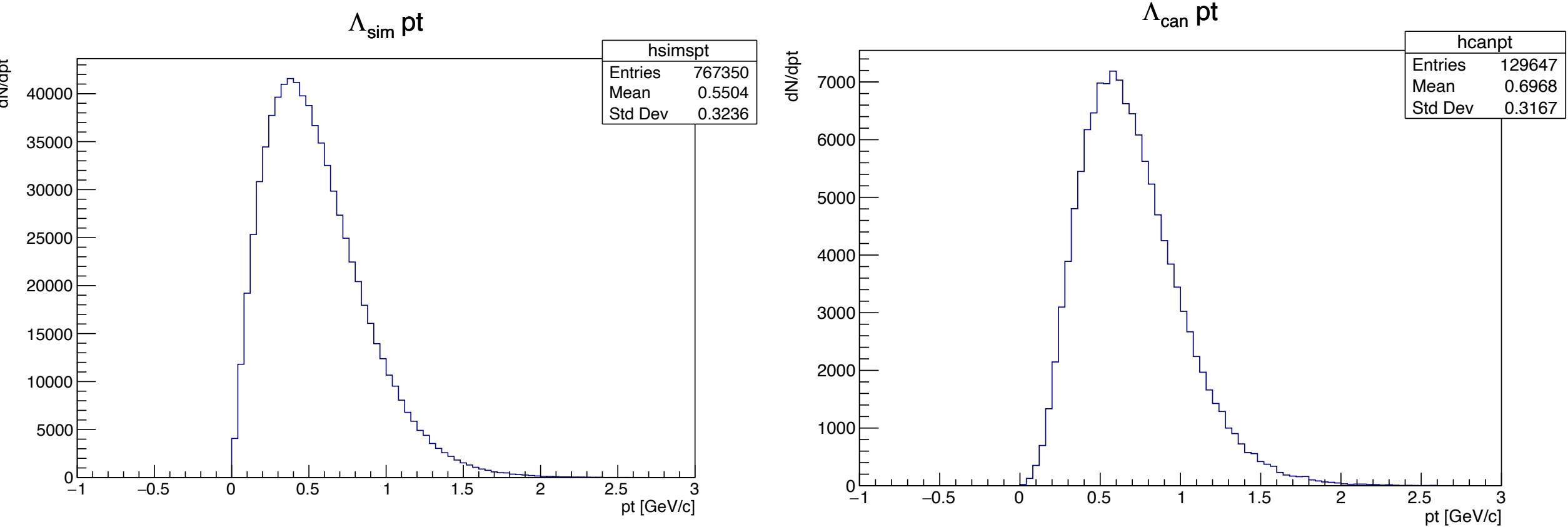
Momentums – e.g., p_y (sic!)



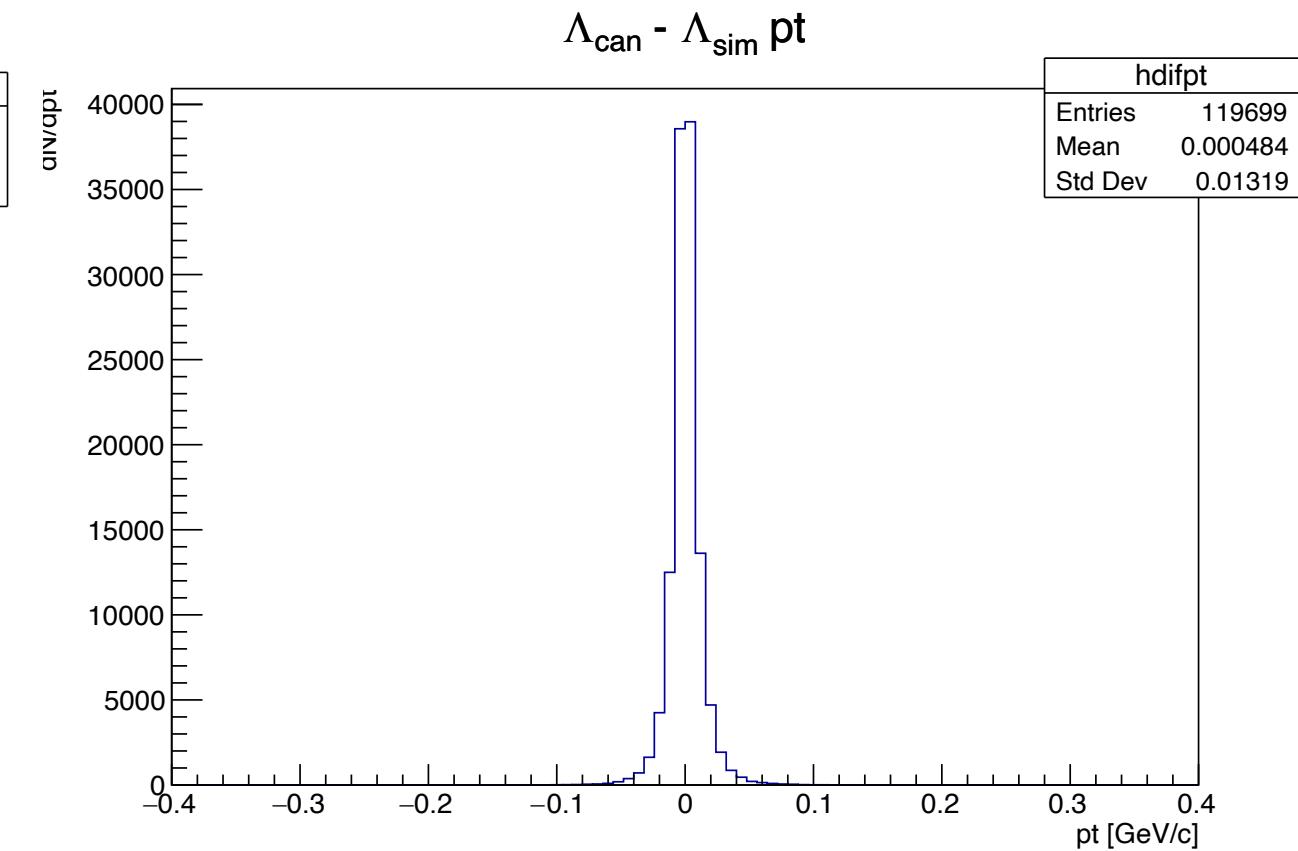
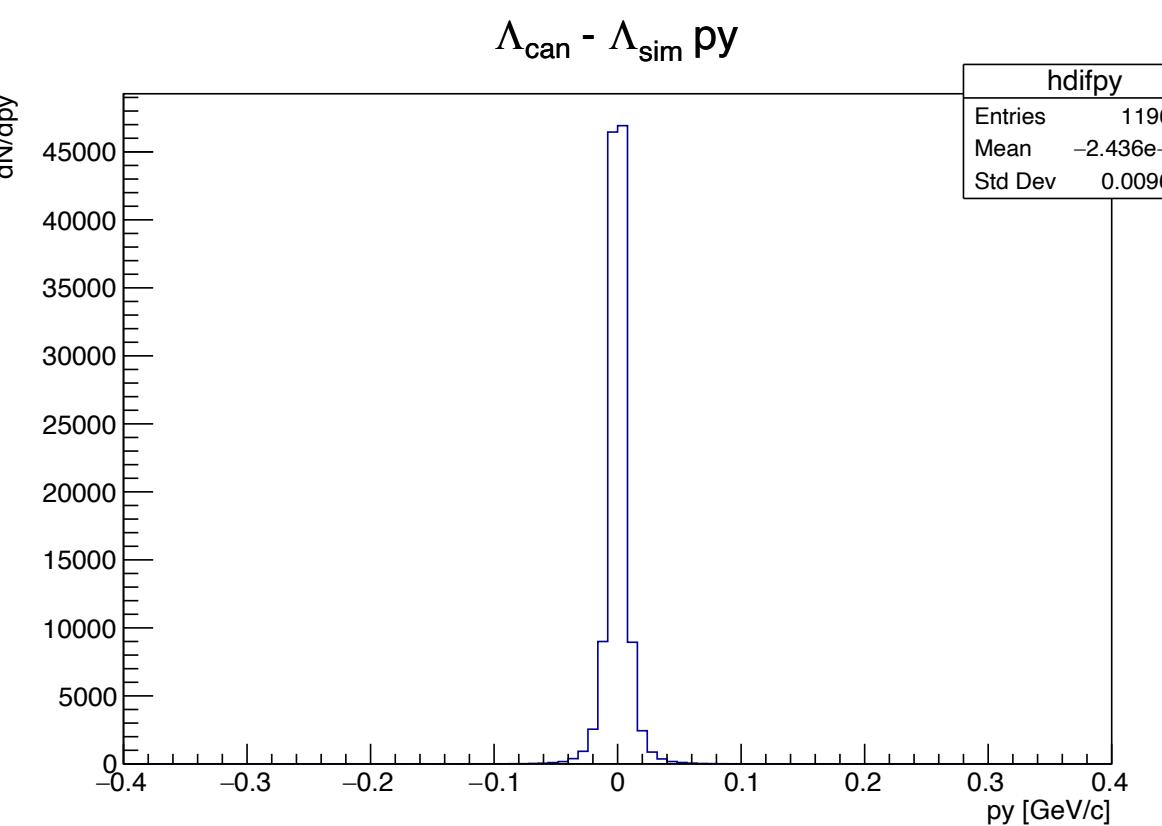
Momentums – e.g., p_z



