WC study
and trigger study

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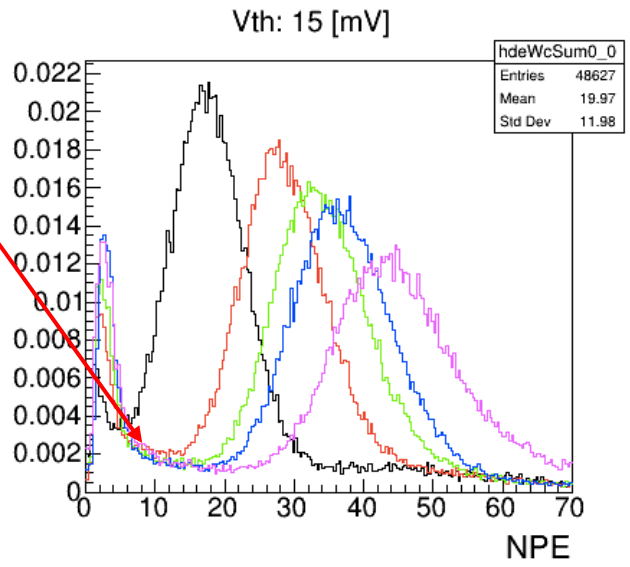
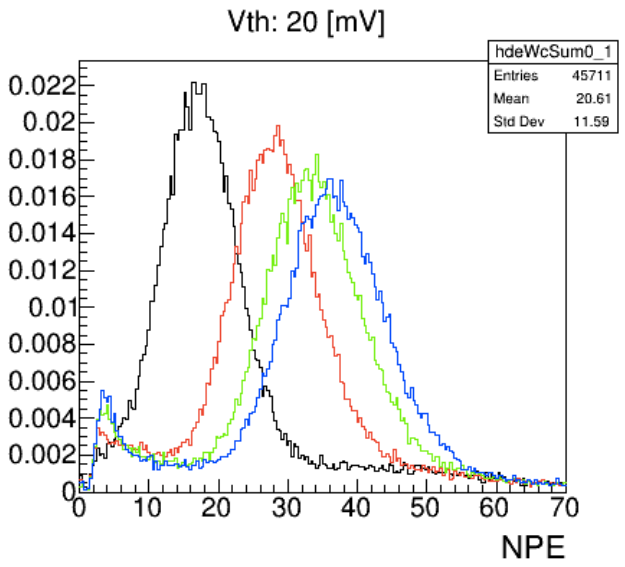
WC data summary

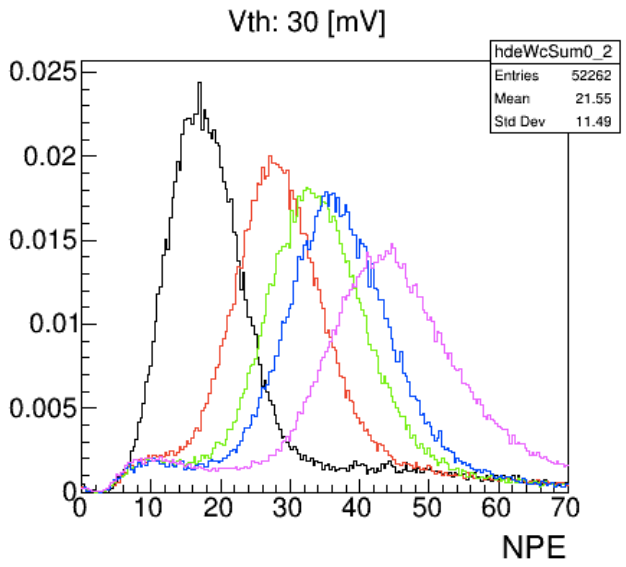
- K^+ beam data
  - Mom: 800, 1000, 1200, 1400 MeV/c
  - Vth: 15, 20, 30, 40, 50 mV
  - Trig: BH1 × BH2 × $\overline{BAC}$ × TOF(Seg 10-12) × $\overline{LAC}$
  - Offline cut: nhTOF==1 & nhLAC ==0 & dtTof ~ center
- pi^+ beam data
  - Mom: 800, 1000 MeV/c
  - Vth: 15, 30, 50 mV
  - Trig: BH1 × BH2 × TOF(Seg 10-12)
  - Offline cut: nhTOF==1 & nhLAC > 0 & dtTof ~ center
- p beam data
  - Mom: 800, 1000, 1200, 1400 MeV/c
  - Vth: 15, 30, 50 mV
  - Trig: BH1 × BH2 × TOF(Seg 10-12)
  - Offline cut: nhTOF==1 & nhLAC ==0 & dtTof ~ center

