

Status Report

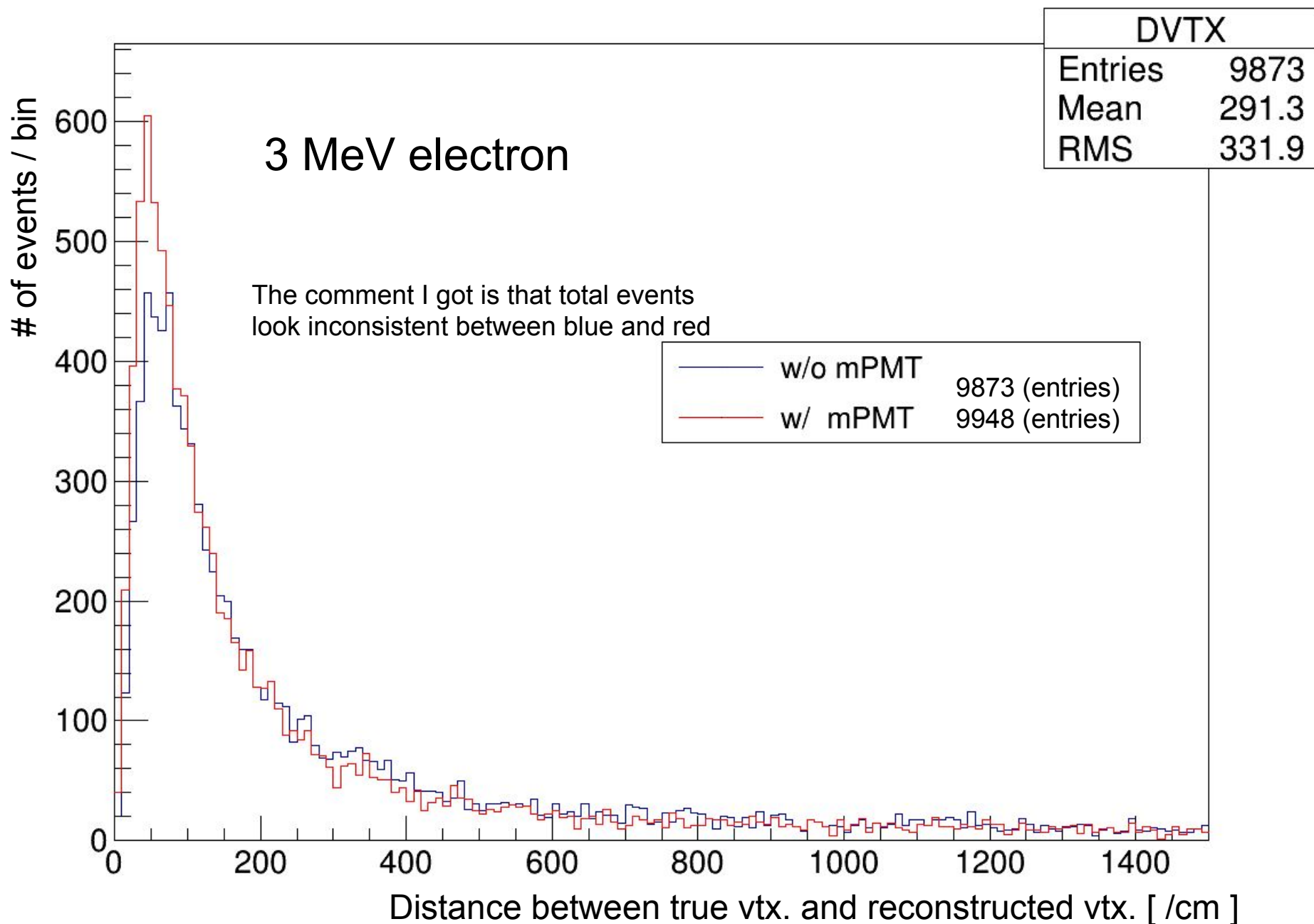
Shota Izumiyama
29 Nov. 2019
mPMT-Japan meeting

