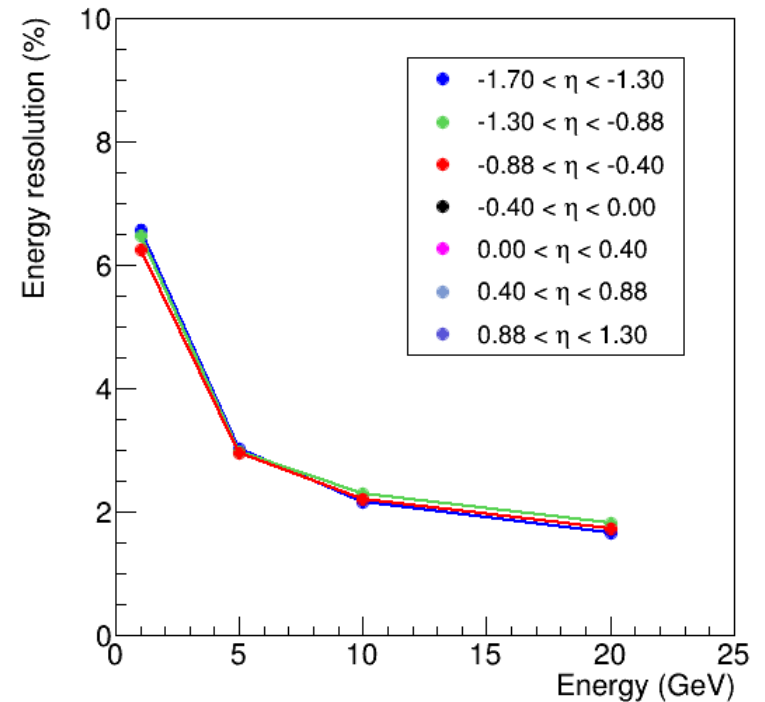
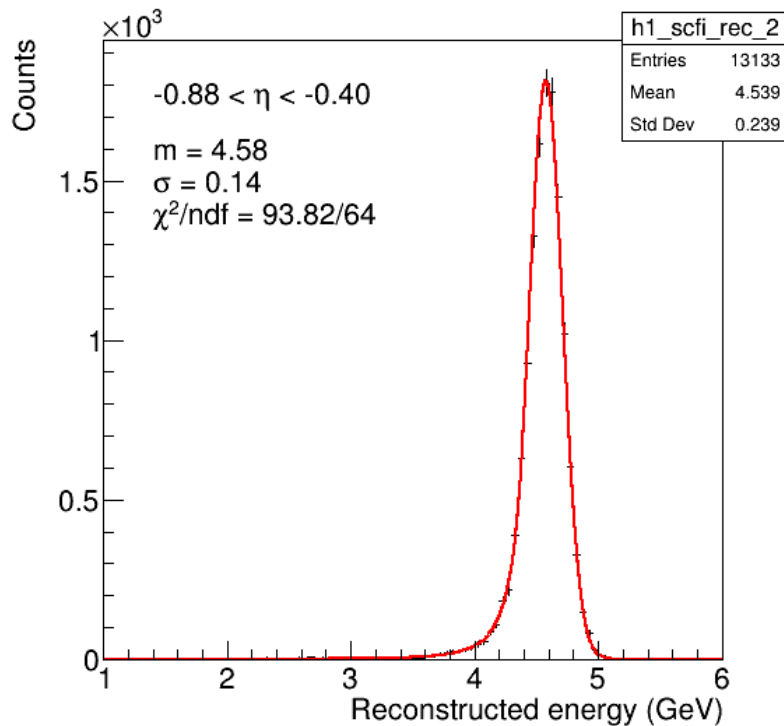


