Energy and position resolution plots

Aug 27 (Tue)
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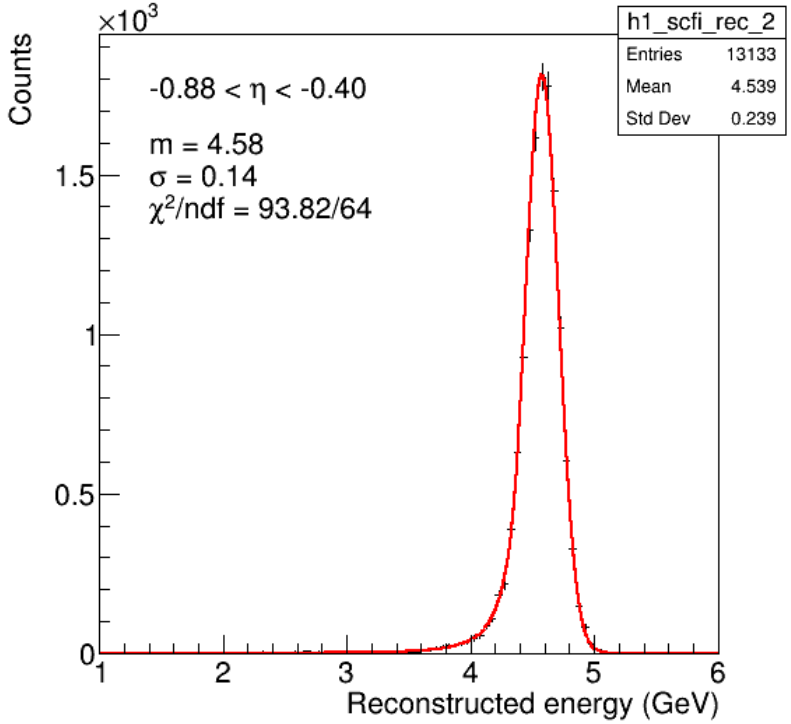
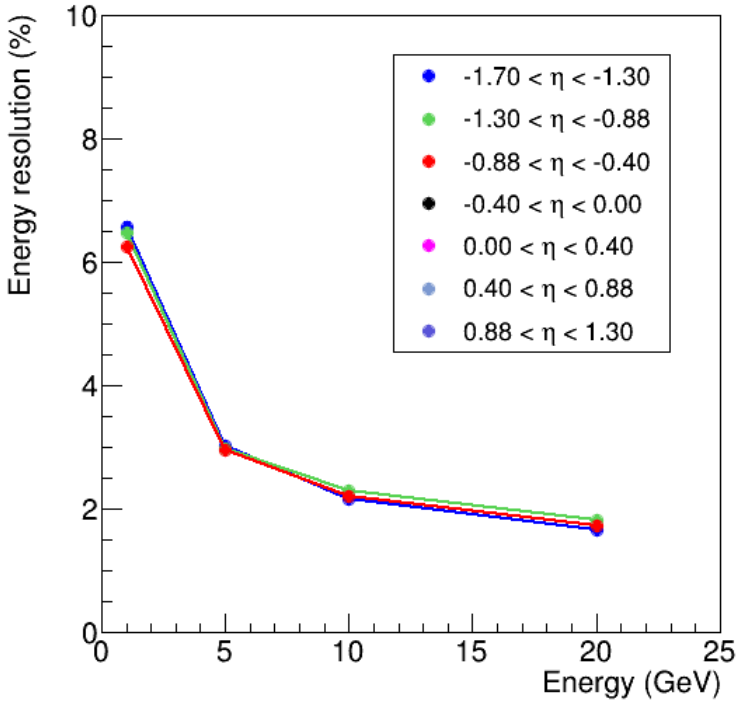
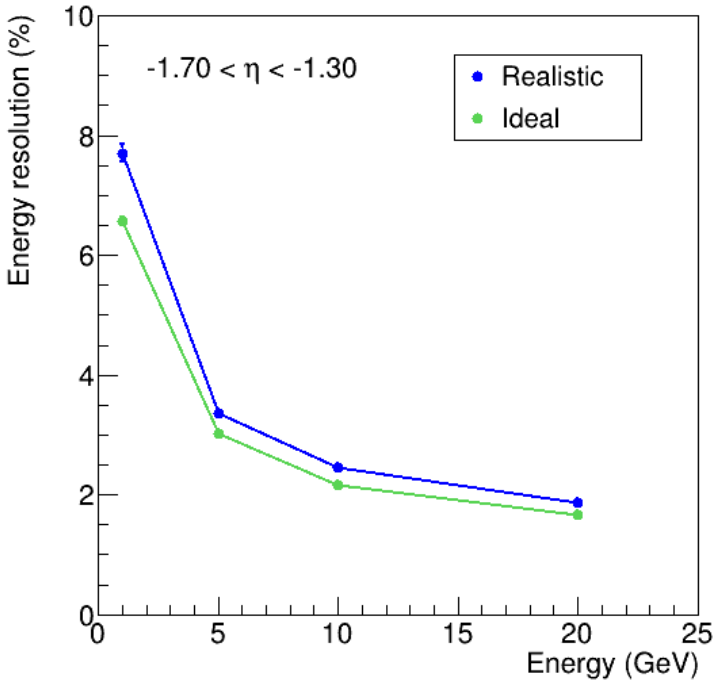
Energy resolution plot

