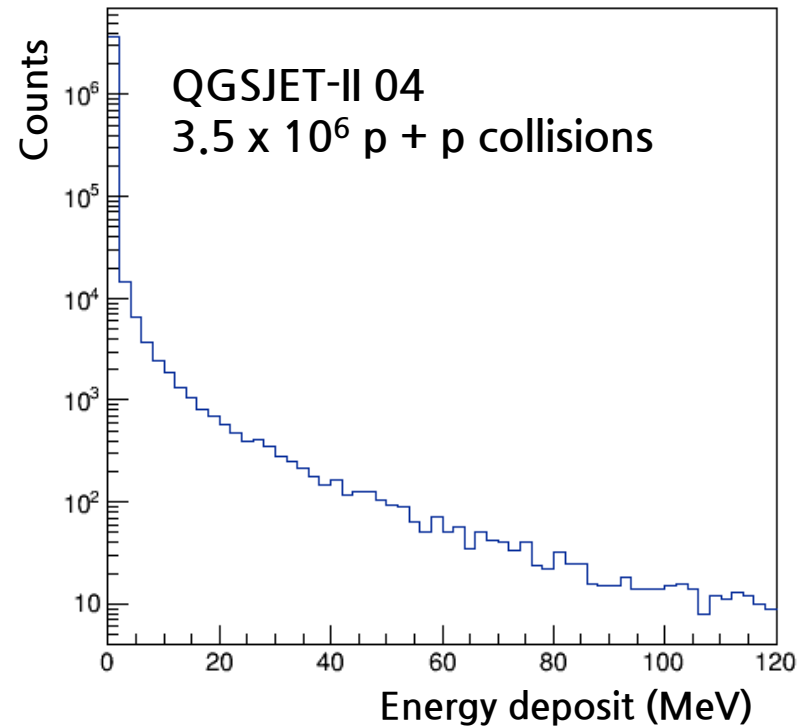
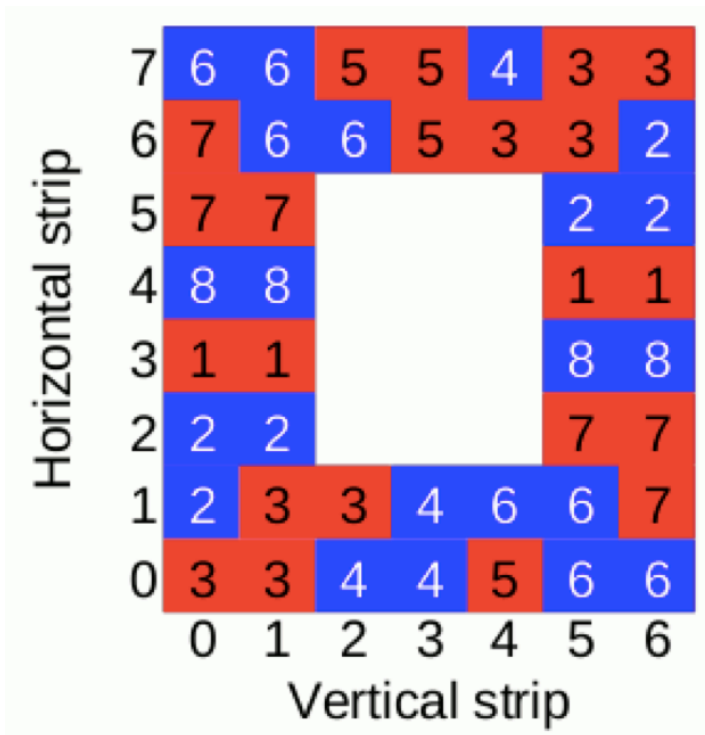