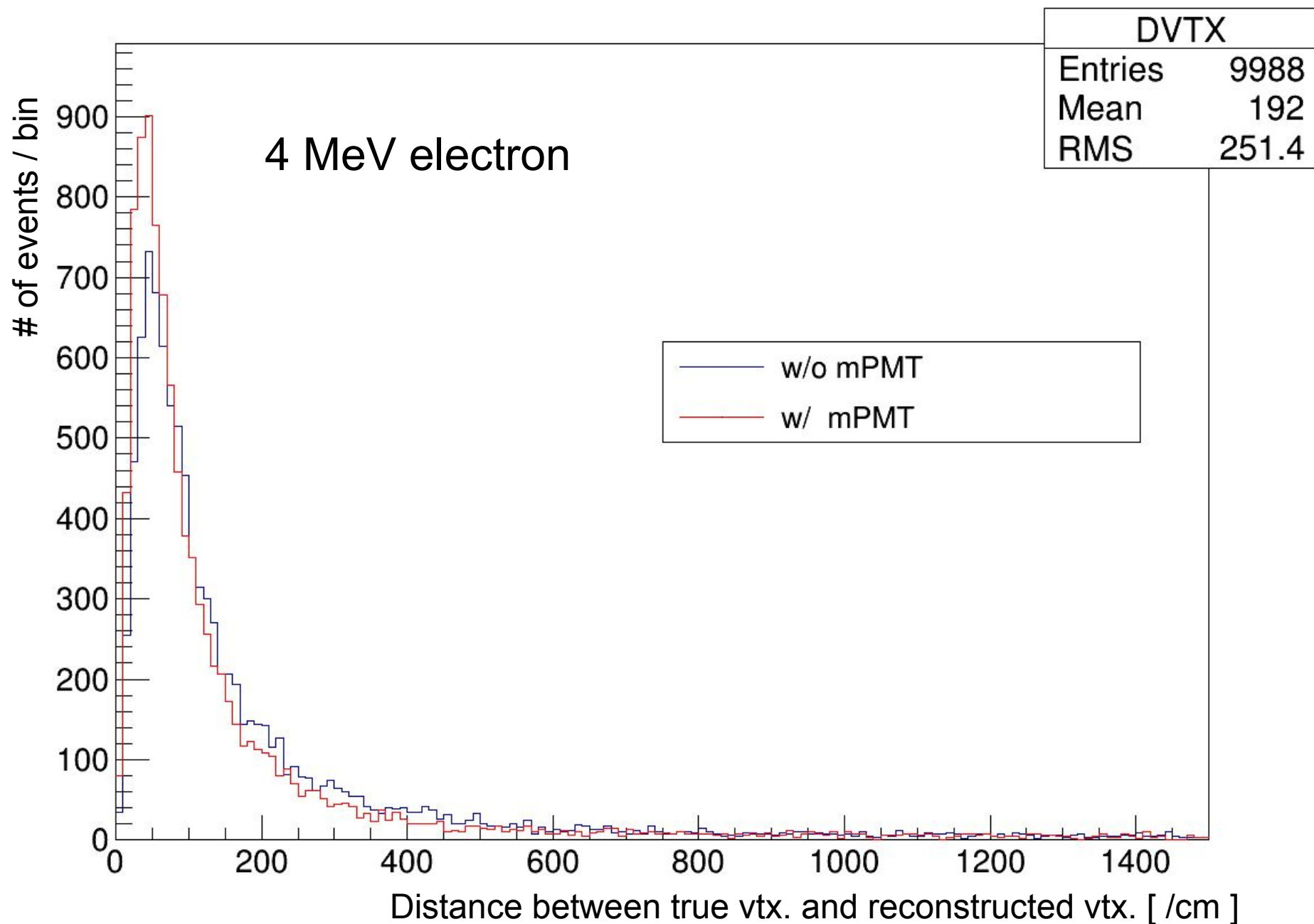
This week

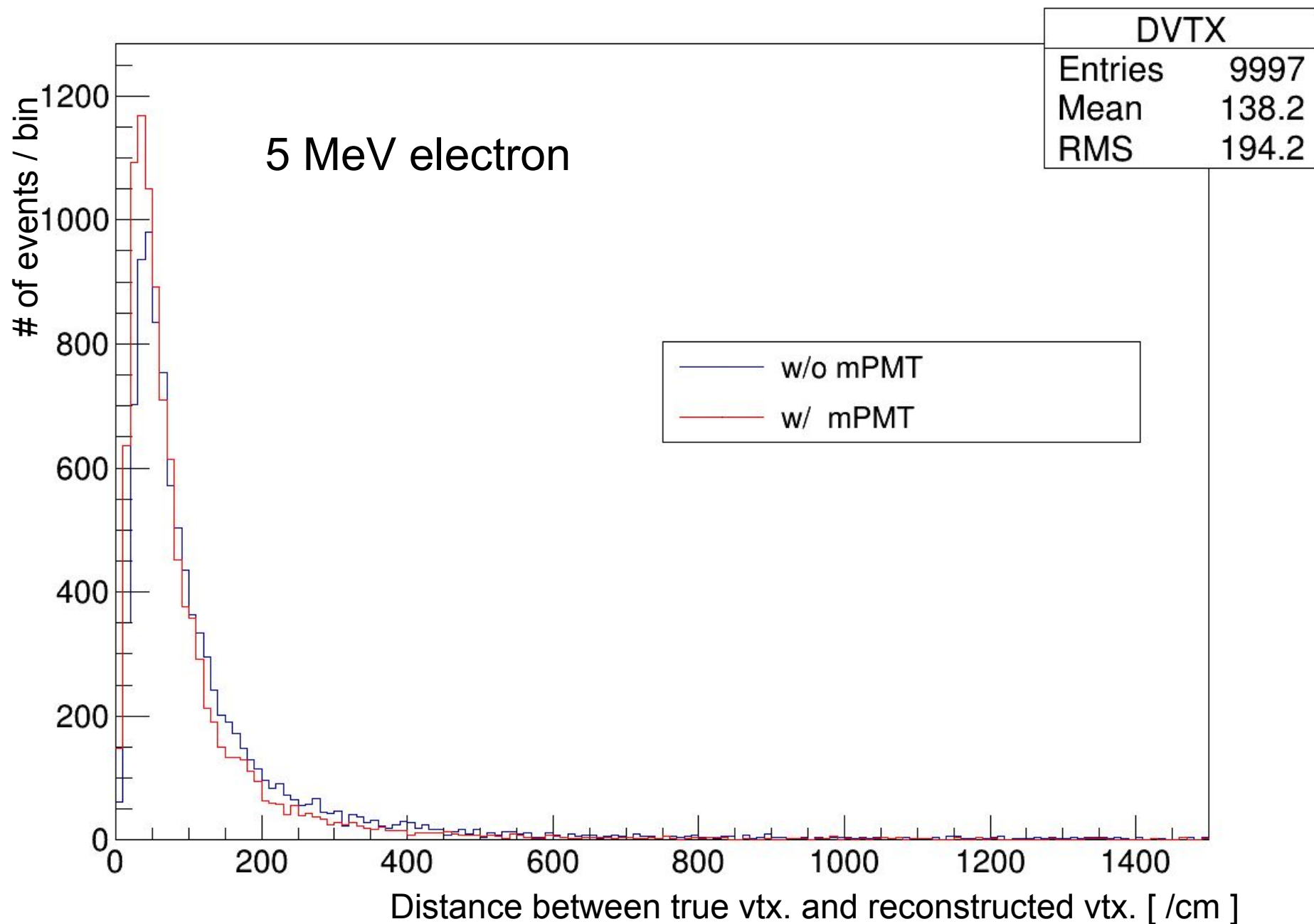
- Checked non-flat D.R. distribution
- Reported my progress at HK software meeting of 28 Nov.
- Preparing presentation of mid-term report of Tokyo Tech. physics department.

