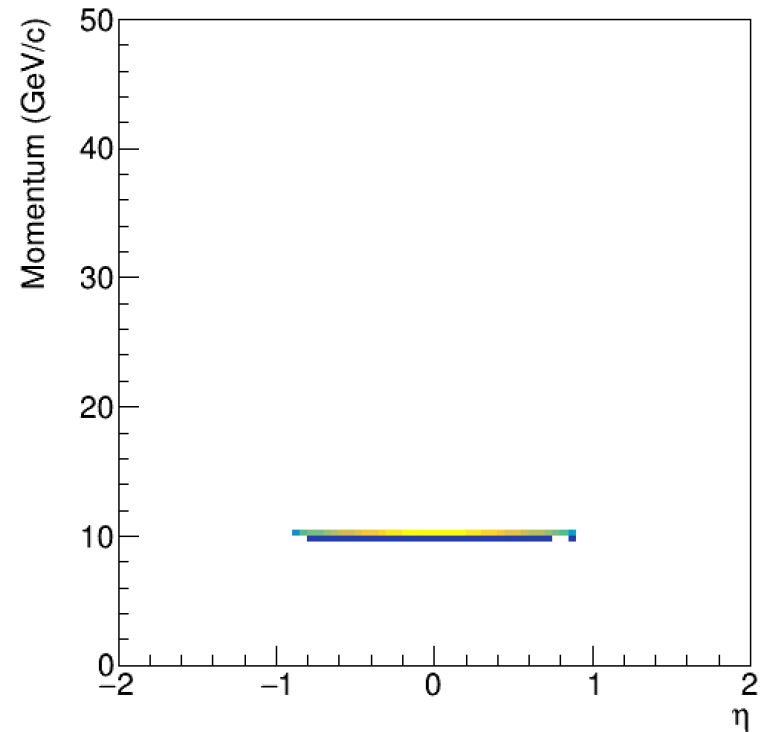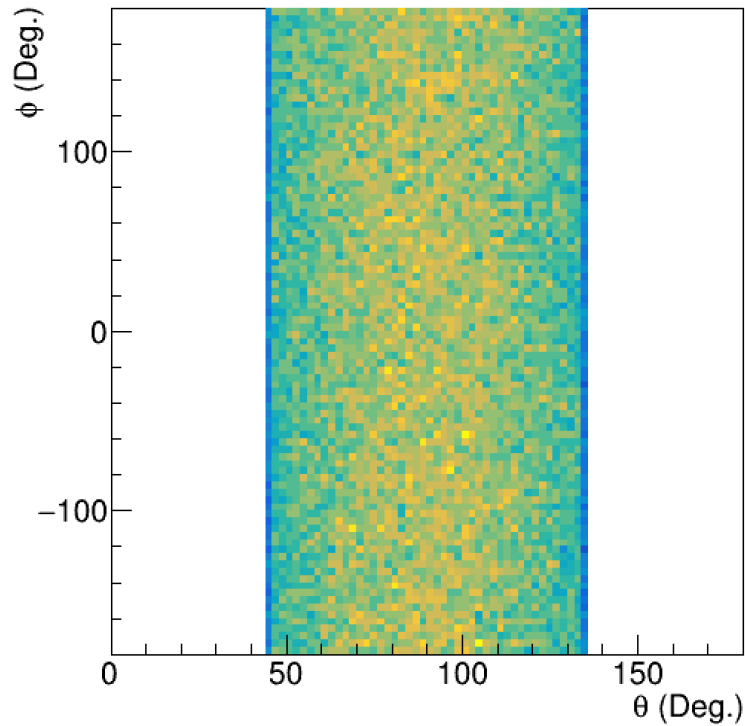# Plots to be saved by the benchmark