# Energy and position resolution plots

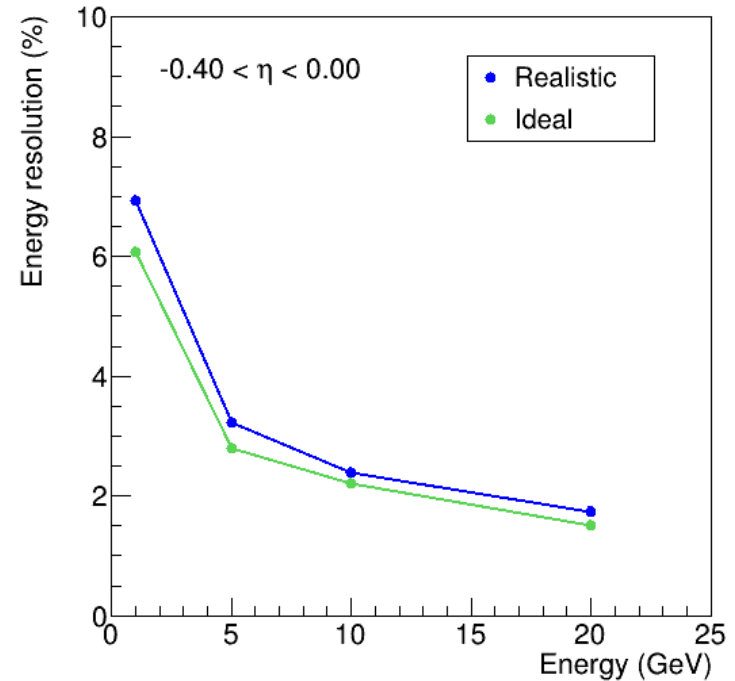
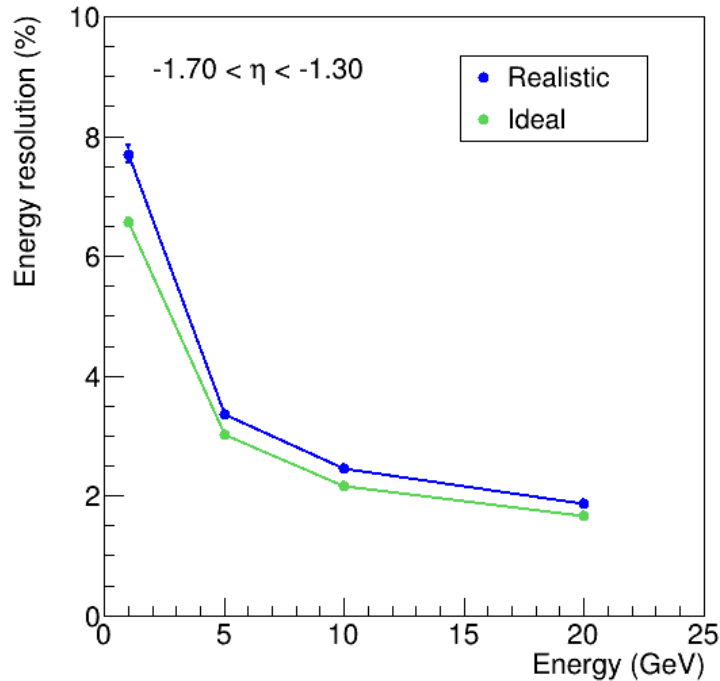
Aug 27 (Tue)  
Minho Kim