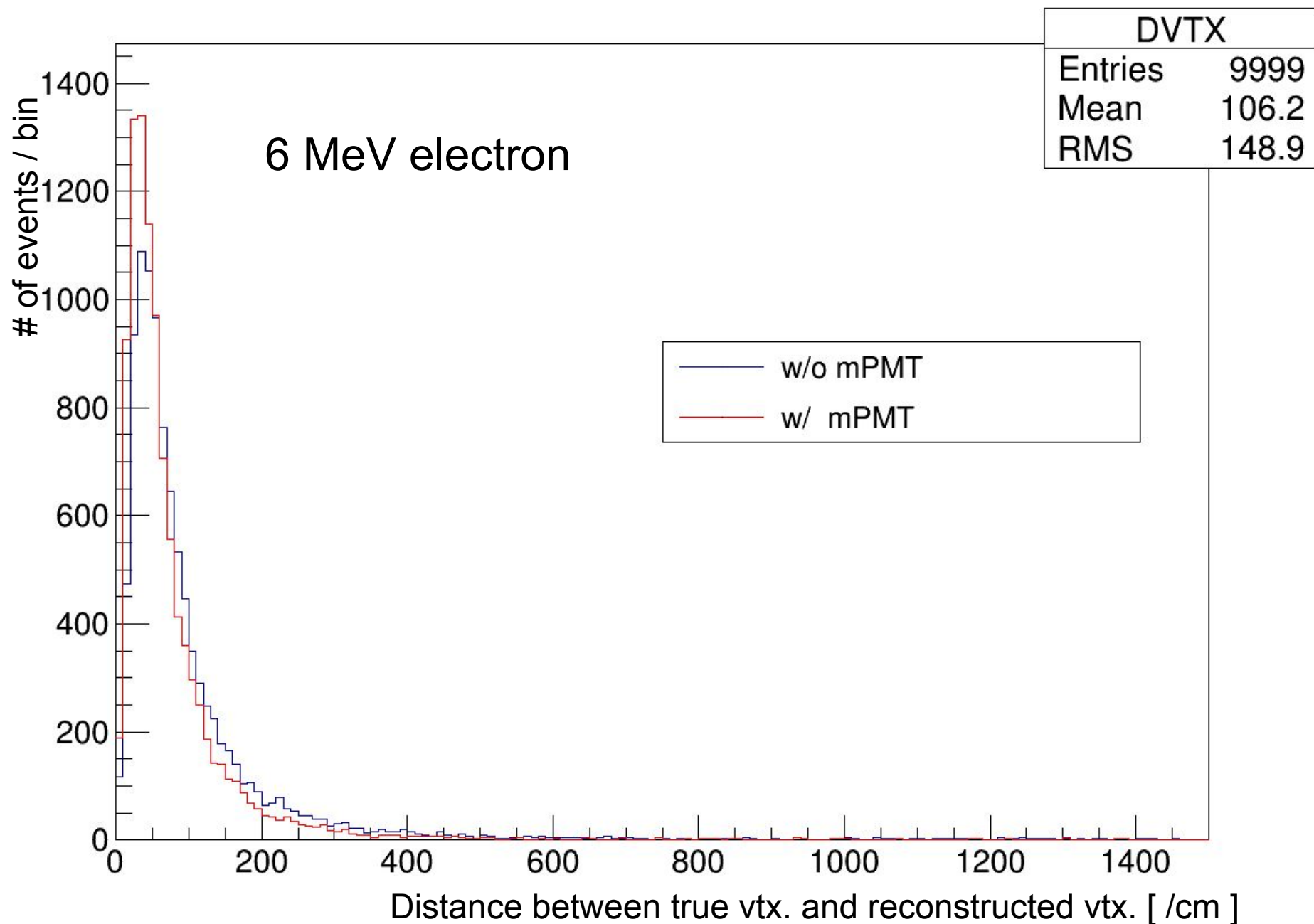
Vertex resolution

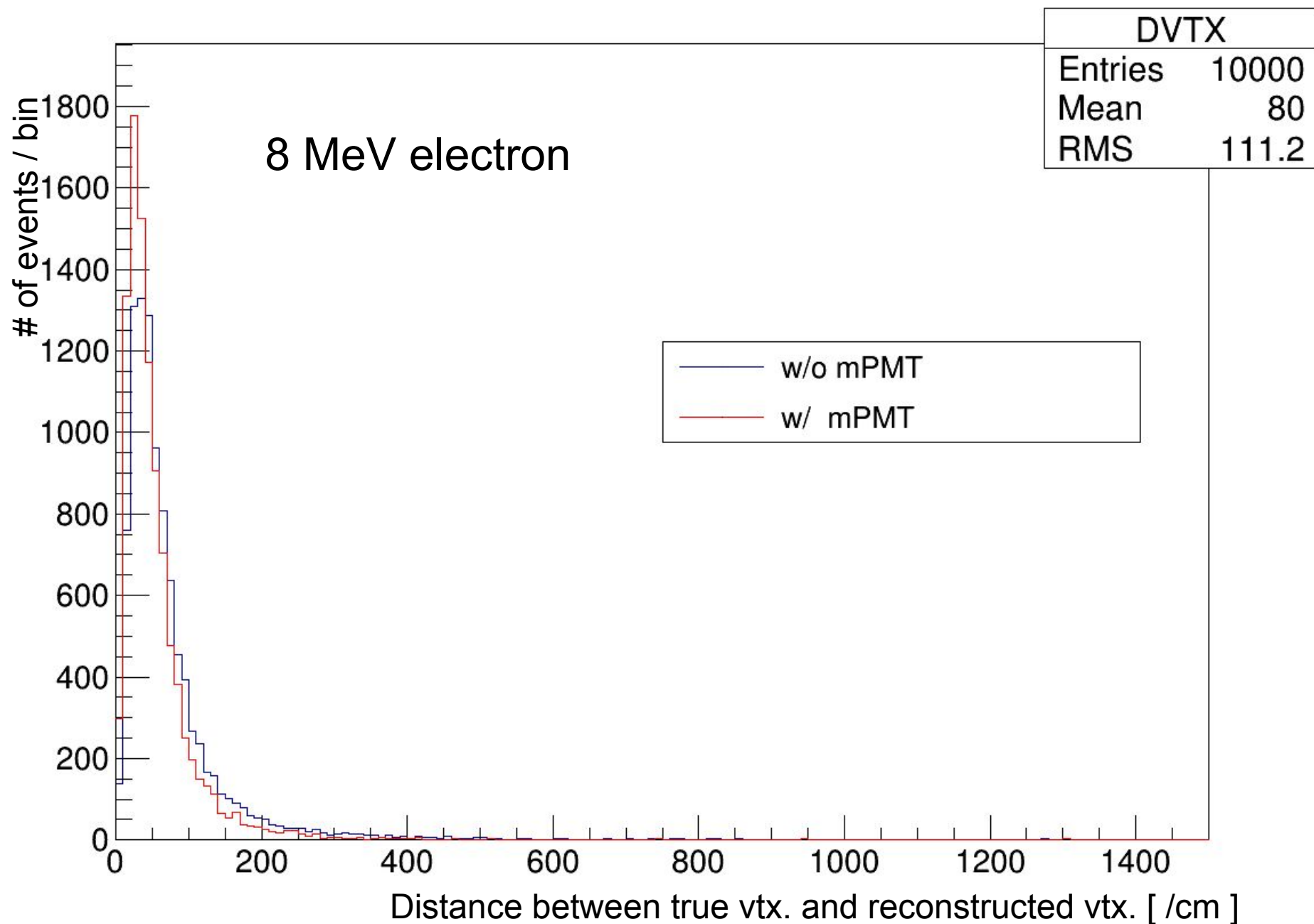
- Reported the reproduced result about vertex resolution at HK software meeting
- Found that there are big difference between Benjamin-san's result and my result in vertex resolution
- Commented that the “distance between true and MC” distribution looks strange

