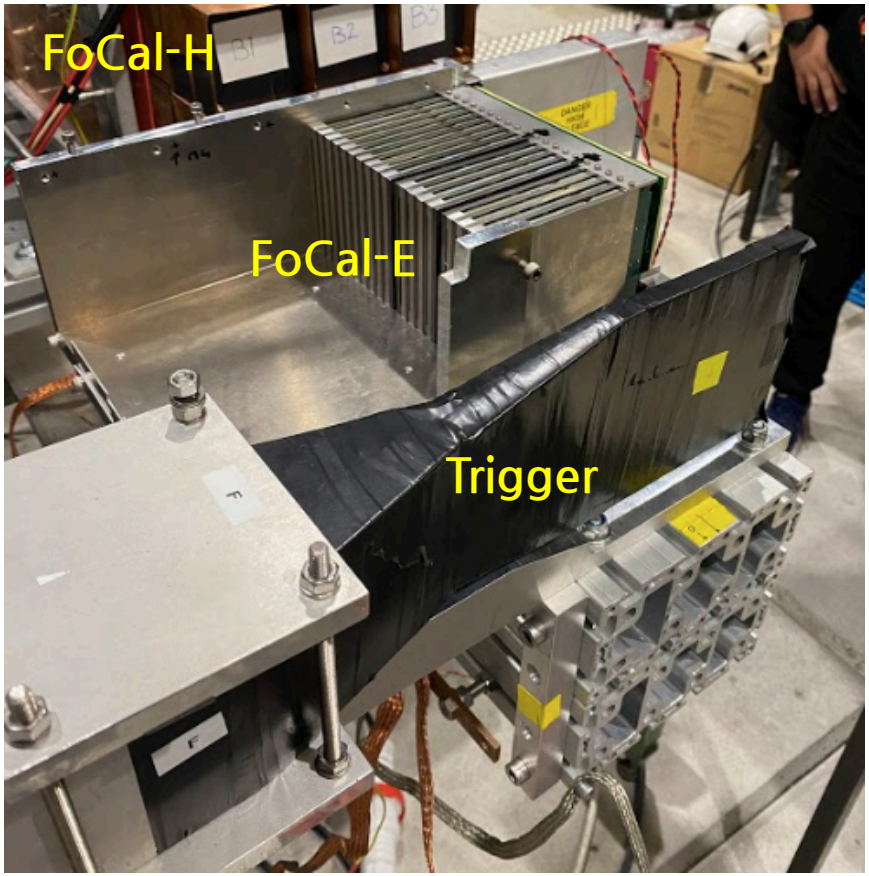
ALICE FoCal SPS beam test

October 27

Minho Kim

FoCal SPS beam test

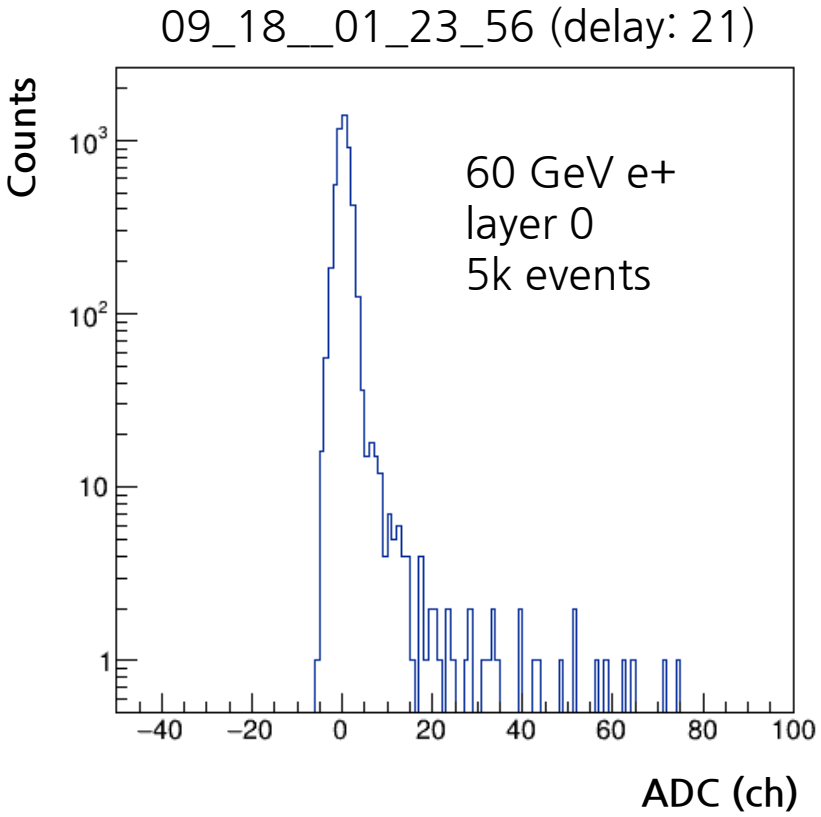


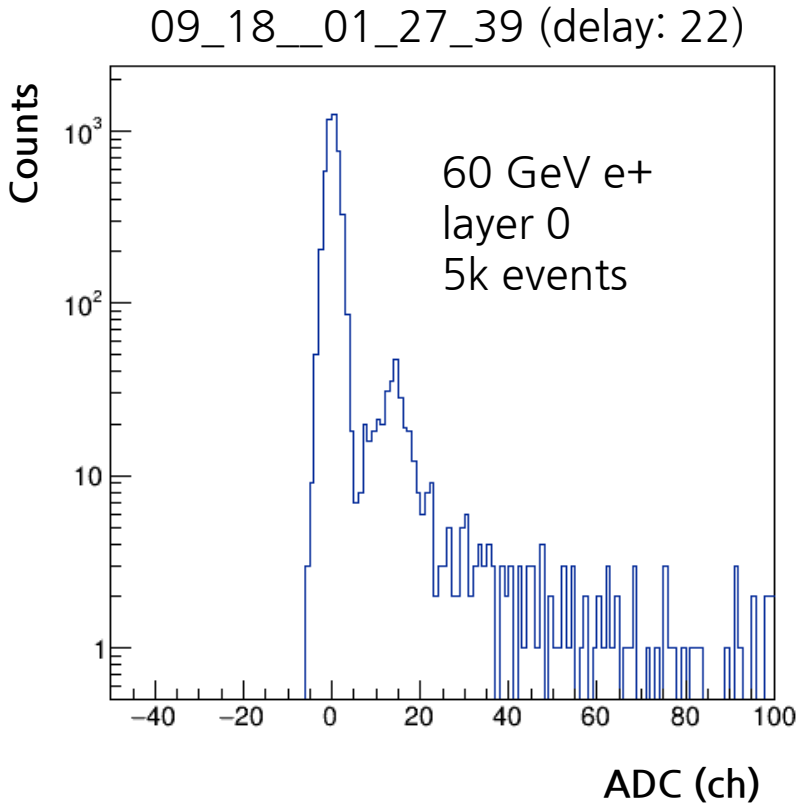
- Prototype of the ALICE FoCal (FoCal-E + H) was installed at the SPS beam line and measured positrons and charged pions from September 15 to 21.

My activities

- Data analysis and online monitoring have been assigned to me, Jonghan, and Hanseo.
- Followings should be studied from the analyzers.
  - Basic data check.
  - TOT behavior, dynamic range.
  - Detector performance: energy resolution, linearity.

