

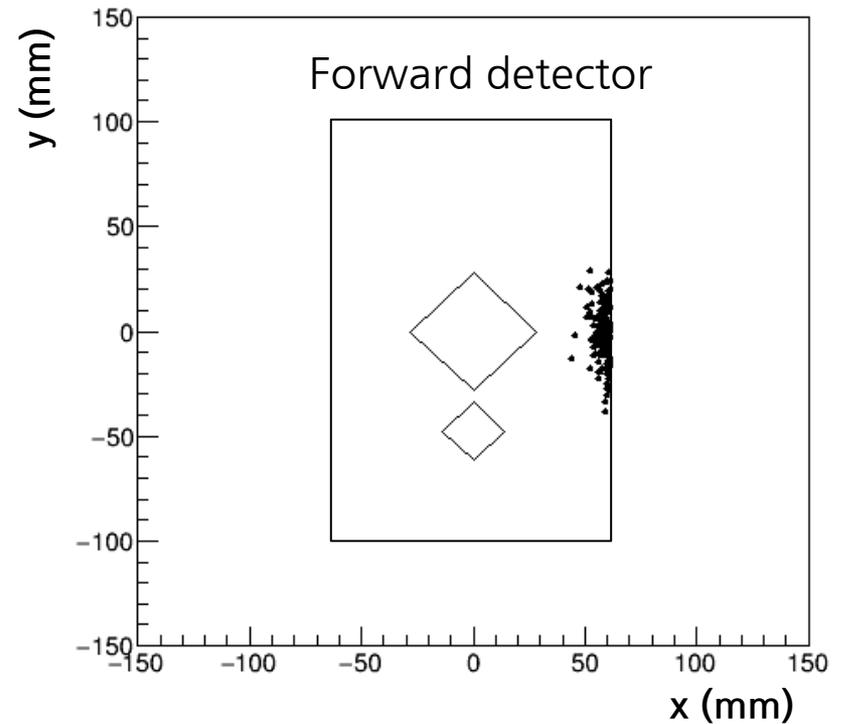
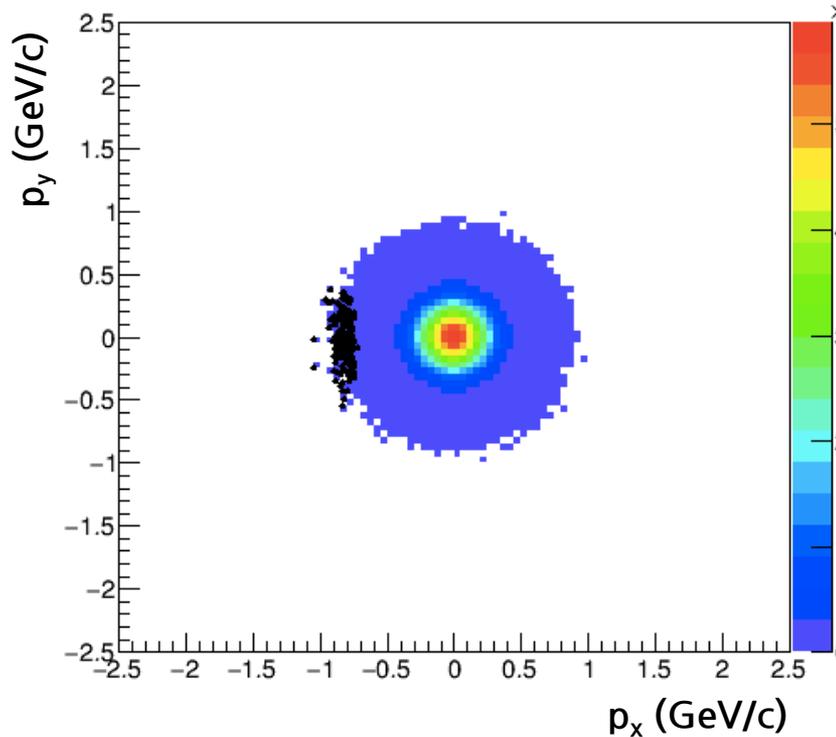
Status report