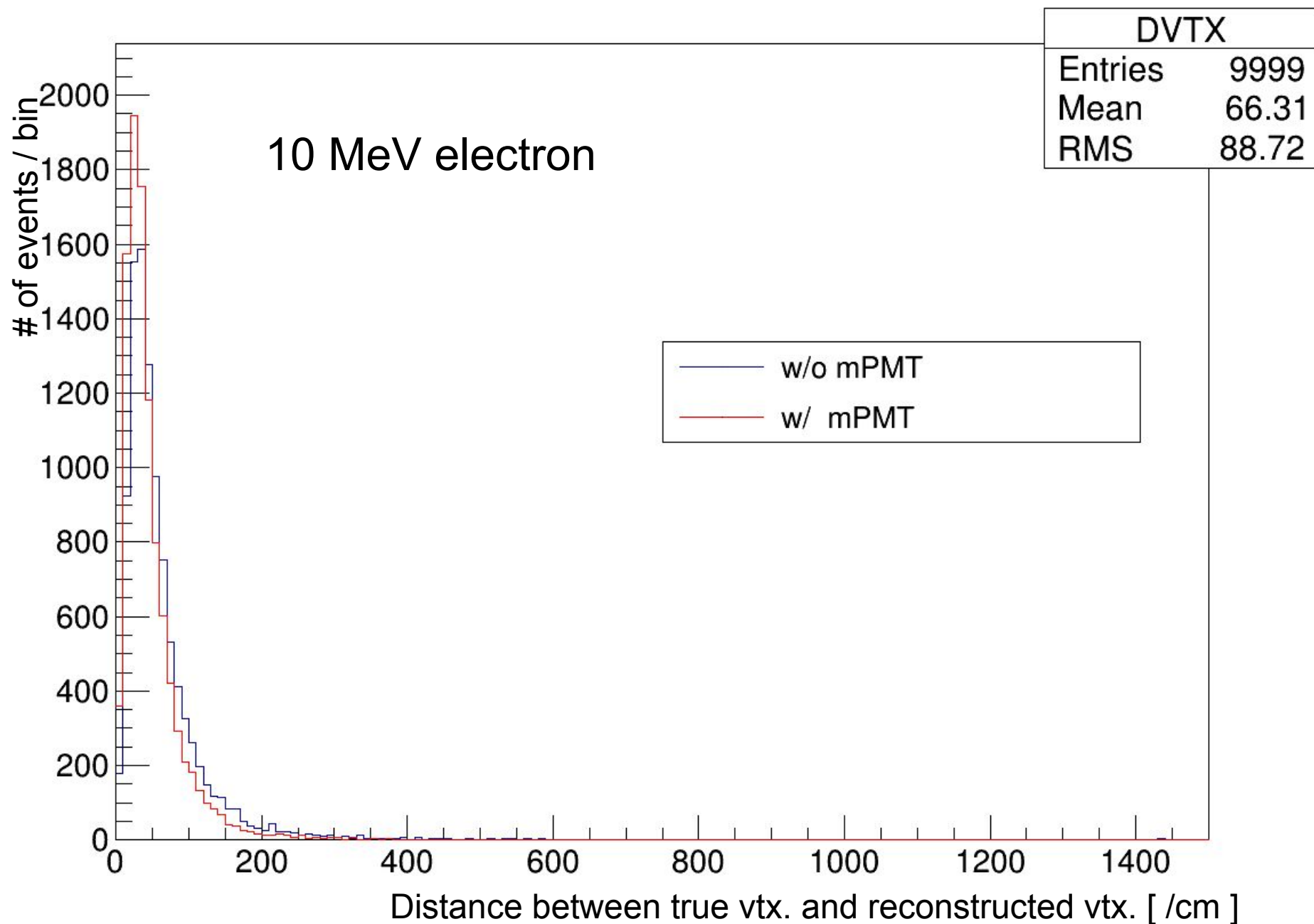


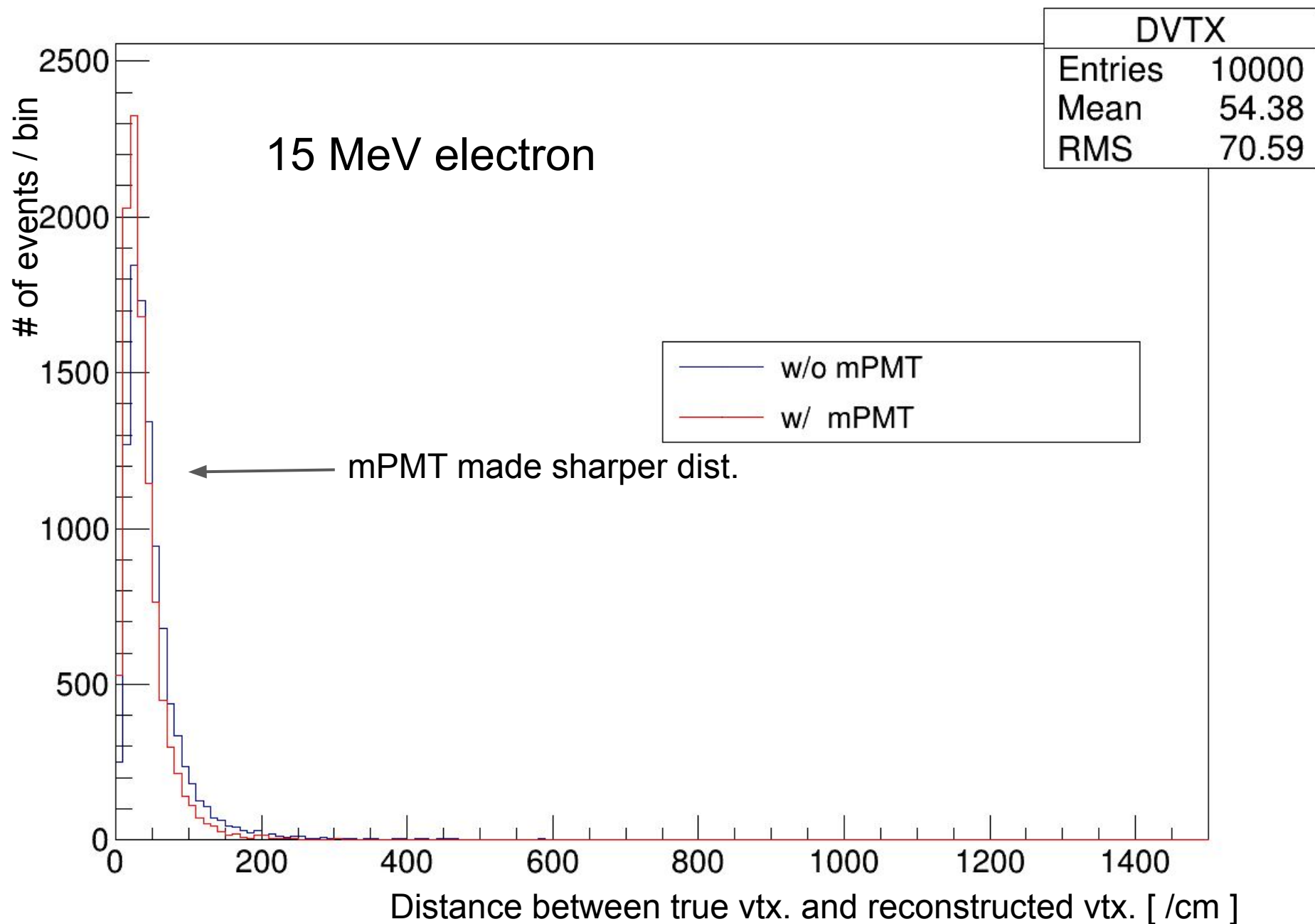