# 1. Expected ZDC performance in the RHICf-II experiment

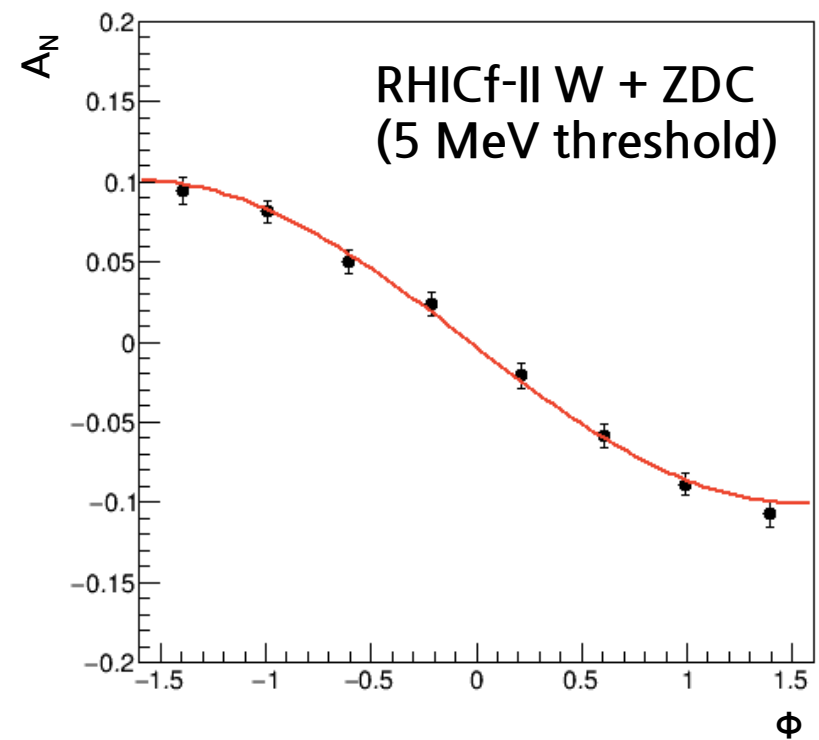
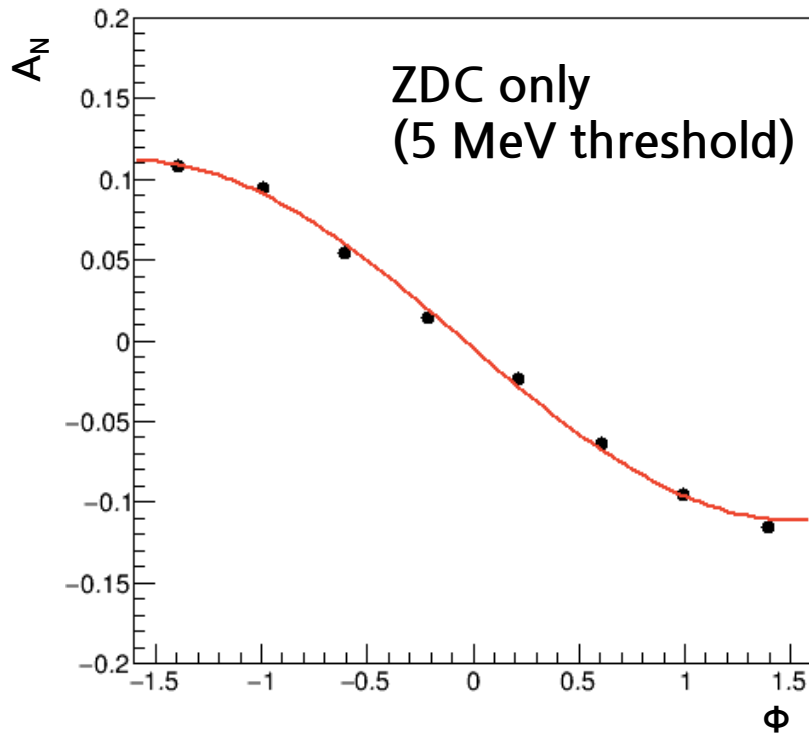
1 Apr 2022  
Minho Kim

