

Status and Plan for HPS MC

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Jan 26th, 2022

HPS Weekly Meeting

2019 MC

- Pass0 samples:
 - Detector: HPS-PhysicsRun2019-v2-4pt5
 - Information: <https://confluence.slac.stanford.edu/display/hpsg/2019+MC+Samples>
- Needs for next pass:
 - Parameters for beam rotation and target offsetting
 - Update detector setup with update of alignment

2021 MC

- Samples were produced for trigger tuning of 2021 experiment: <https://confluence.slac.stanford.edu/display/hpsg/Future+experiments>
- With recent updates for hps-java, MC softwares have been ready for 2021 MC production.
- Alignment of calibration is ongoing.
- Single particles for Ecal calibration.

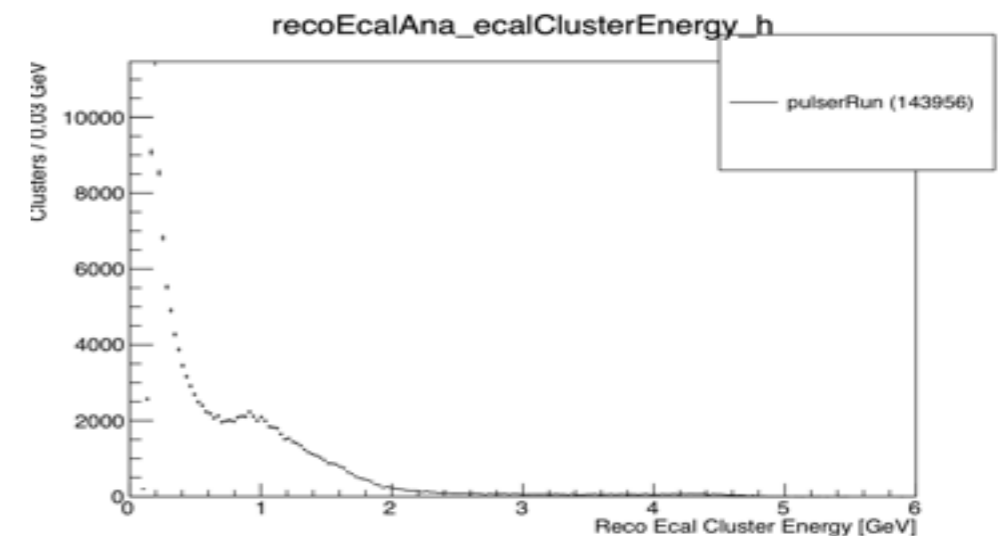
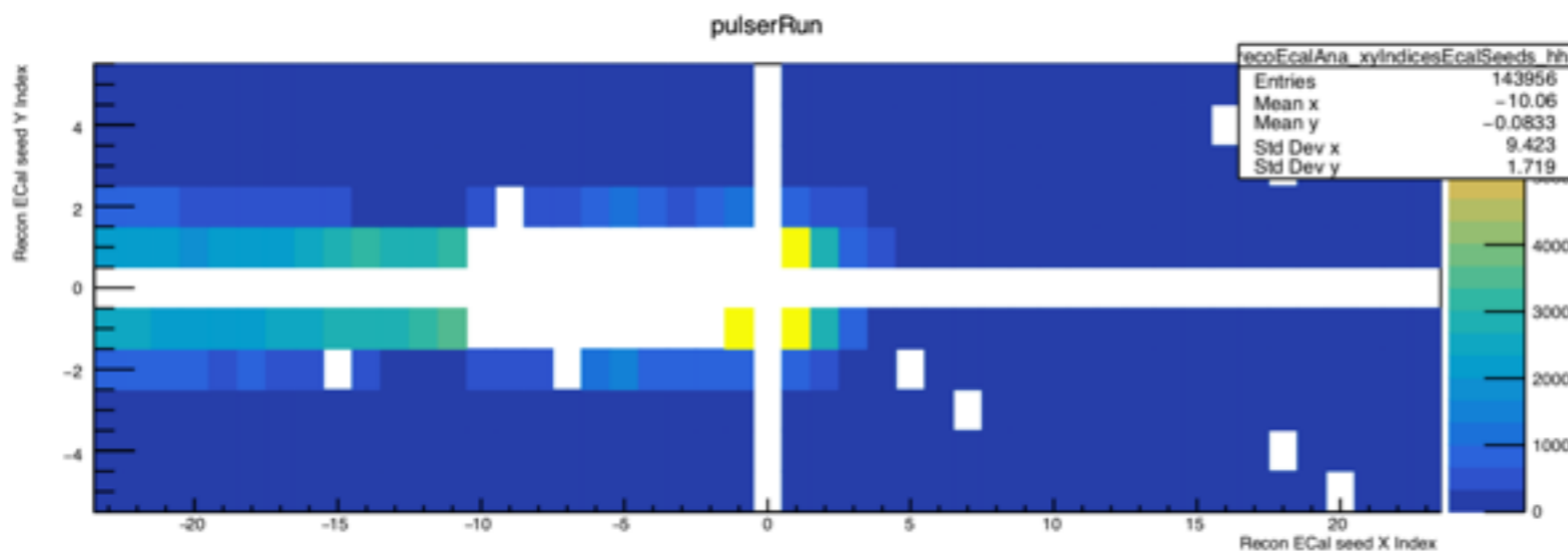
Software