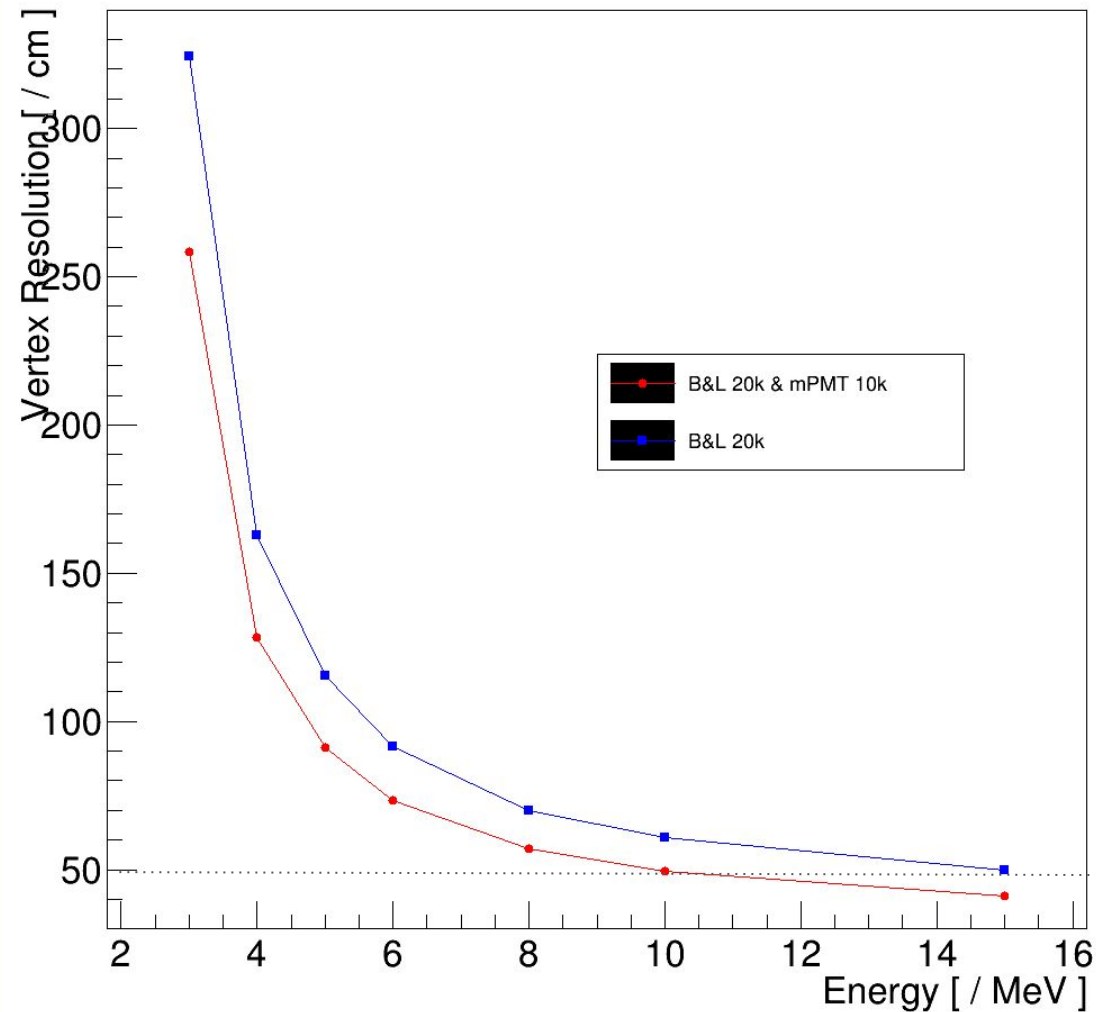
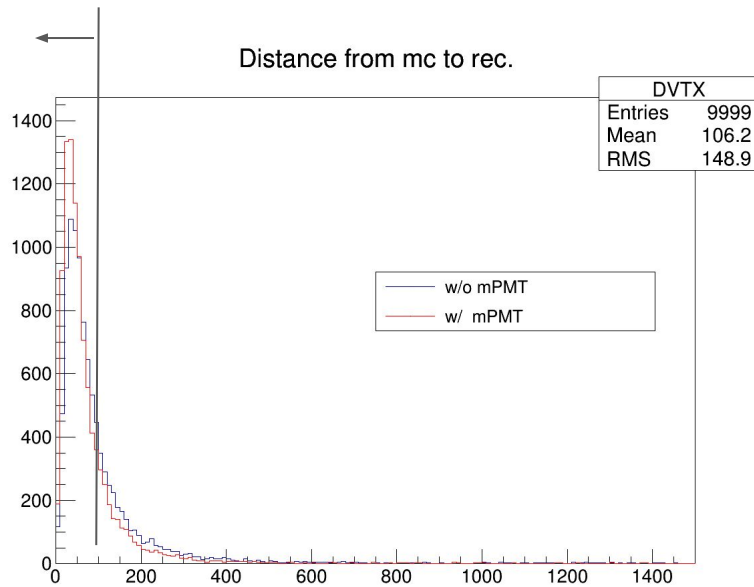