02 Jun 2022
Minho Kim

Activities summary

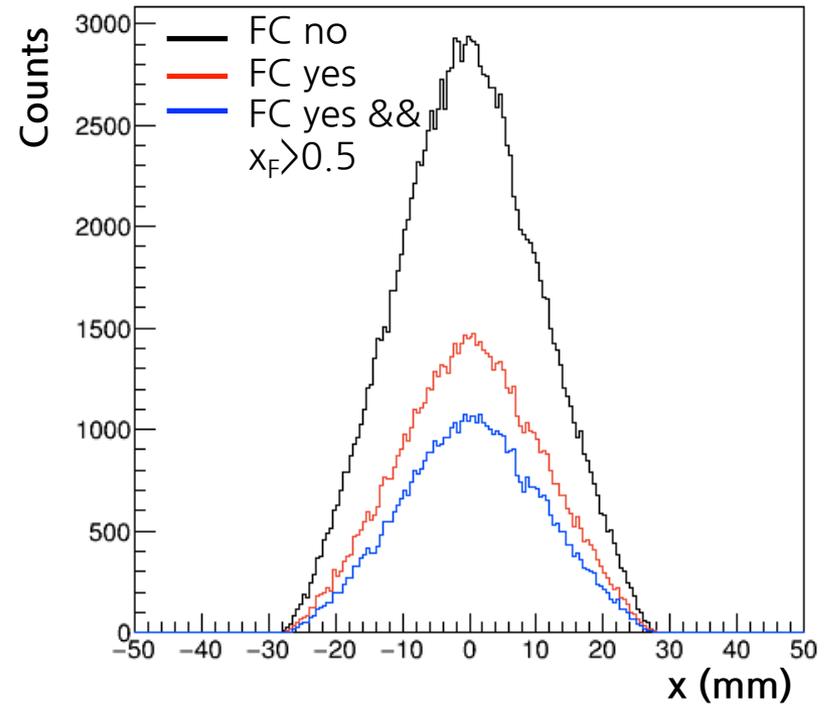
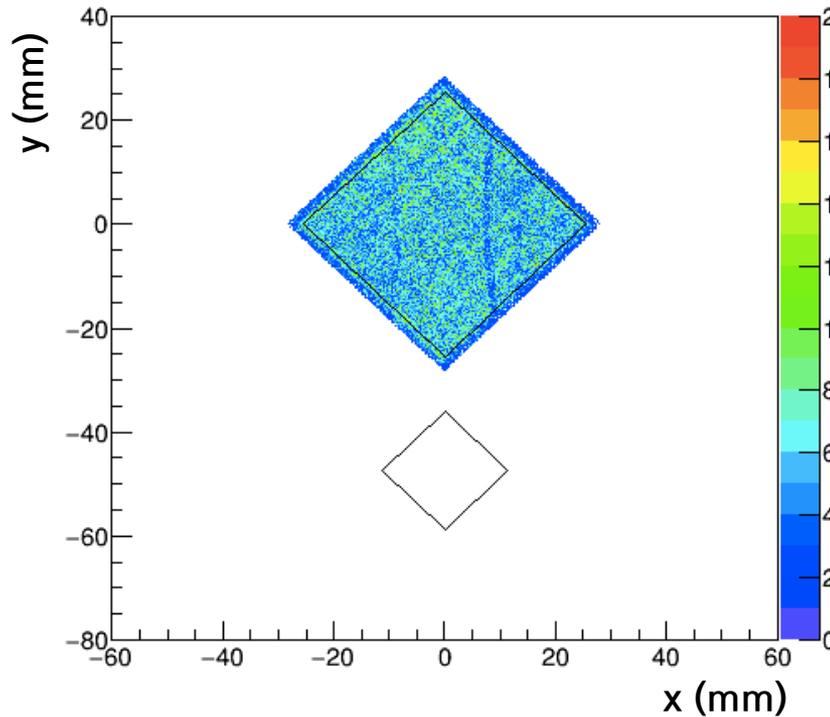
- Background study for the neutron A_N .
 - Protons by elastic scattering.
 - Charged particles by inelastic scattering.
- Surviving efficiencies depending on energy threshold of FoCal-E.
- AUM2022 slide.