Delay timing of the gate

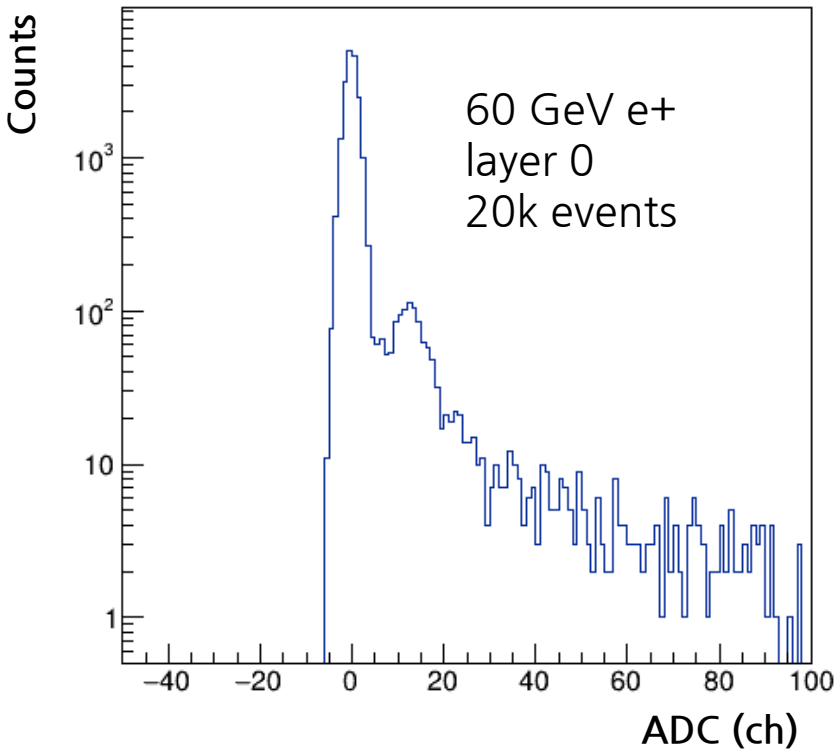




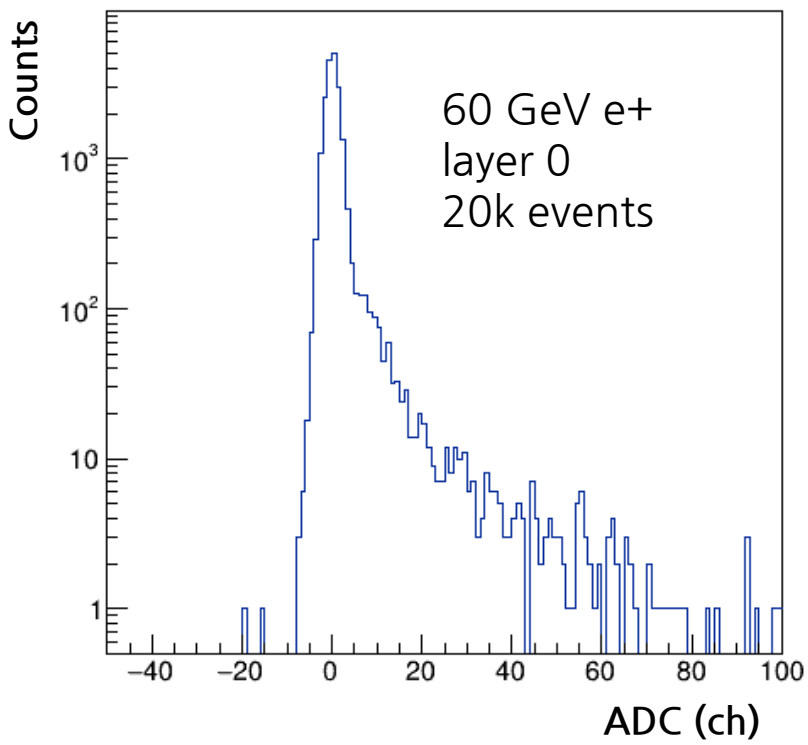
- At the first delay scan, delay: 22 