Vertex resolution

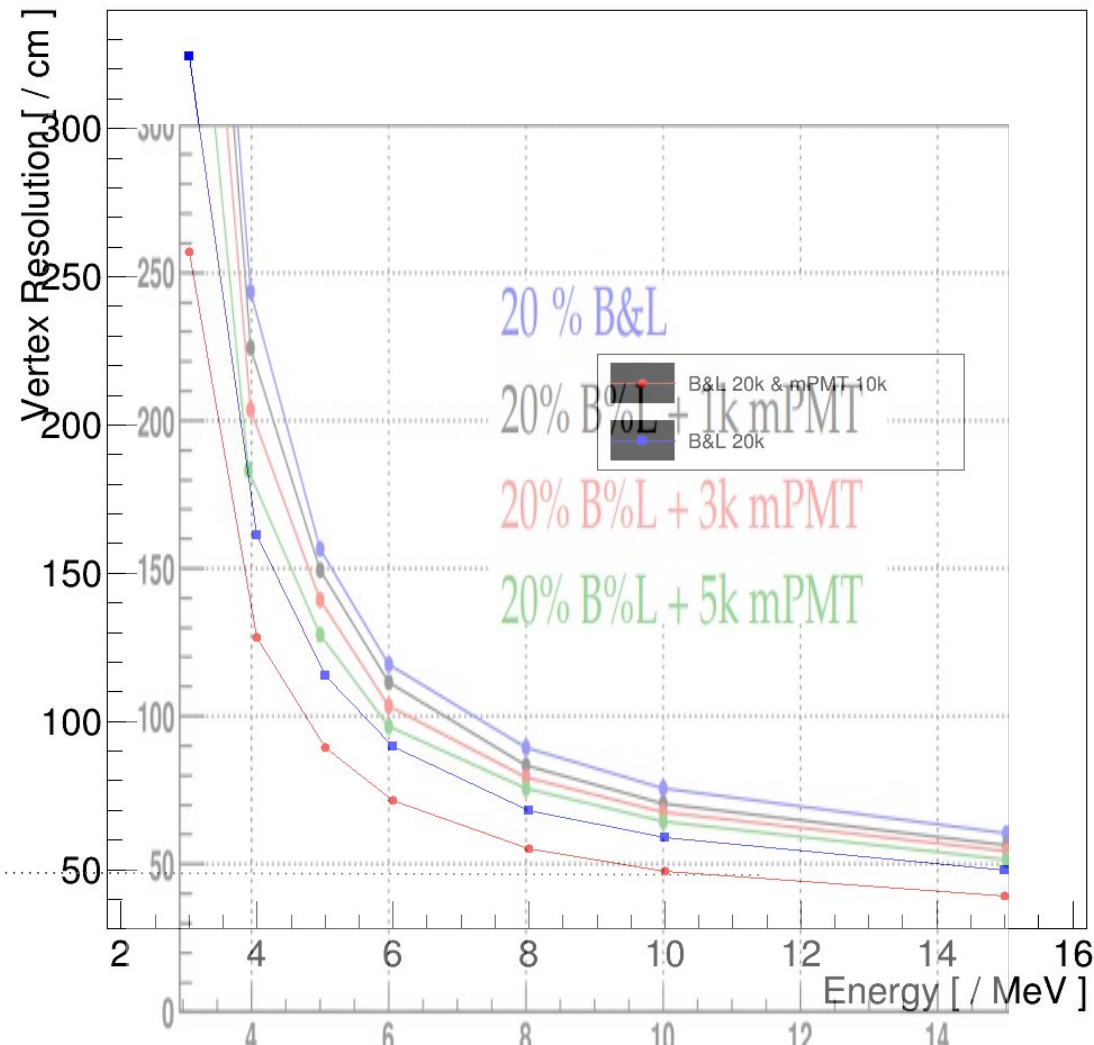
- Same plot with the plot I showed at 1st Nov.

Vertex resolution is defined as the distance giving 68 % of total events



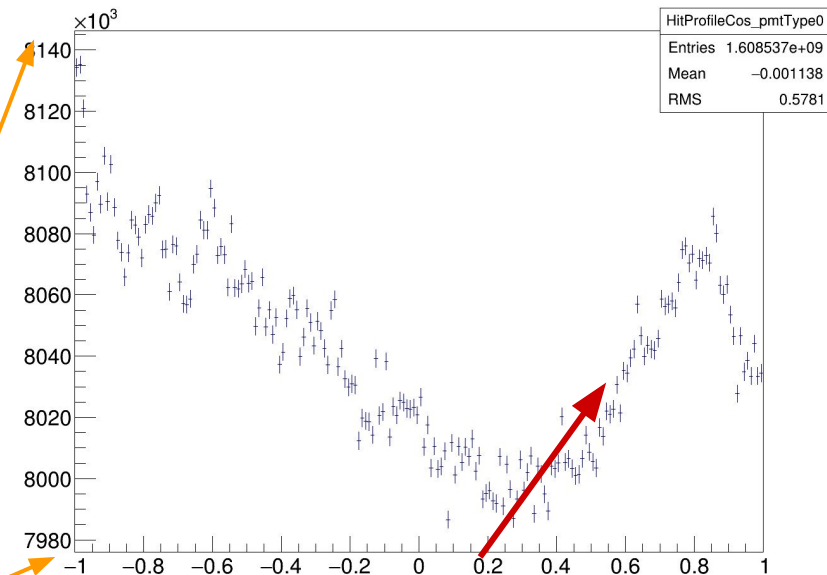
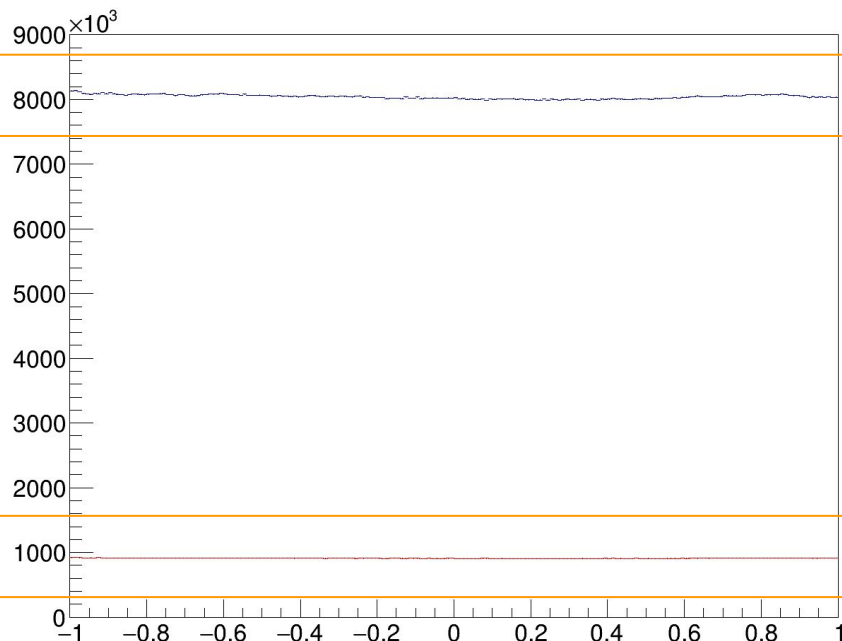
Vertex resolution