- Beginning on March 1st, 2022, the Auger and swif1 commands will no longer be available for JLab batch machines. Swif2 mode has been added into hps-mc by Jeremy to replace Auger mode.
- Omar made great progress with SLIC filtering for MC biasing, and he will work with Cameron to find out how best to integrate his recent work on SLIC into hps-mc.
- Code development for MC event overlaid with pulser data have been done. Validation is ongoing.
- Todo list:
 - For SIMP analysis, update MadGraph for lower PSum cut
 - Application of OSG
 - Replacing EGS5 and simulation preprocessing tools with GEANT4, using hps-sim?

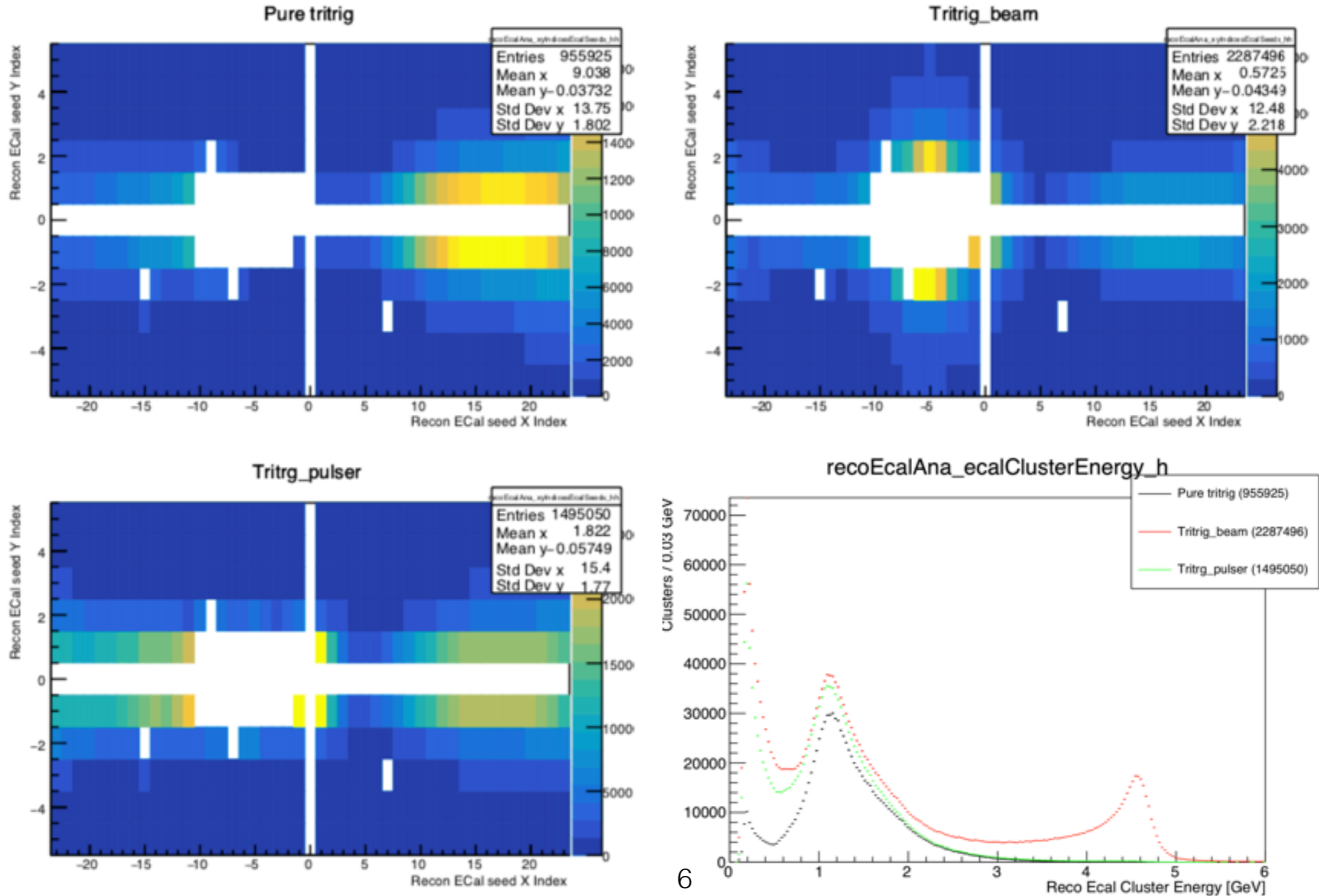
Validation for MC Event Overlaid with Pulser Data