# Polarization measurement



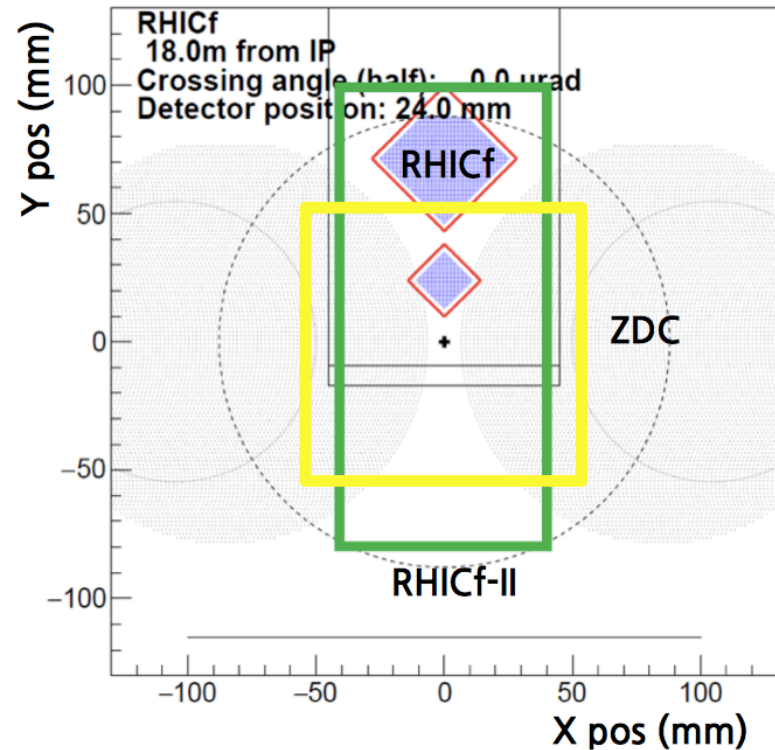
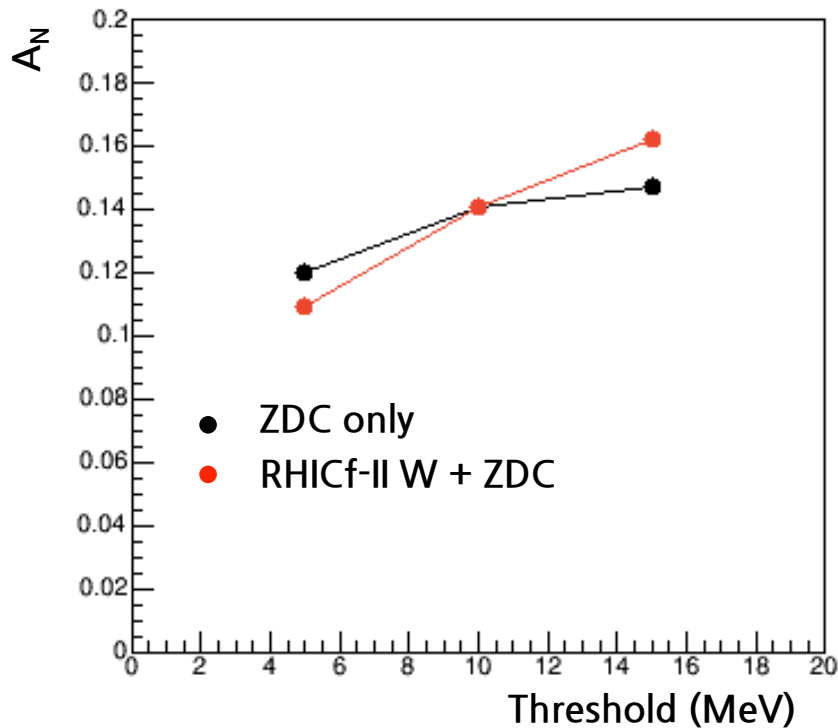
- SMD (10 cm x 10 cm) is composed of 8 horizontal and 7 vertical strips.
- A square-shaped number is fired if the energy deposits of corresponding vertical and horizontal strips are larger than a threshold.
- Polarization estimation depending on the threshold was compared.