- Compared with Benjamin-san's plot
- Better than result of Benjamin-san (9 th HK proto-collaboration meeting (pre meeting))

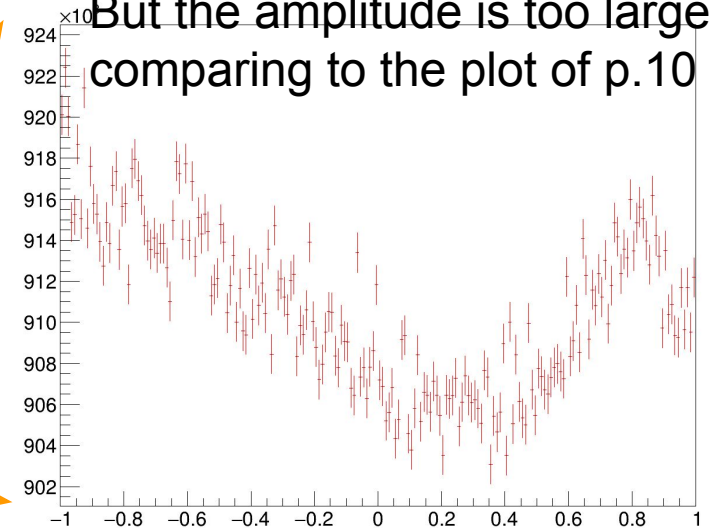


Non-flat D.R.

- When I generated 2.2 MeV gamma-ray w/ D.R., there are non-flat distribution in hit profile
- Non isotropic D.R.
→ detector geometry?
- Checked this

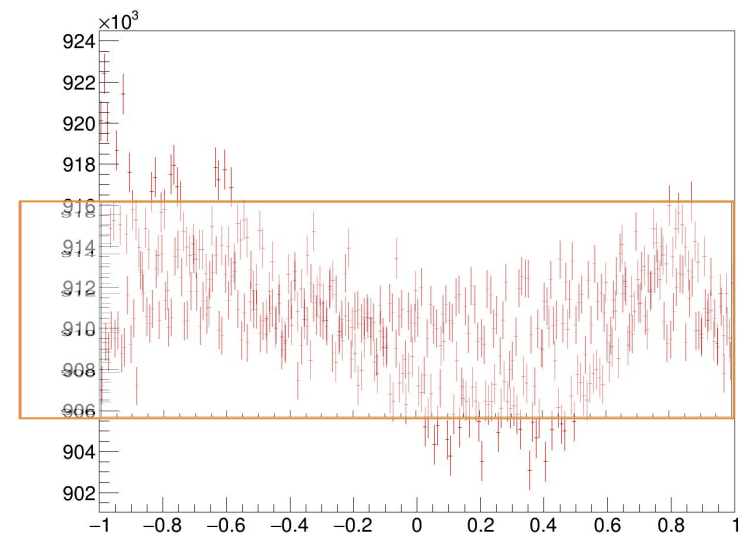
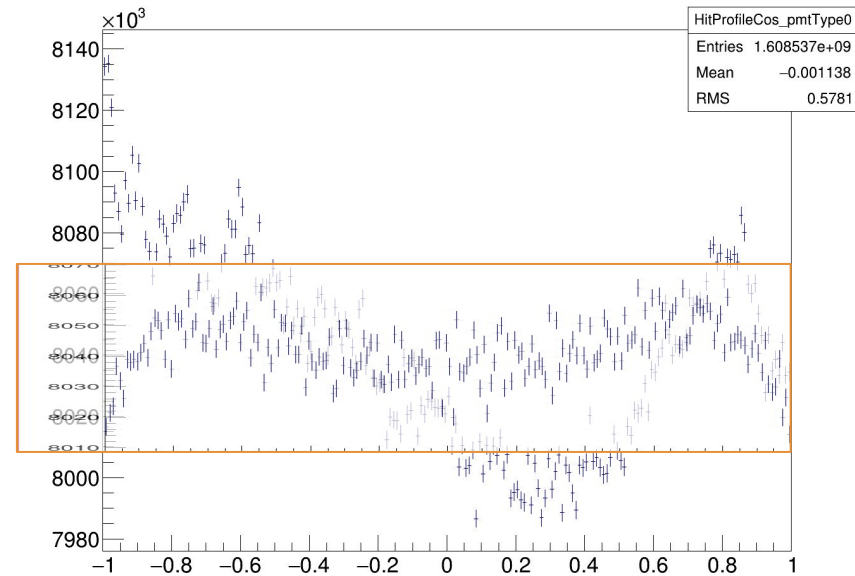


2.2 MeV gamma signal.
But the amplitude is too large
comparing to the plot of p.10



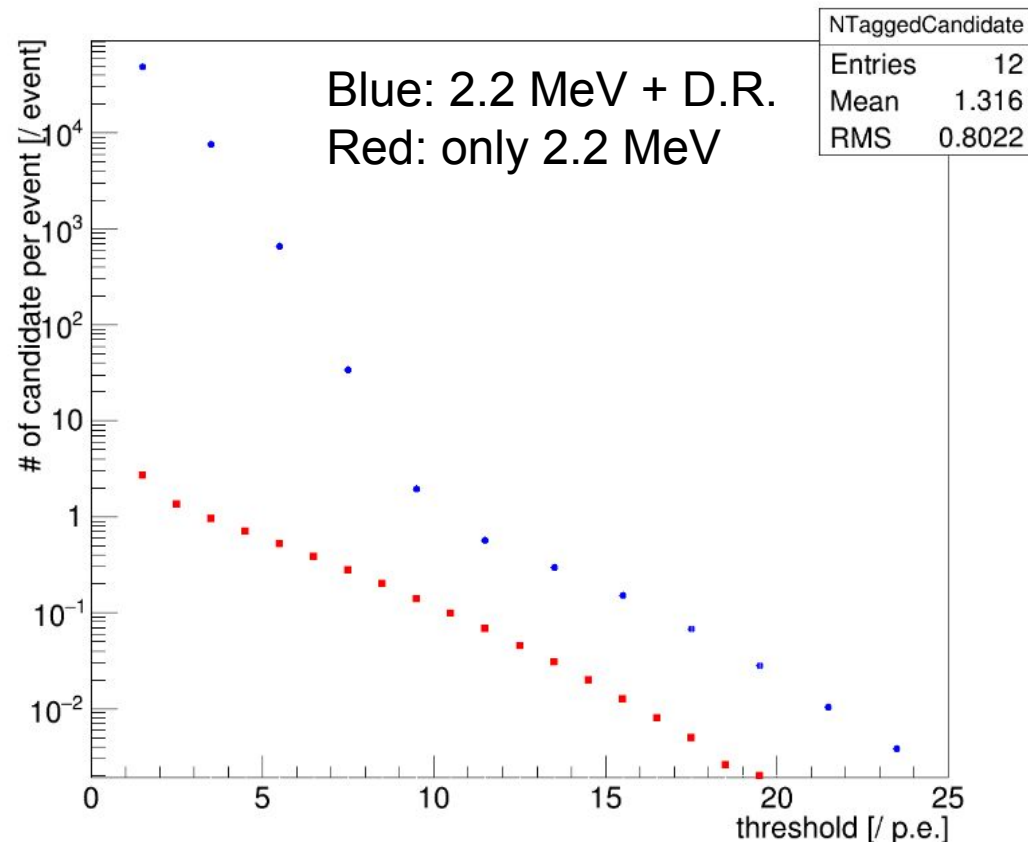
Non-flat D.R.