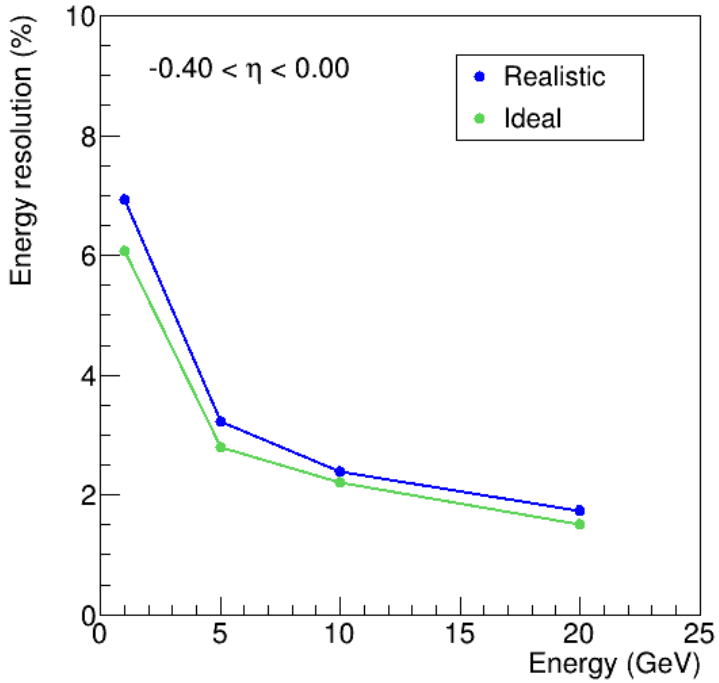




- The reconstructed energy distribution was fitted by a Crystal Ball function.
- Little η dependence. → There is little shower leakage.
- It might be better to reduce the number of η ranges.

More realistic situation





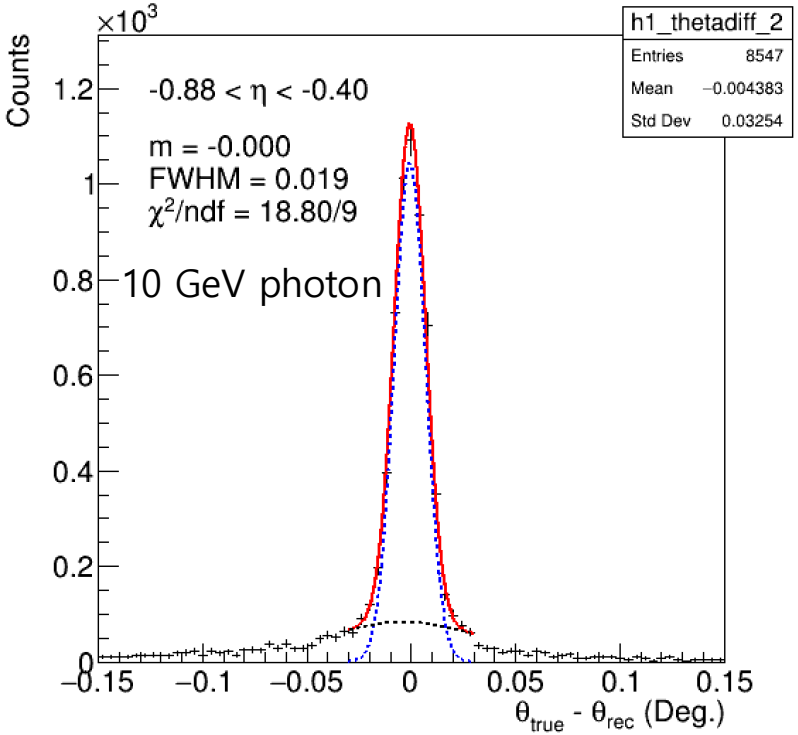
- In a given layer, the attenuation effect and GeV to number of photoelectrons were applied to every ScFi layer hits.
  → Sum all the photoelectrons and the Poisson smearing was applied.
  → Correct the attenuation effect, the number of photoelectrons was converted to GeV, and a geometry mean was calculated.
  → Sum all the layers.