- Three samples with single3 trigger (2019 MC) were produced for test.
 - Pure tritrig
 - Tritrig + MC beam
 - Tritrig + pulser data (run 10646)

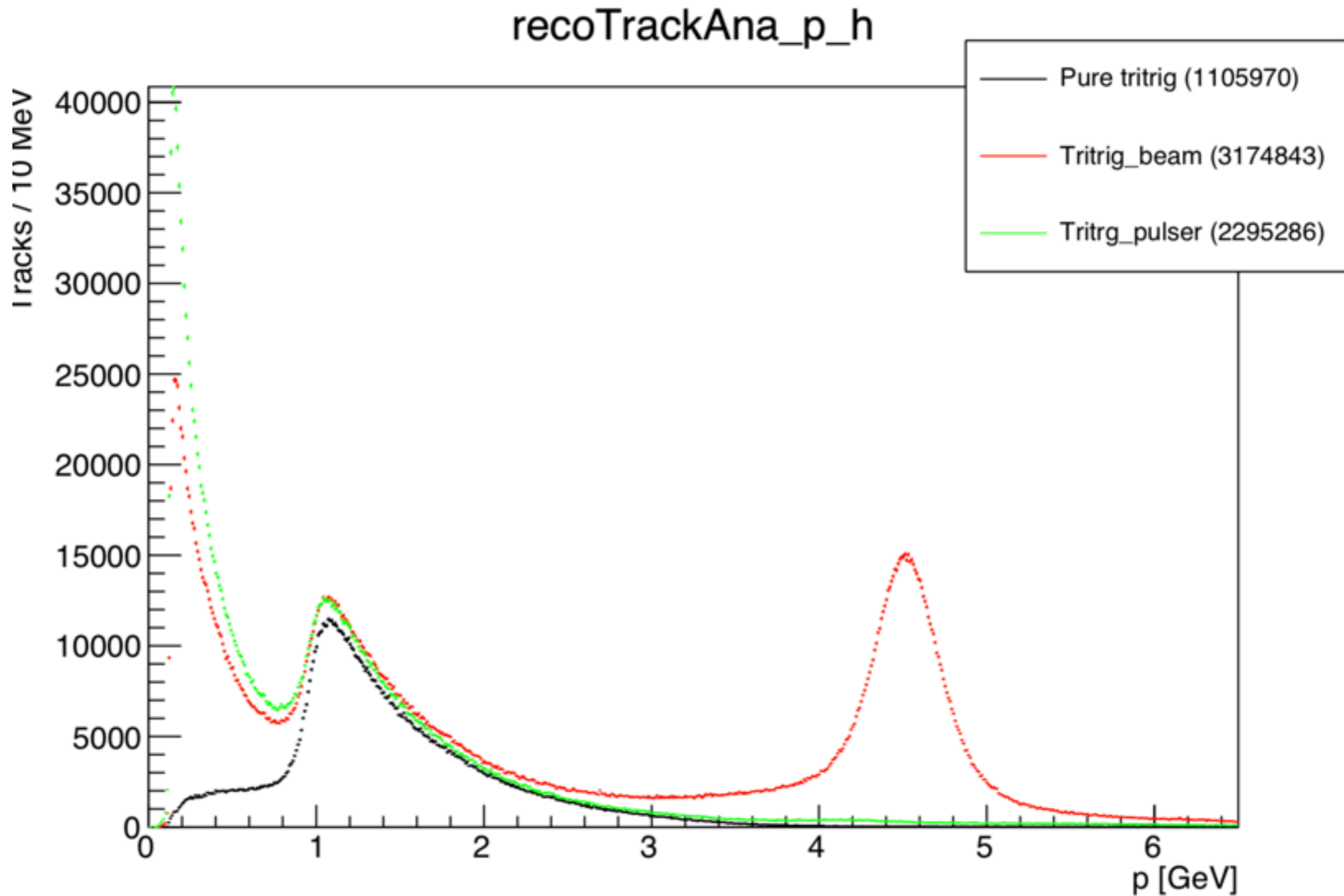
Ecal distributions for 2019 pulser data



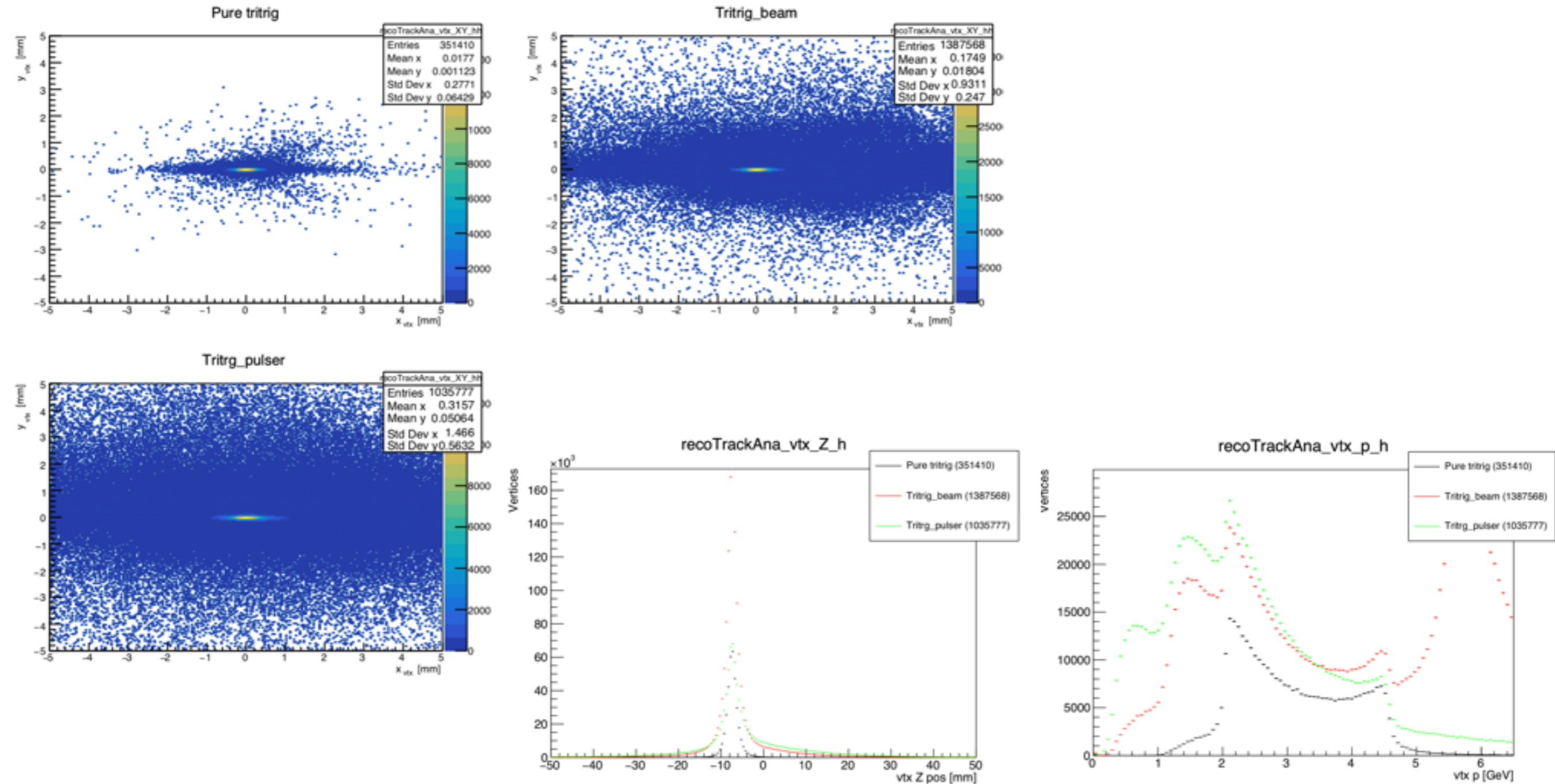
