

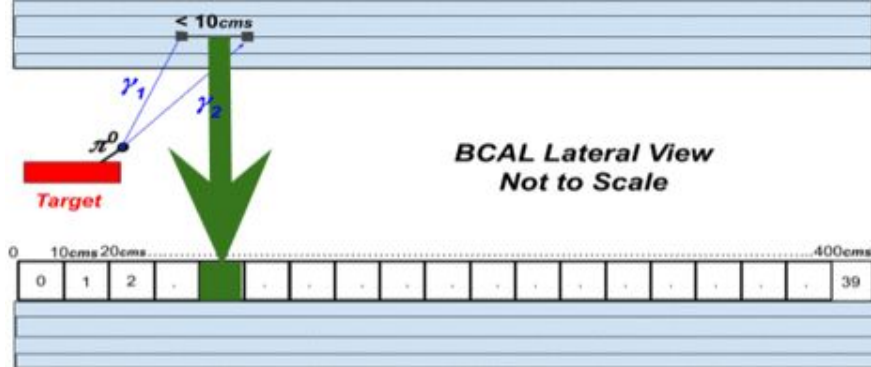
Z Calibration Study update

25th Nov 2020

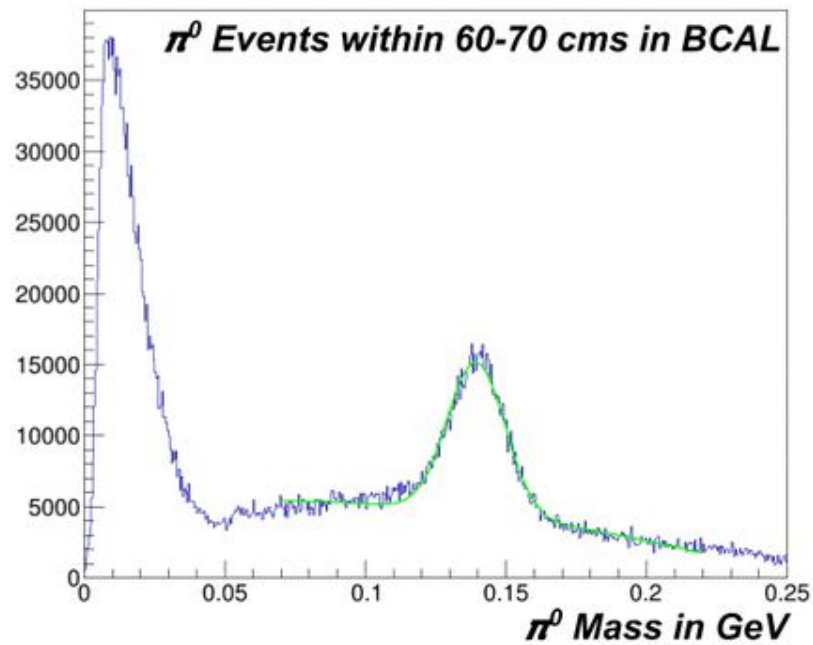
Karthik Suresh

Recap

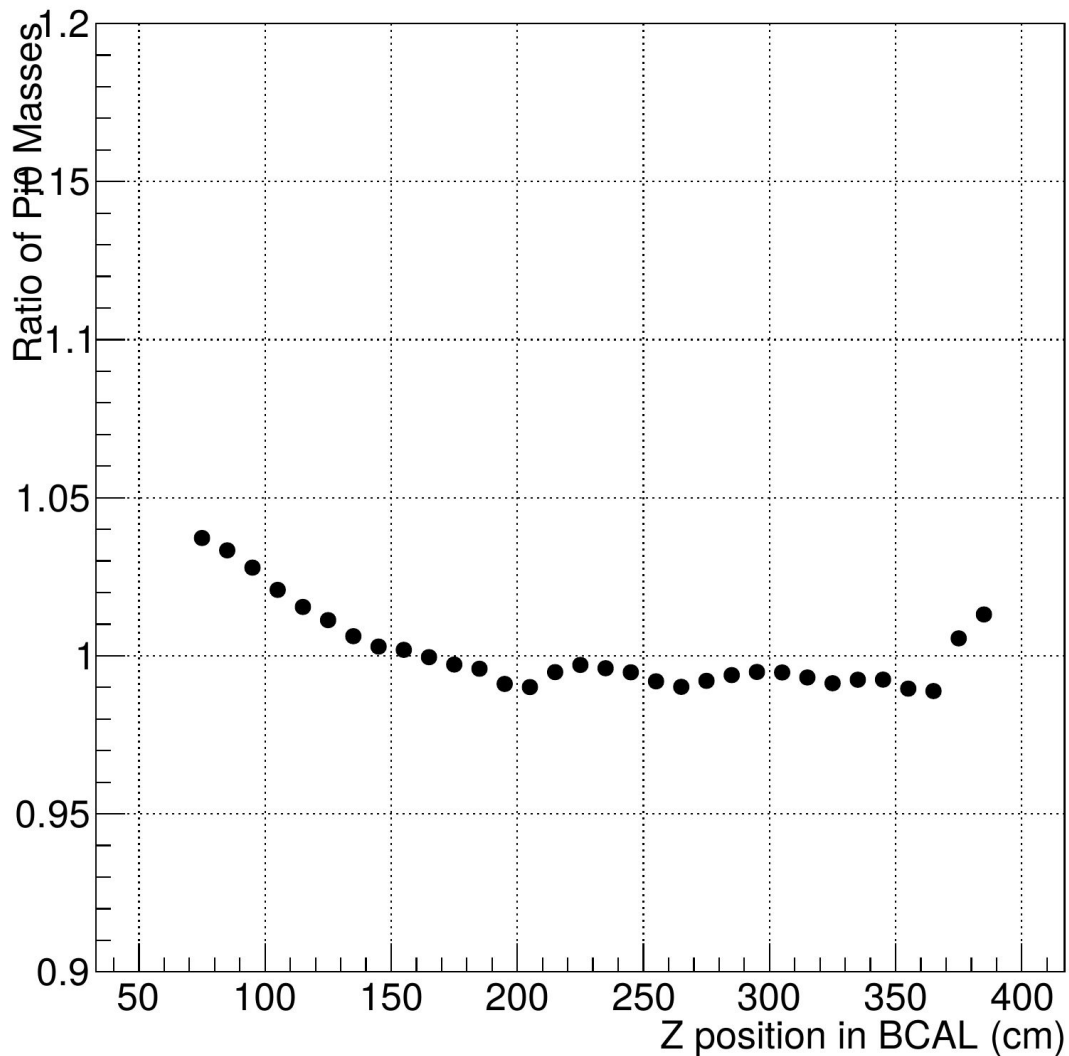
- To study the z-dependance in reconstruction of photon showers in the BCAL in calibration of gains using Pi0 events
- The study on data was done in the following way:
 - Using the Pi0 skimmed files showers (Photon1 and Photon2) with $E \geq 0.4$ GeV and their respective z position has to be within 10cms ($|z_1 - z_2| \leq 10$ cms) were selected.
 - Invariant mass for the pair of photons were calculated and were studied in the z bins of 10 cms. (the position of the pi0 candidate is the average Z of z_1 and z_2)
- The MC study was done on just a Pi0 gun using the same procedure. Certainly not apples to apples comparison. So Elton and Mark suggested to repeat the study using bggen sample.