Aug 06
Minho Kim

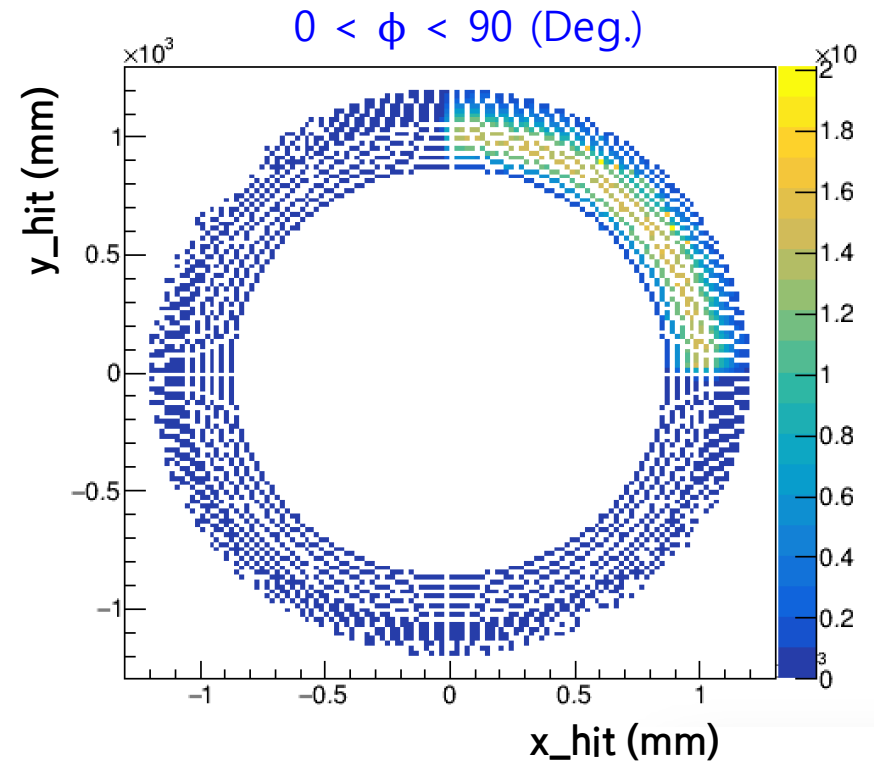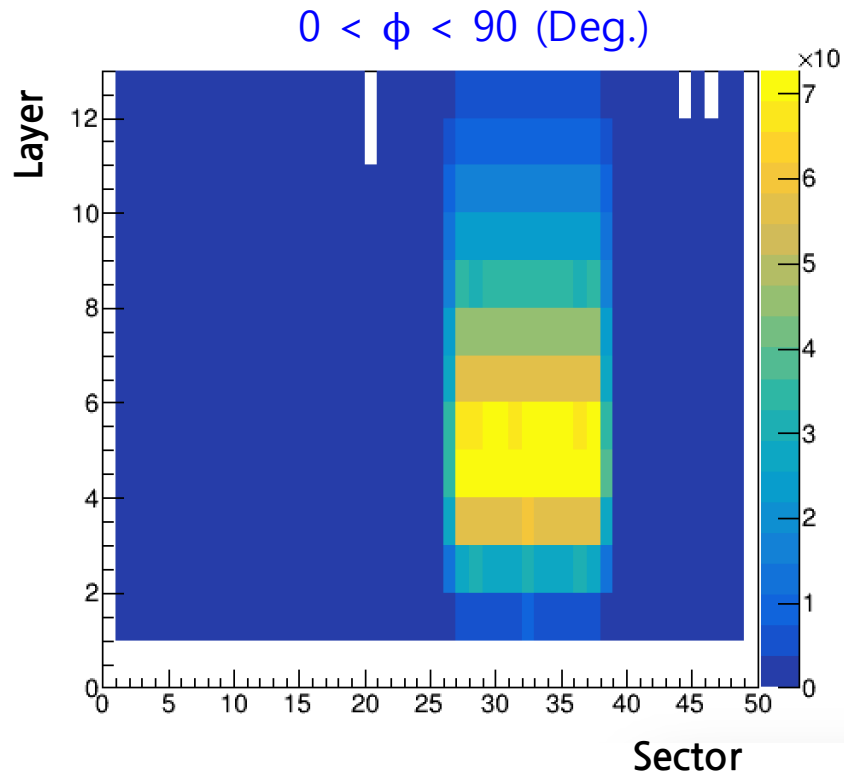# Items to be checked by the benchmark

- Whether the beam was generated well.

- Whether the shower was developed well in the BIC.

- Whether the BIC reconstructed the beam properly.

# Beam information



- θ vs φ and $\eta$ vs Mom. Distributions show us the beam energy and how the beam spread out.

# Shower development (ScFi layers)



0 < φ < 90 (Deg.)

0 < φ < 90 (Deg.)

- The energy deposit-weighted sector vs layer and x_hit vs y_hit distributions with different φ ranges show that the EM shower was well developed in the detector.