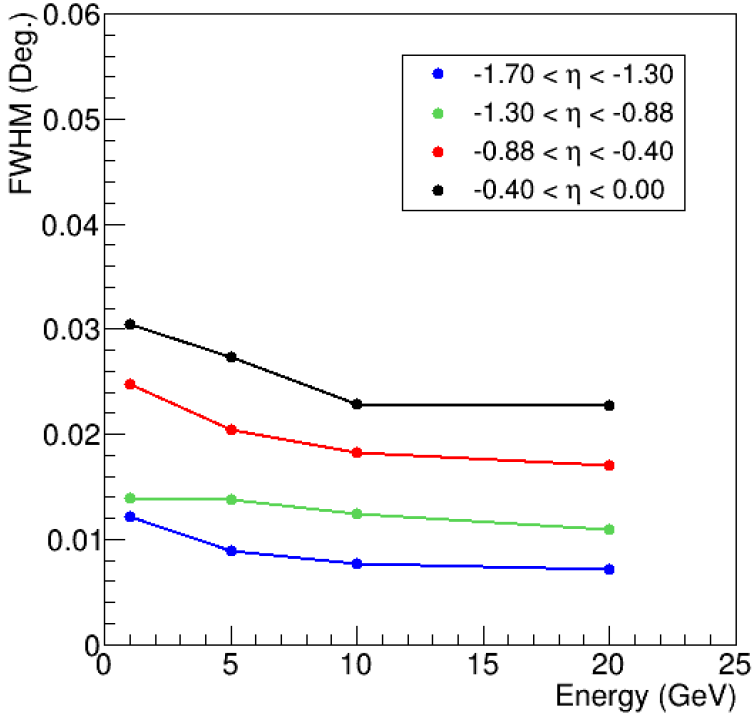
- The realistic cases show about 0.5-1.0% worse resolution.

Position reconstruction

- We want to use the small amount of pixel information from the layer where the EM shower starts to be developed.
- More information from the following layers worsens the resolution. It will be close to the cluster performance.
- Because there is no 2nd layer information in the current eicrecon file, we can't select the events where the shower starts to be developed from the 3rd layer. → In this report, the position was reconstructed only by the 1st layer.
- The position was reconstructed by energy-weighted average of the imaging layer hits to suppress a bias by the magnetic field in the ϕ reconstruction.