# Azimuthal angular modulation



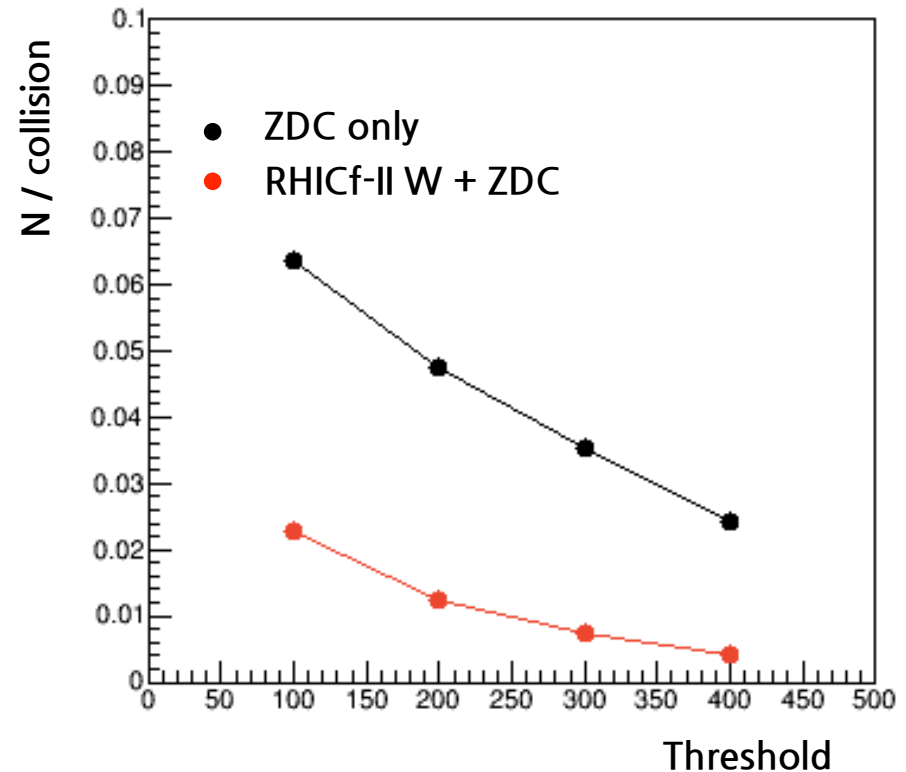
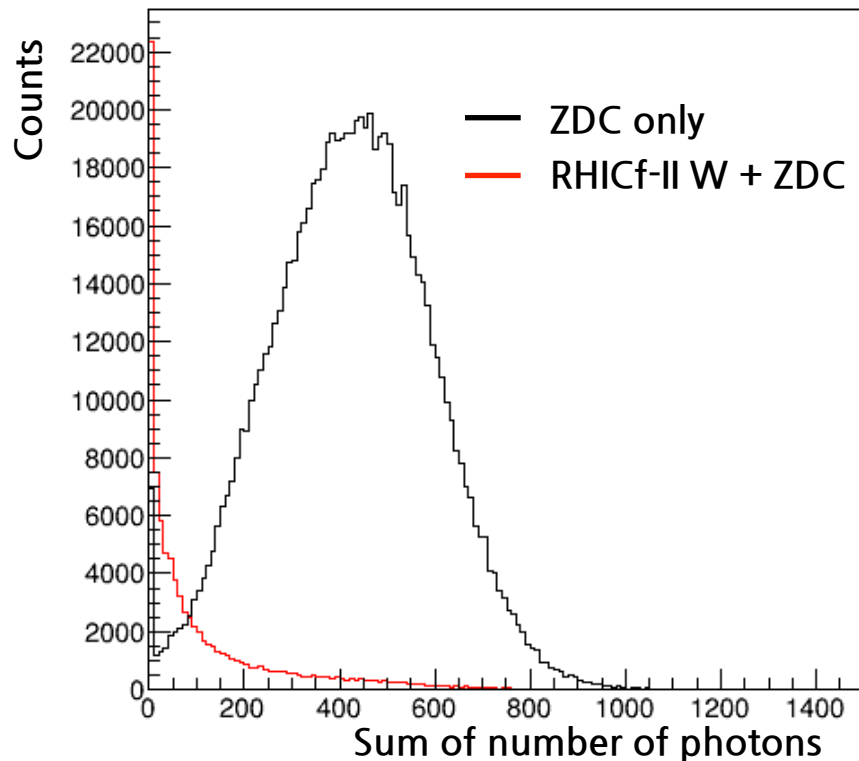
- Up and down spin patterns were assigned only to the neutron events for an artificial  $A_N = -0.2$ , otherwise 0.
- RHICf-II tungsten makes the interaction and the estimated neutron  $A_N$  diluted.
  - Statistics becomes lower.
  - Azimuthal angular modulation is more diluted.

