Status report (26 Sep. 2016)

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DAQ: Some Issues in Module Study

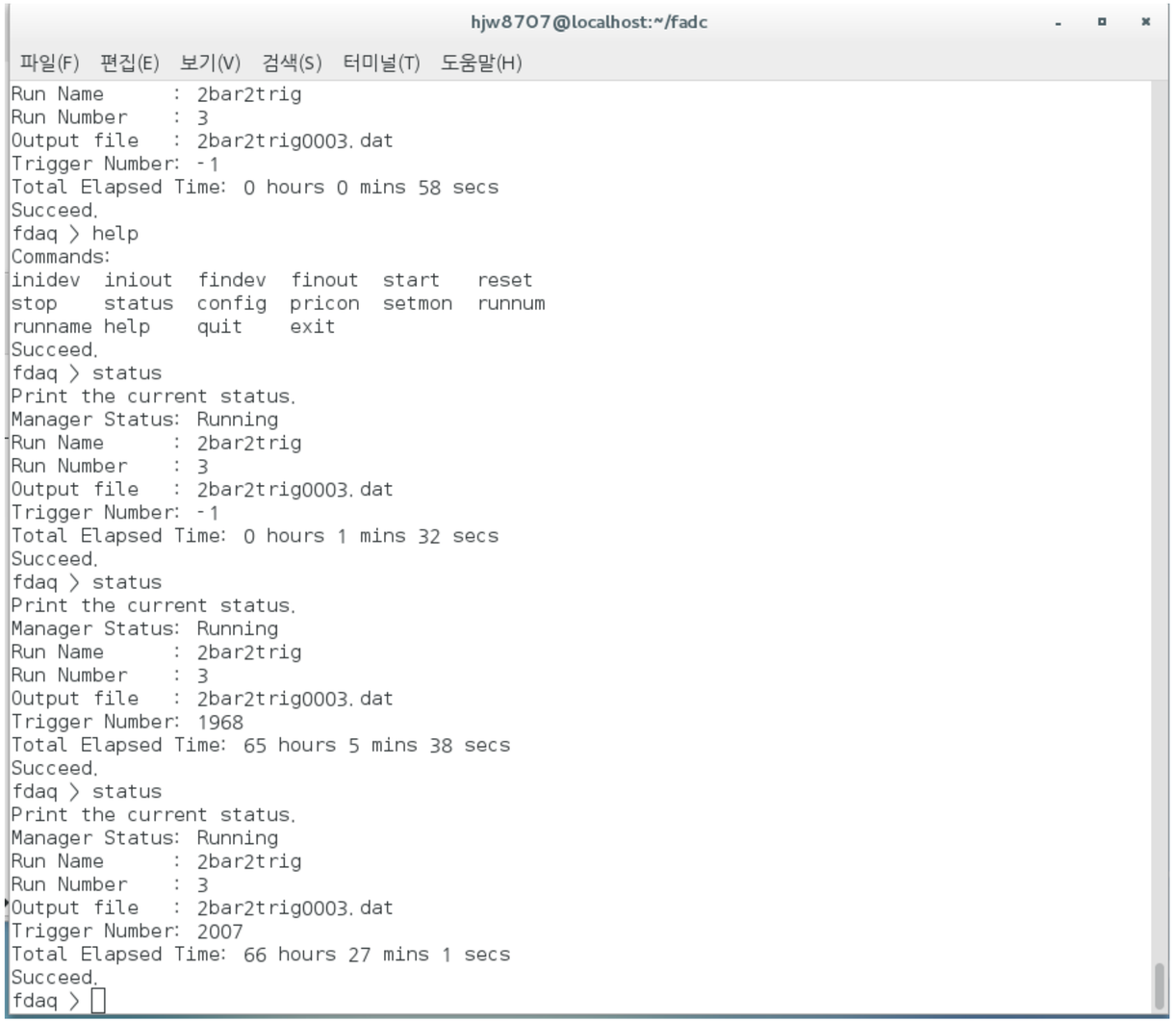
1. Unexpected behavior of TDC → **being checked by Dr. Kim**
2. Uncertainty in trigger timing (~ 8 ns) → **no problem**
3. Incorrect run number → **no problem**
4. Cannot set dead time → **at least, 32 us**

DAQ: Using 8 Channels

- 3 plastic bars + PWO triggers (Up and Down)
- 4-day data taking
- DAQ system worked well.