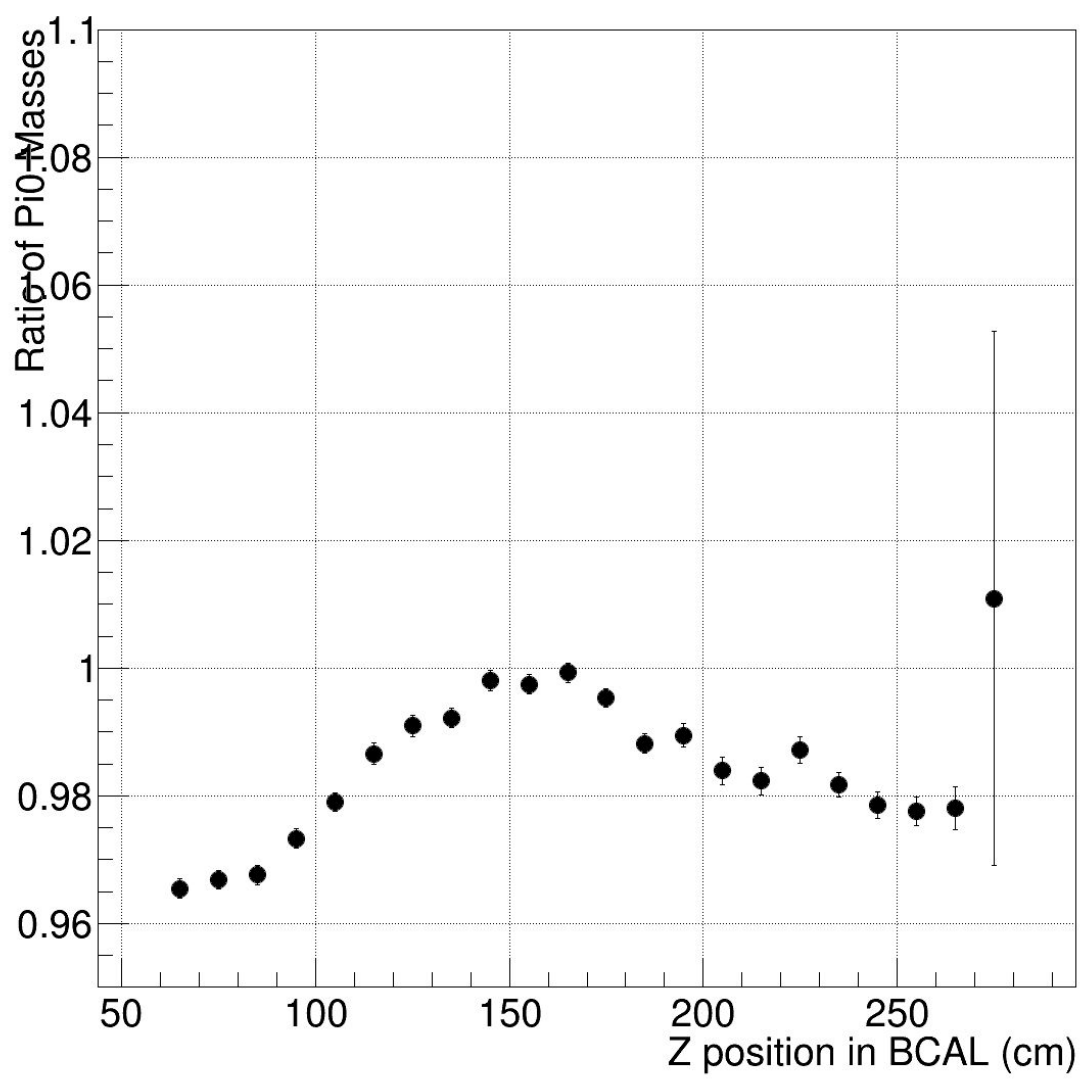
inv_mass vs z_symmetric within 10 cms



Reconstructed invariant mass of pi0 mass as a function of z position for FALL 2018 data. This was counter intuitive since there is leakage of energy at the back of the BCAL