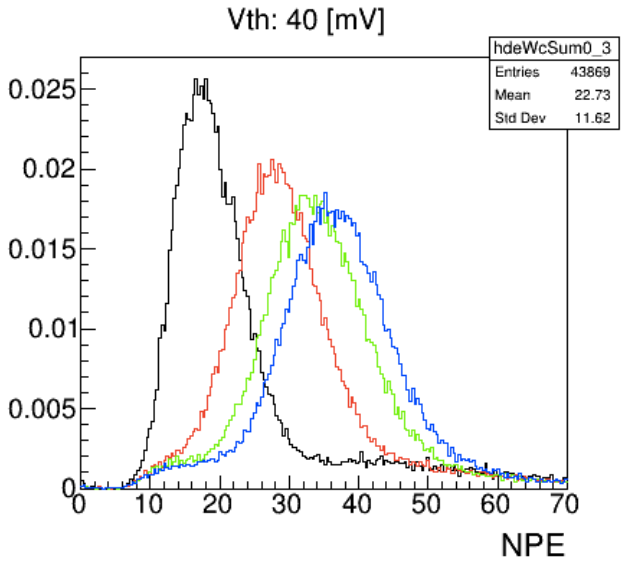
NPE distributions (K^+ and pi^+ beam)

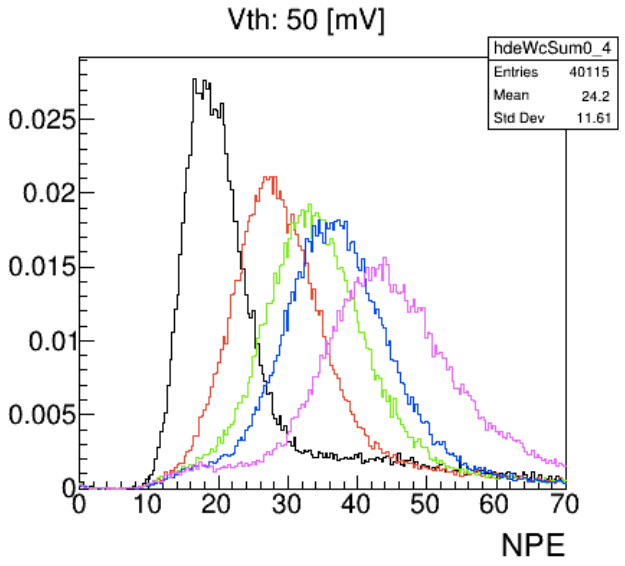
There are two component in NPE distributions. One is the gaussian distribution which is normal component.
The other is flat distribution (non gaus distribution), which may be due to the absorption to acrylic region.