# Energy resolution plot



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

# More realistic situation

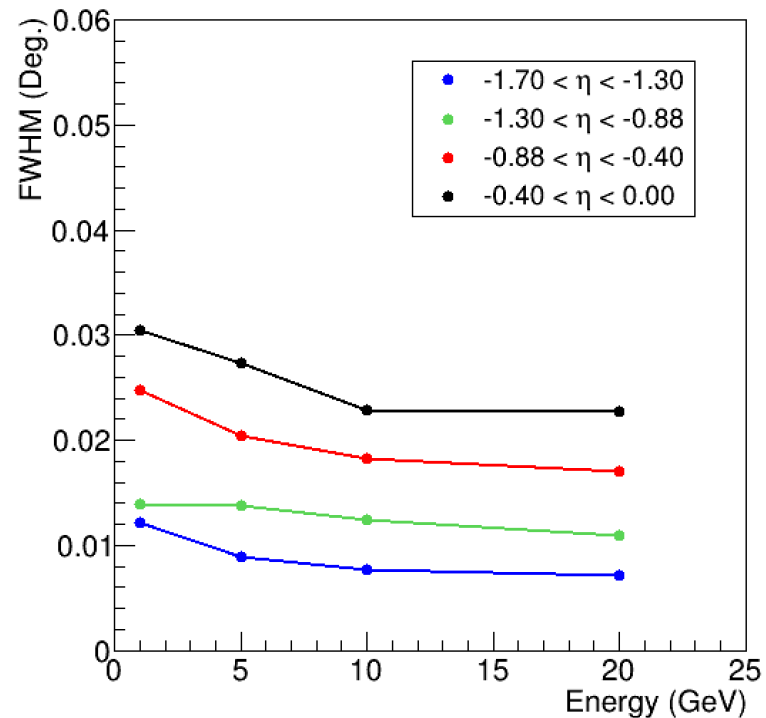
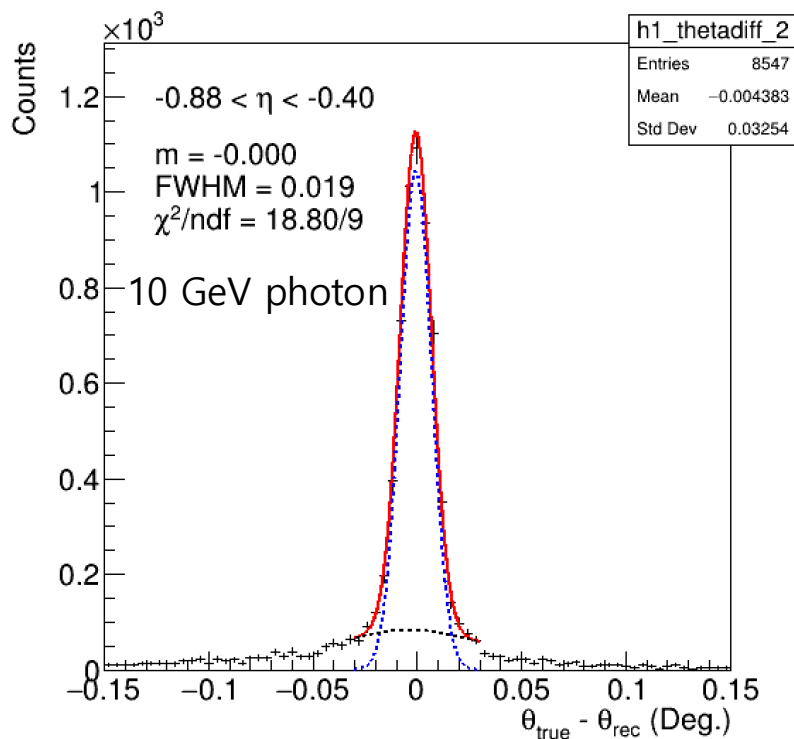


- In a given layer, the attenuation effect and GeV to number of photoelectrons were applied to every ScFi layer hits.
  - Sum all the photoelectrons and the Poisson smearing was applied.
  - Correct the attenuation effect, the number of photoelectrons was converted to GeV, and a geometry mean was calculated.
  - Sum all the layers.
- The realistic cases show about 0.5-1.0% worse resolution.