# Shower development (Imaging layers)
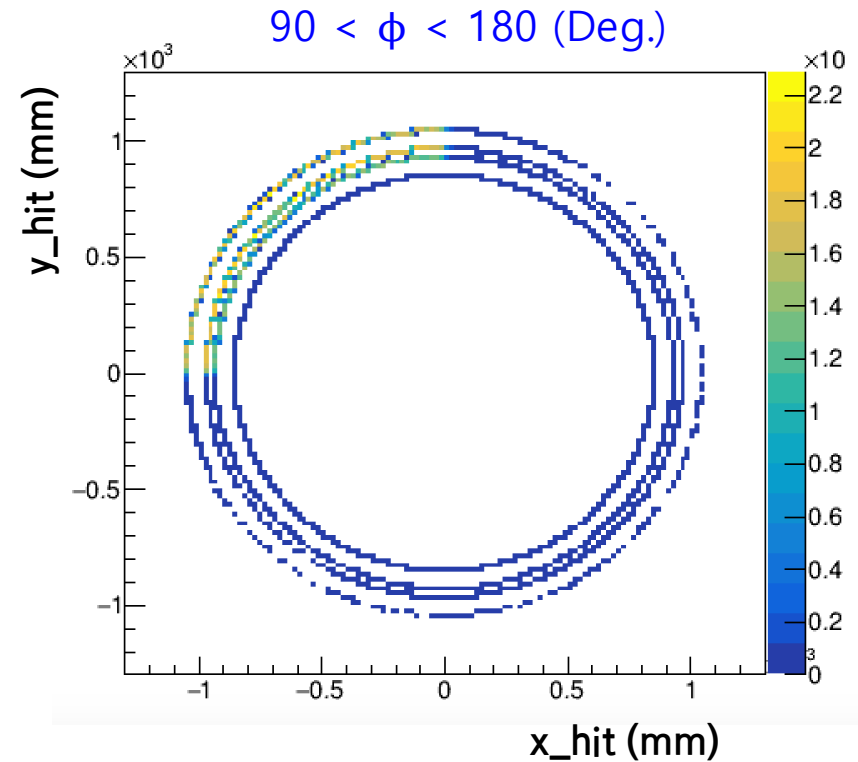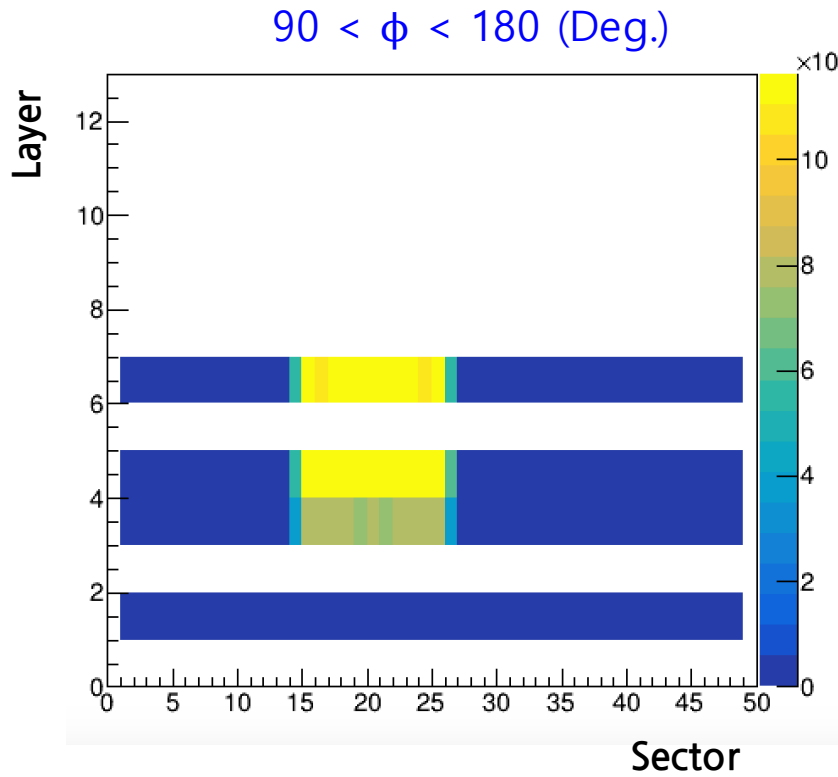


90 < φ < 180 (Deg.)

90 < φ < 180 (Deg.)