Comparison for ECal Clusters



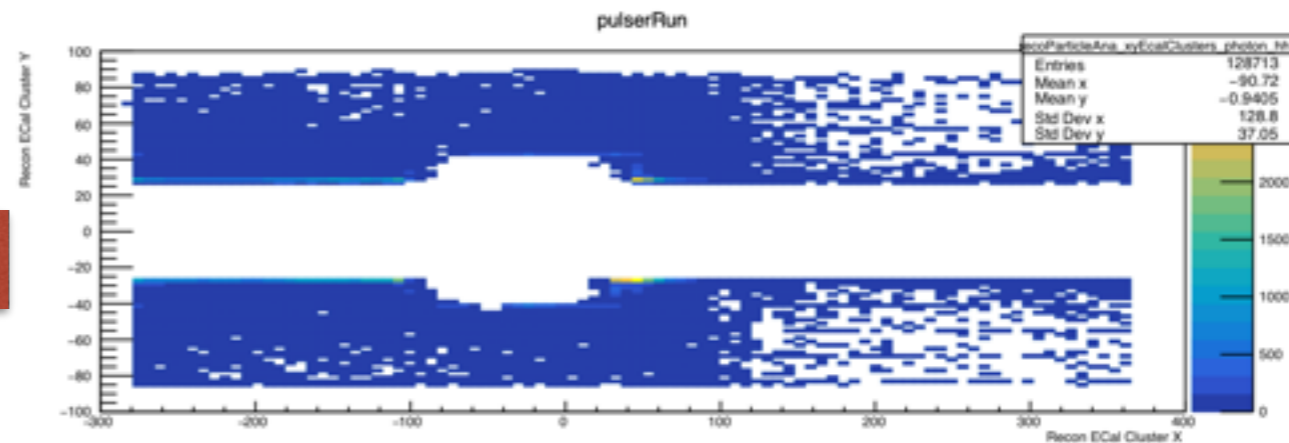
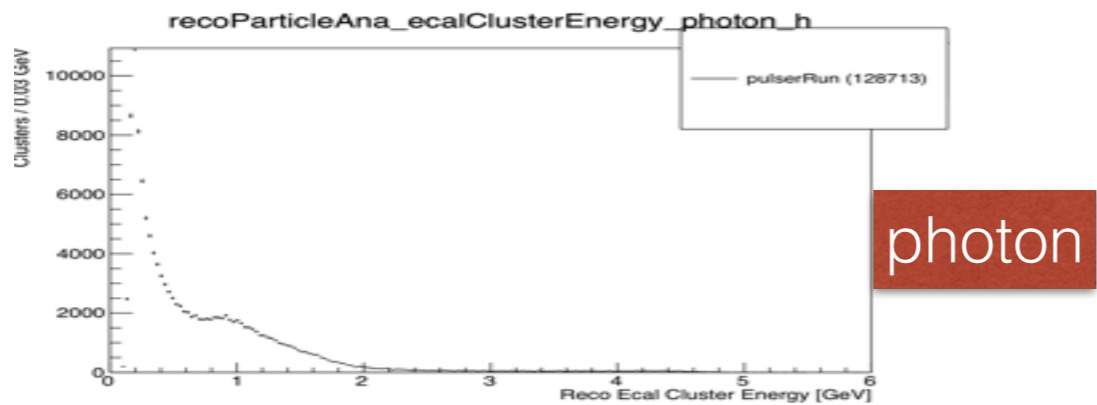
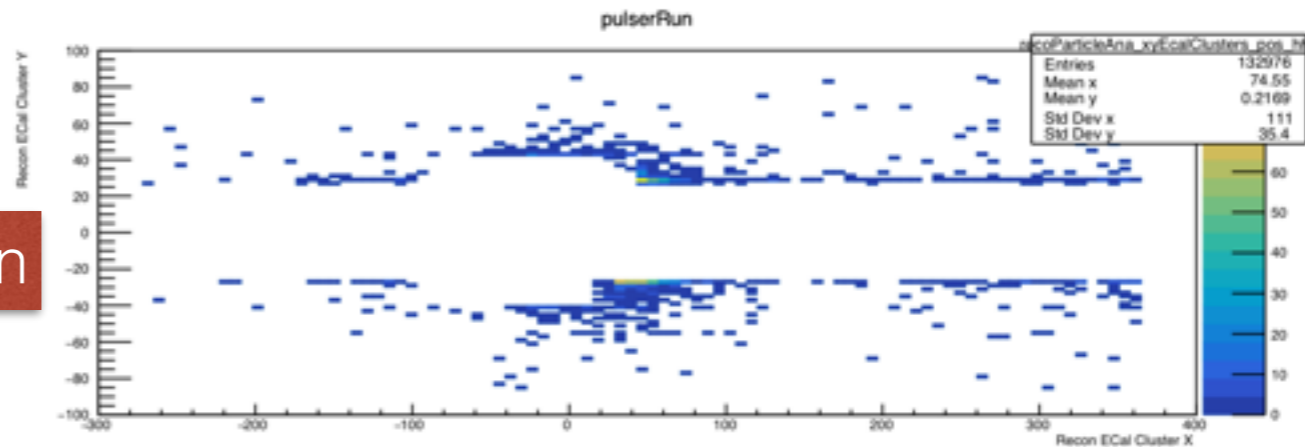