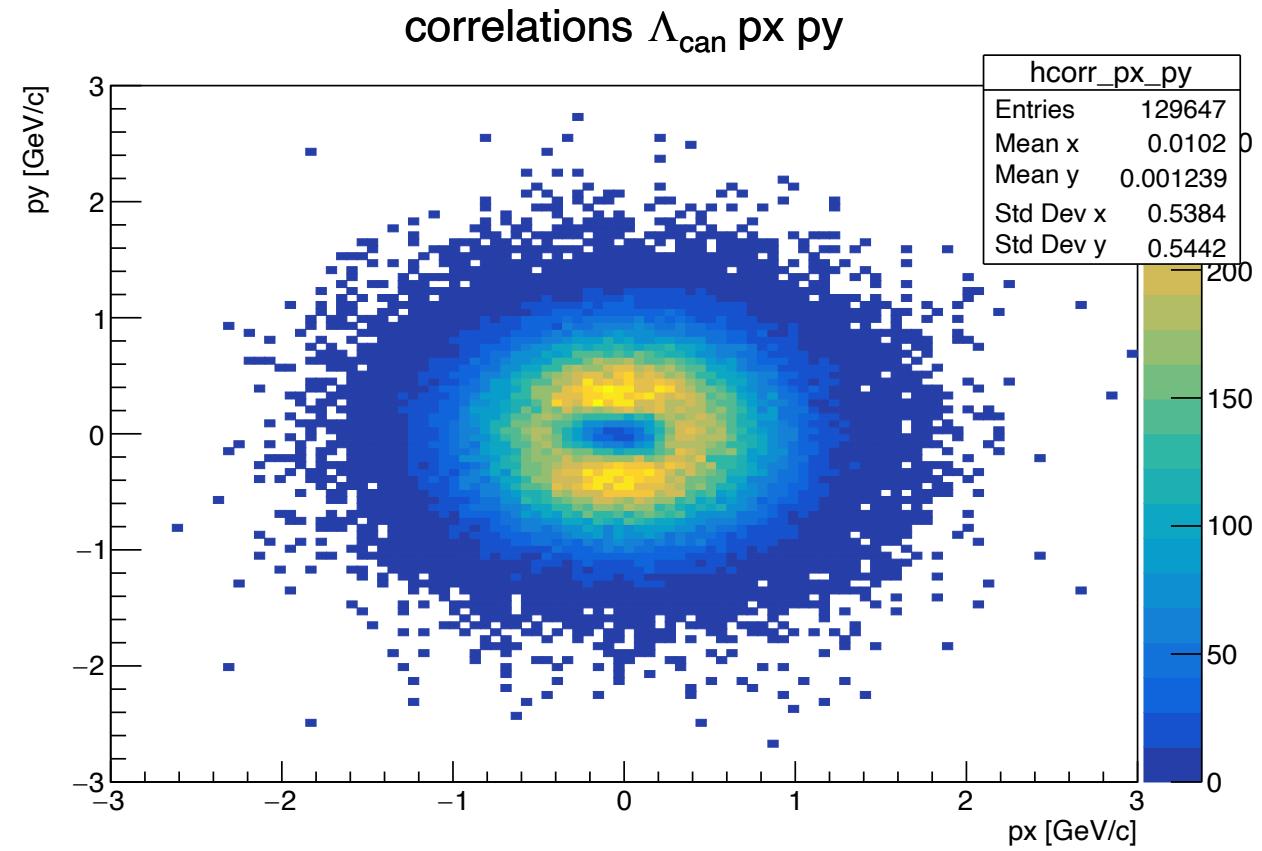
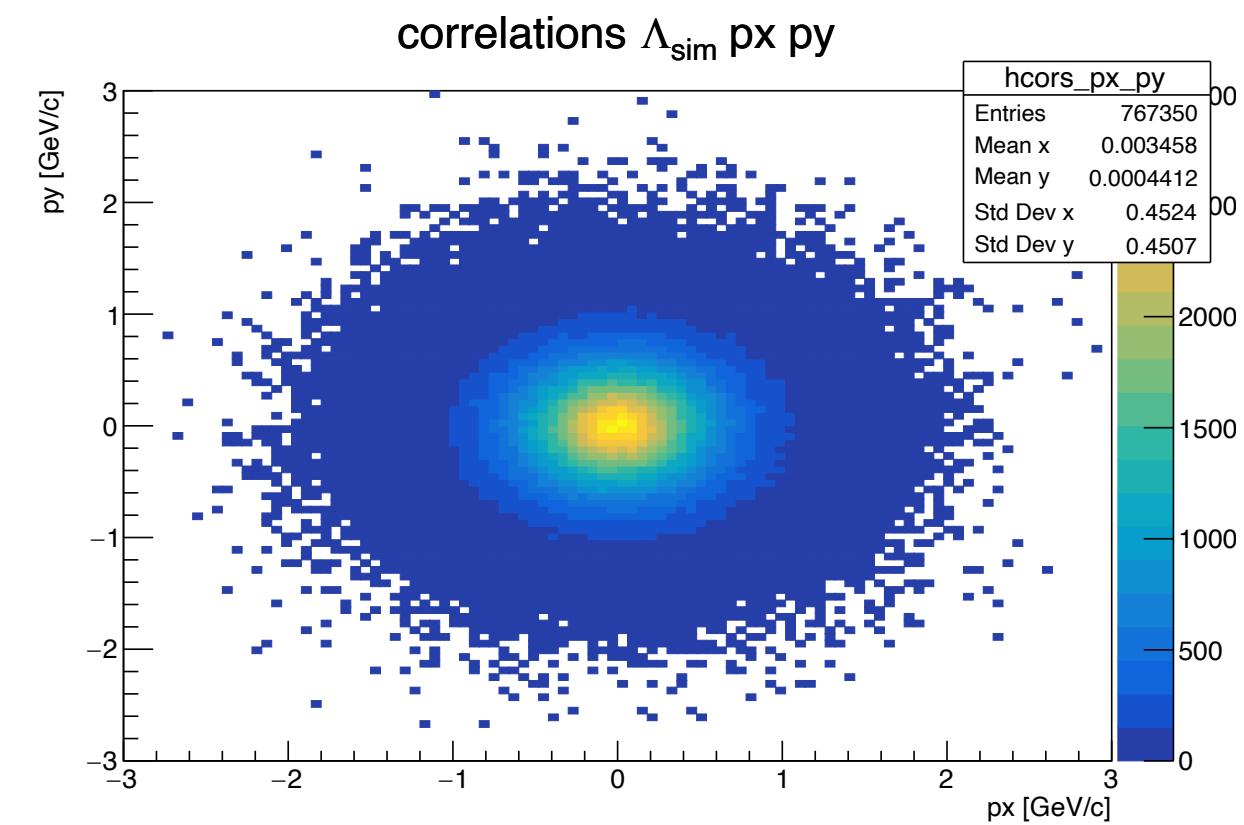
Momentums – e.g., p_T