DAQ: New code

- **fdaq** (FADC DAQ)
  - Using another thread for data taking
  - based on terminal interface
  - initial version
  - getting improved



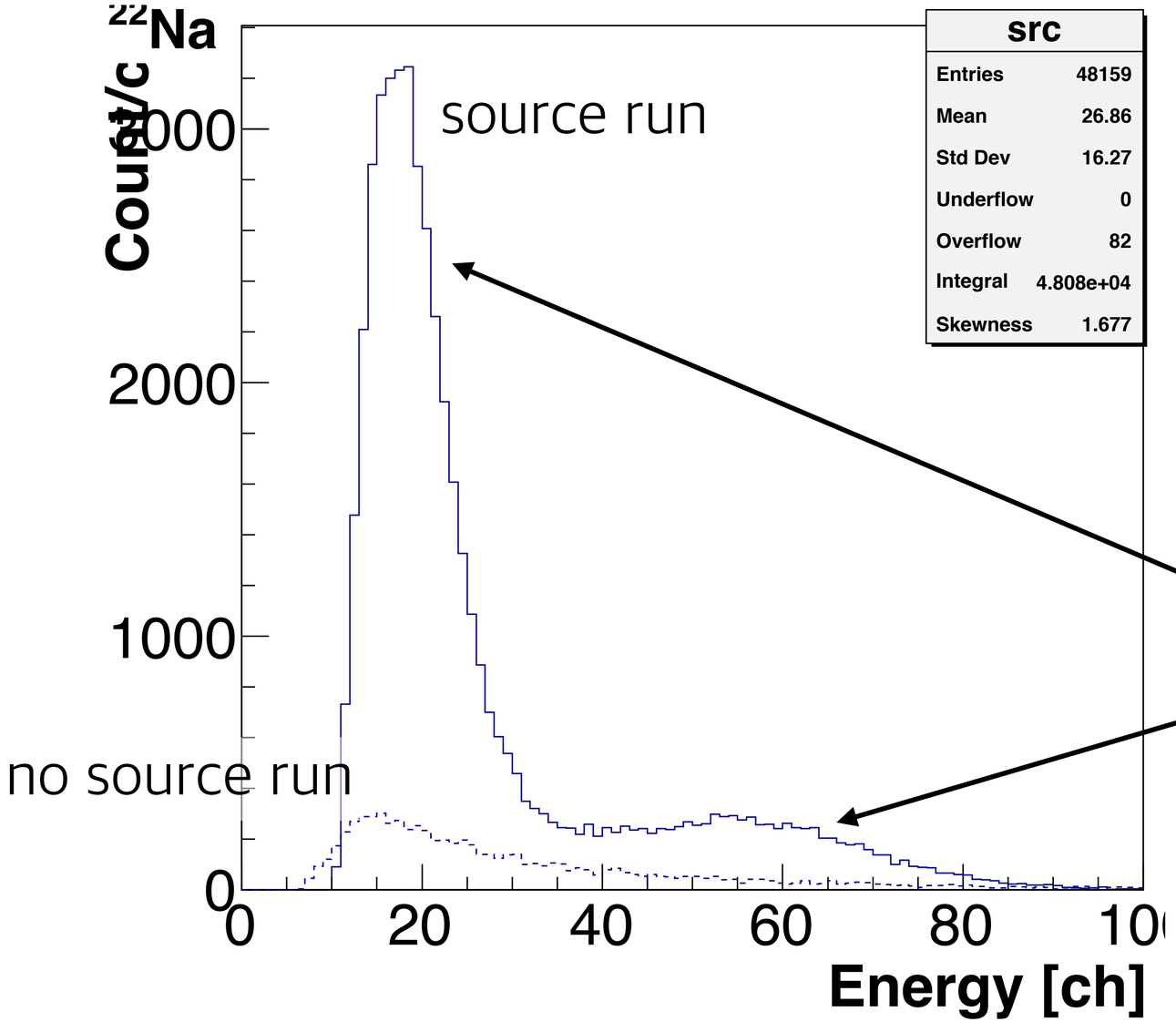
DAQ: Modification

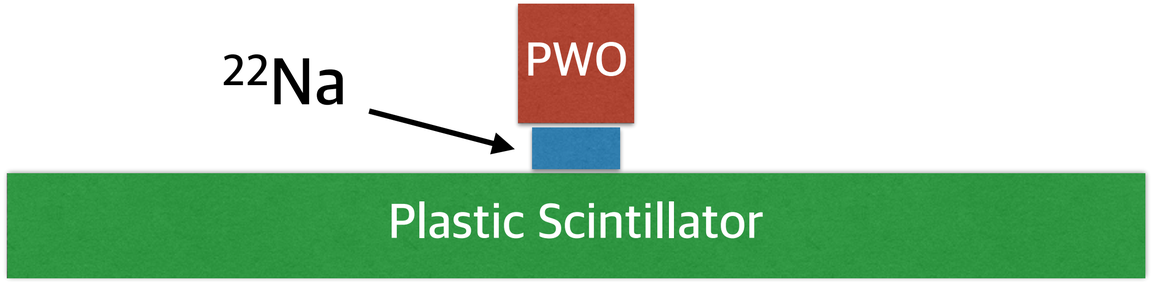
- Run Name / Run Number
  - Raw data file name = (run name) + (run number) + (.dat)
- Add Header / Ender
  - Raw data structure: Header / Data Blocks / Ender
  - Header: Description, Run Name, Run Number, DAQ Start Time
  - Ender: Description, DAQ End Time