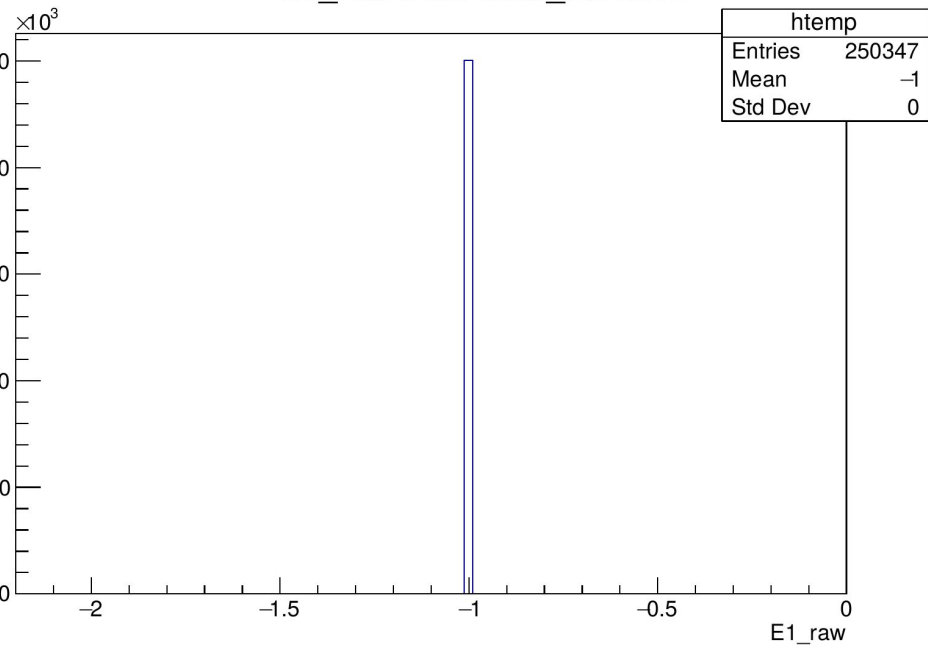
Reconstructed invariant mass of pi0 mass as a function of z position for pi0 Gun MC.



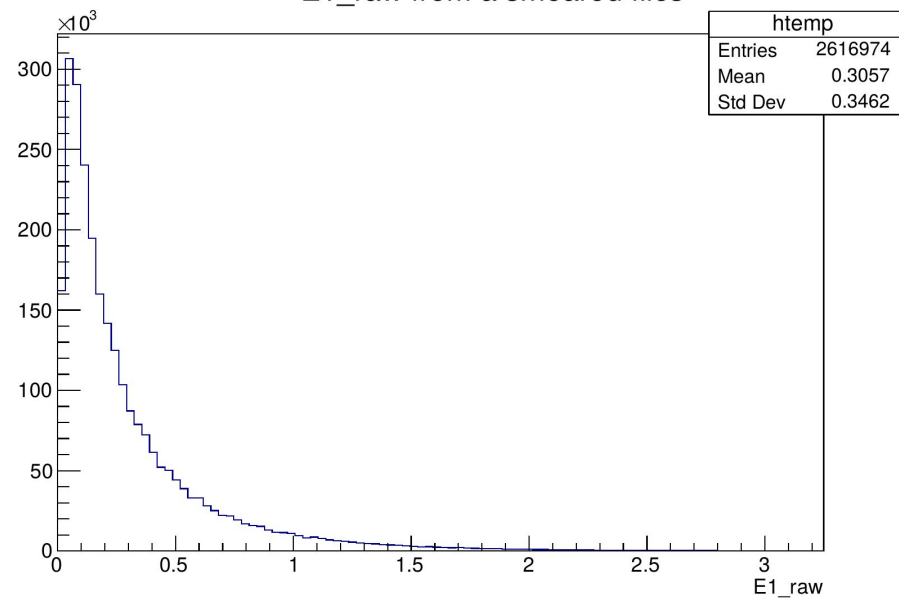
Doing the same study using the bggen sample

- To treat the bggen just like data:
 - For every event loop through the dNeutralShower shower object.
 - Get the BCALShowers from each NeutralShower object
 - Store the required information.
- All the available bggen files are reconstructed dana_rest.hddm files
- For dana_rest.hddm files
 - The E_raw of the showers always return -1
 - The z prefers a single value at about 200-220 cms
- It works fine with smeared files