showed a clear MIP peak.

Delay timing of the gate

09_18__04_22_22 (delay: 21)



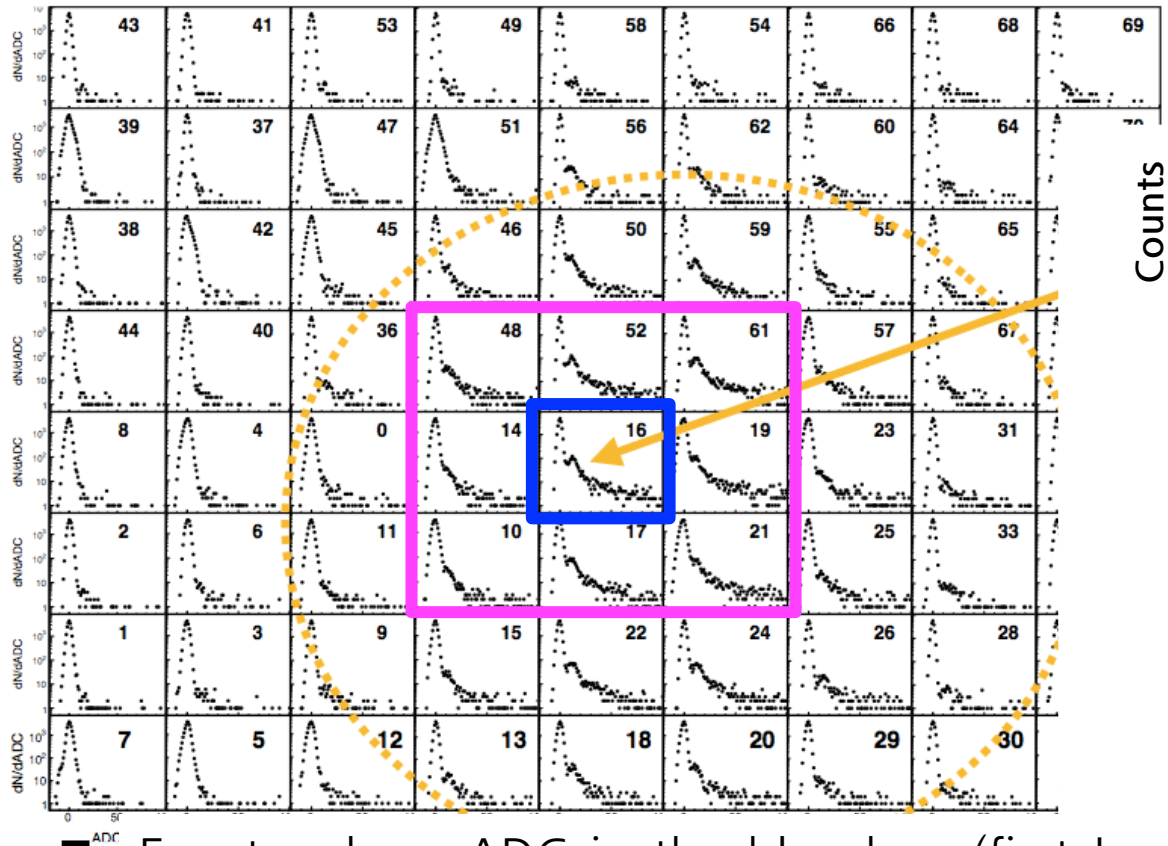
09_18__04_31_29 (delay: 22)