DAQ: To-Do List

- Plastic scintillator: time $\longleftrightarrow$ position conversion factor
  - Take data for several different trigger positions
- Energy calibration
  - cosmic ray runs / Am-Be source runs (?)
- Cosmic-ray tracking

DAQ: ^{22}Na Source



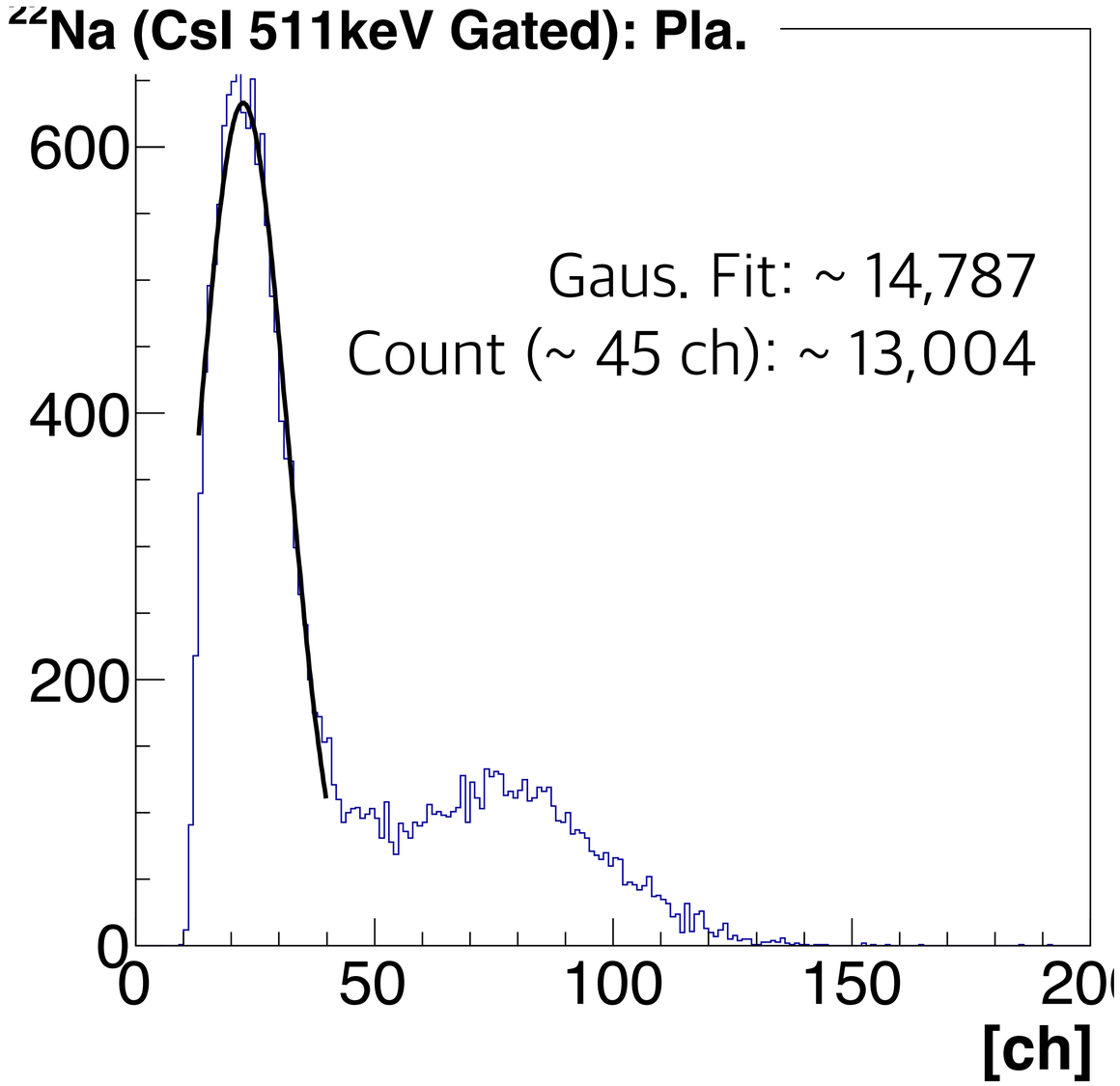