- The energy deposit-weighted sector vs layer and x_hit vs y_hit distributions with different φ ranges show that the EM shower was well developed in the detector.
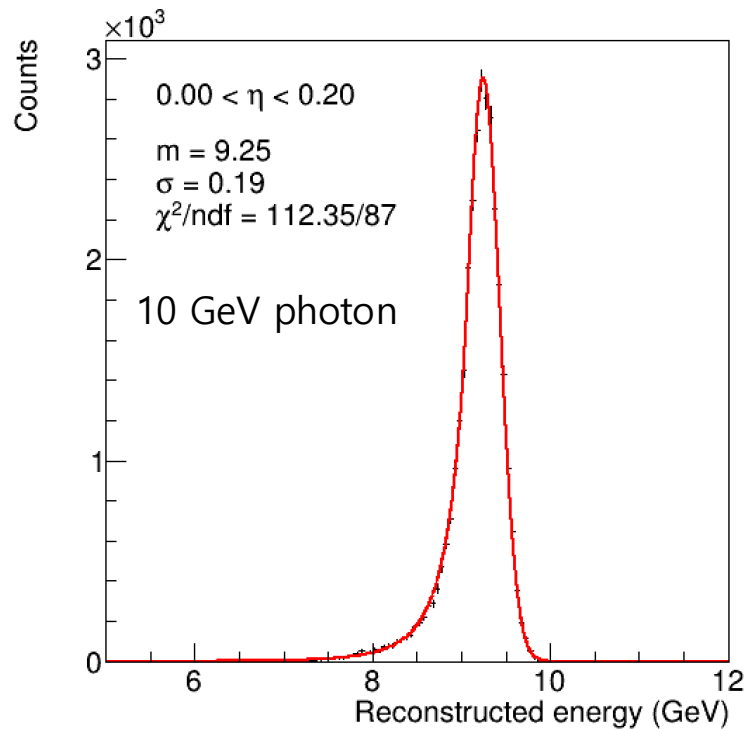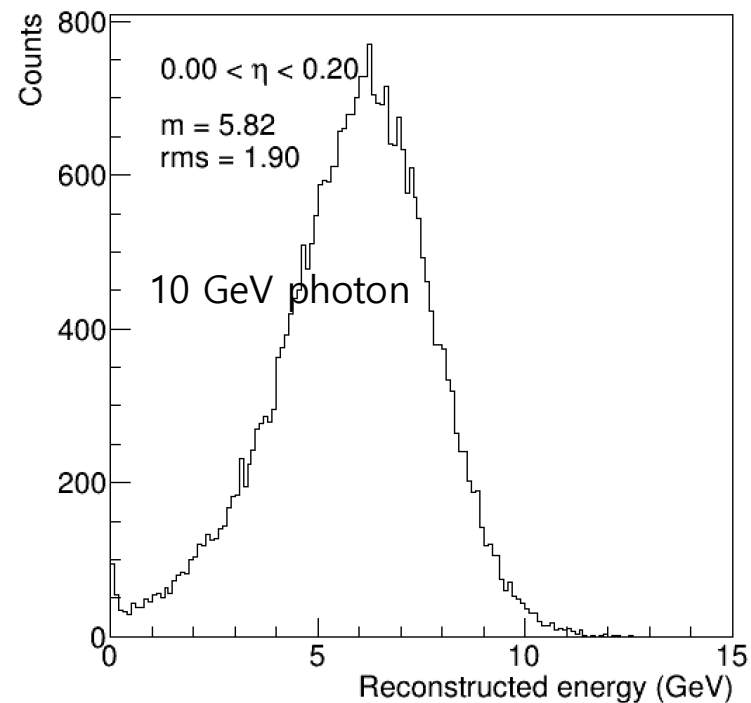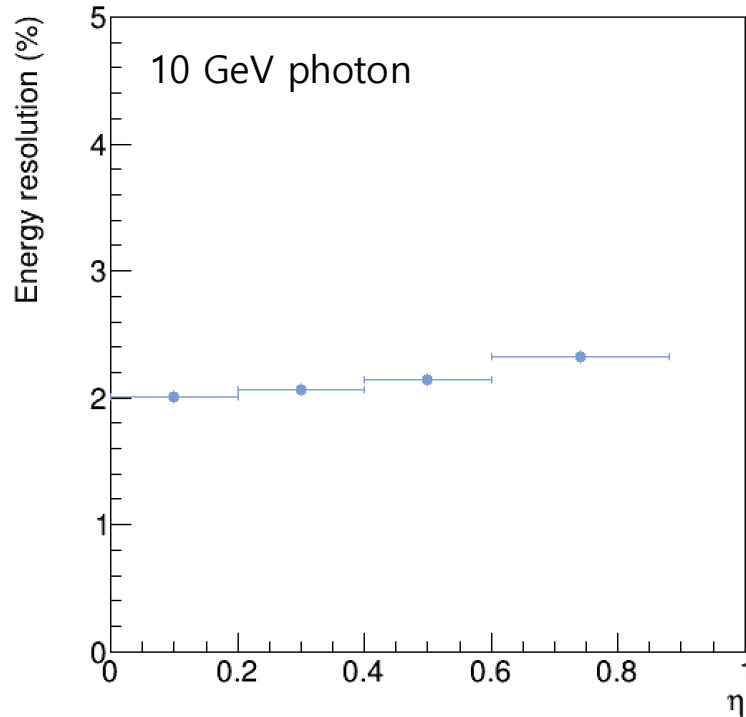
# Energy resolution plots
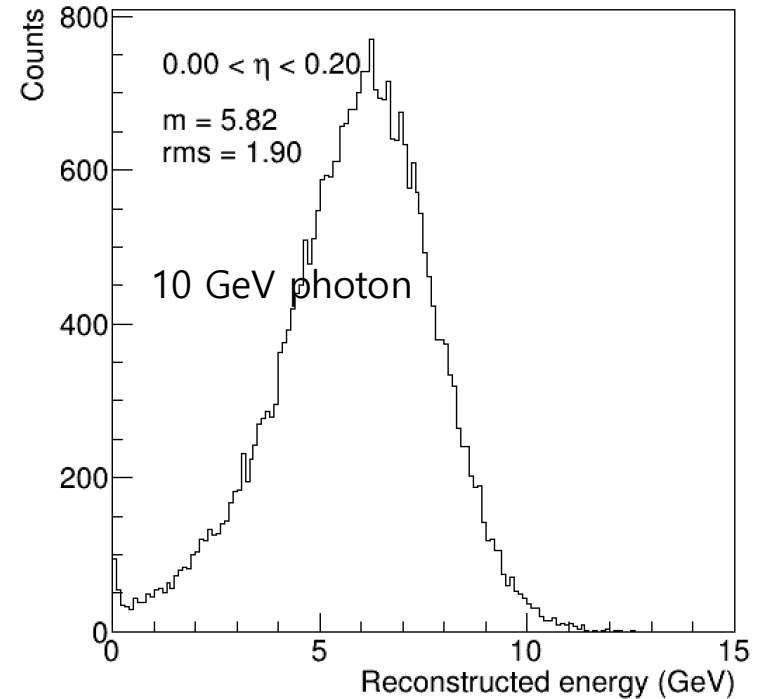
ScFi layer