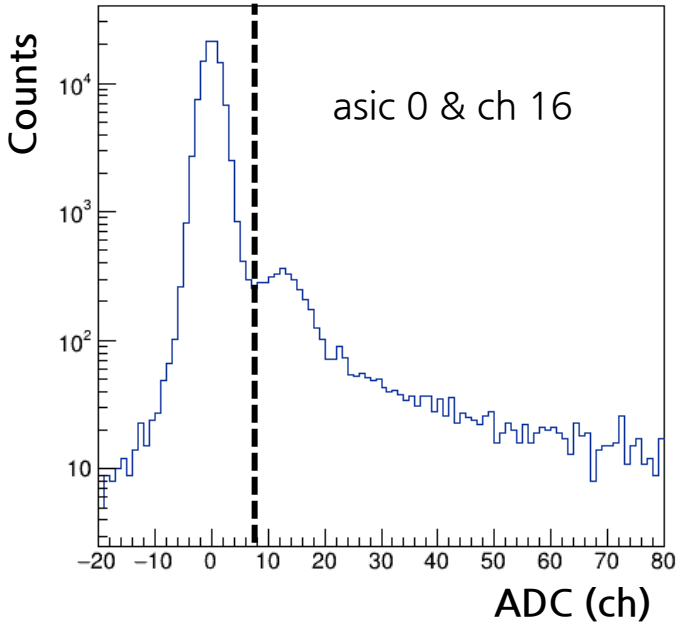


- However, it was reversed at the third delay scan. A clear MIP peak is shown with the delay: 21 this time.
- A timing jitter is suspected as an origin but 25 ns is too big for a jitter.

  → Experts are surveying why this happened.