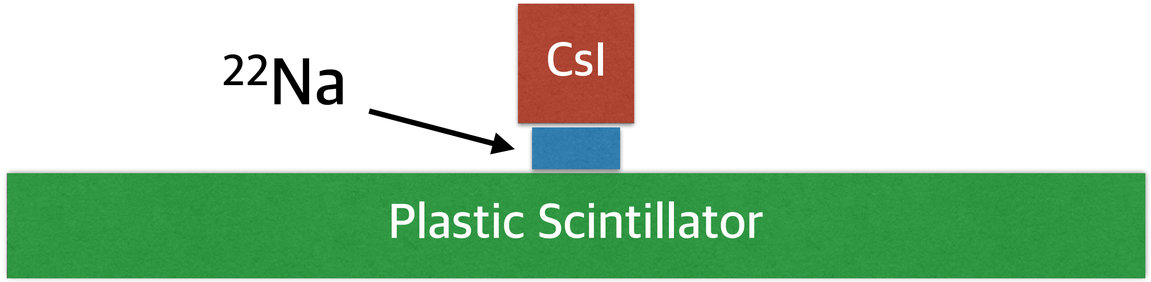
PWO & Pla. coincidence
Threshold = -10 mV
HV = - 1600 V

511 keV-peak (~ 17.6 ch)
1275 keV- peak (~ 52.6 ch)

0.046 ch / keV
(10 ch = 217 keV)
(100 MeV = 4600 ch)

DAQ: ^{22}Na Source





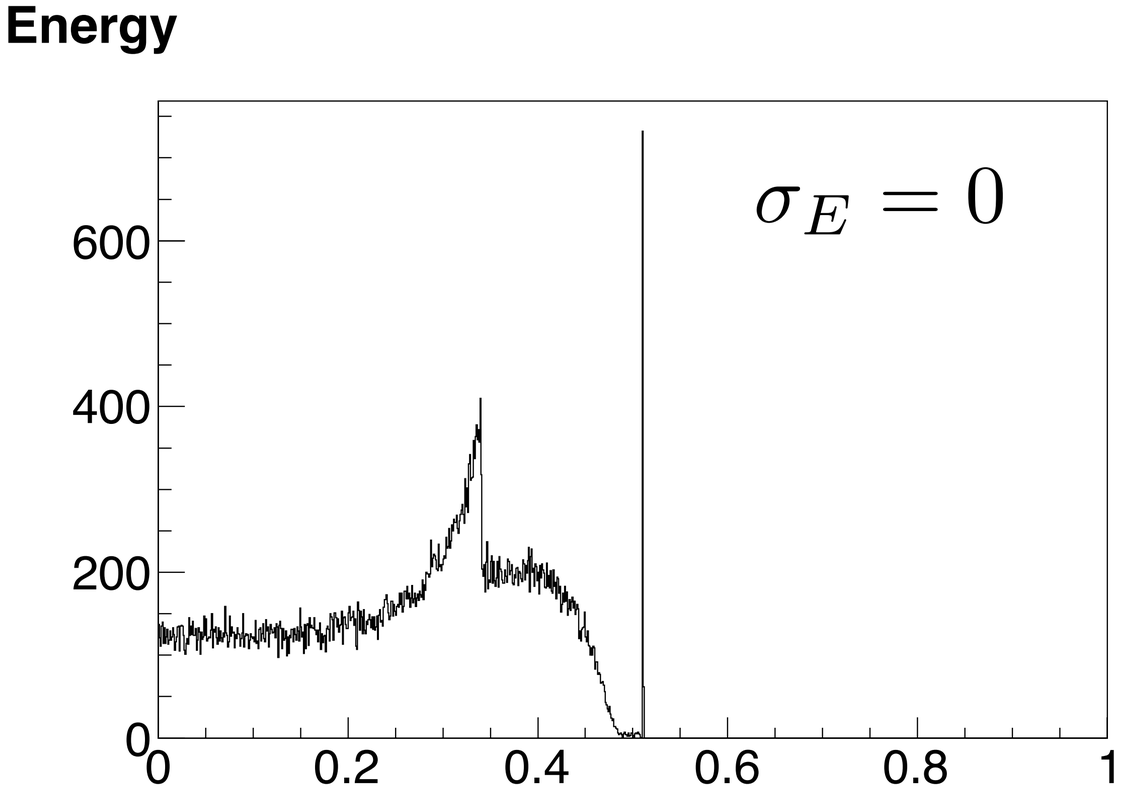
CsI & Pla. coincidence
Threshold = -10 mV
HV = - 1650 V
Trigger = CsI