- Generated 2.2 MeV γ at center of the tank
- Overlayed its plots (orange boxes)
 - Variation became smaller
- → It might be came from detector geometry
- This is not mistake of my code. So I continue n-tagging study with the MC.



n-tagging: N10 method performance

- I did N10 method with variational threshold for the MC of only 2.2 MeV and the MC of 2.2 MeV and D.R.
- I will check whether or not the tagged candidate is came from 2.2 MeV or D.R.

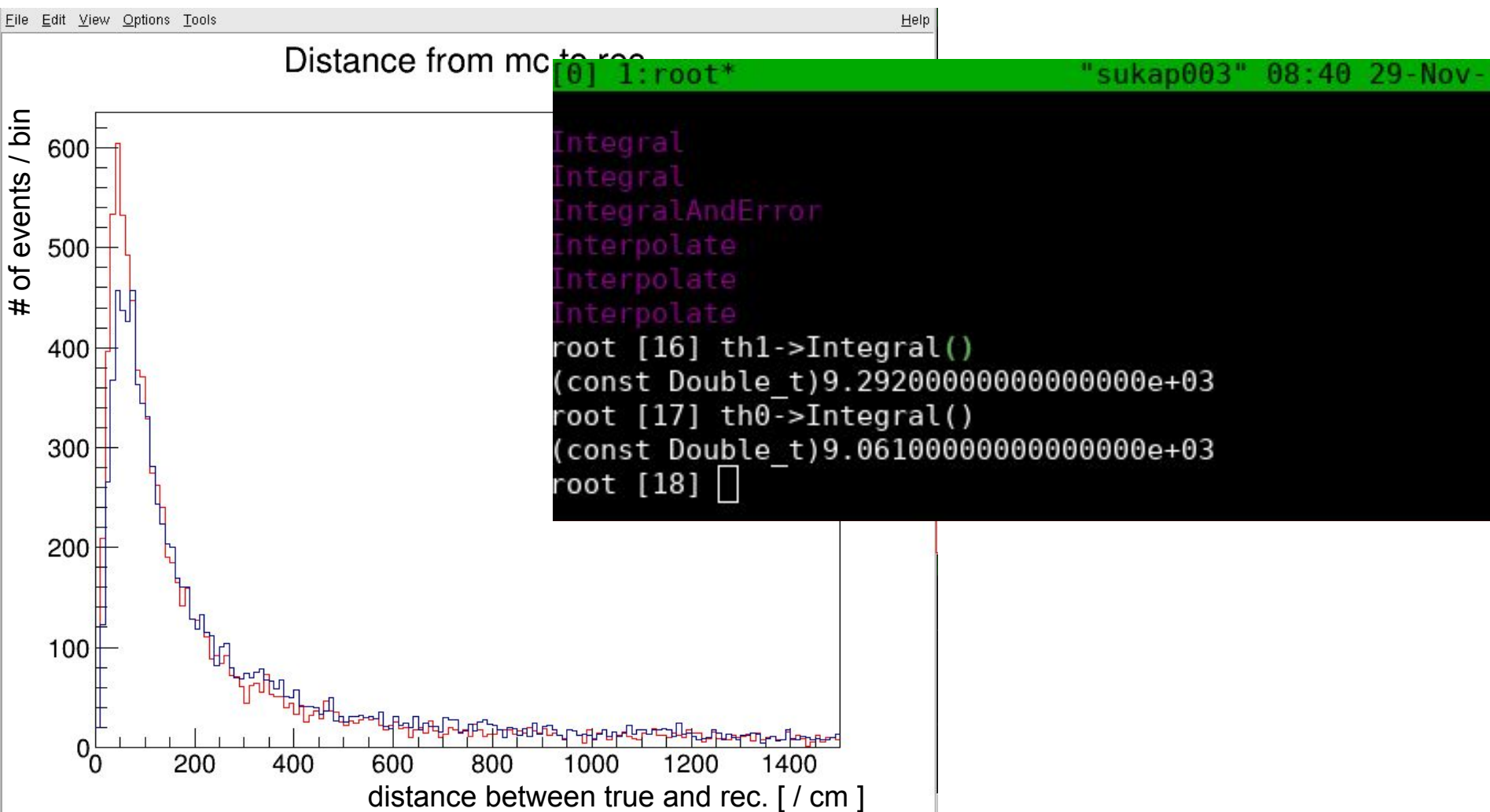


Todo

- Evaluate the performance of N10 method
- Produce timing PDF for FitVertexLE
 - Generate plot with “AnalyzeWSHierarchy”
 - Produce timing PDF with “ProduceWSPlot.cxx”

Backup

3 MeV: red (th1) mPMT, blue (th0) B&L PMT



MC production

- Detector geometry:
 - HK hybrid config. of B&L PMT and mPMT
 - B&L PMT:
 - Photo coverage: 20 %
 - D.R.: 4.2 kHz
 - mPMT:
 - Photo coverage: 10 %
 - D.R.: 100 Hz
- Particle gun: gps
 - Particle:
 - Electron: energy = 3, 4, 5, 6, 8, 10, 15 MeV
 - Gamma (used for n-tagging study): energy = 2.2 MeV
 - Vertex:
 - Uniform in tank
 - Isotropic direction
 - 10,000 events for each energy and particle

MC production (cont'd)

- Digitizer & Trigger

- for electron events:
 - NDigits, [pre, post] trigger window = [-400, 950] ns
- for 2.2 MeV gamma events:
 - NTagDigits, [pre, post] trigger window = [-1e6, 1e6] ns
for n-tagging study: its needs 1 ms time window
(1ms $\sim$ 5x capture time)
 - I simulate capture time (exp-distribution) with selecting 1ms time window randomly in 2ms time window