Analysis conditions

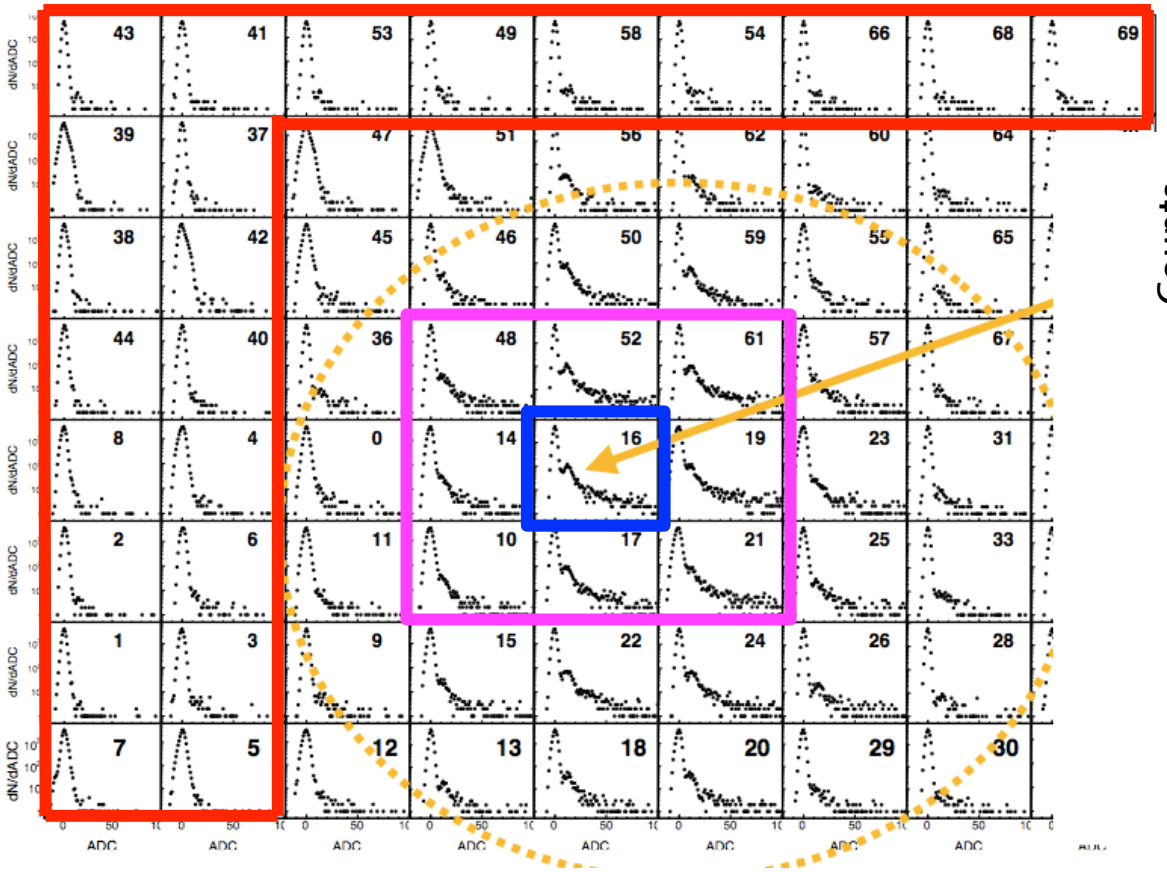




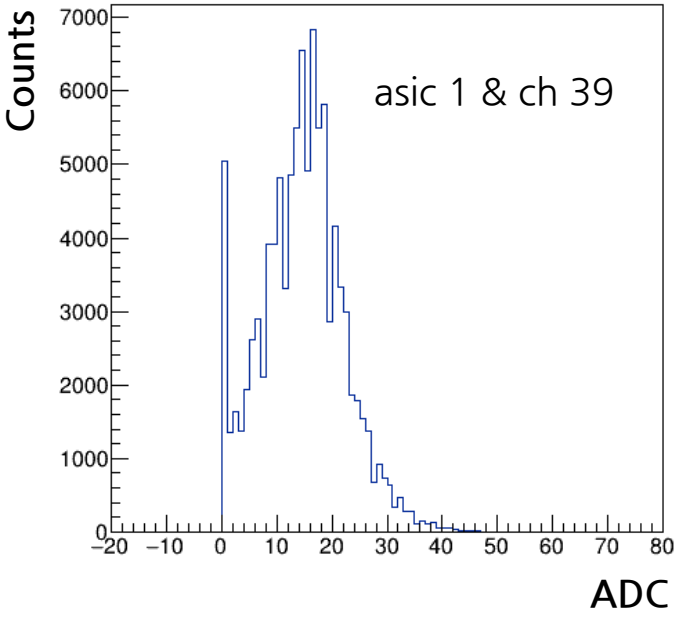
- Events where ADC in the blue box (first layer, ch = 16) first layer was larger than pedestal were selected.
- Assuming e+ hits the detector, the energy deposit was indirectly calculated by summing the ADCs of the channels in the pink box.

  → This ADC sum was converted to the # of MIPs assuming that the MIP peaks of all channels are ADC_{MIP} = pedestal mean + 10.