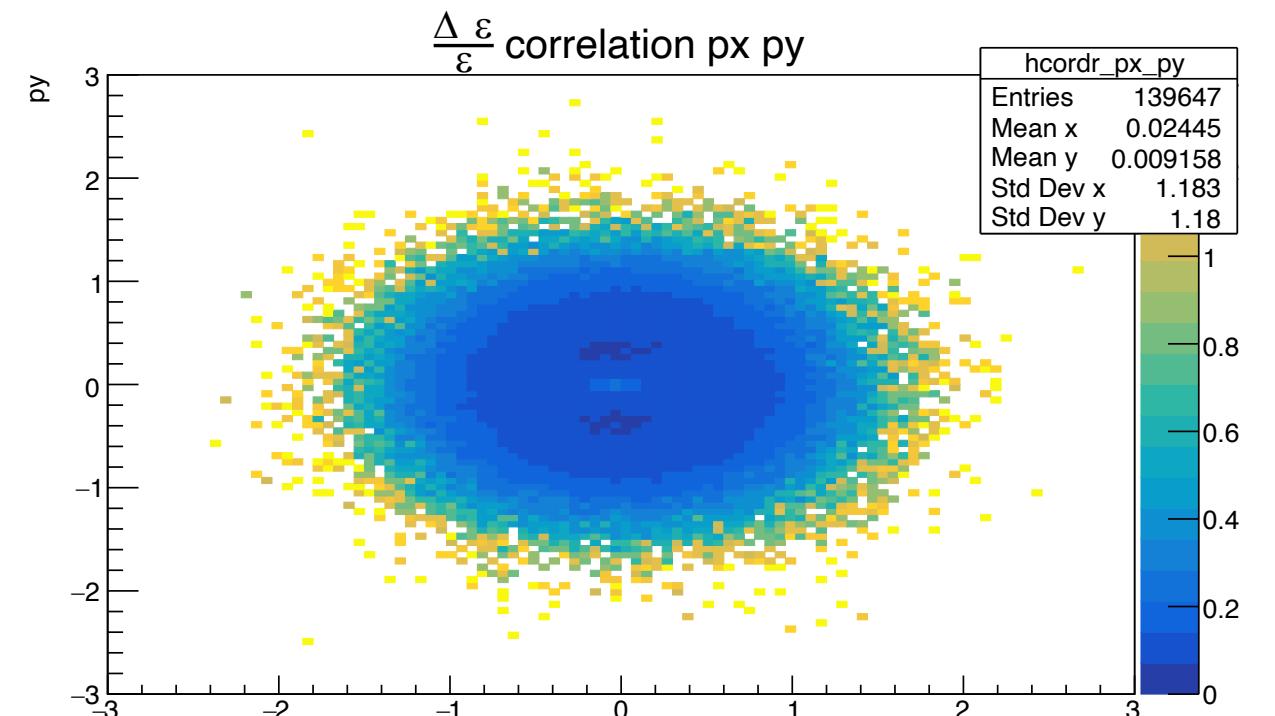
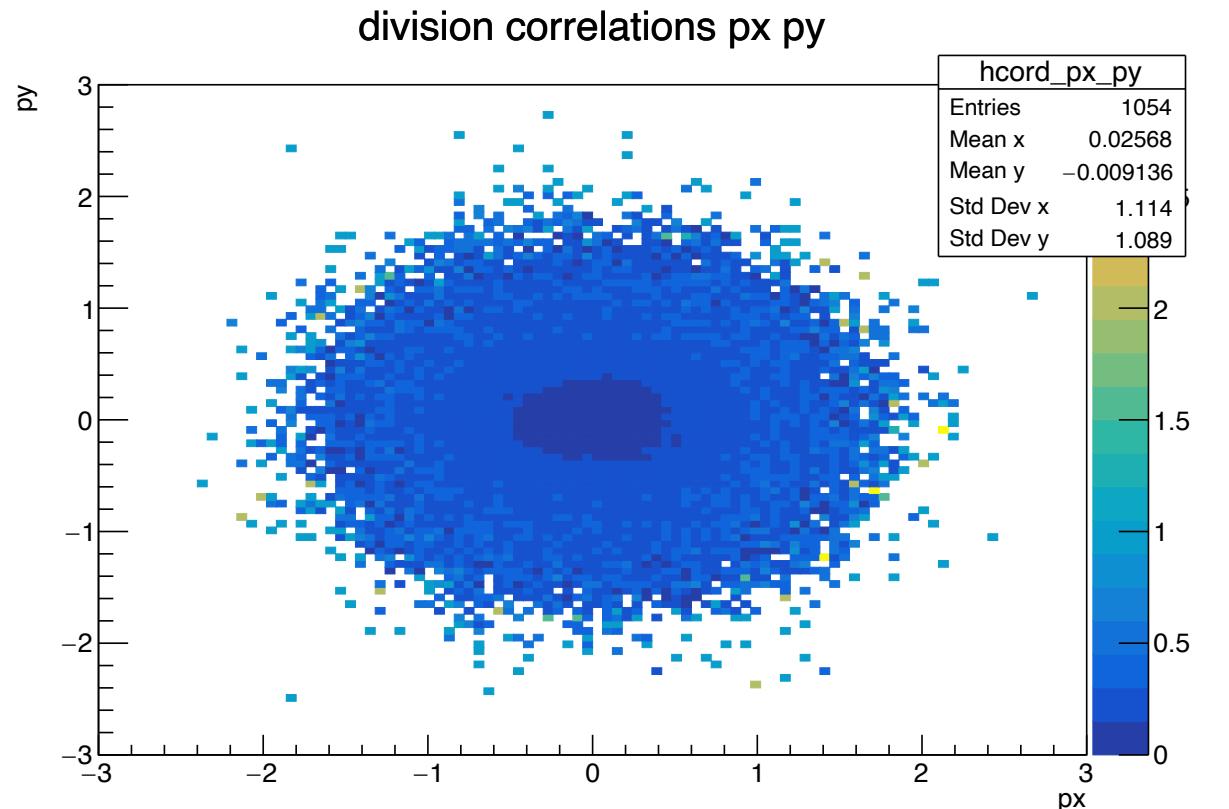
Momentums – difference between candidates (reconstructed) and simulated