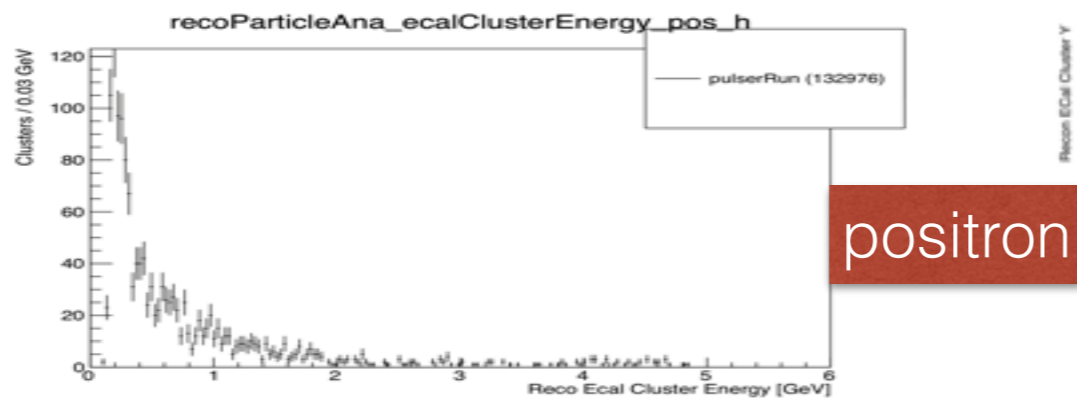
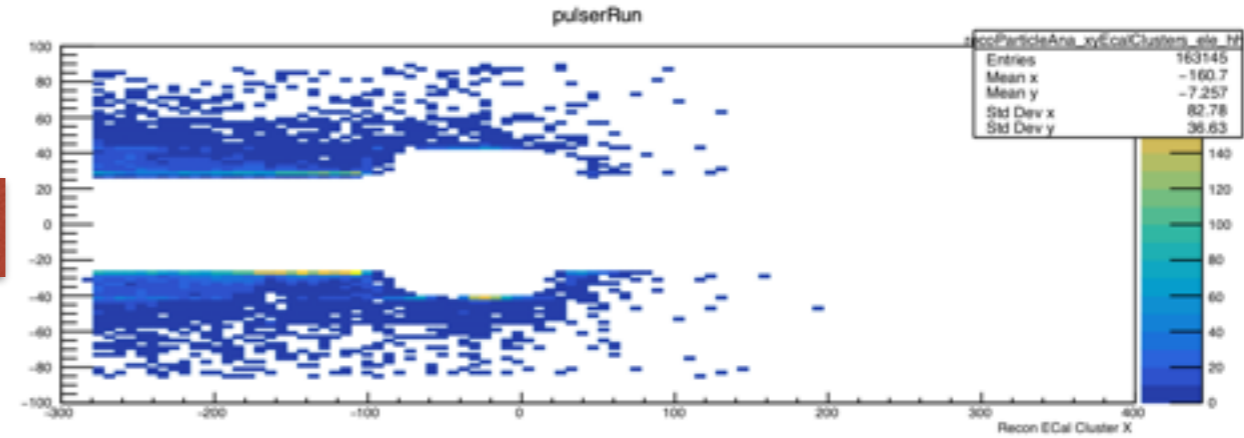
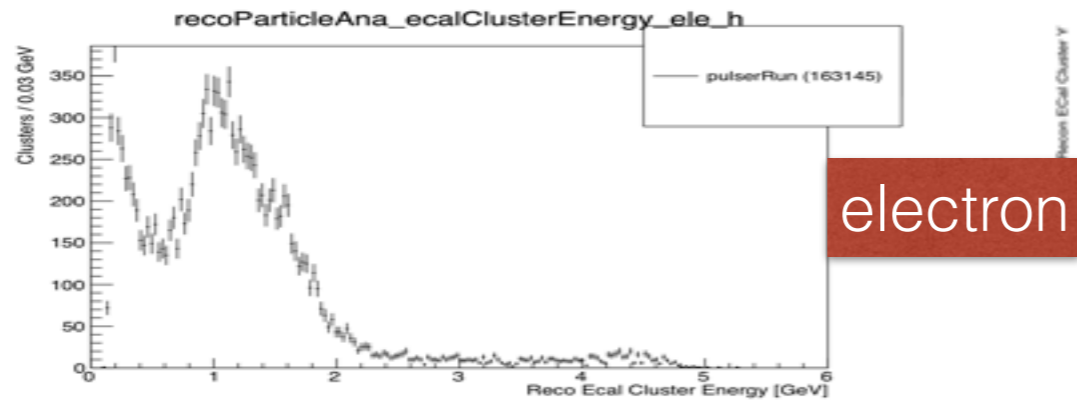
Comparison of Tracks