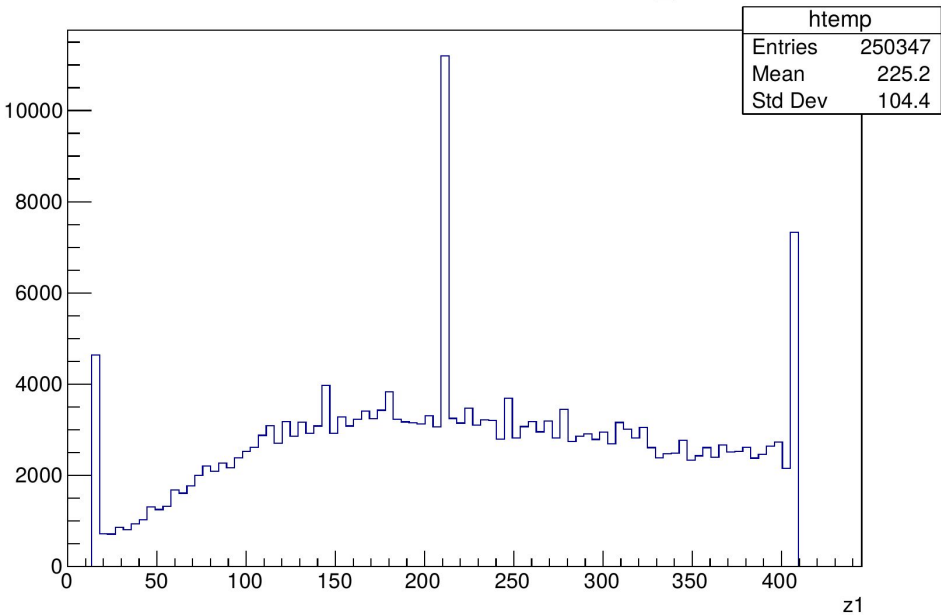
E1_raw from dana_rest files



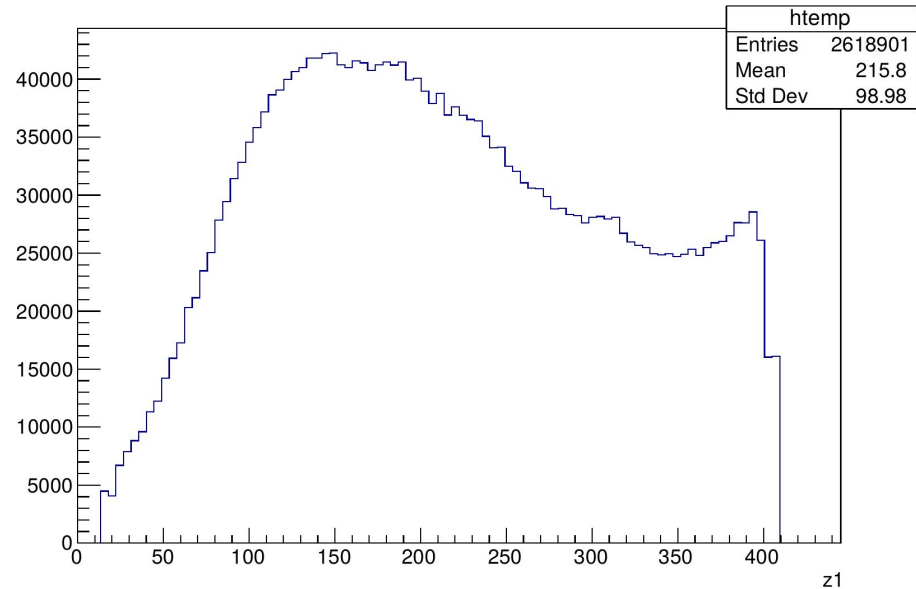
E1_raw from a smeared files



z1 from dana_rest files

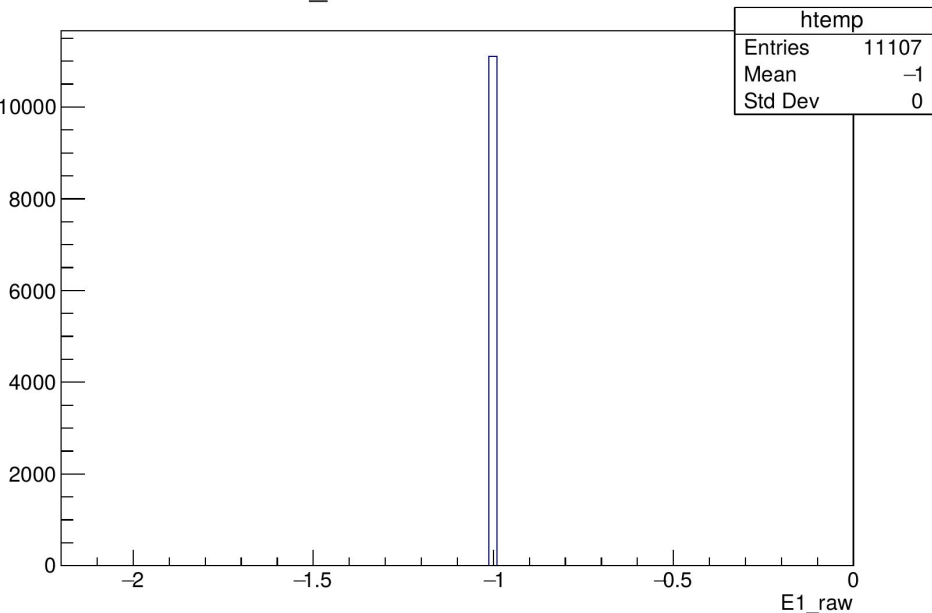


z1 from smeared files

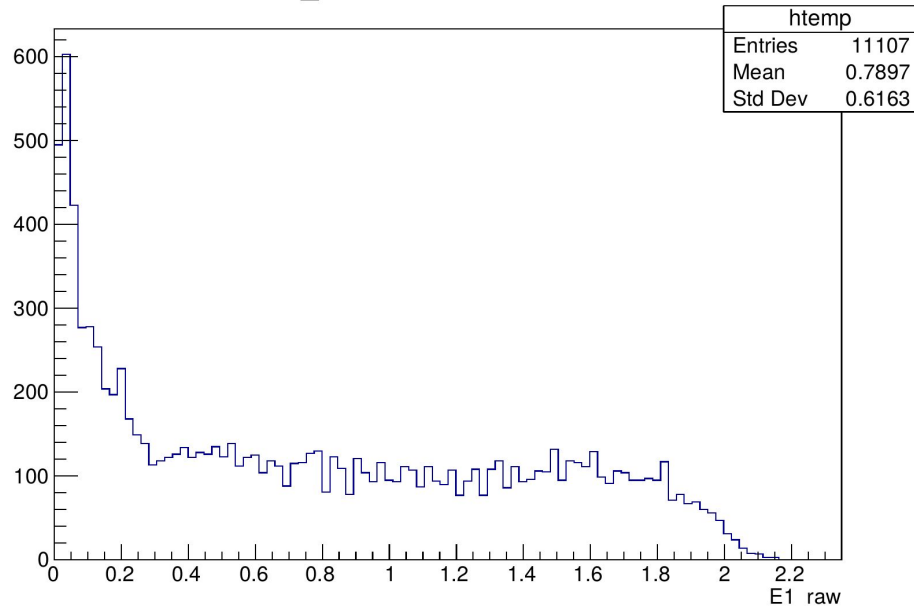


Testing on a simple pion gun (10k events) to check if the plugin is wrong somehow.

E1_raw from smeared files



E1_raw from smeared files



Conclusions

- Generating a new set of bggen with saving smeared outputs to run over the plugin
- Is there any other ideas to select of neutral showers from a bggen sample to use the existing bggen samples?
 - A simple match between thrown information and the reconstructed BCALShower will work?
But this only matches photons and may not be same as selecting out in skims
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