Elastic scattering sample



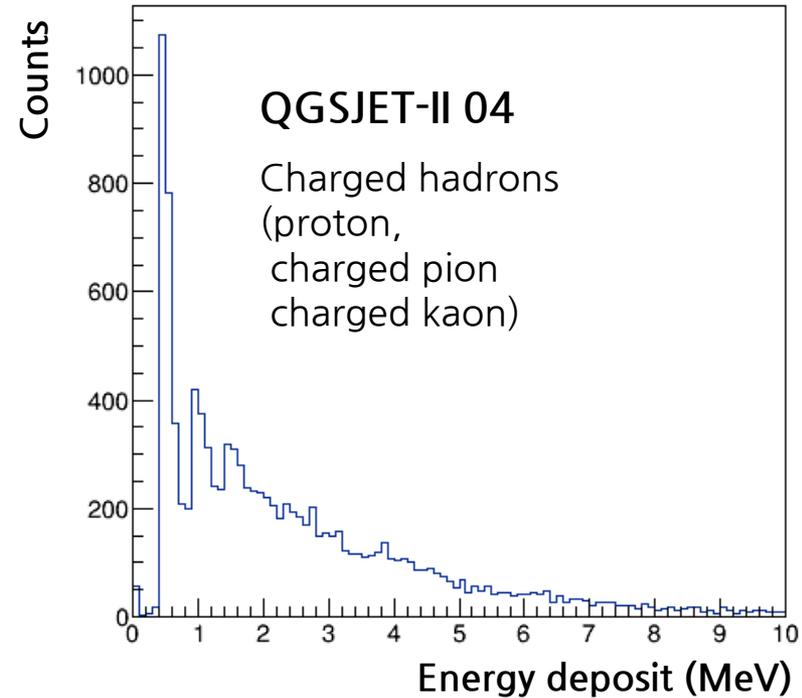
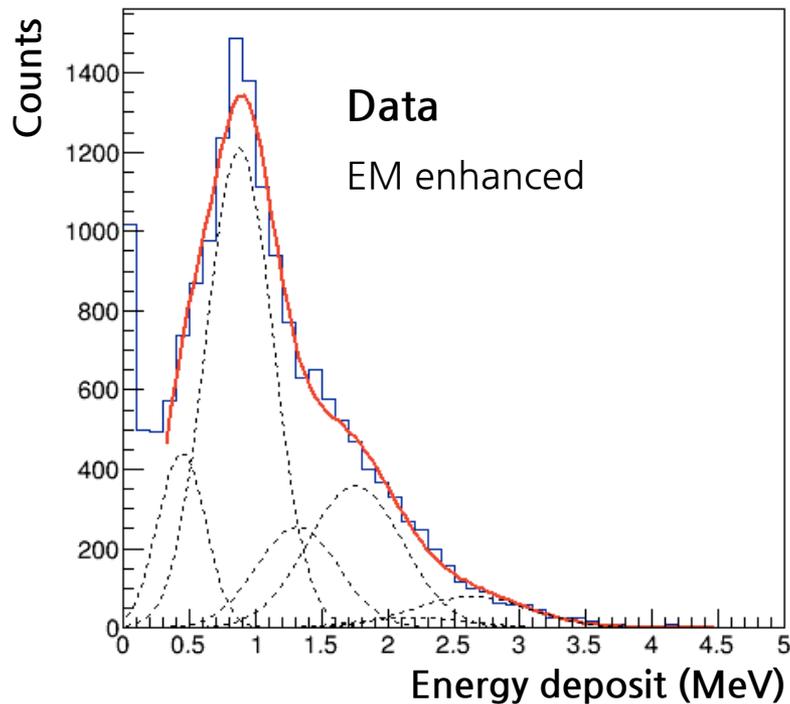
- In the MC, there is a forward detector in front of the RHICf detector.
- Most left-side hits of the forward detector is already beyond the RHICf acceptance.
- Effect of the elastic-scattered proton to the neutron A_N should be negligible. Effect of shower particles by proton-beam pipe interaction will also be studied.