Imaging layer



- Reconstructed energy distributions (both ScFi and imaging layers) in different η ranges will be saved.
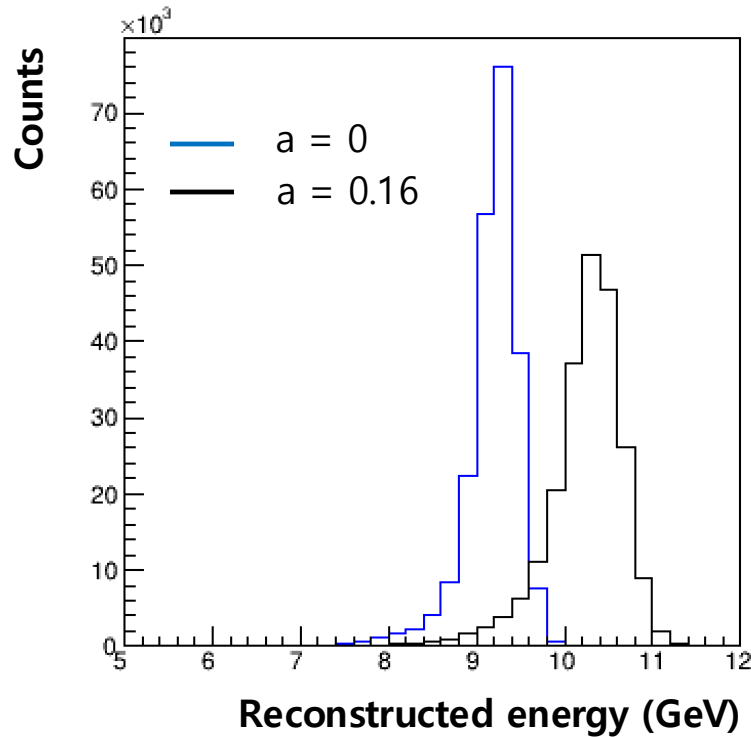
# Energy resolution plots
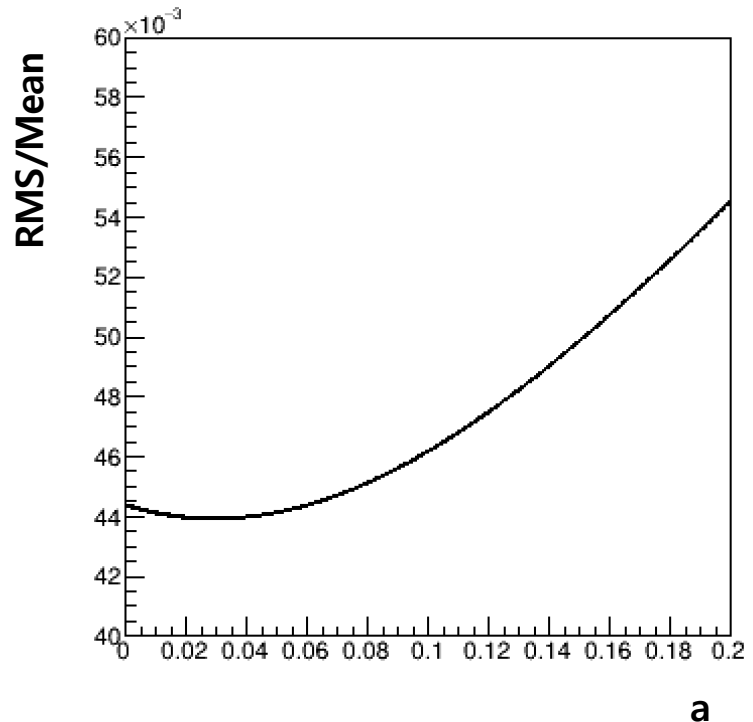
ScFi layer

Imaging layer



- Reconstructed energy distributions (both ScFi and imaging layers) of different η ranges will be saved.

- Energy resolution as a function of η will also be saved.

# Combined energy reconstruction
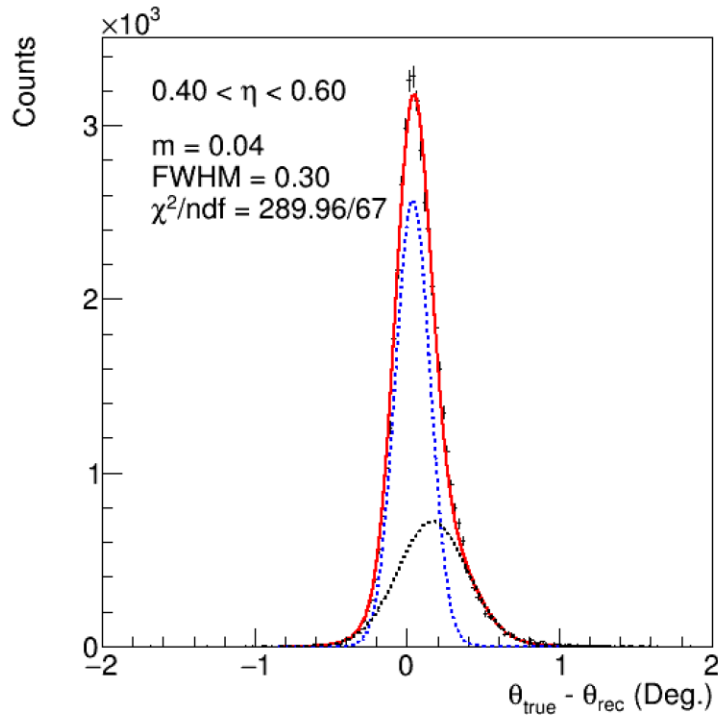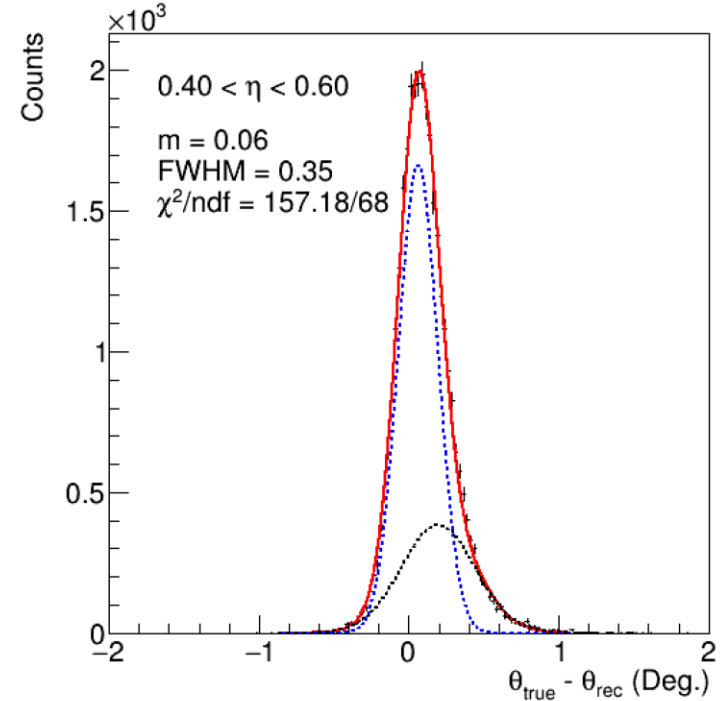
ScFi + a*Imag

Scan "a"



- Energy deposits on the imaging layers may improve the energy resolution.

