

Report on KOTO EMCal Study

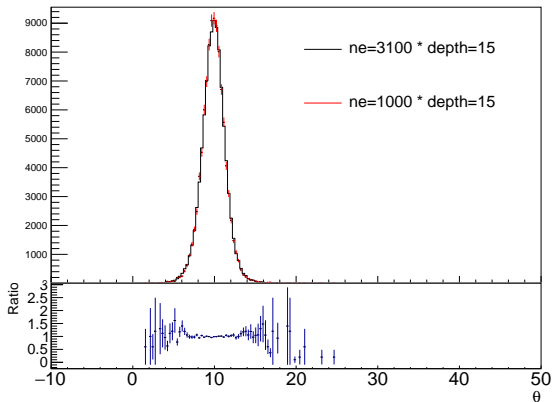
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July 13, 2021

Updated contents

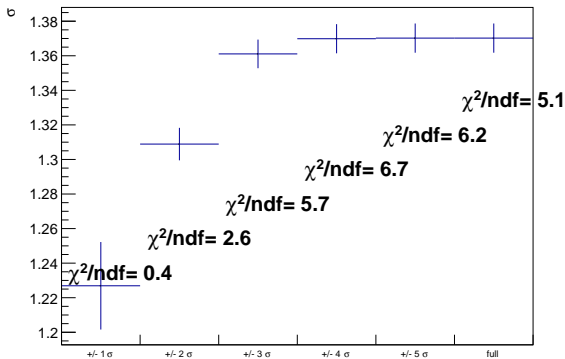
- ▶ N_estimators scan
- ▶ Systematic study for fitting procedure
- ▶ Detector optimization
 - ▶ Detector width
 - ▶ Front layers
 - ▶ Energy resolution
- ▶ The detector configuration was updated to start with the scintillator.
- ▶ $\theta = 10$ and 1 GeV photon events were used.

N_estimators scan



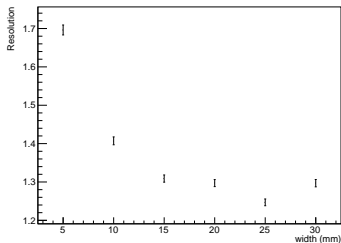
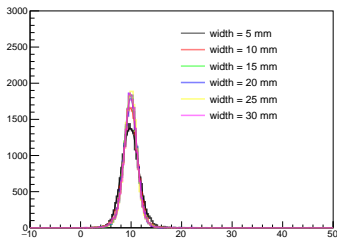
► Fine with $N_estimators=1000$

Systematic study for fitting procedure



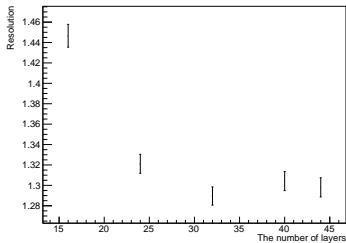
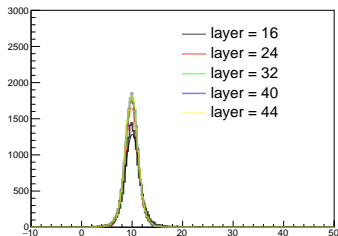
- ▶ Gaussian fit was tested with different fit ranges.
- ▶ 2σ range was selected.

Detector width study



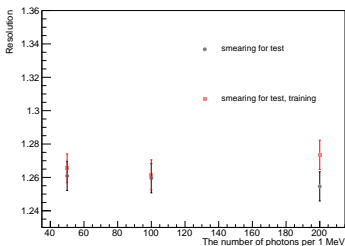
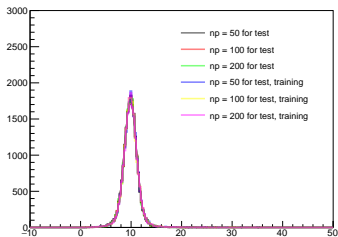
- ▶ Previously, 50k events were used for the training.
- ▶ Statistics for the training is enhanced to 100k
- ▶ Fine with 15 mm

Front layers study



- ▶ 10 MeV selection was applied.
- ▶ Fine with 24 layers.

Energy resolution study



- ▶ width = 15 mm, 24 layers, 10 MeV selection, 0.5 MeV threshold
- ▶ Smearing with $\sigma = \sqrt{e/npe}$

Plan

- ▶ Incident angle and incident energy dependences will be checked
- ▶ Paper draft preparation
- ▶ Other things to be discussed?
- ▶ Fiber+W