Analysis conditions

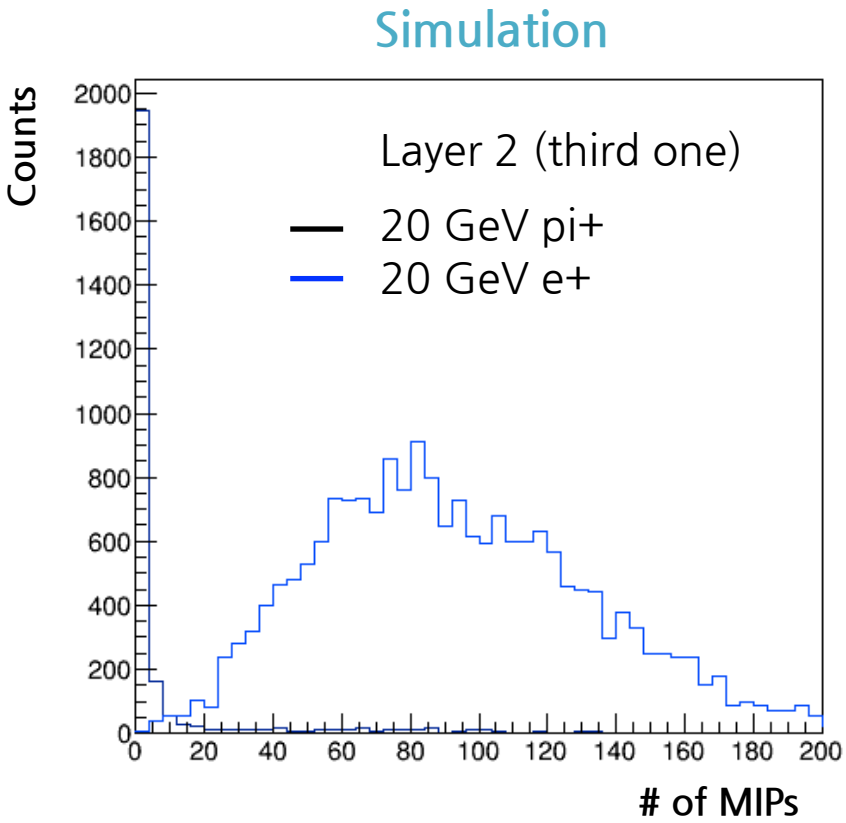


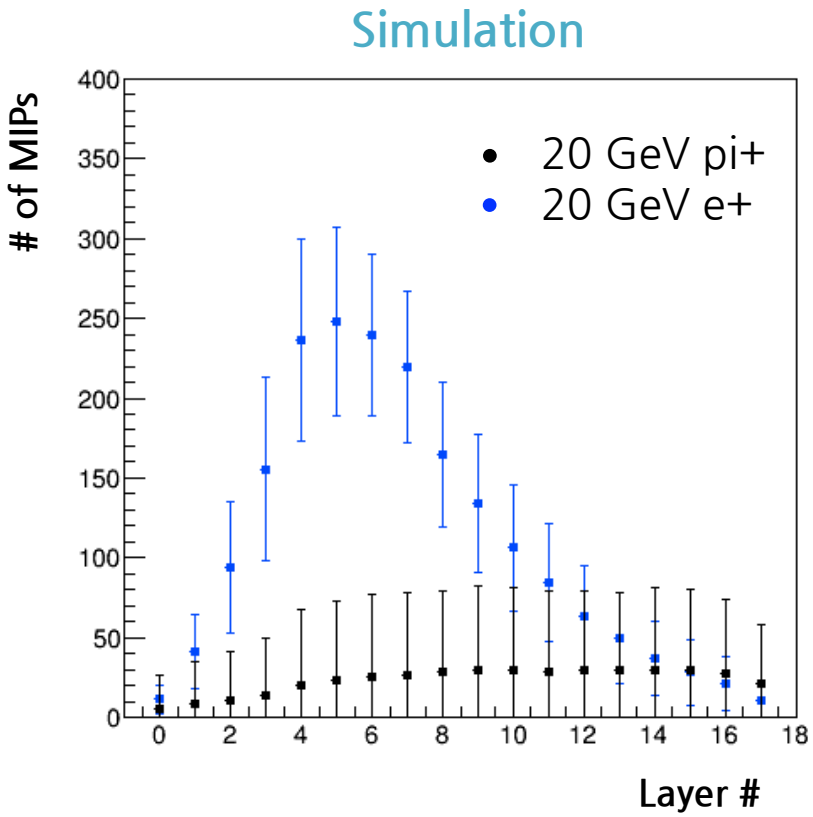
When TOT is set, it effects to the ADC distribution. The TOT is not stably set yet.



- Channels in the red border were used for the common noise subtraction.
- If the ADC shape of a channel in the red border was strange (right figure), it was excluded when the common noise was estimated.