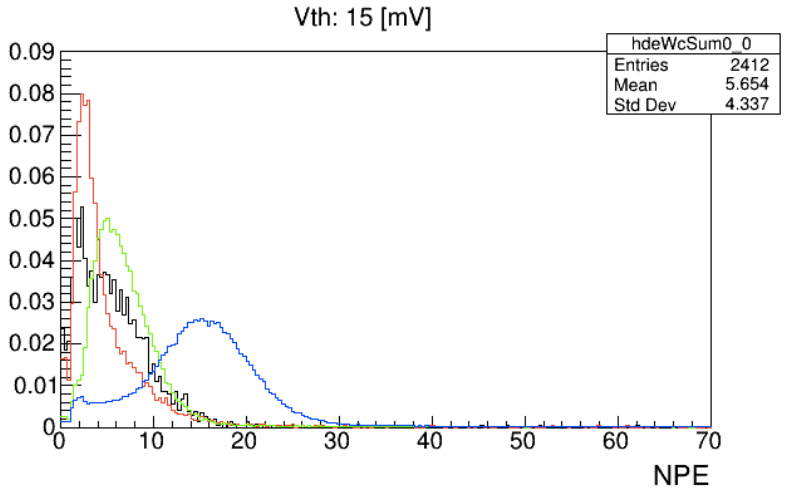


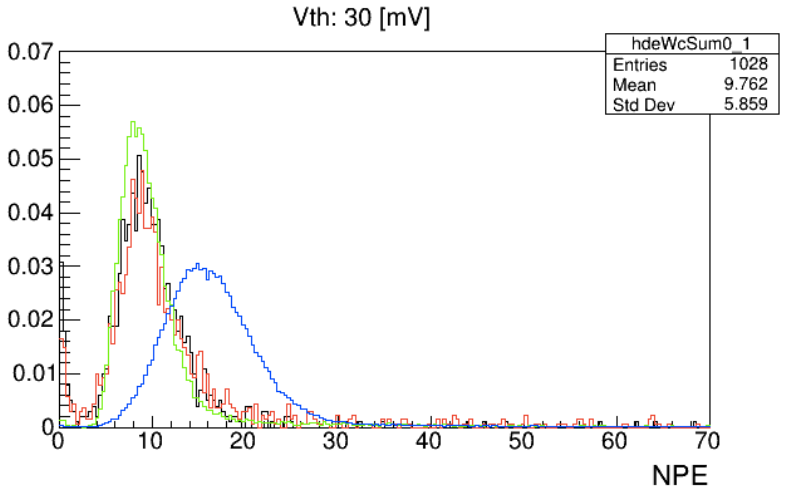


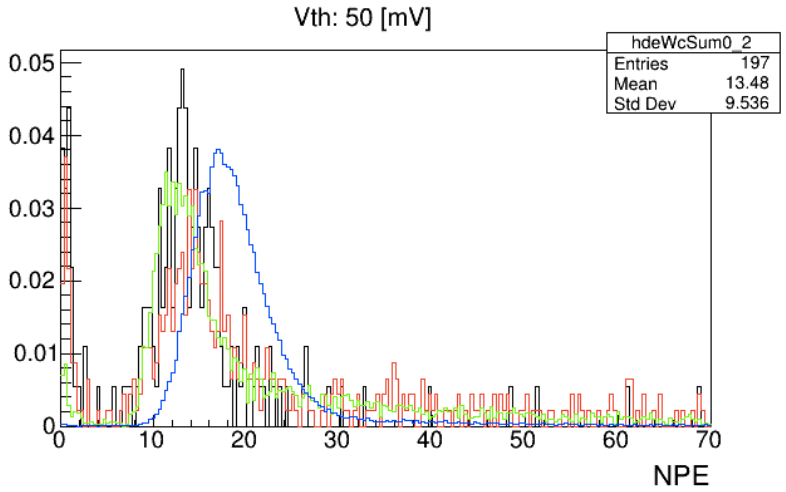
- K: 800 MeV/c
- K: 1000 MeV/c
- K: 1200 MeV/c
- K: 1400 MeV/c
- π: 1000 MeV/c

NPE distributions (proton beam)

There is also two component for 1400 MeV/c data, whose β is sufficiently larger to produce WC signal.