# Depending on threshold



- Estimated polarization get larger when the RHICf-II tungsten is located as the SMD threshold increases.
- It seems to be related with the effective area of the RHICf-II detector. The neutron ratio is almost same.

# Number of hits

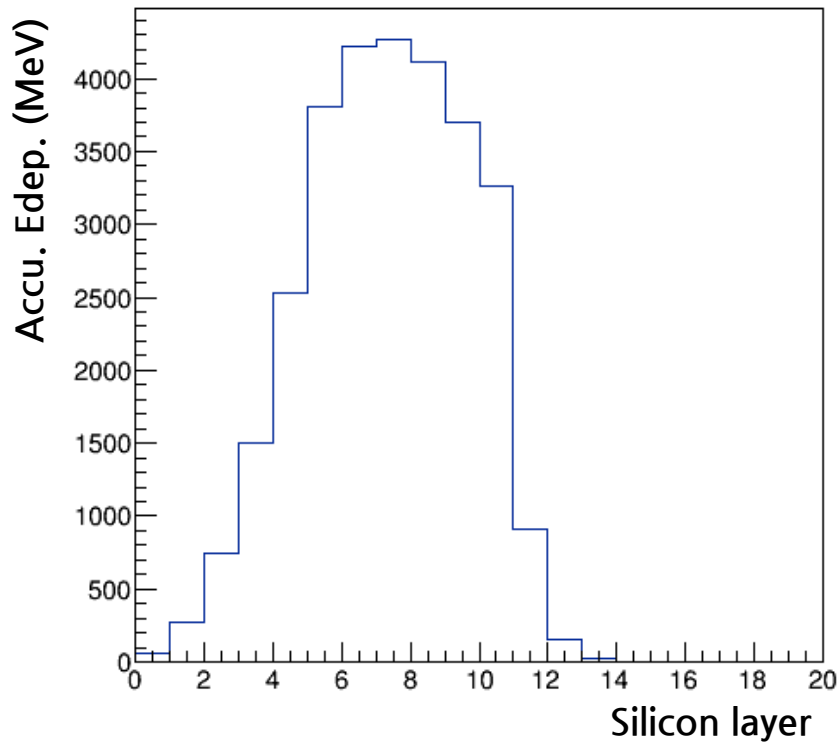


- PMT collects the Cherenkov light from the optical fibers.
- A hit was defined that all the number of photons generated in the ZDC was larger than a given threshold.

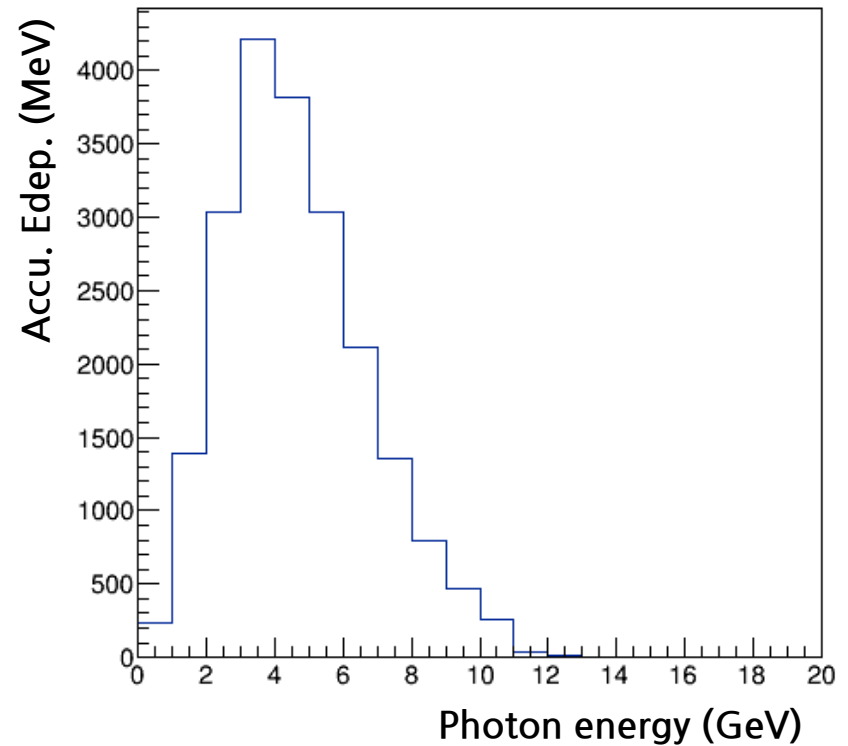
## **2. RHICf-II detector configuration**