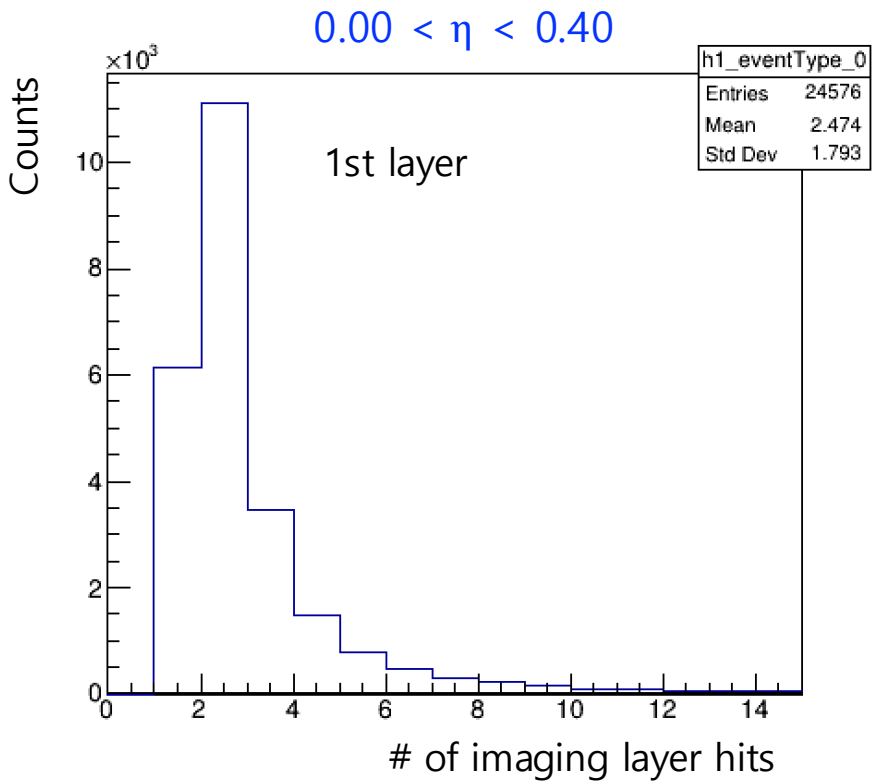
θ resolution plots

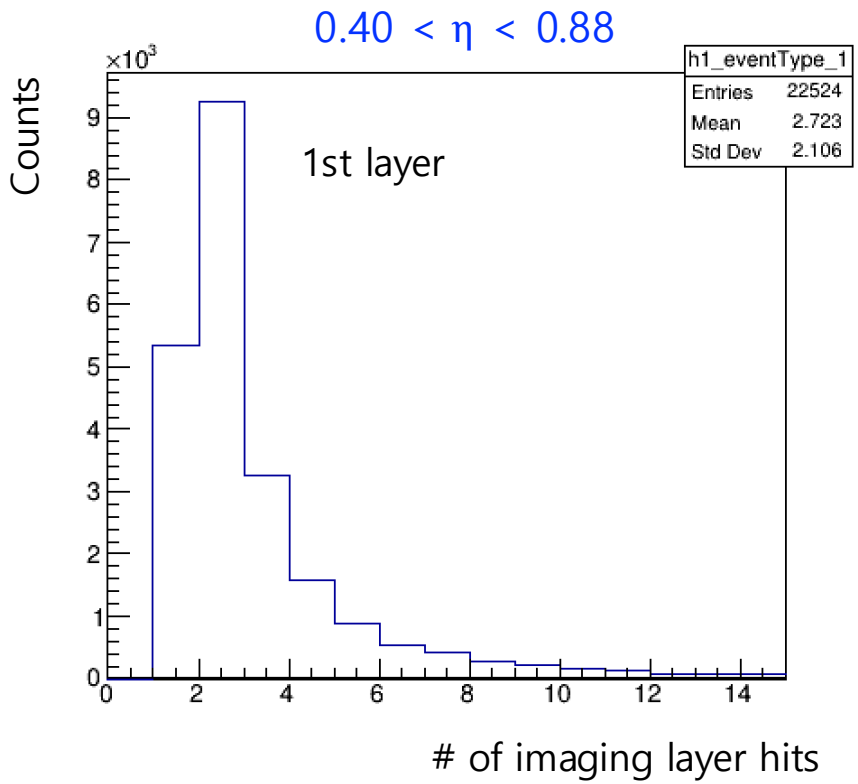




- FWHM of the θ difference distribution was estimated by fitting the distribution with double Gaussian.
- Larger |η| showed better resolution.