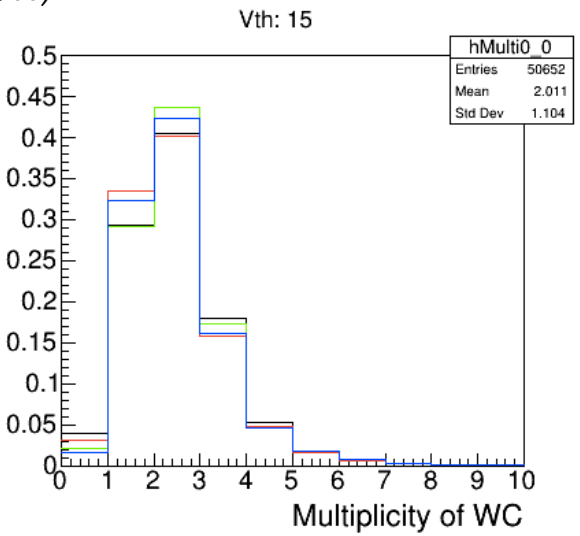


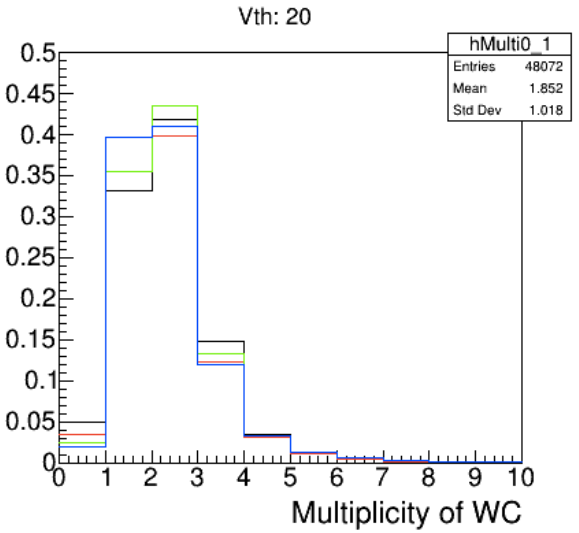


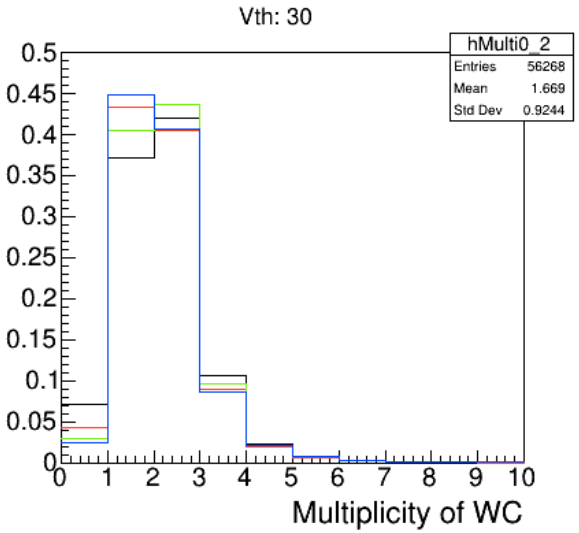
—p: 800 MeV/c
—p: 1000 MeV/c
—p: 1200 MeV/c
—p: 1400 MeV/c

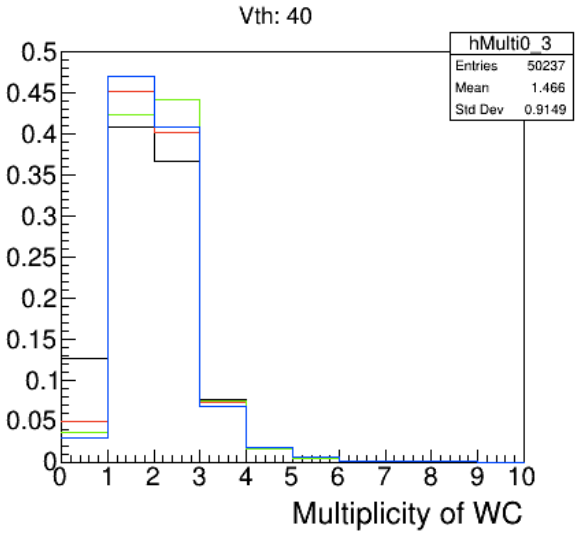
Multiplicity distributions (K^+ and pi^+ beam)

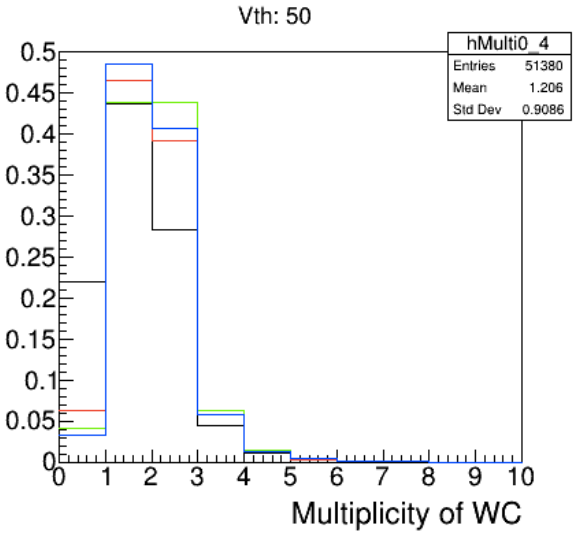
Even I select the nhTof ==1 events (single hit events), there are large multiplicity events (multi ≧ 3), which will be due the in-flight decay between LAC and WC and strong interactions (especially lower Vth selection).