Correlations: rec-sim p_x - p_y



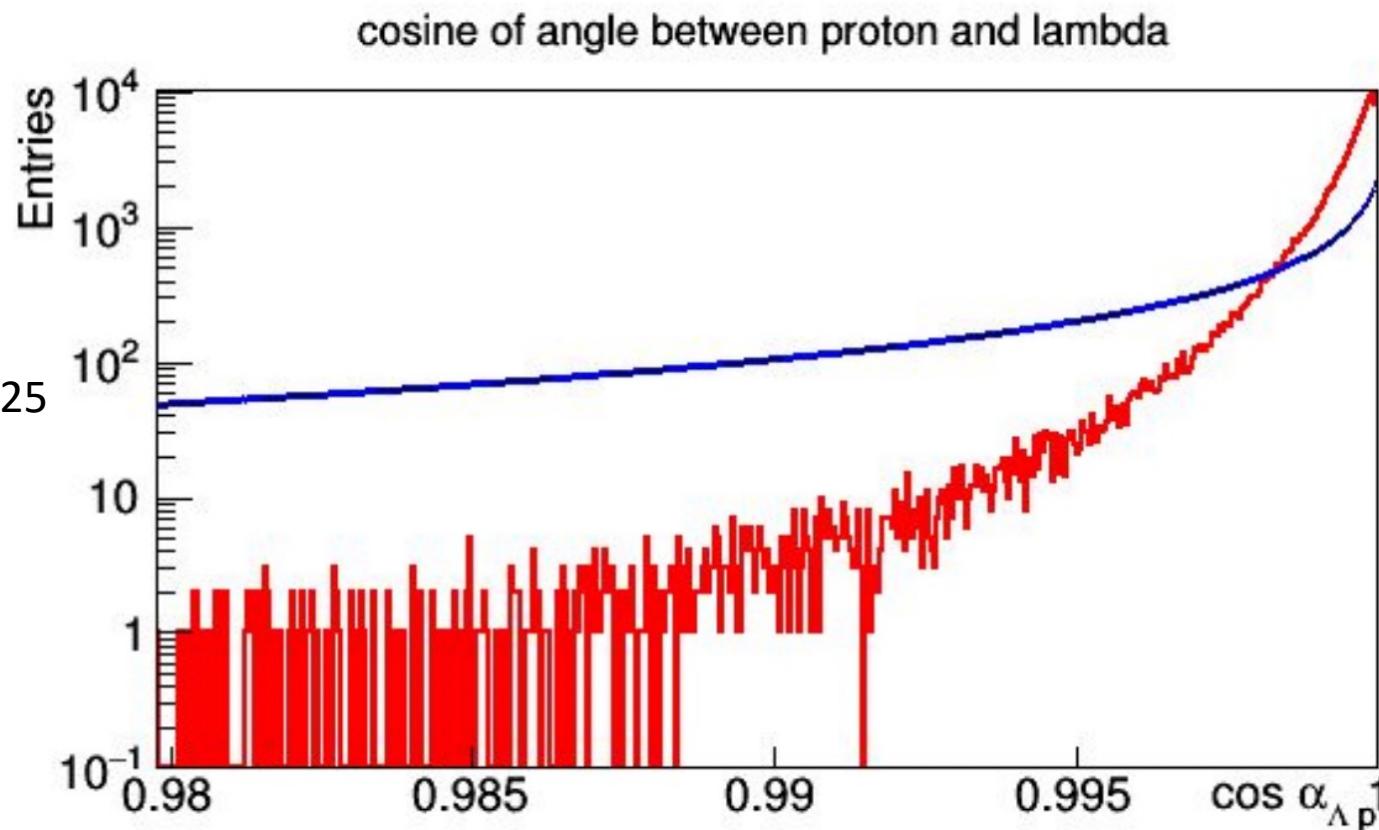
Correlations: rec-sim p_x - p_y



$$\Delta \varepsilon^2 = \left(\frac{\delta \varepsilon}{\delta N_s} \right)^2 \cdot \Delta N_s^2 + \left(\frac{\delta \varepsilon}{\delta N_r} \right)^2 \cdot \Delta N_r^2 \Rightarrow \frac{\Delta \varepsilon}{\varepsilon} = \sqrt{\frac{1}{N_r} + \frac{1}{N_s}}$$

Cosine cut

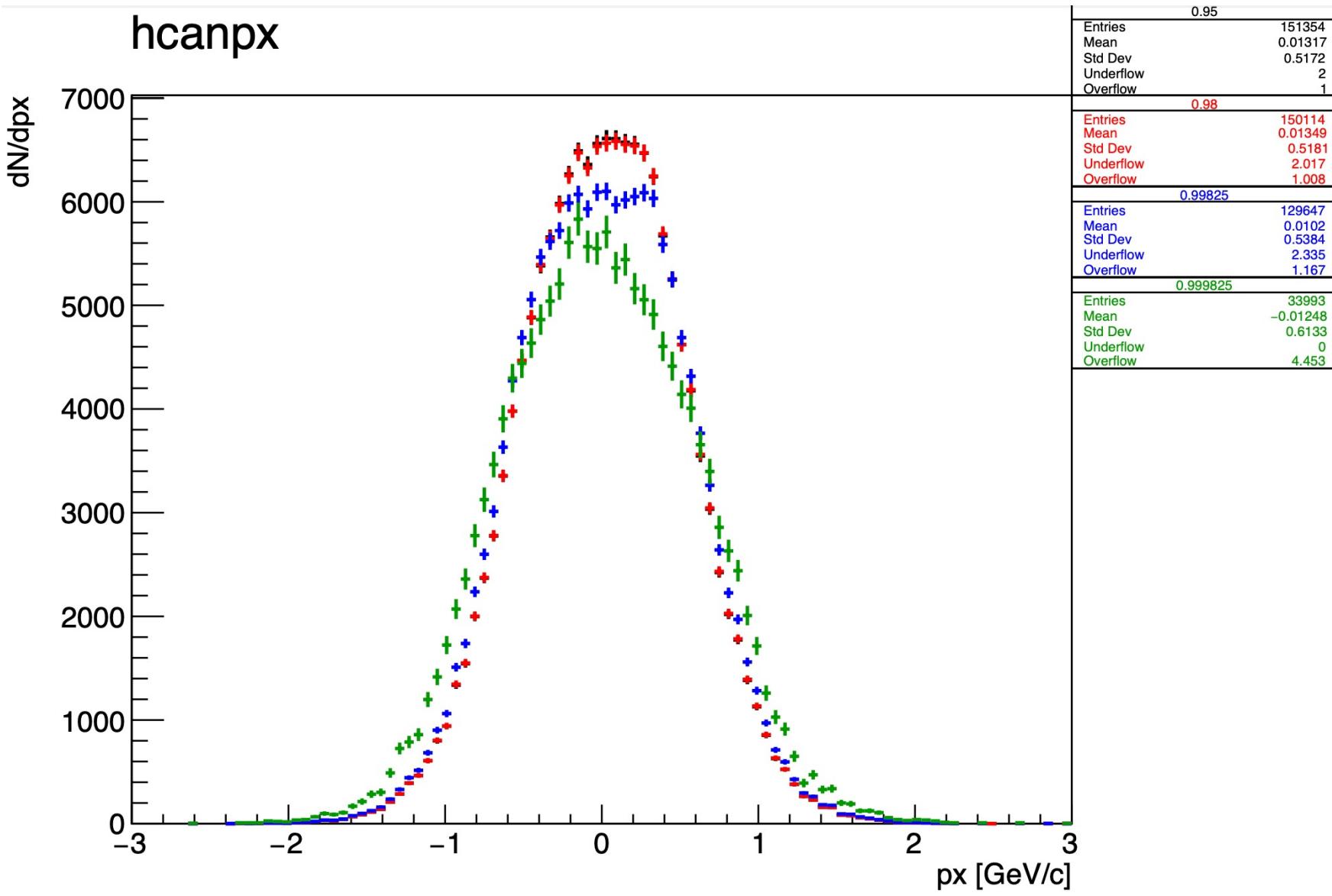
- The value of $\cos \alpha_{\{\Lambda p\}}$ has a big impact on the efficiency of the reconstruction method.
- The value used in the graphs above was 0.99825
- We can compare it with different values:



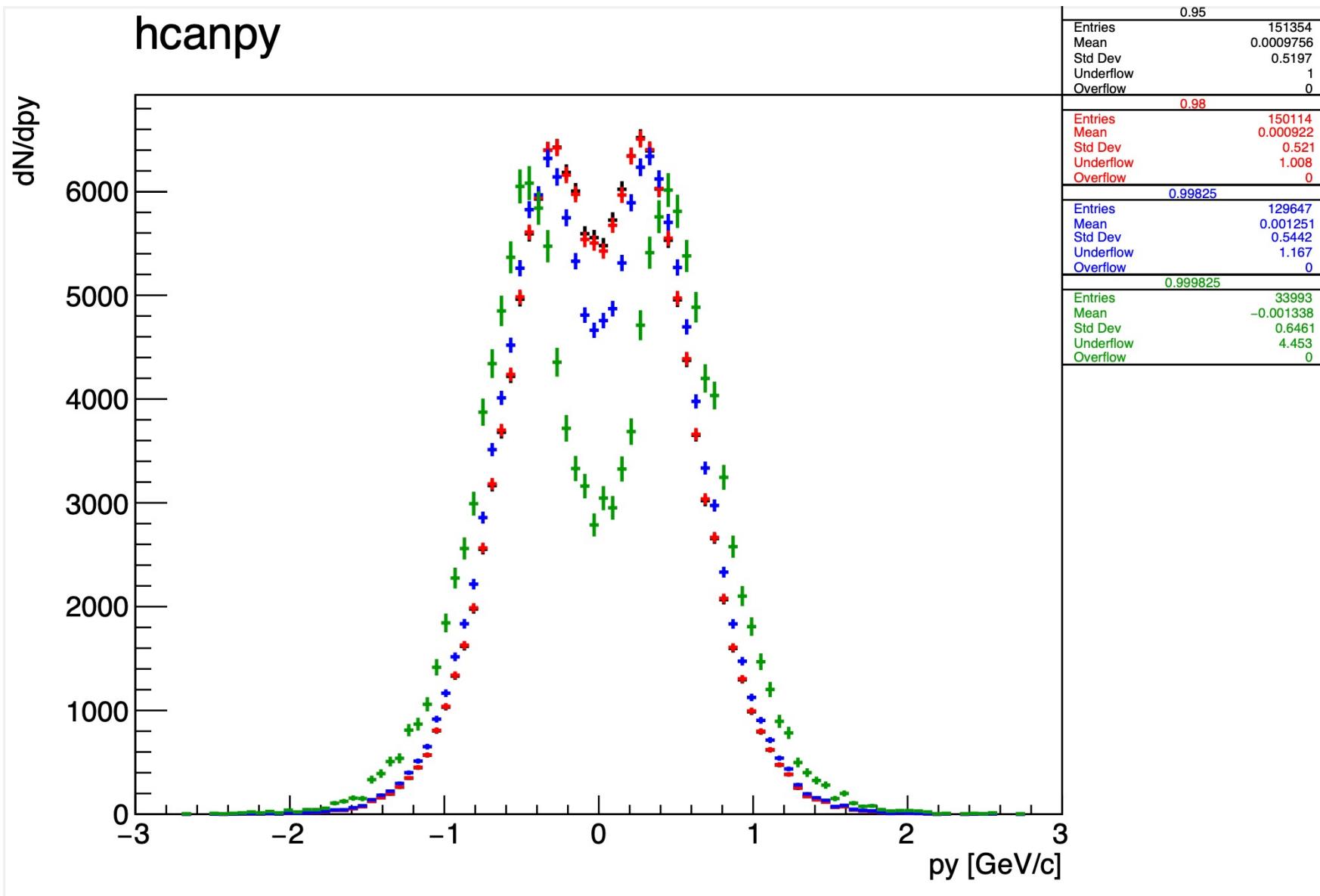
@ Oleksii Lubynets:

https://indico.gsi.de/event/10062/contributions/48045/attachments/33320/43053/PFSimple4Lambda_Highlights_36CM.pdf