Roughly,

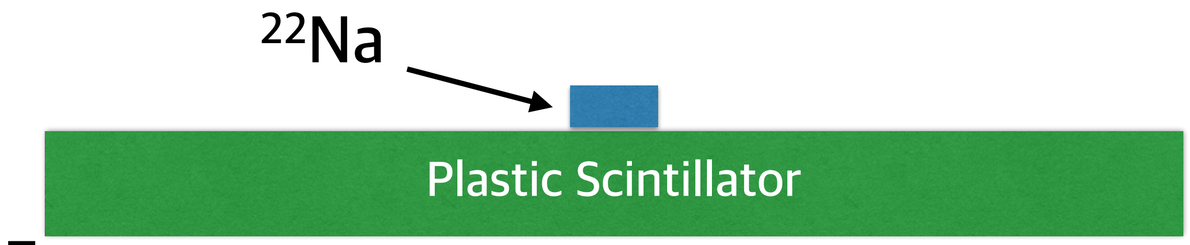
$$\epsilon = \frac{14,787}{45,194} = 32.7\%, \text{ or}$$

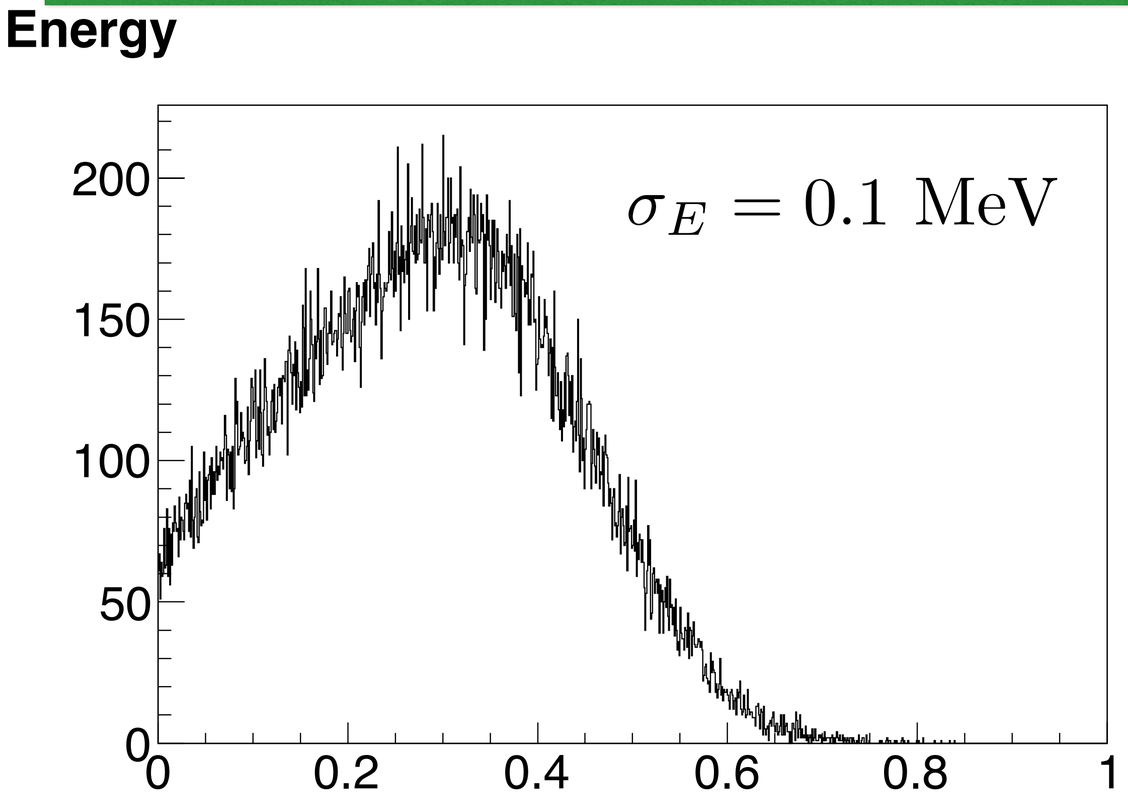
$$\epsilon = \frac{13,004}{45,194} = 28.8\%$$

DAQ: ^{22}Na Source (Simulation)