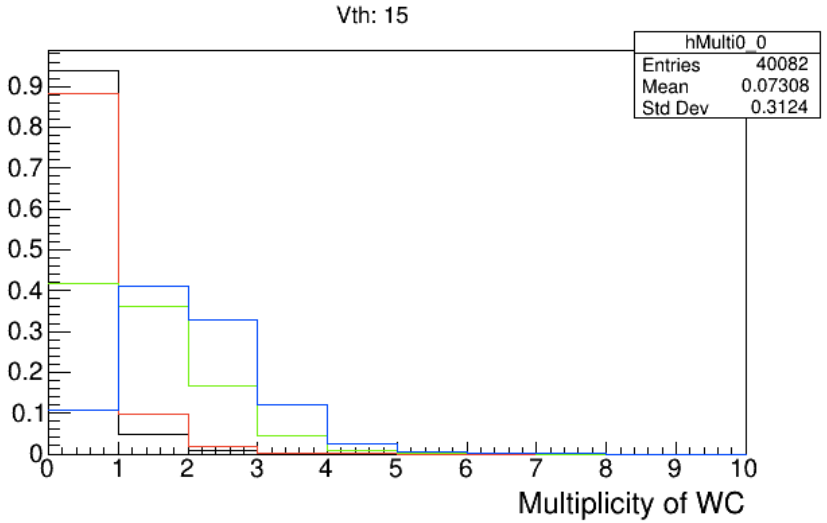


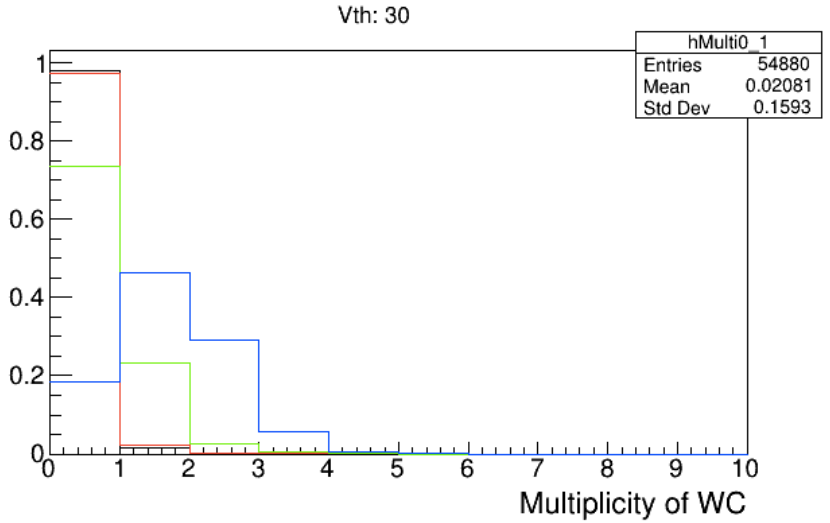


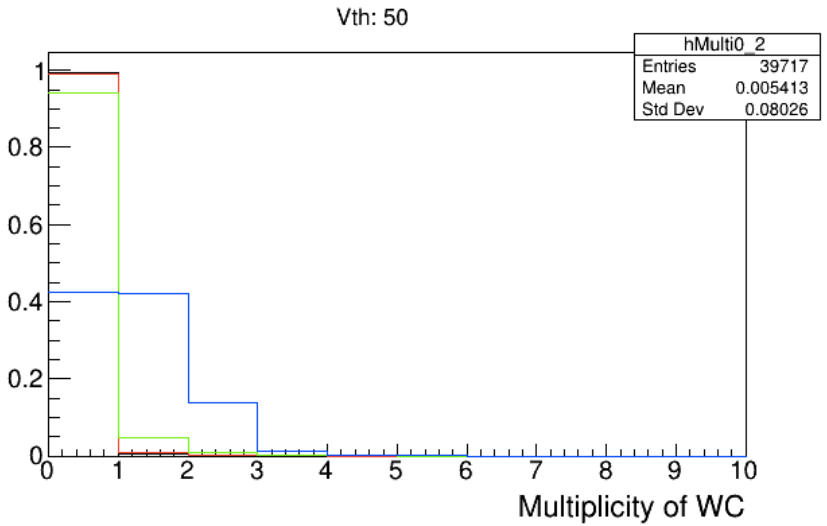
- K: 800 MeV/c
- K: 1000 MeV/c
- K: 1200 MeV/c
- K: 1400 MeV/c
- π : 1000 MeV/c

Multiplicity distributions (proton beam)

Similarly, there are also high multiplicity events (Multi ≧ 3) for proton events, may be due to the strong interactions.