- To study the possible improvement, we can compare the quantity, RMS/Mean, after multiplying a scale factor to the energy deposit on the imaging layer.

- There was no significant improvement.
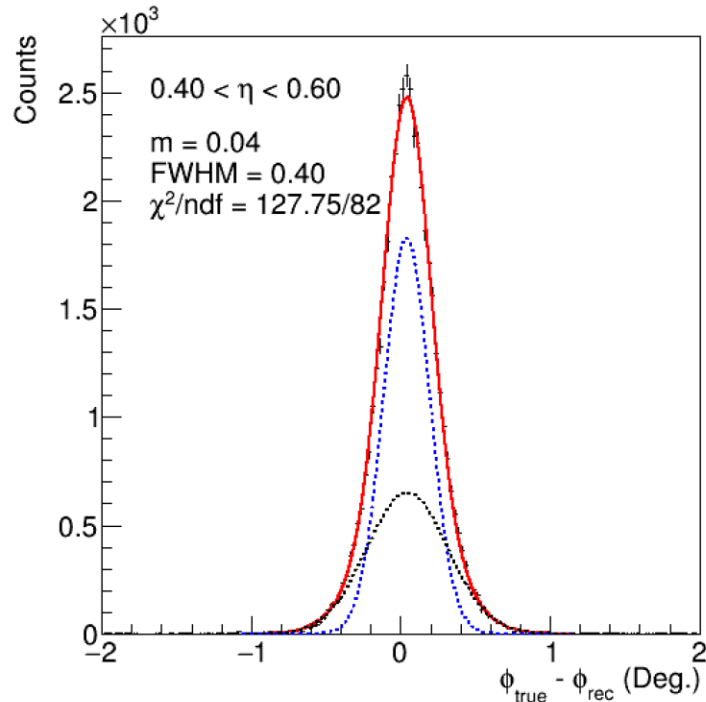
# Angle resolution plots (θ)
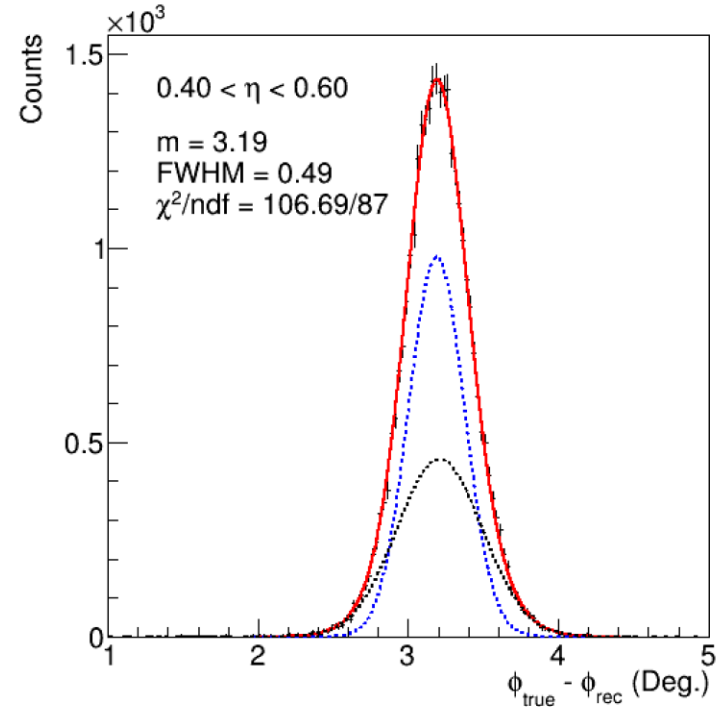
5 GeV photon

5 GeV electron



- The angle difference distribution was fitted by a superposition of two Gaussians.