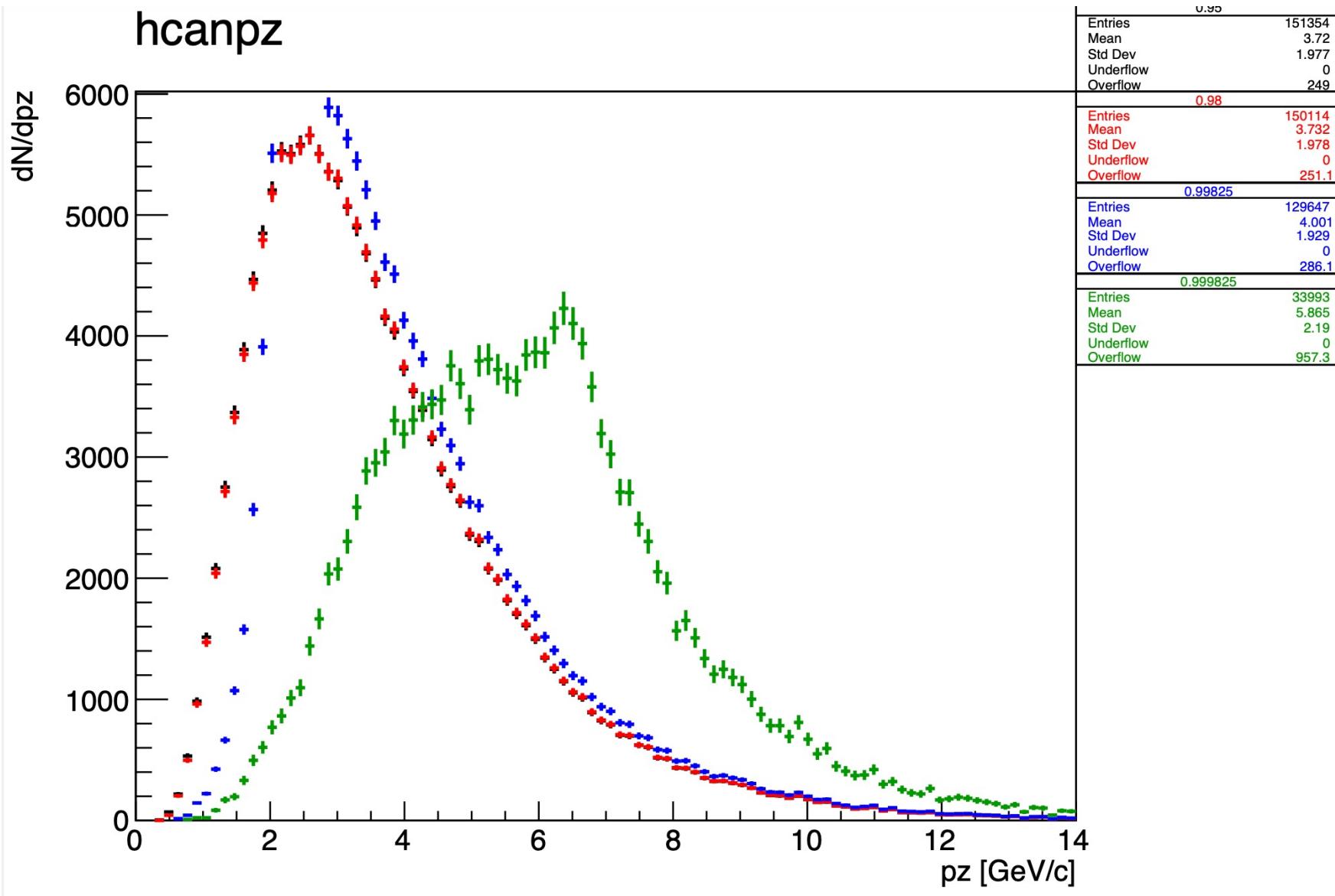
Momentums – e.g., p_x



Momentums – e.g., p_y

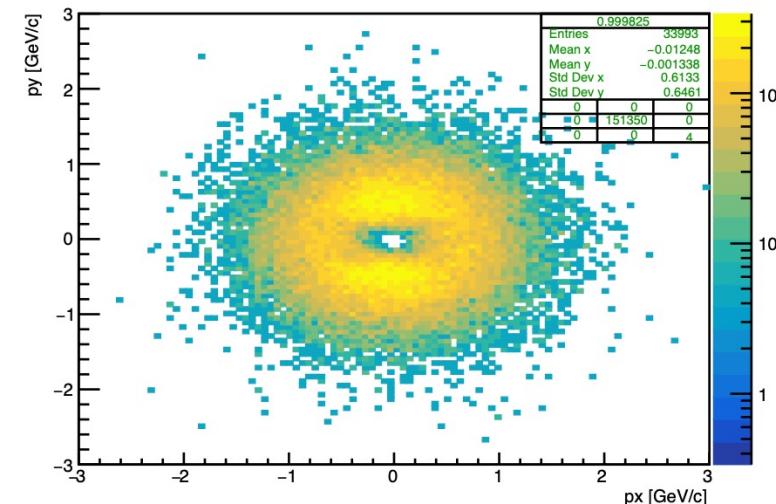
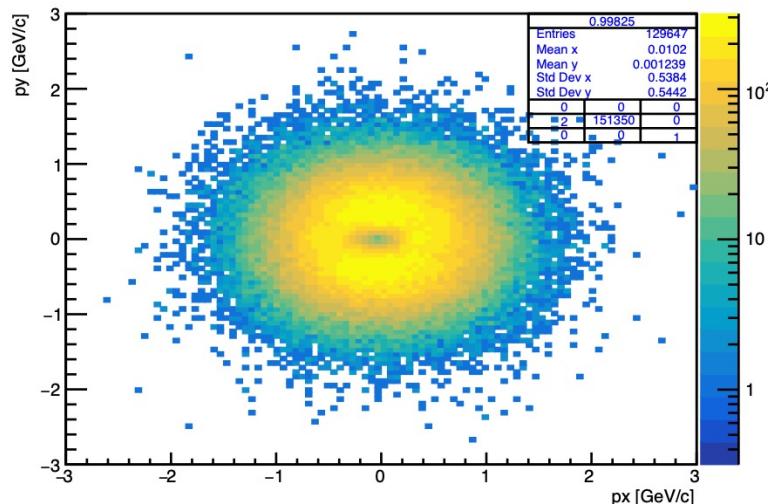
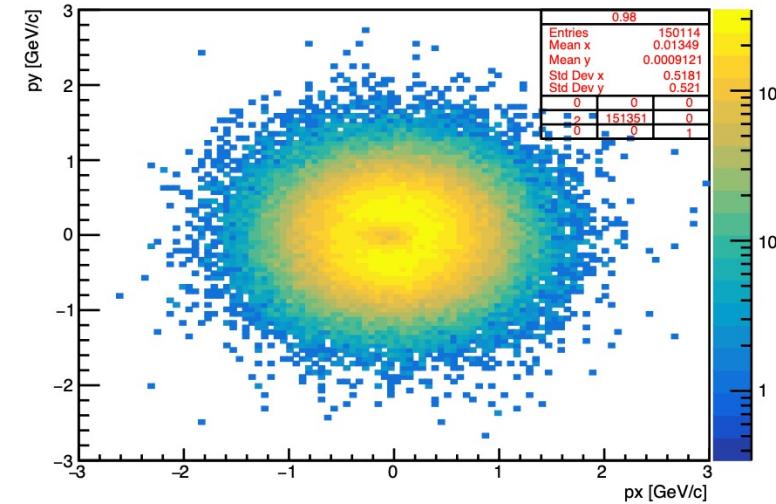
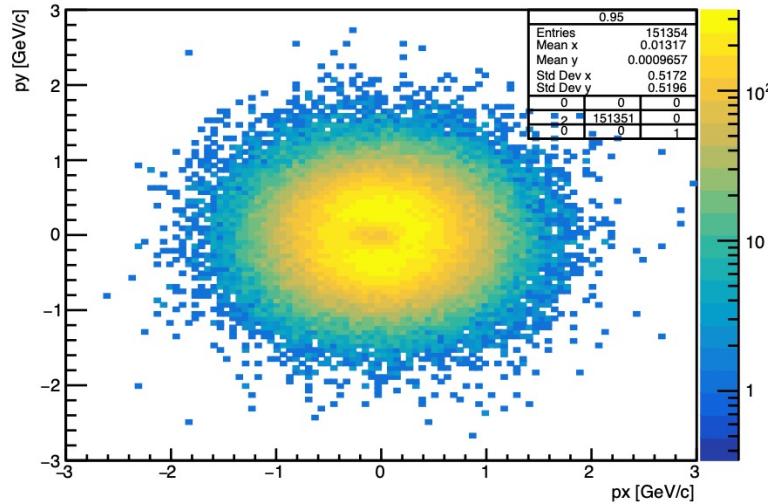