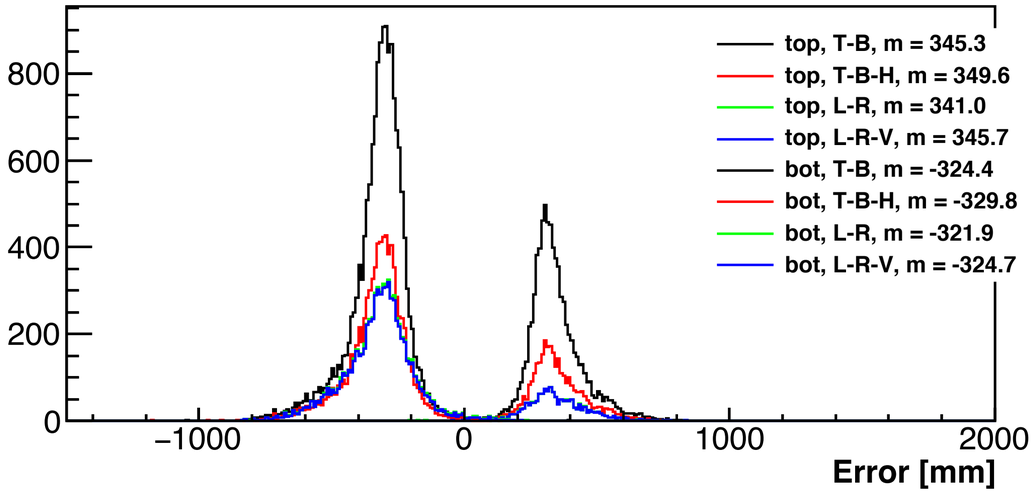
77,064 Hits / 100,000 Events



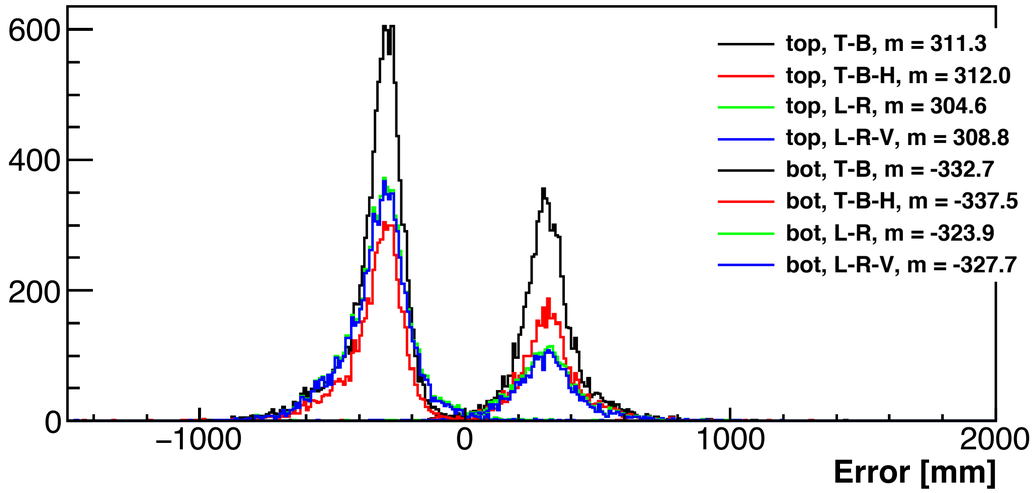


Simulation: Test the trilateration algorithm (Vertical position (Z), Resolution, $\pi^{\pm}$ & γ from π^{0}, v = 0.9c)