- The distributions have right-side tails due to the magnetic field. The shower particles experience forces to $\pm$x directions. → Makes the $\theta_{rec}$ smaller.
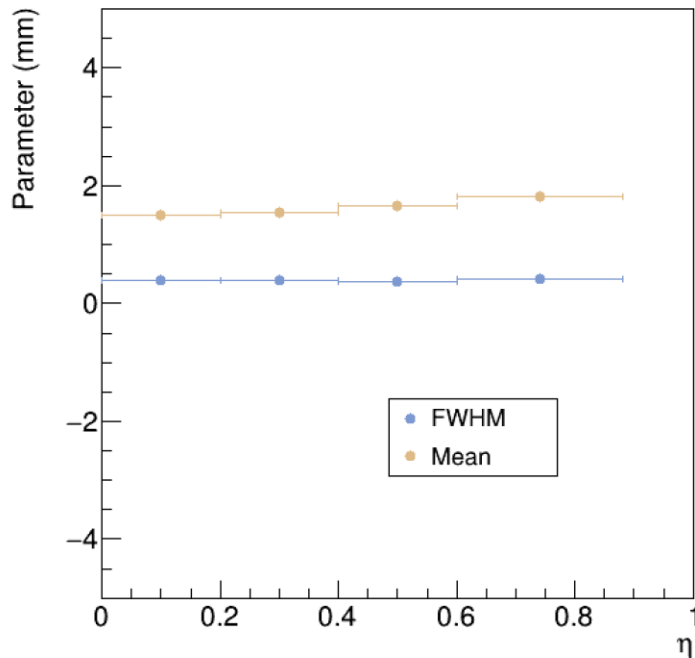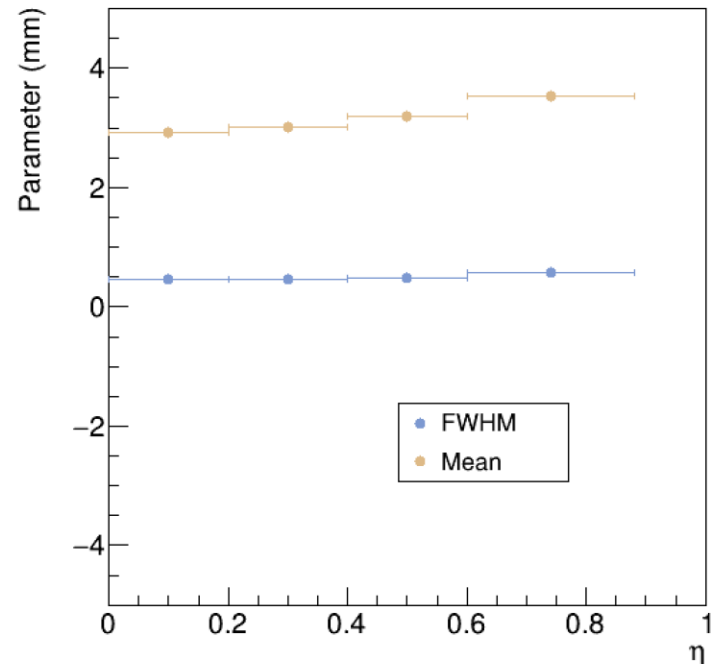
# Angle resolution plots (φ)

5 GeV photon

5 GeV electron



- The electron distribution has an offset due to the magnetic field.

- The shower particles experience forces to the $\pm$x directions. → Makes the $\phi_{rec}$ smeared.
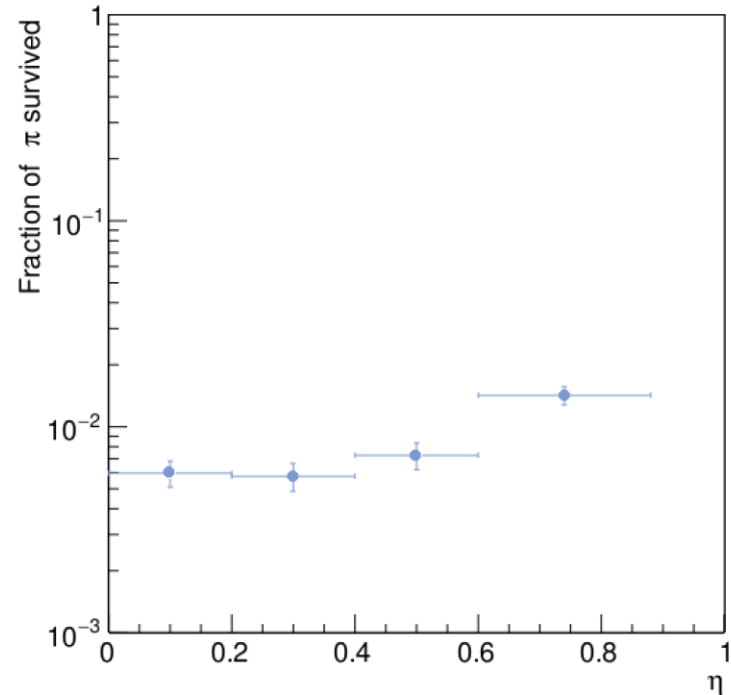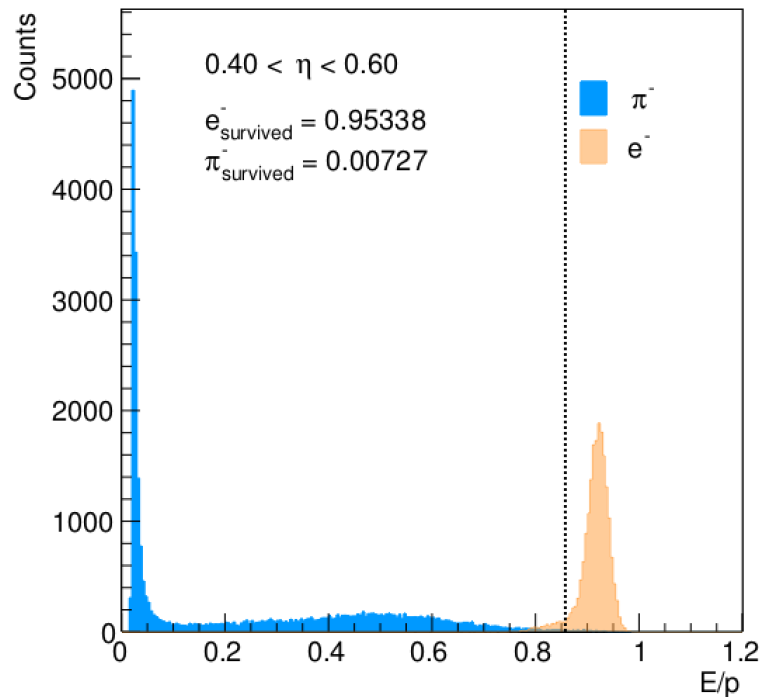
# Angle resolution plots



10 GeV electron

5 GeV electron

- Both the offset and FWHM will be plotted for angle resolution.