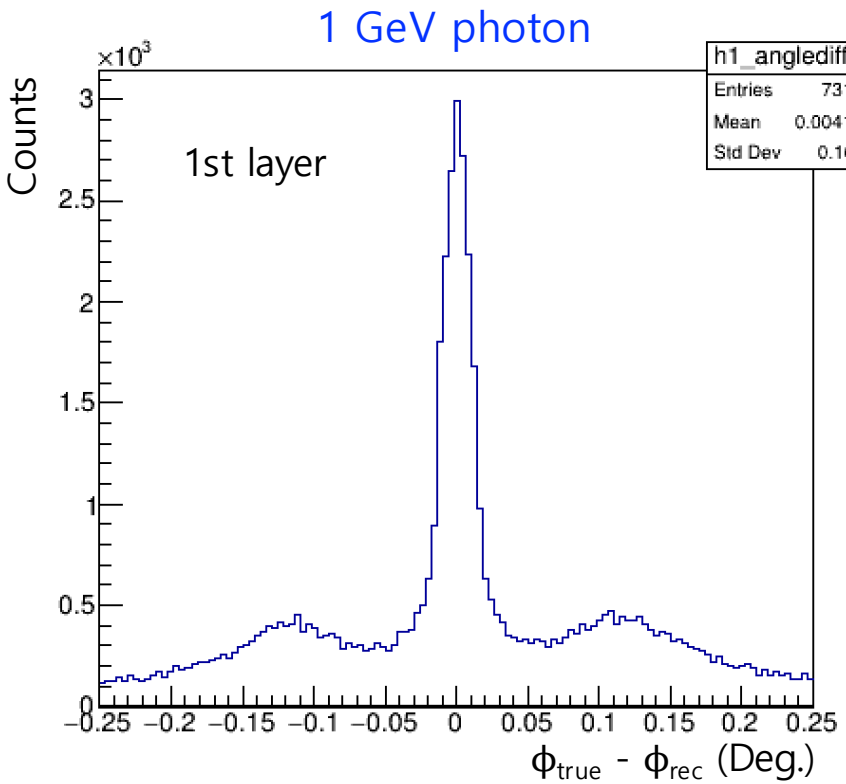
θ resolution plots

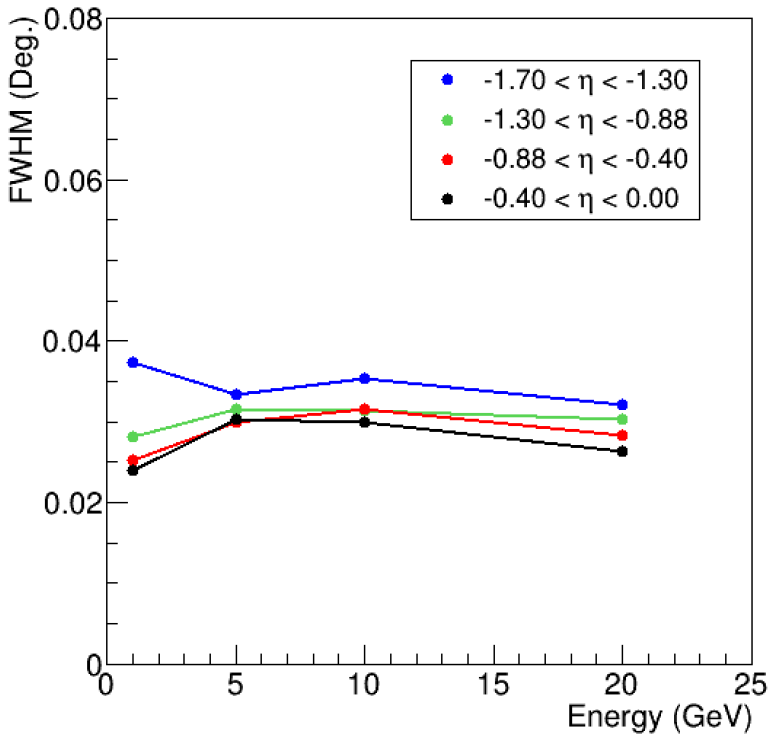




- The larger η makes the position fluctuations by the shower particles smaller because they should be projected to the z-axis to reconstruct θ.