# Position reconstruction

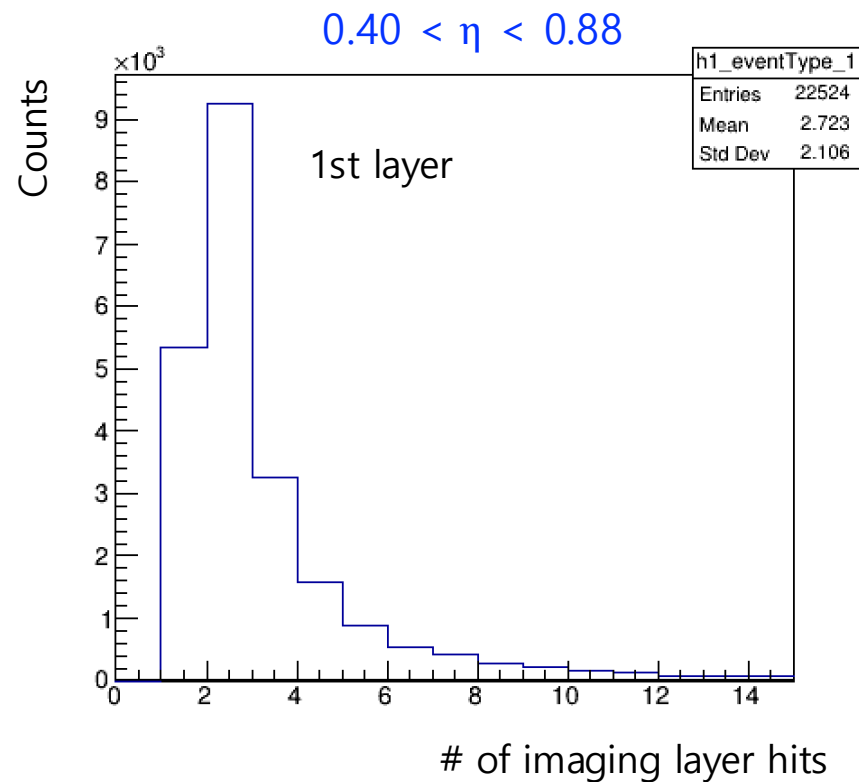
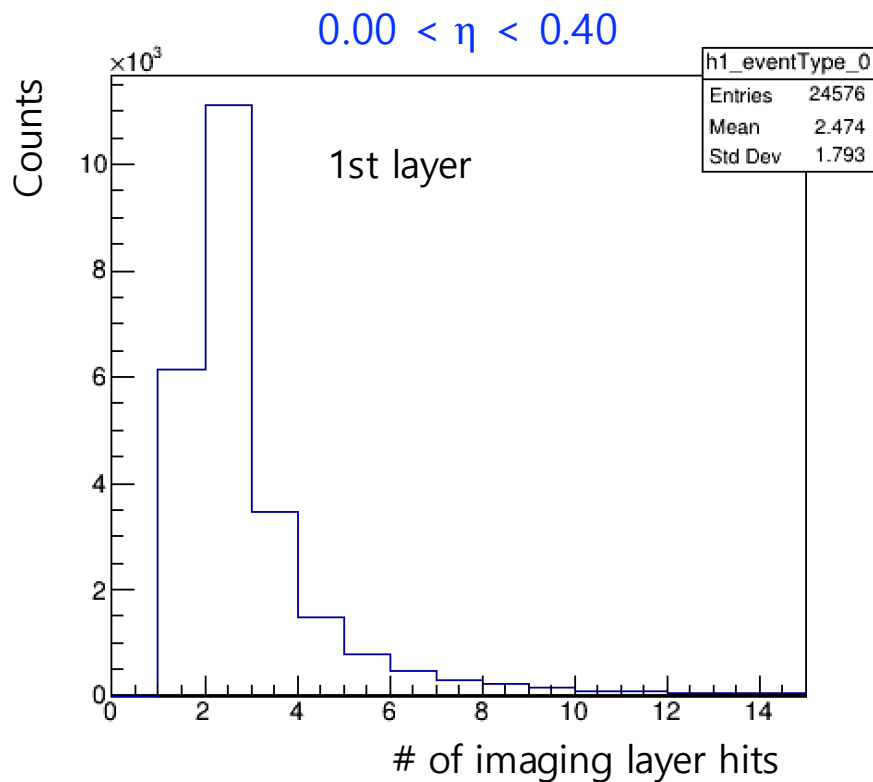
- We want to use the small amount of pixel information from the layer where the EM shower starts to be developed.
- More information from the following layers worsens the resolution. It will be close to the cluster performance.
- Because there is no 2nd layer information in the current eicrecon file, 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  $\phi$  reconstruction.