Momentums – e.g., p_z



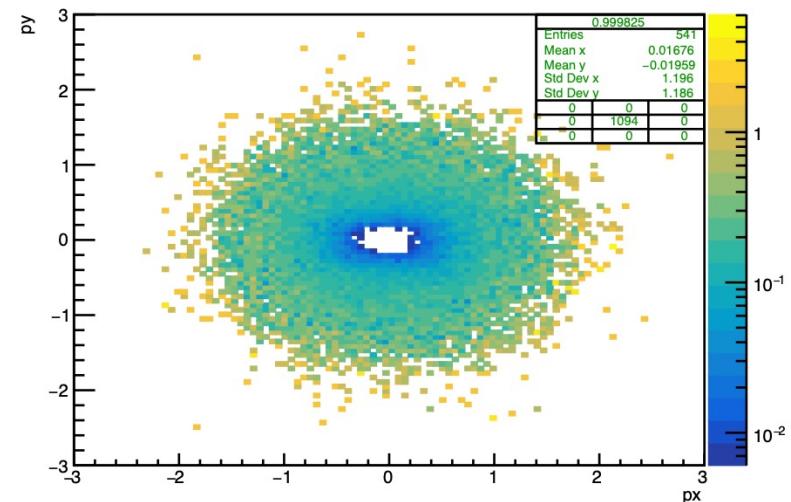
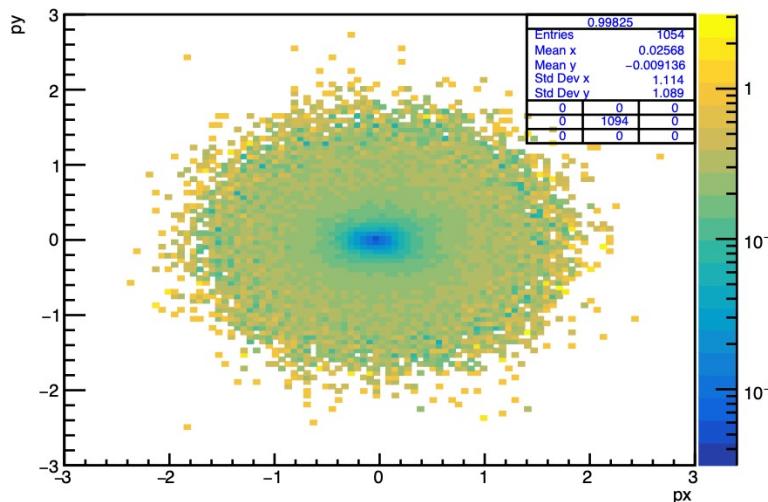
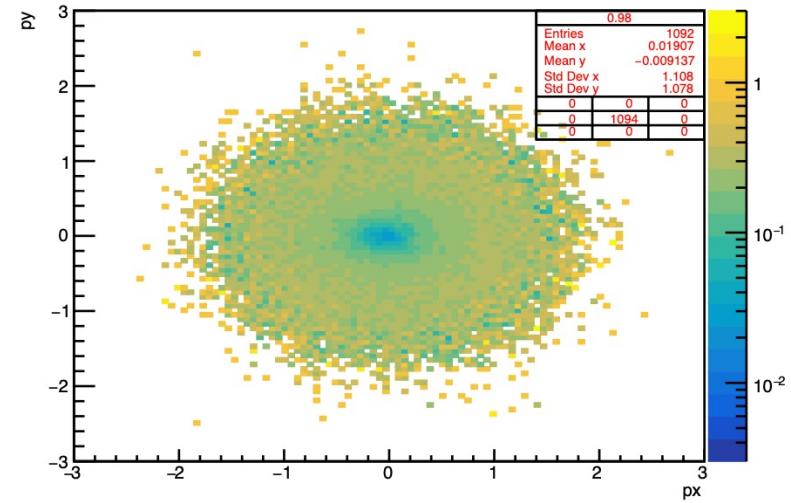
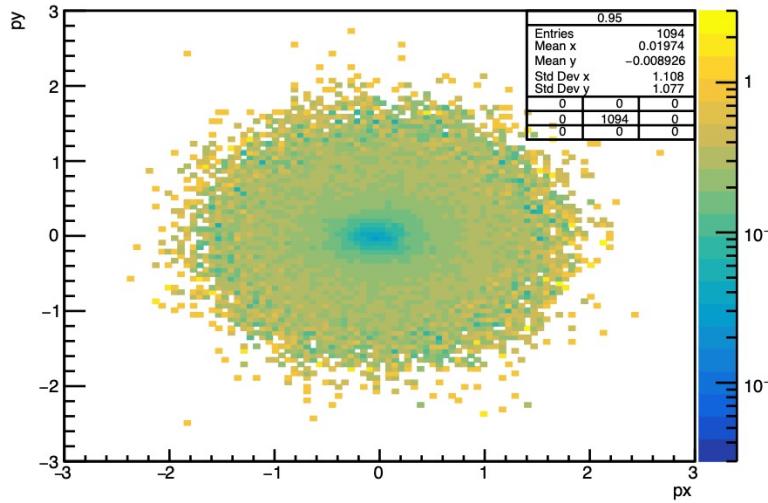
Correlations: reconstructed p_x - p_y