# e/π separation plots



- E/p distributions of e and π will be plotted with a dashed threshold line that makes the e efficiency higher than 95%.

- Fraction of the survived π will also be presented as a function of η.

- Other methods for e/π separation have been investigated. So far, there was no method that showed a better performance than E/p.

# Previous plots
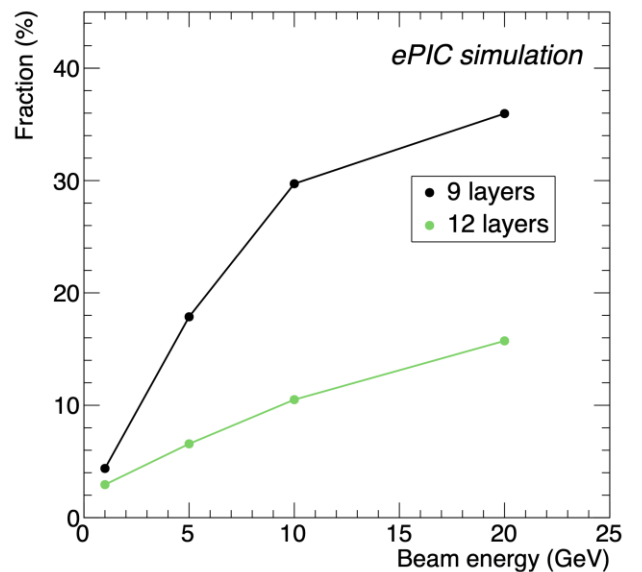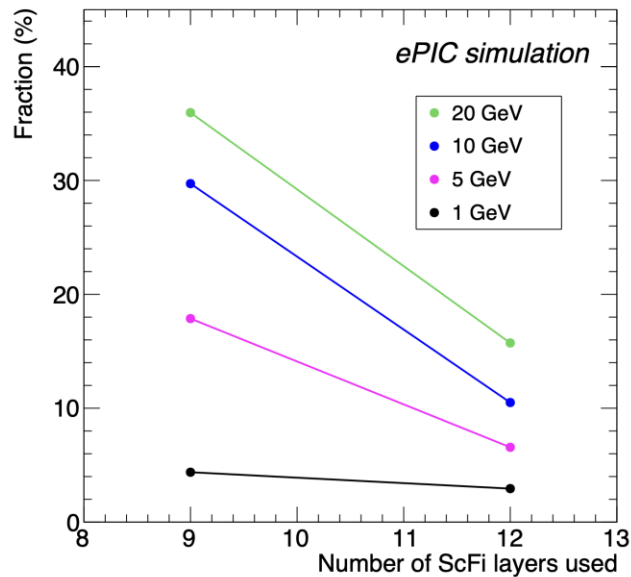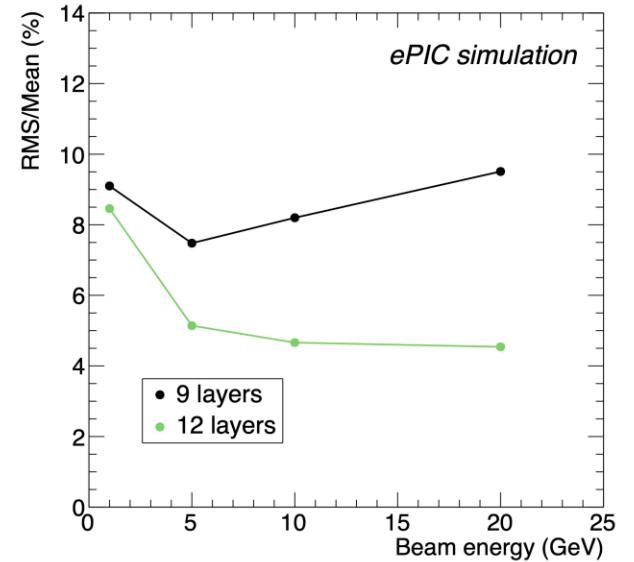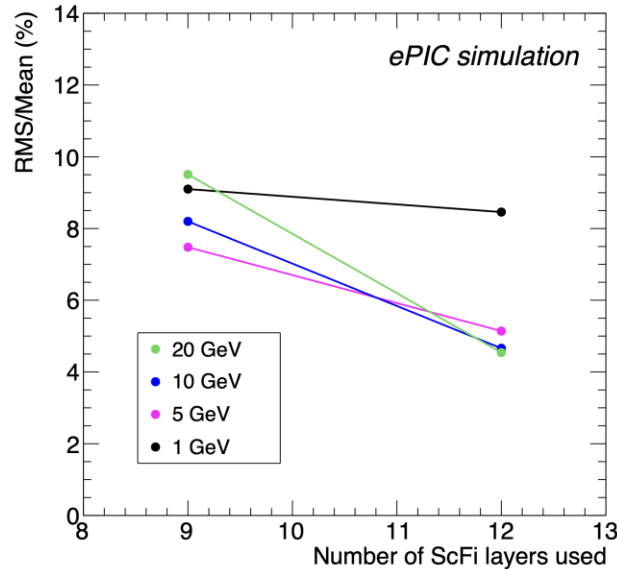
# Plan

- TTreeReader methold is being translated to ROOT::RDataFrame.

- The benchmark task is expected to be completed by this month.