Comparison of Vertices



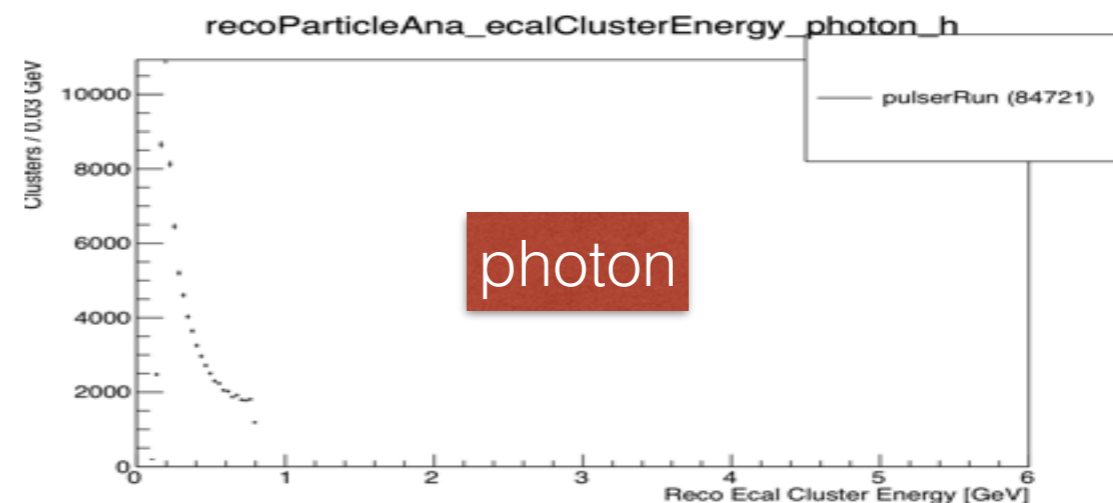
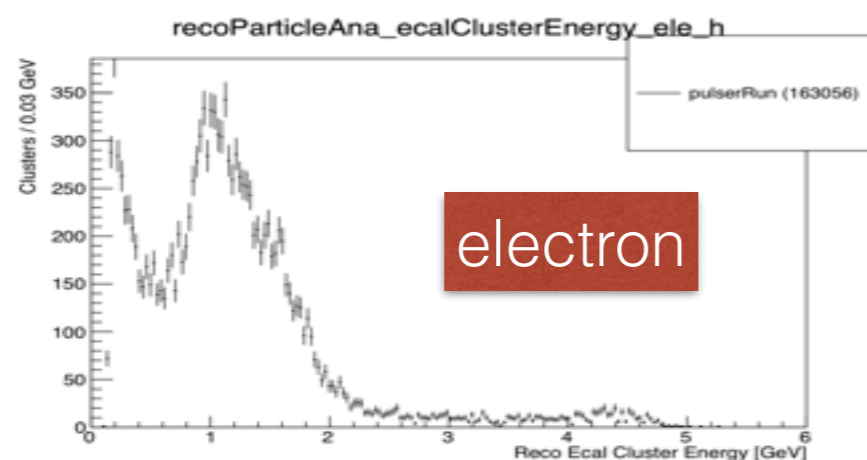
Why no Clear FEE Peak for Pulser Data?