x distribution of data



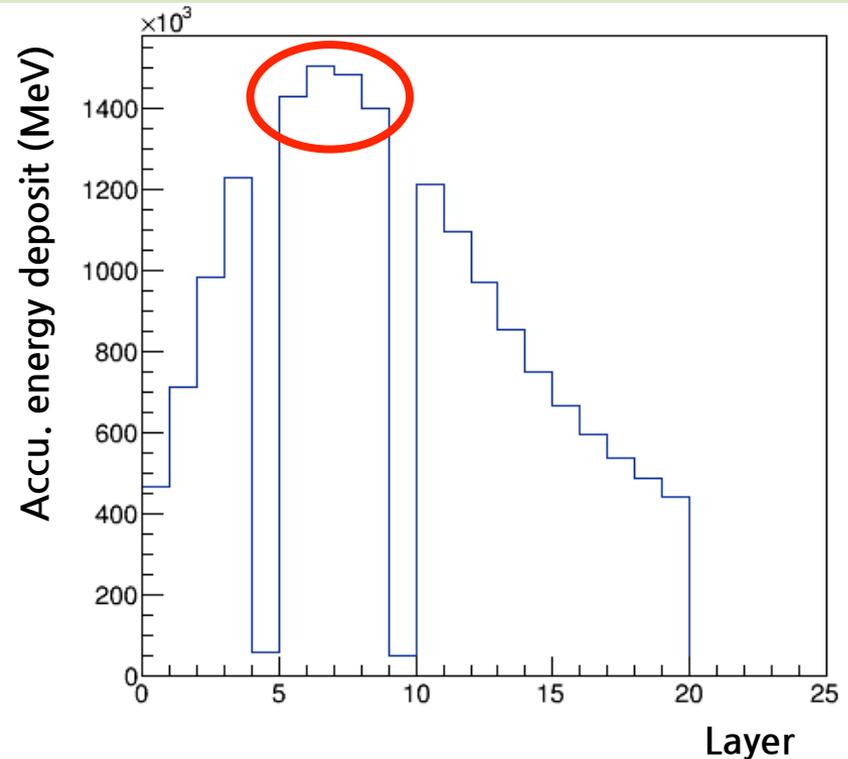
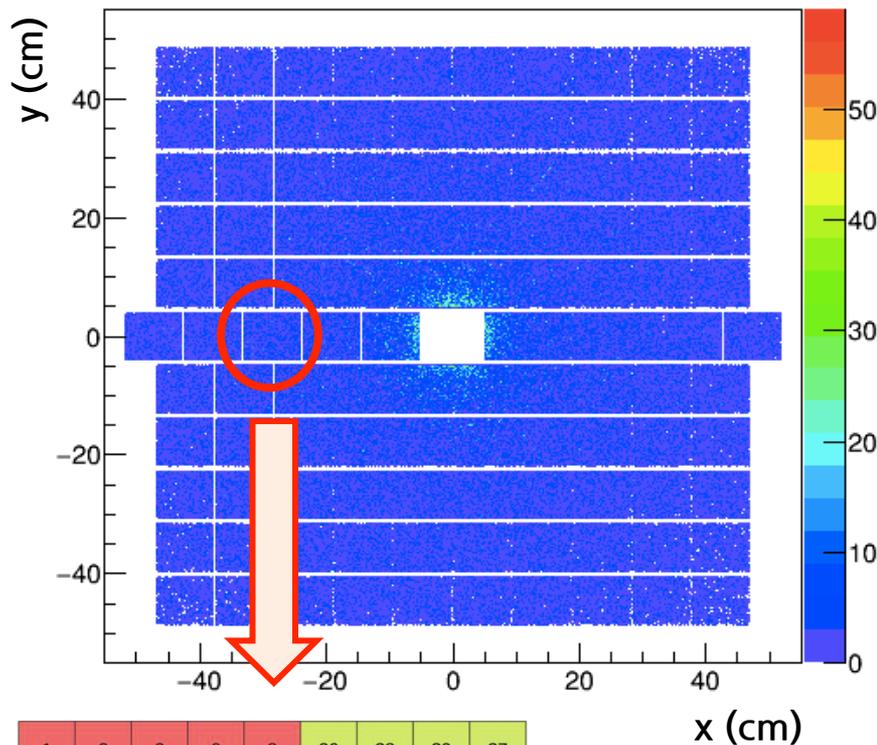
- There is a structure in front of the RHICf detector which makes number of hits of the RHICf detector around it lower.
- There is no difference in the x distribution between with and without front counter condition.

Reconstruction of the FC distribution



- By fitting the FC distribution of data, we know the PMT response.
- Referring to this PMT response, we can estimate how much fraction of charged hadron background is included in the neutron event after a cut condition of ~ 1 MIP is applied.