# Forward tungsten thickness

3.5 mm (11) + 21 mm (7)

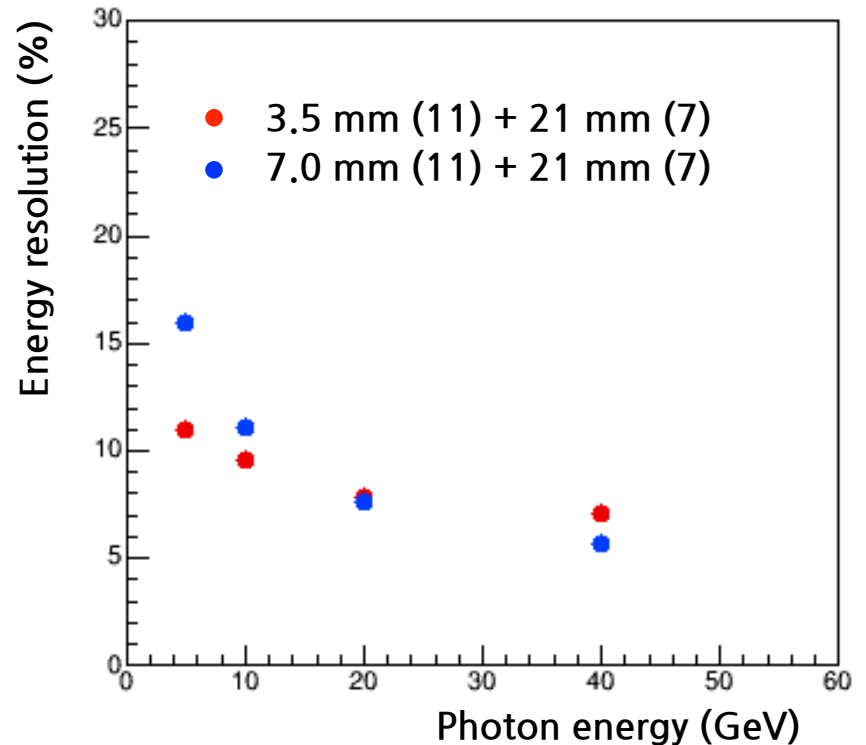
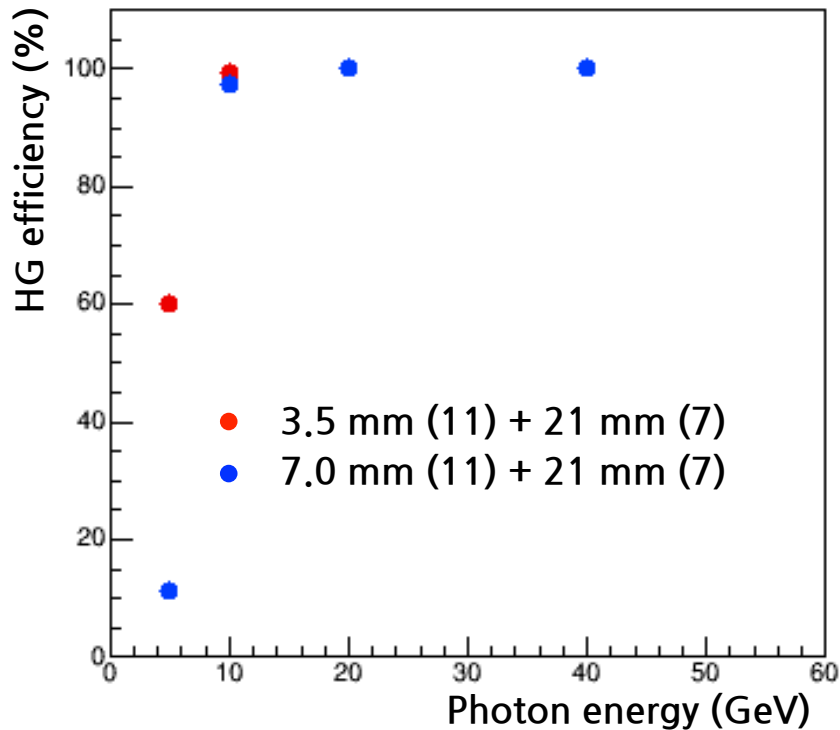