# $\theta$ resolution plots



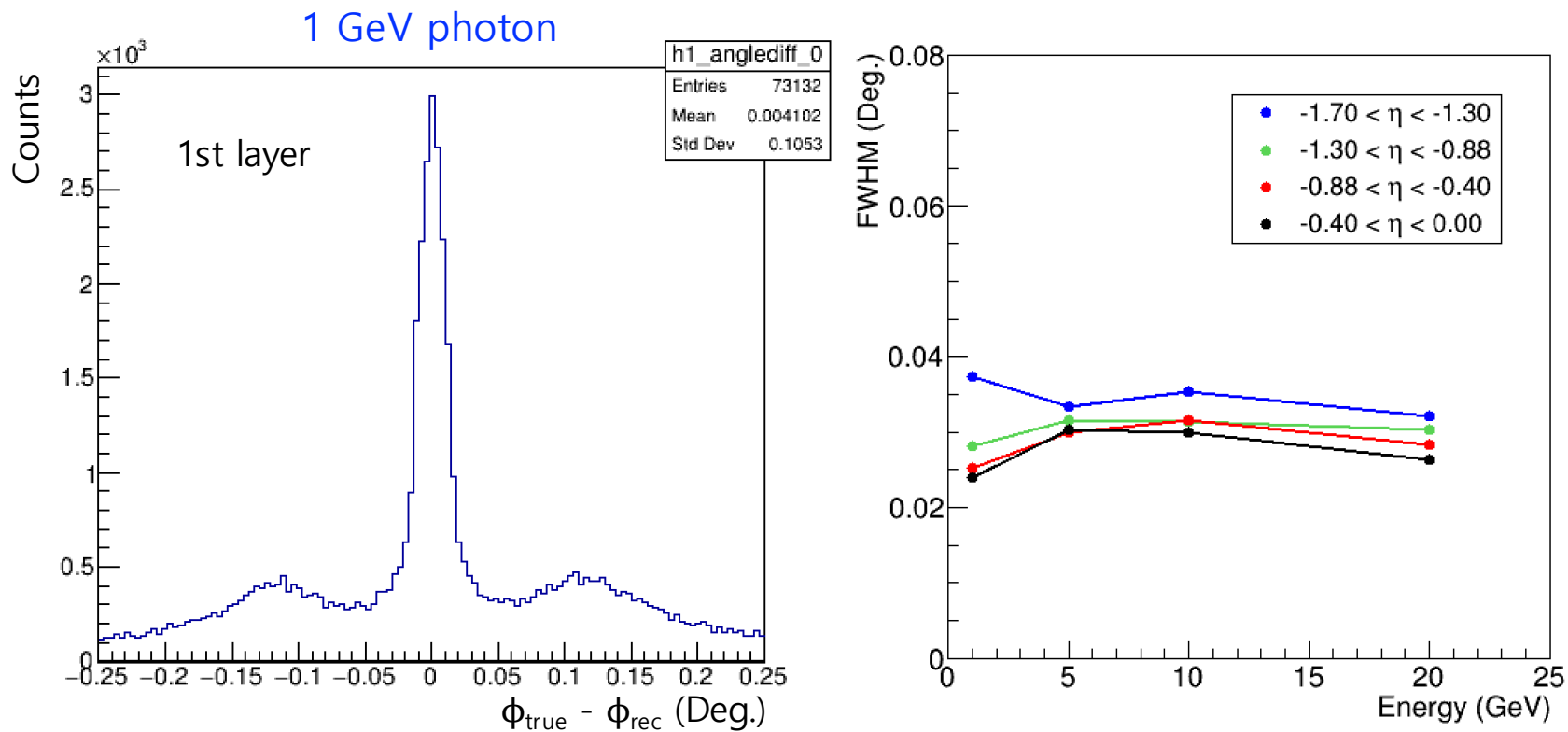
- FWHM of the  $\theta$  difference distribution was estimated by fitting the distribution with double Gaussian.
- Larger  $|\eta|$  showed better resolution.