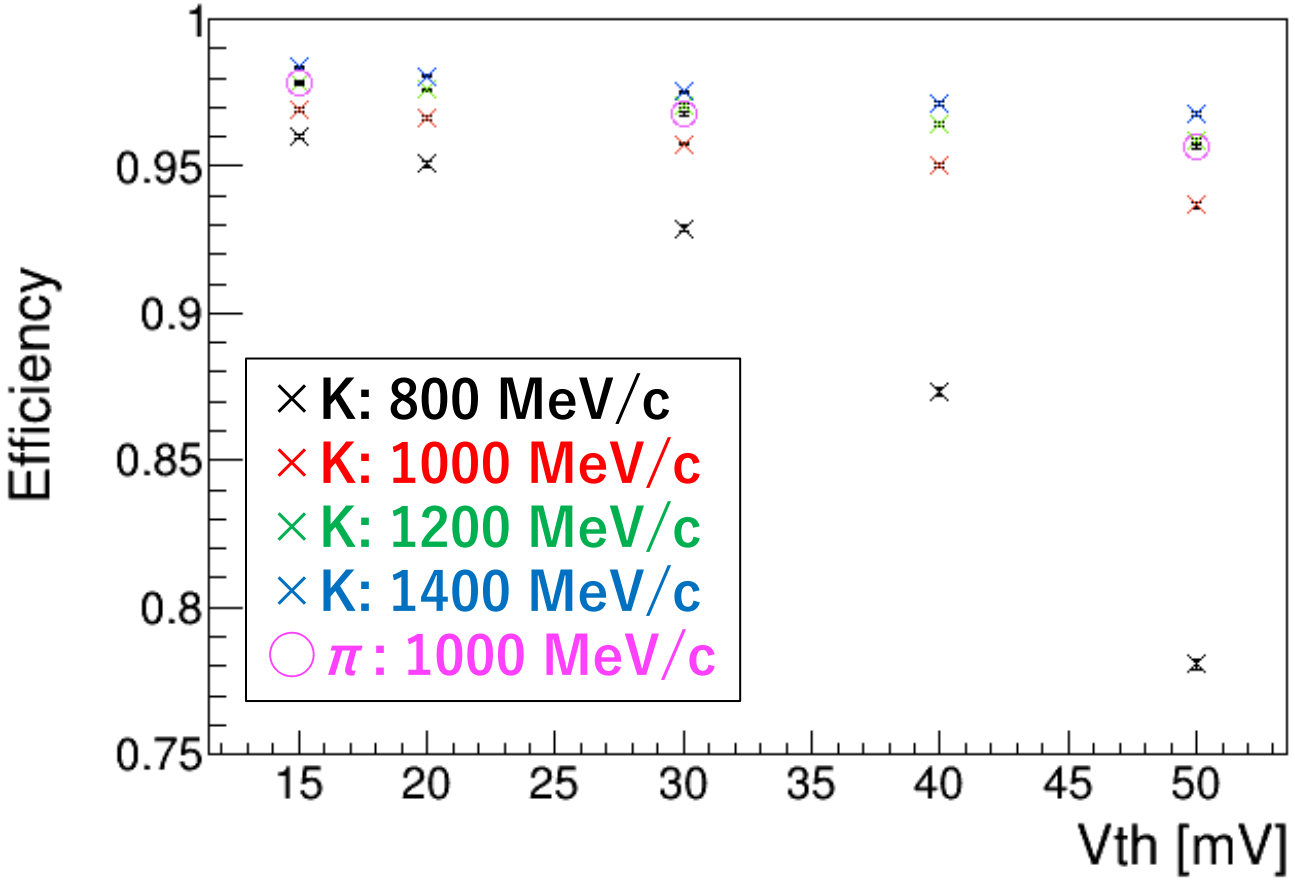


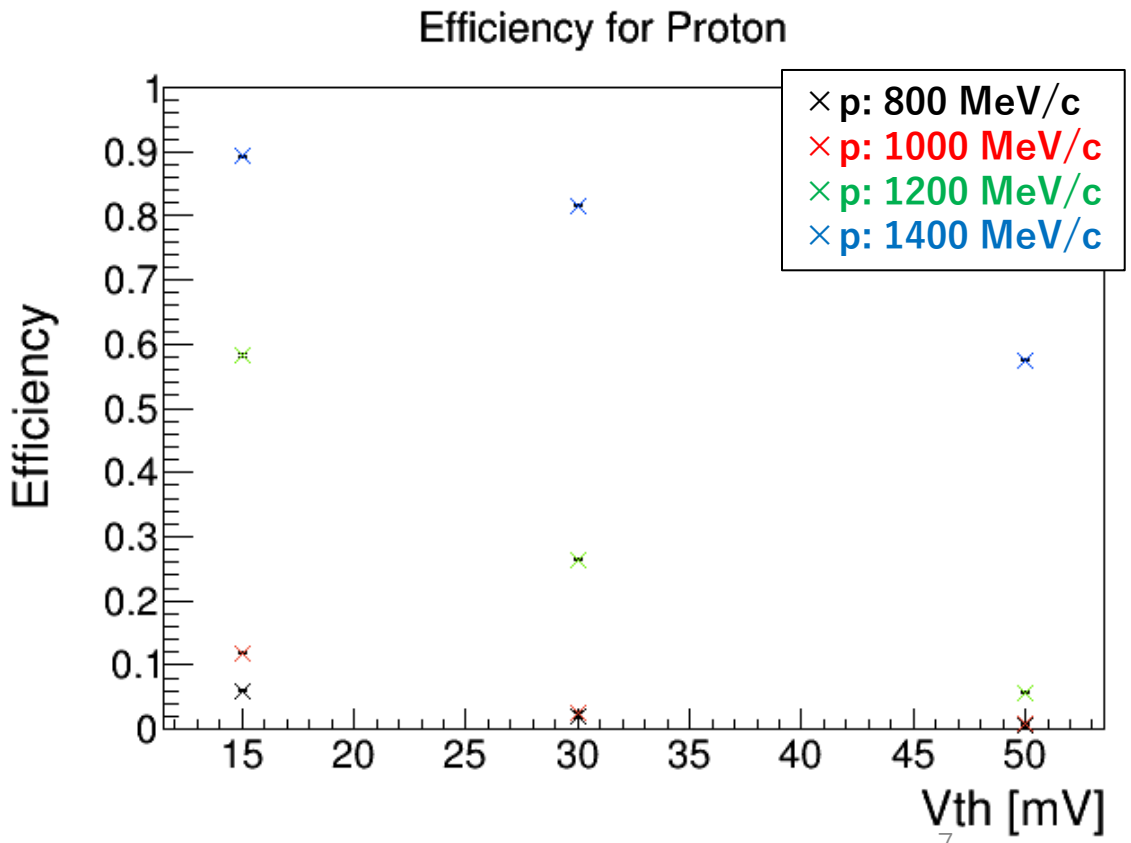
—p: 800 MeV/c
—p: 1000 MeV/c
—p: 1200 MeV/c
—p: 1400 MeV/c

Efficiency summary

I think that reasonable Vth to survive K+ and kill low momentum proton is about 30 mV.
Here, the efficiency for pi beam is lower than the kaon's one. It is expected to be due to the difference of the beam profile or decay in flight effect (especially $K^+ \rightarrow 3\pi$ mode).

Efficiency for K^+ and π^+





We check the trigger rate by adding the WC and LAC for E03 based trigger with Fe target.
The E03 target thickness is almost two time larger than E42. Then, expected trigger condition should be half.
When we added WC and LAC to E03 trigger, the trigger rate is drastically dropped. However, the trigger rate without FAC and PVAC is almost same as E03. Here, the effect of 2D Mtx is more significant to E42 trigger than E03. I think we can achieve the reasonable trigger rate ~ 2k / spill for E42 data taking.