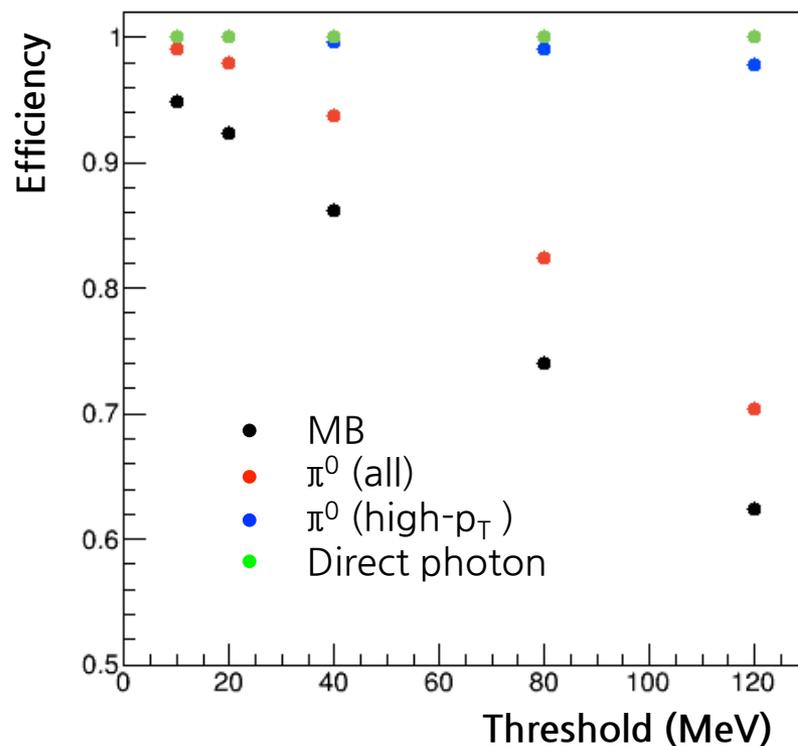
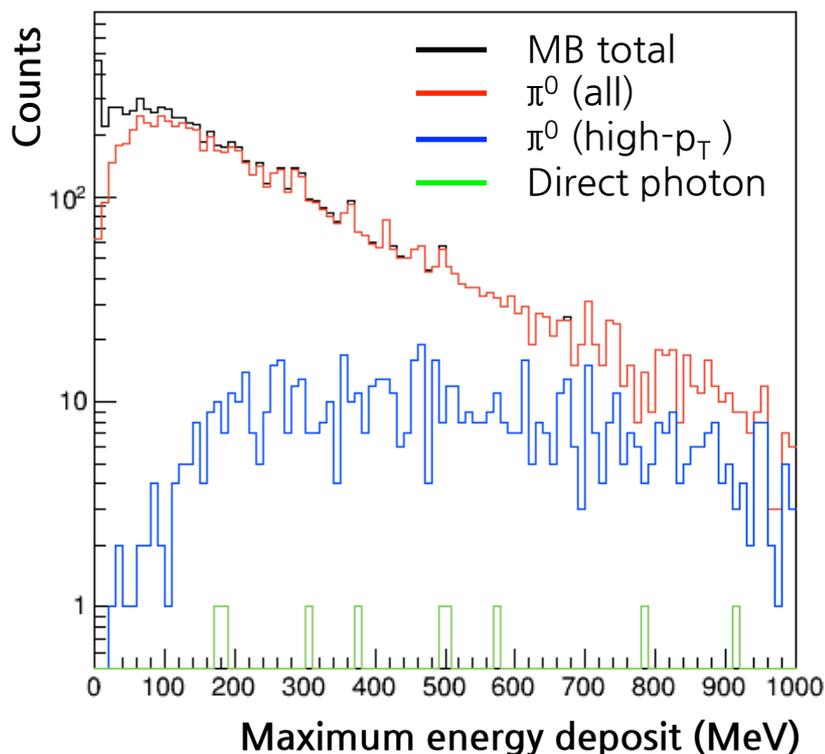
Energy deposits used for trigger



| | | | | | | | | |
|----|----|----|----|----|----|----|----|----|
| 1 | 3 | 2 | 0 | 8 | 36 | 38 | 39 | 37 |
| 5 | 7 | 6 | 4 | 44 | 40 | 42 | 43 | 41 |
| 9 | 11 | 10 | 12 | 48 | 50 | 46 | 47 | 45 |
| 17 | 13 | 15 | 14 | 16 | 52 | 51 | 49 | 53 |
| 18 | 20 | 21 | 19 | 23 | 55 | 57 | 56 | 54 |
| 26 | 22 | 24 | 25 | 59 | 61 | 60 | 58 | 62 |
| 30 | 28 | 29 | 27 | 67 | 63 | 65 | 64 | 66 |
| 34 | 32 | 33 | 31 | 35 | 71 | 69 | 68 | 70 |

- Energy deposits of 72 channels were summed from 5 to 8 layer.
- An event was survived when the highest energy deposit sum (among 110 energy deposit sums) is larger than a threshold.

Surviving efficiency



- Surviving efficiency of an event type was calculated by number of triggered events divided by number of original events.
- As the threshold increases, the efficiencies of high- p_T π^0 and direct photon don't much drop while those of MB and general π^0 steeply decrease to $\sim 50\%$.
- More HGCROC and a clustering algorithm should be studied for higher rejection + higher efficiency.