ϕ resolution plots

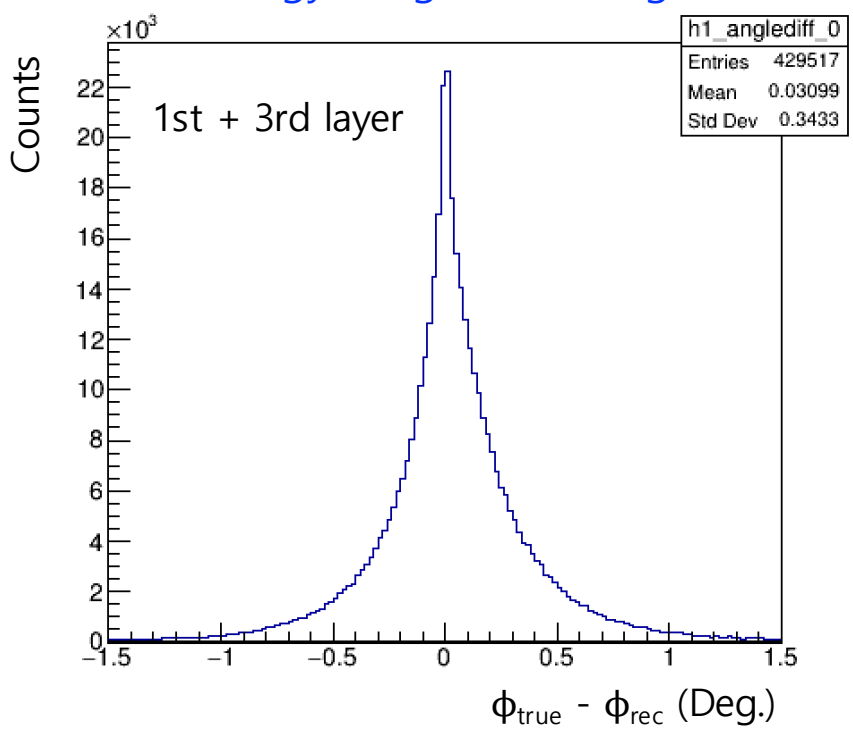




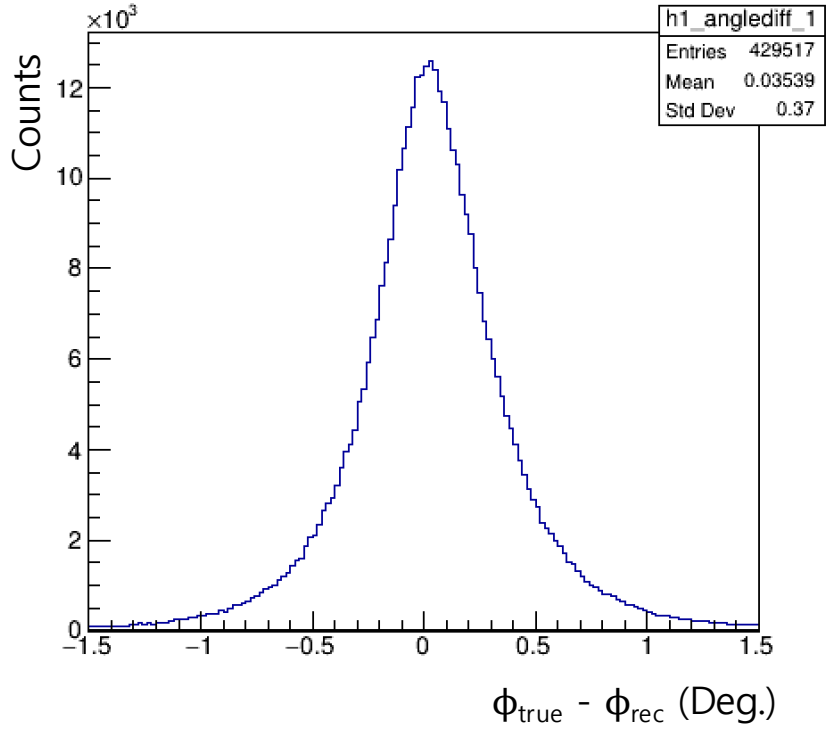
- The ϕ difference distribution seriously suffers from the magnetic field.
- Only the middle sharp peak was fitted (wrong), but it seems like the magnetic field made the ϕ resolution plot messy.

ϕ resolution plots

Energy-weighted average



Cluster



- If we use one more layer (3rd layer), we can make the distribution look better for fitting, but the effect of the magnetic field will increase.
- If we implement the 2nd layer, the shape will be much better.

Shower overlapping

- How about studying the shower overlapping using single π^0 eicrecon file first?