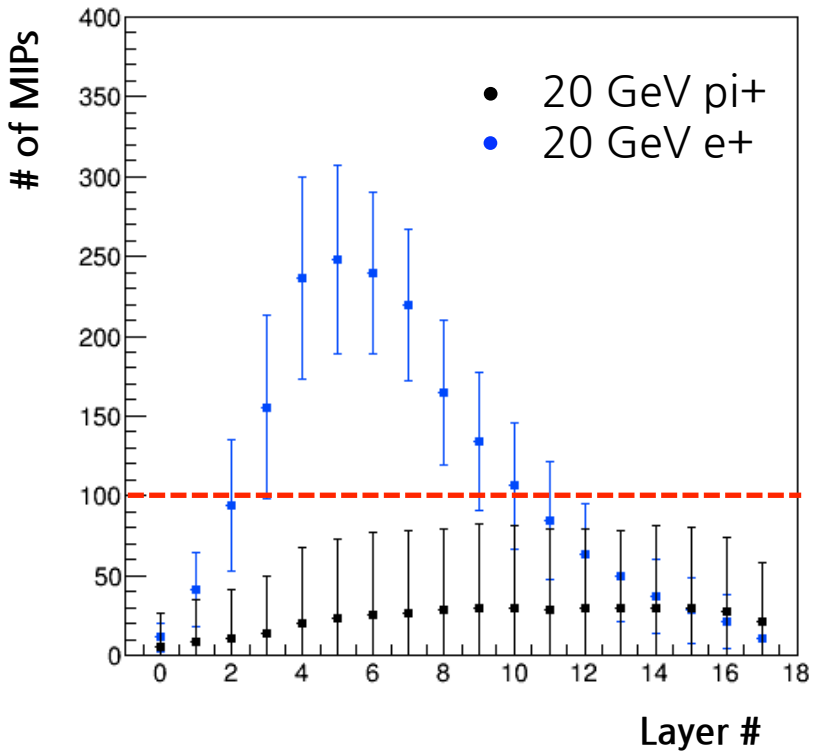
e+ event enhancement

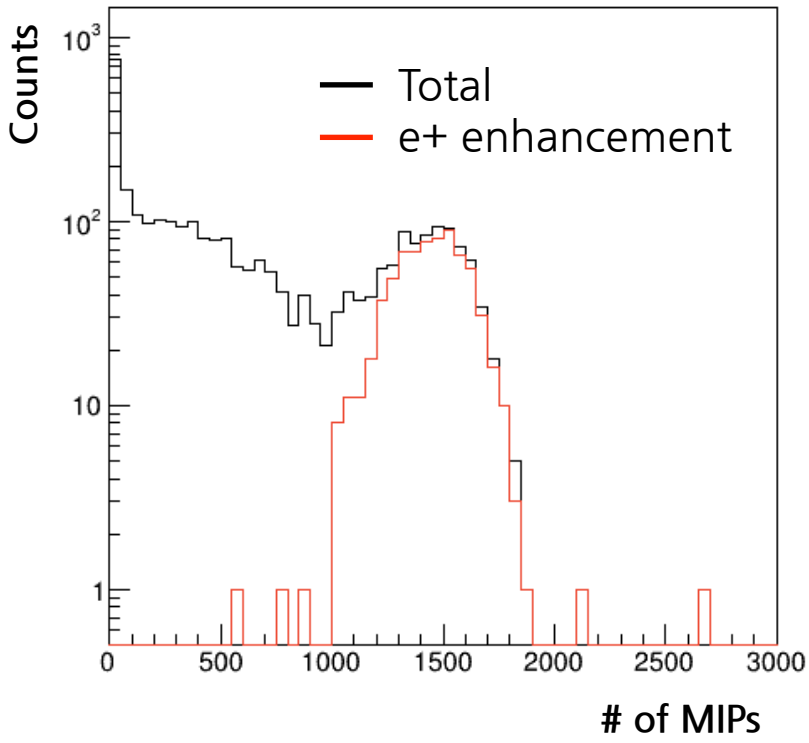




- e+ fraction to the beam is less than 30% and it decreases while the beam energy increases.
- Mean and RMS of the # of MIPs distribution of each layer were plotted for e+ and pi+ to study a condition which can enhance the e+ event.