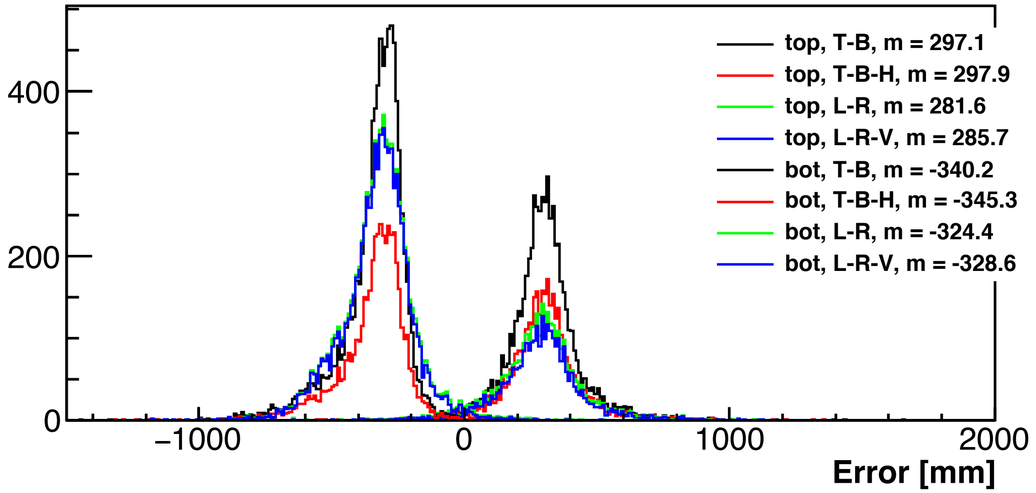
425 mm



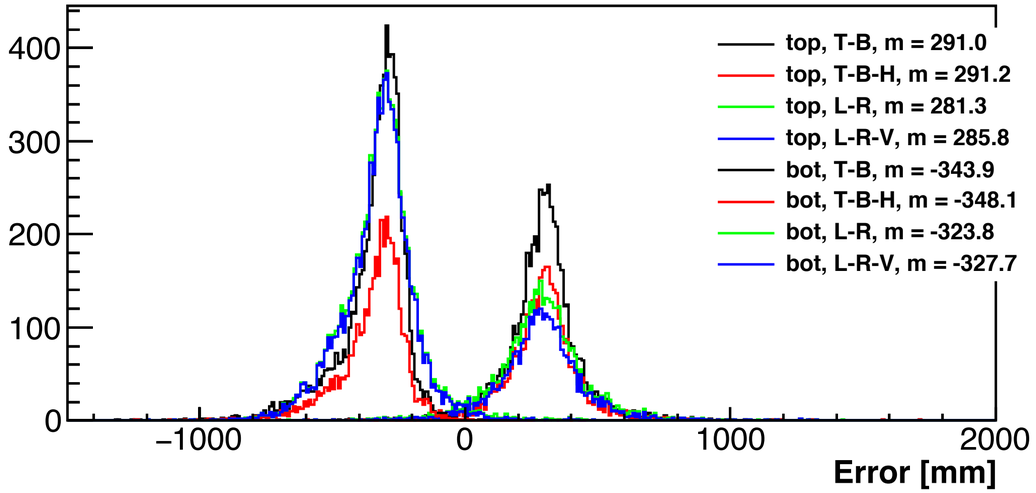
625 mm



725 mm

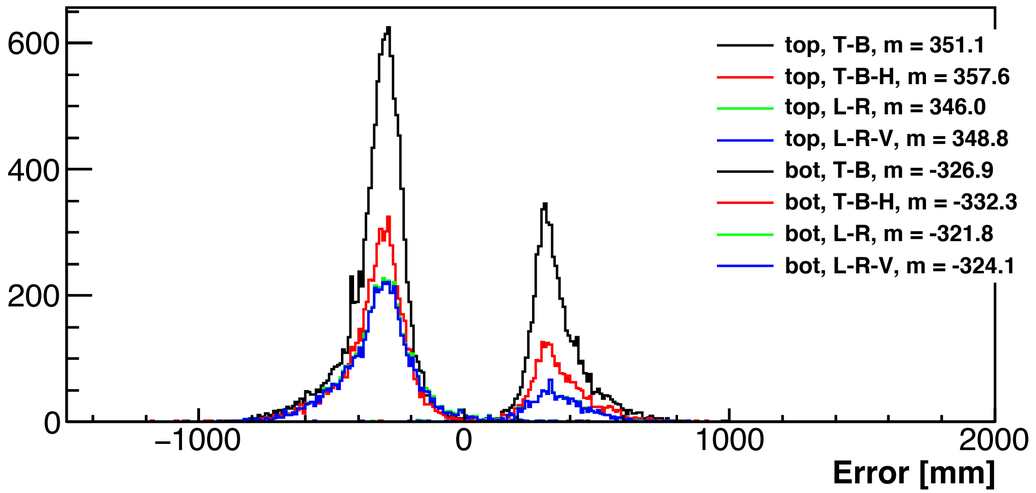


825 mm

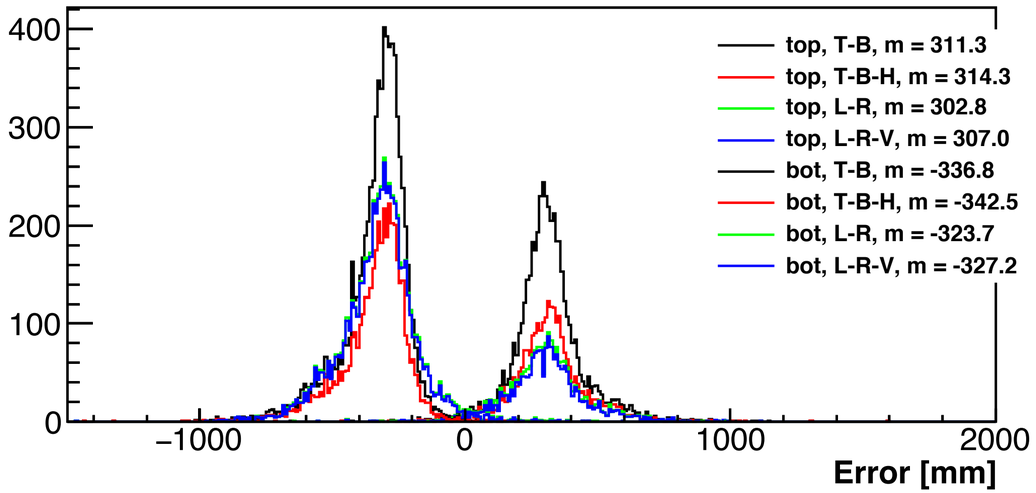