# $\theta$ resolution plots



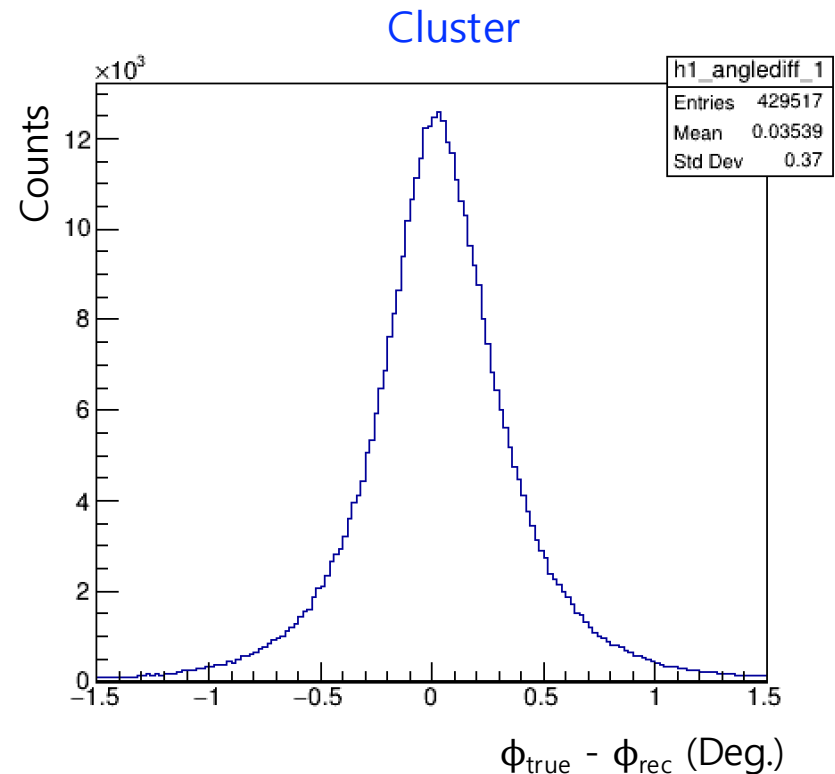
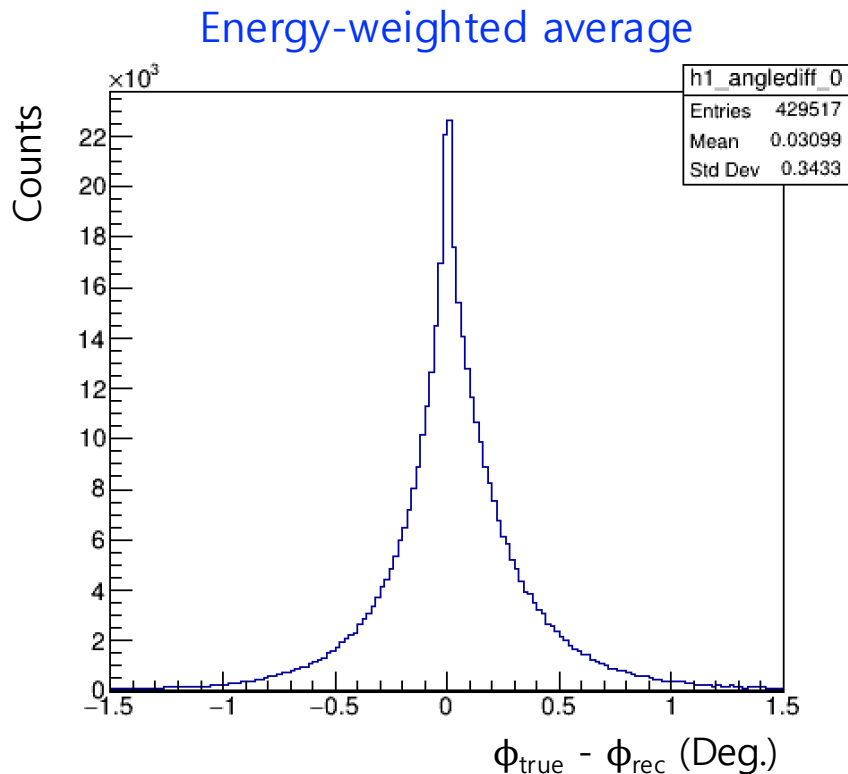
- The larger  $\eta$  makes the position fluctuations by the shower particles smaller because they should be projected to the z-axis to reconstruct  $\theta$ .

# $\phi$ resolution plots



- The  $\phi$  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  $\phi$  resolution plot messy.

# $\phi$ resolution plots



- 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  $\pi^0$  eicrecon file first?