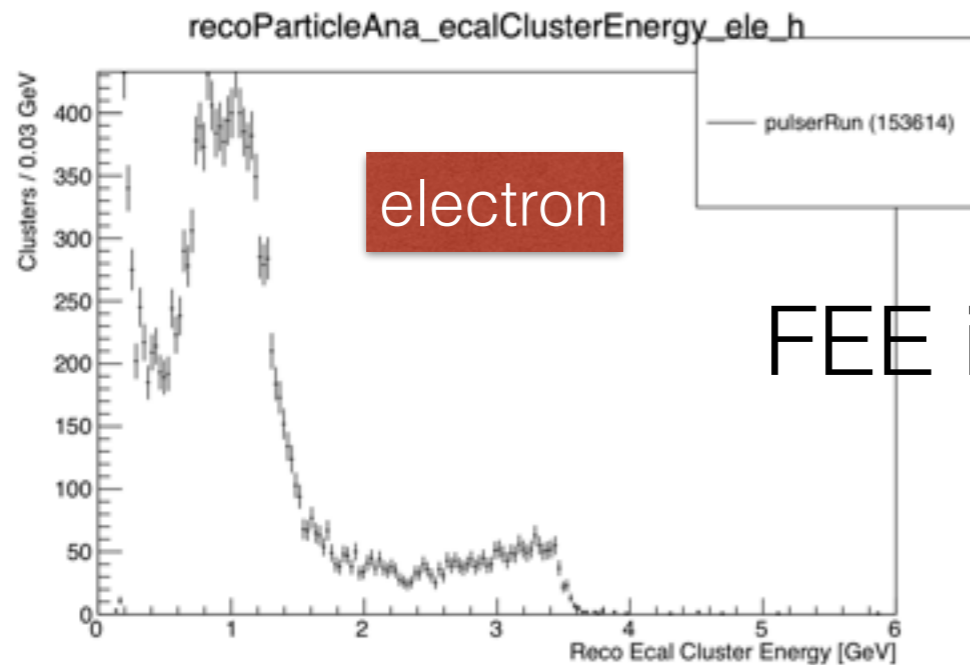
Kinematic Cuts for MC Beam

- Minimum for energy of e-: $0.005 \cdot E_{\text{beam}}$
 - Minimum for y direction ($|p_y/p|$) if energy is larger than $0.6 \cdot E_{\text{beam}}$ for e-: 0.005
 - Minimum for y direction ($|p_y/p|$) of photon: 0.004
 - Maximum for y direction ($|p_y/p|$) if energy is larger than 800 MeV for photon: 0.005
- If we apply these cuts into pulser data, FEE peak will somewhat stand out since some photons will be cut off, but still not sharp like MC beam.
 - I am contacting Takashi to confirm if my understanding for kinematic cuts in EGS5 is correct.

Final-state particles of 2019 random data



2021 Random Data



FEE is more clear for 2021 random data