7.0 mm (11) + 21 mm (7)



- 3.5 mm tungsten thickness well measures the forward part of the EM shower development.
- However, only 3.5 mm tungsten layer can not measure the backward part of the EM shower.

# Forward tungsten thickness



- 3.5 mm provides better efficiency and energy resolution for low energy photon than 7 mm.
- However, the energy resolution gets worse than 7.0 mm as the photon energy increases.
- Combination of 3.5, 7, and 21 mm for tungsten thickness.







# (Possible) second HG layer

■ : Tungsten

■ : Glue + silicon + glue + readout

11 thinner + 7 thicker layers

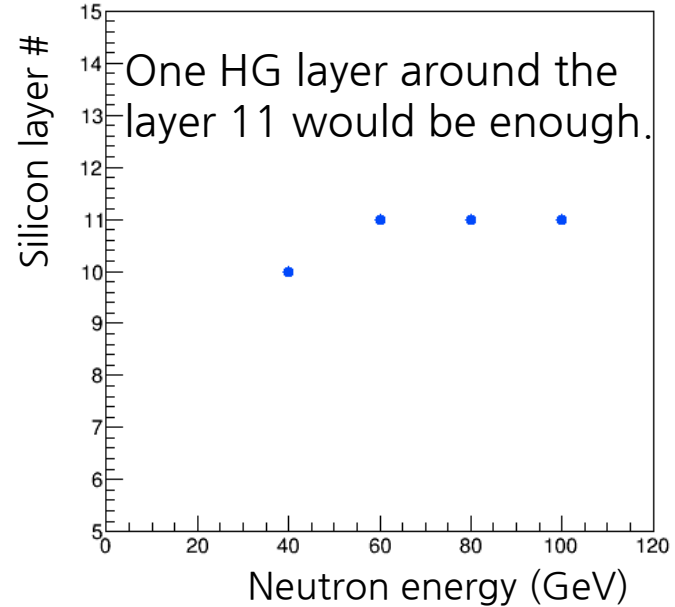
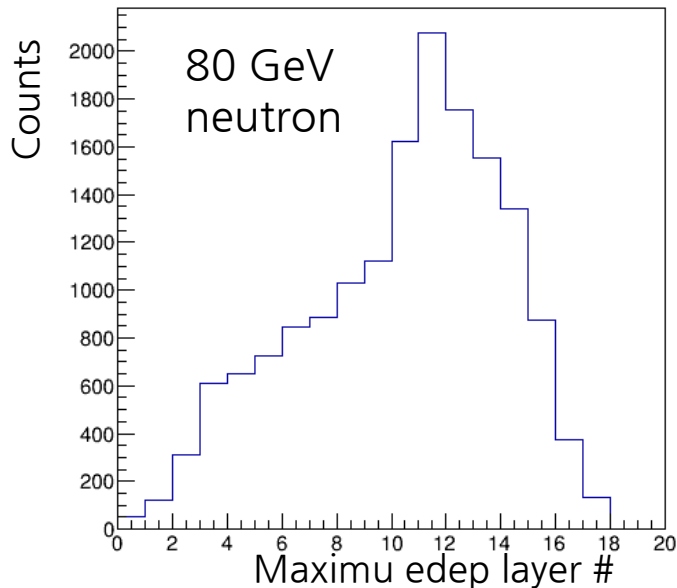
0 1 2 3 ...

11 12 13 ...