hcorr_px_py



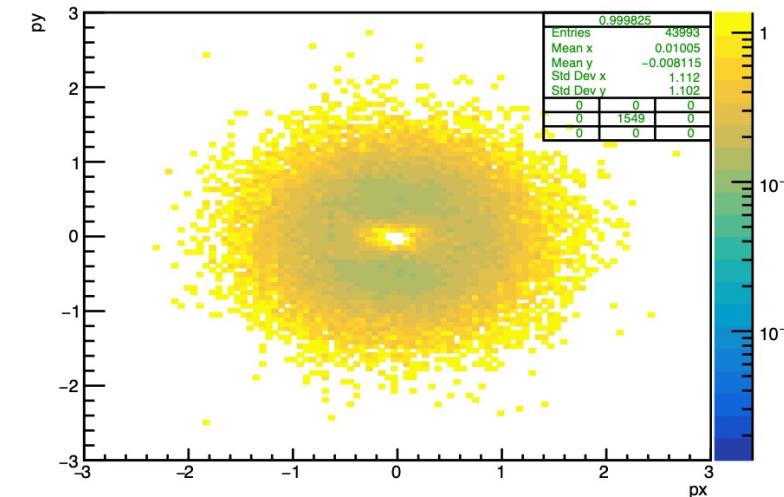
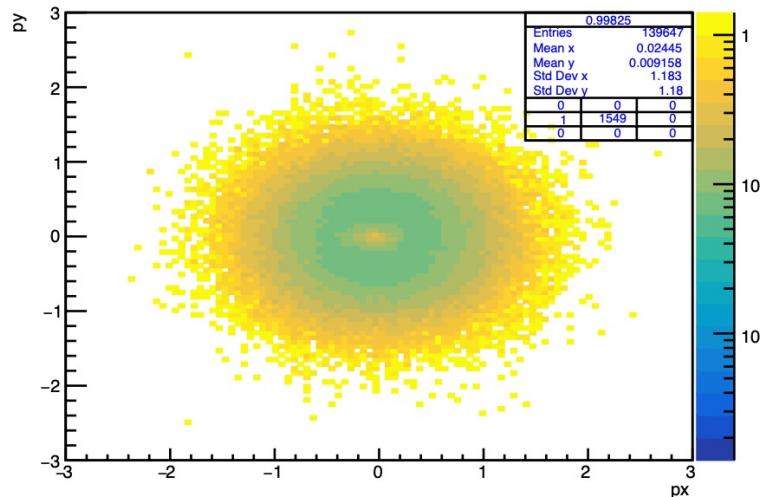
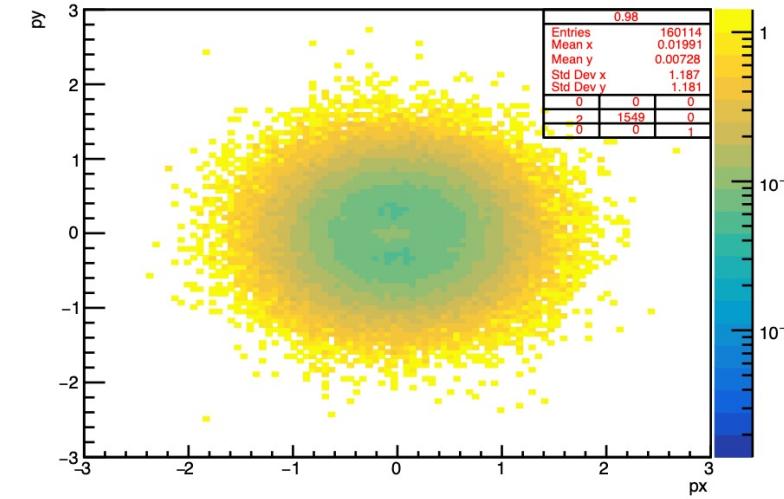
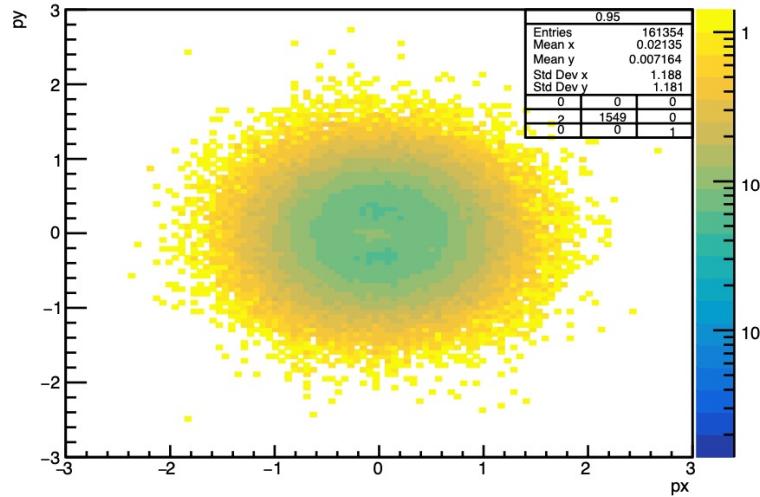
Correlations: rec-sim p_x - p_y (division)

hcord_px_py

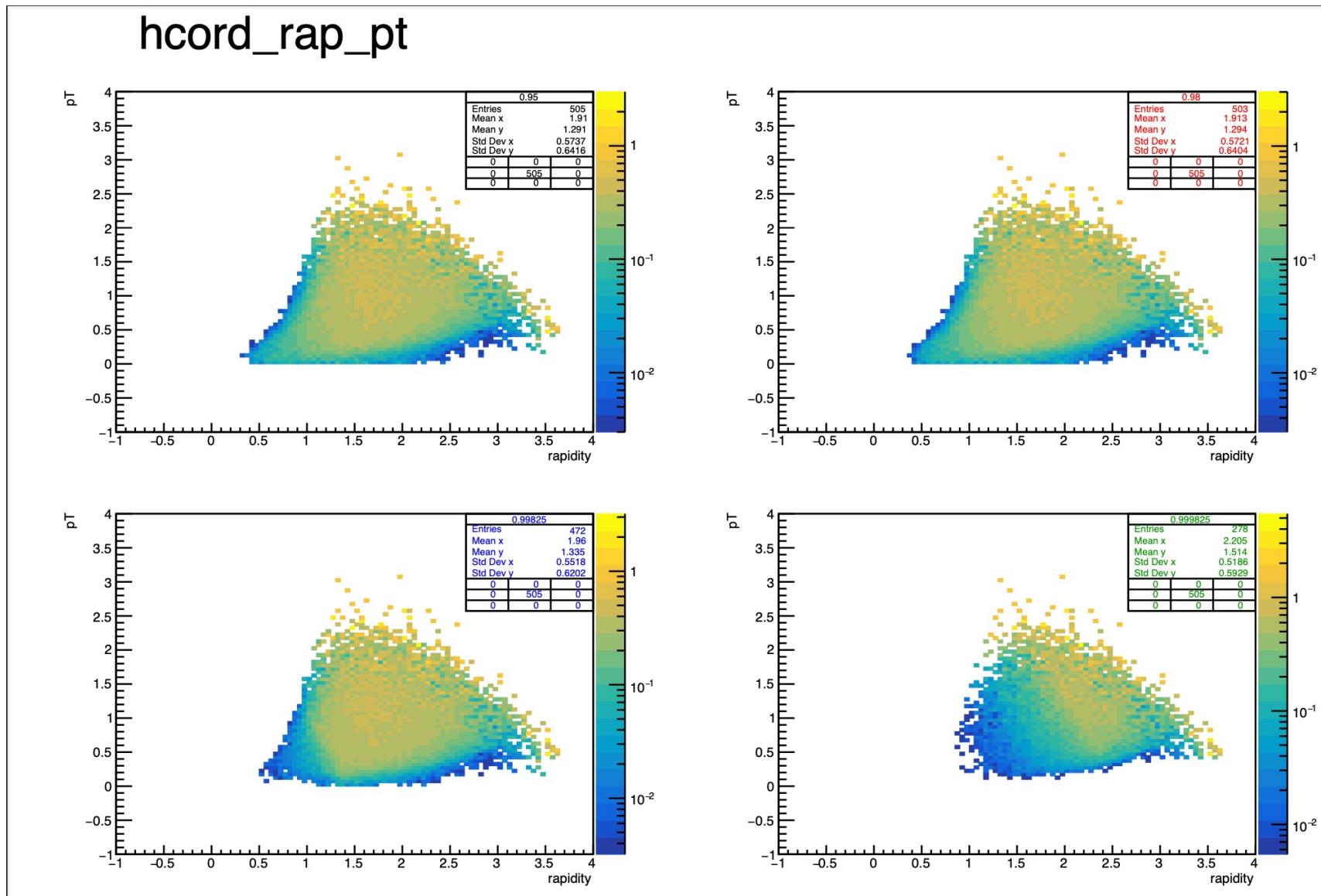


Correlations: rec-sim p_x - p_y (relative error)

hcorder_px_py



And for more correlations... e.g., rapidity- p_T



Correlation rapidity- p_T

hcordr_rap_pt