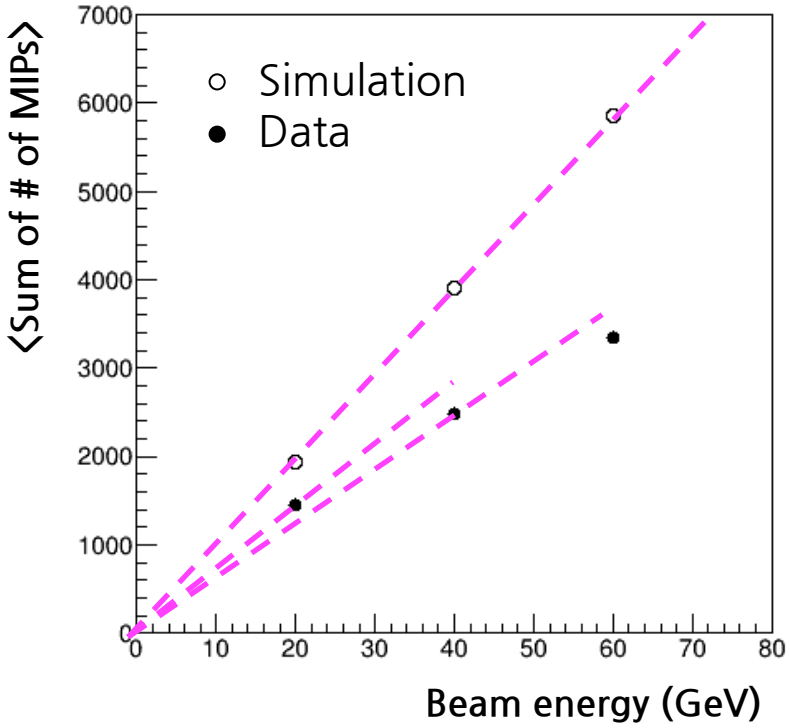
e+ event enhancement

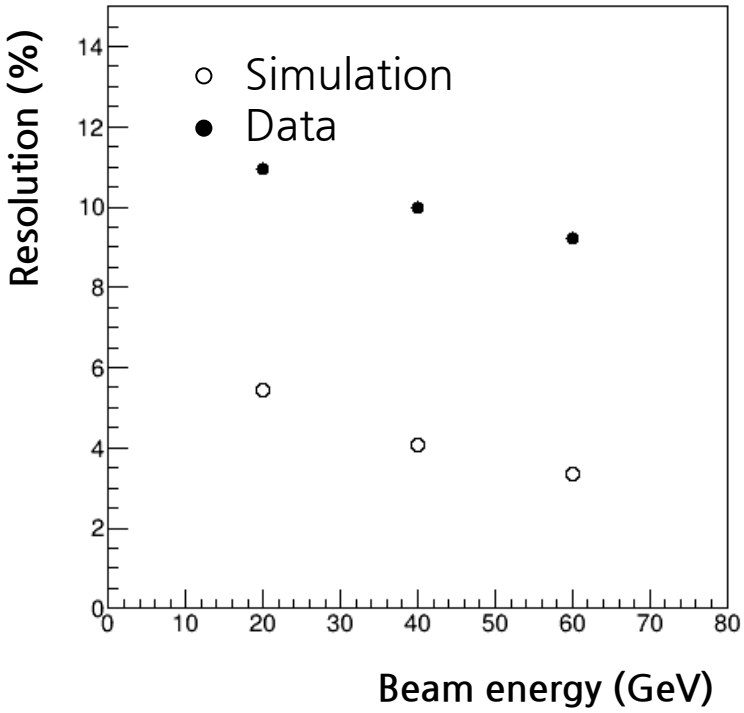




- To enhance the e+ event, only the events where the # of MIPs in layer 4, 5, 6, and 7 were bigger than 100 were selected.
- It seems that the e+ event is enhanced well with the above condition.

Linearity and resolution

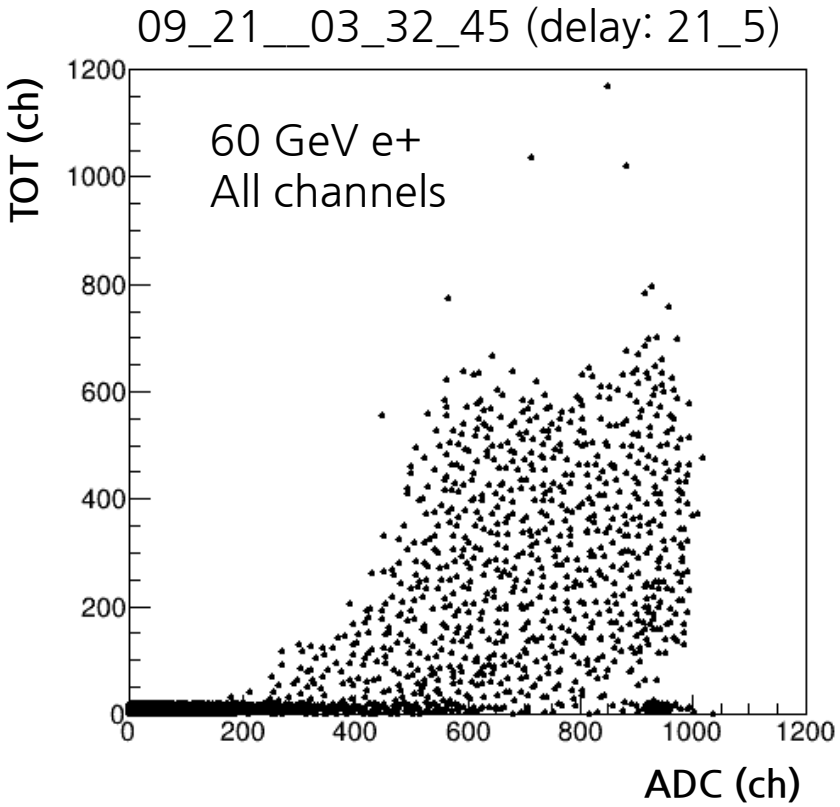




- ADC saturation can be seen assuming the data point starts from the (0, 0).
- Resolution of ADC sum (= sum of # of MIPs) of data is worse than that of simulation.

  →There are several items (MIP position, e+ hits the channel = 16, CMN) to be optimized to study the detector performance more precisely.

ADC vs TOT



- TOT starts having non-zero values when the ADC is larger than ~200.
- When the TOT has non-zero value, it is not proportional to the ADC.
- To better understand the ADC and TOT behaviors, data taking with an internal charge injection is under way.