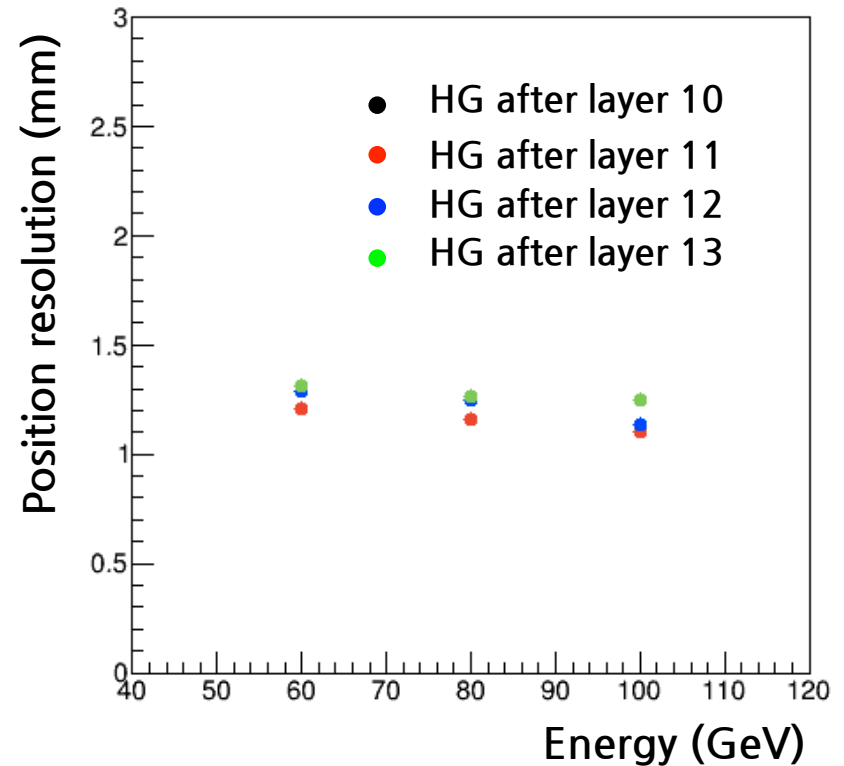
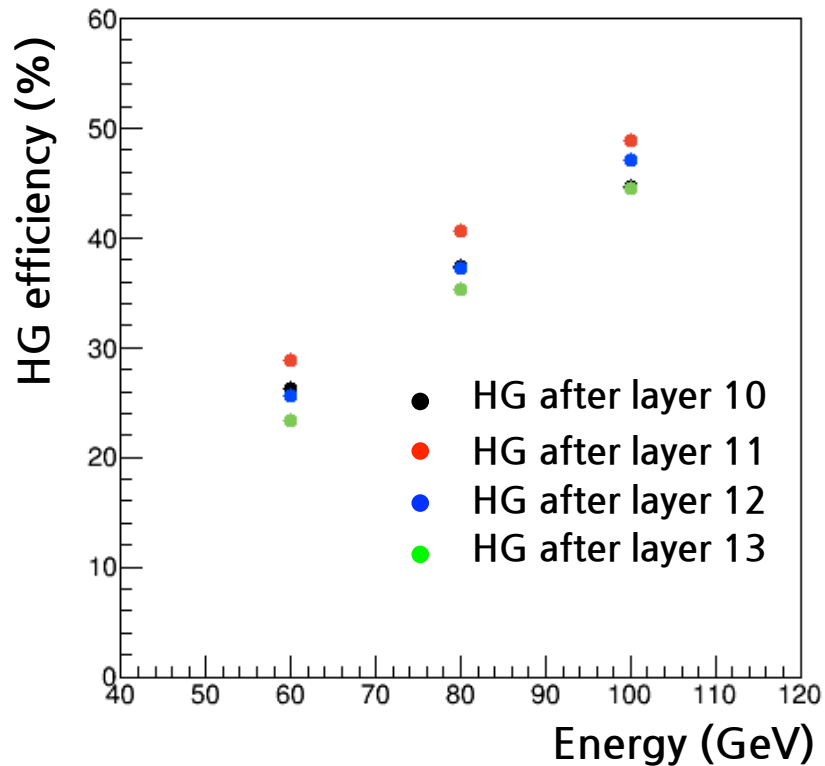


7 mm

21 mm



# HG layer performance for neutron



- HG after layer 11 shows the highest HG efficiency.
- There is no big difference for the position resolution.