Simulation: Test the trilateration algorithm (Vertical position (Z), Resolution, $\pi^{\pm}$, v = 0.9c)

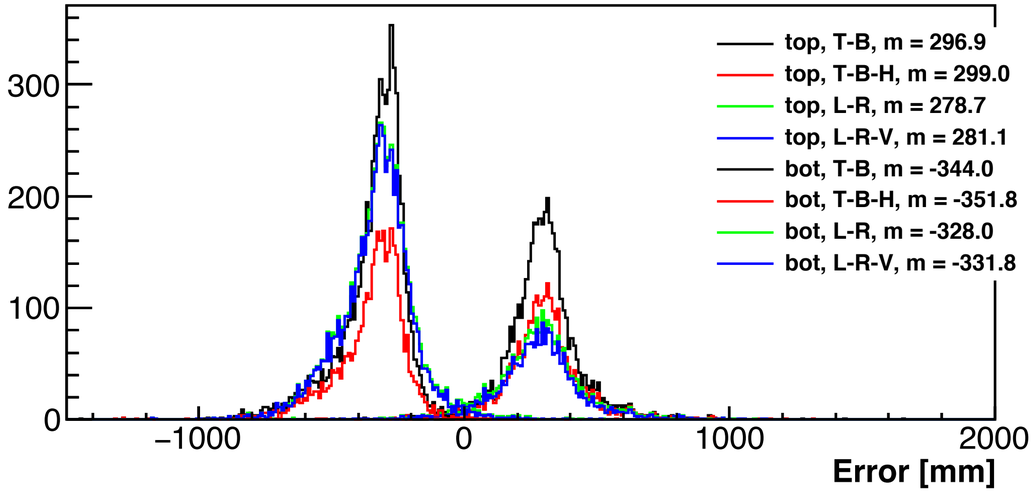
425 mm



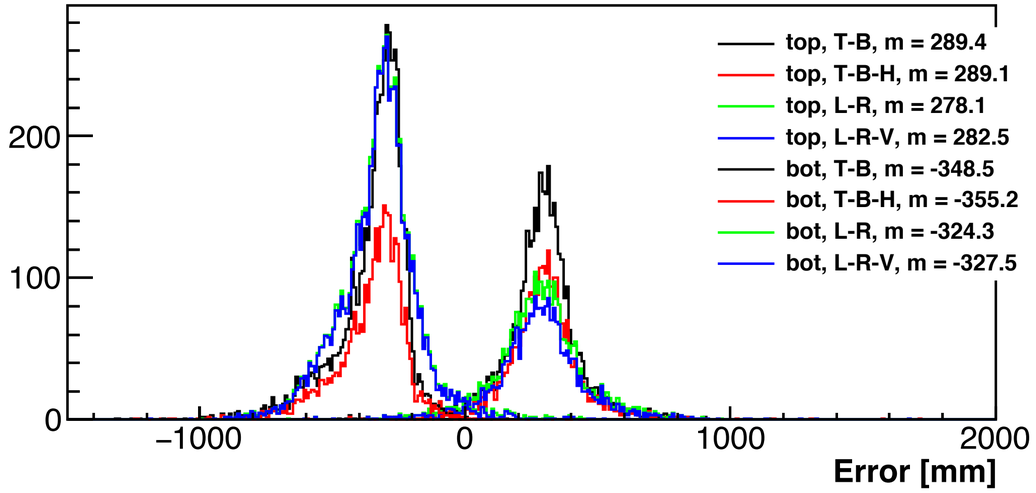
625 mm



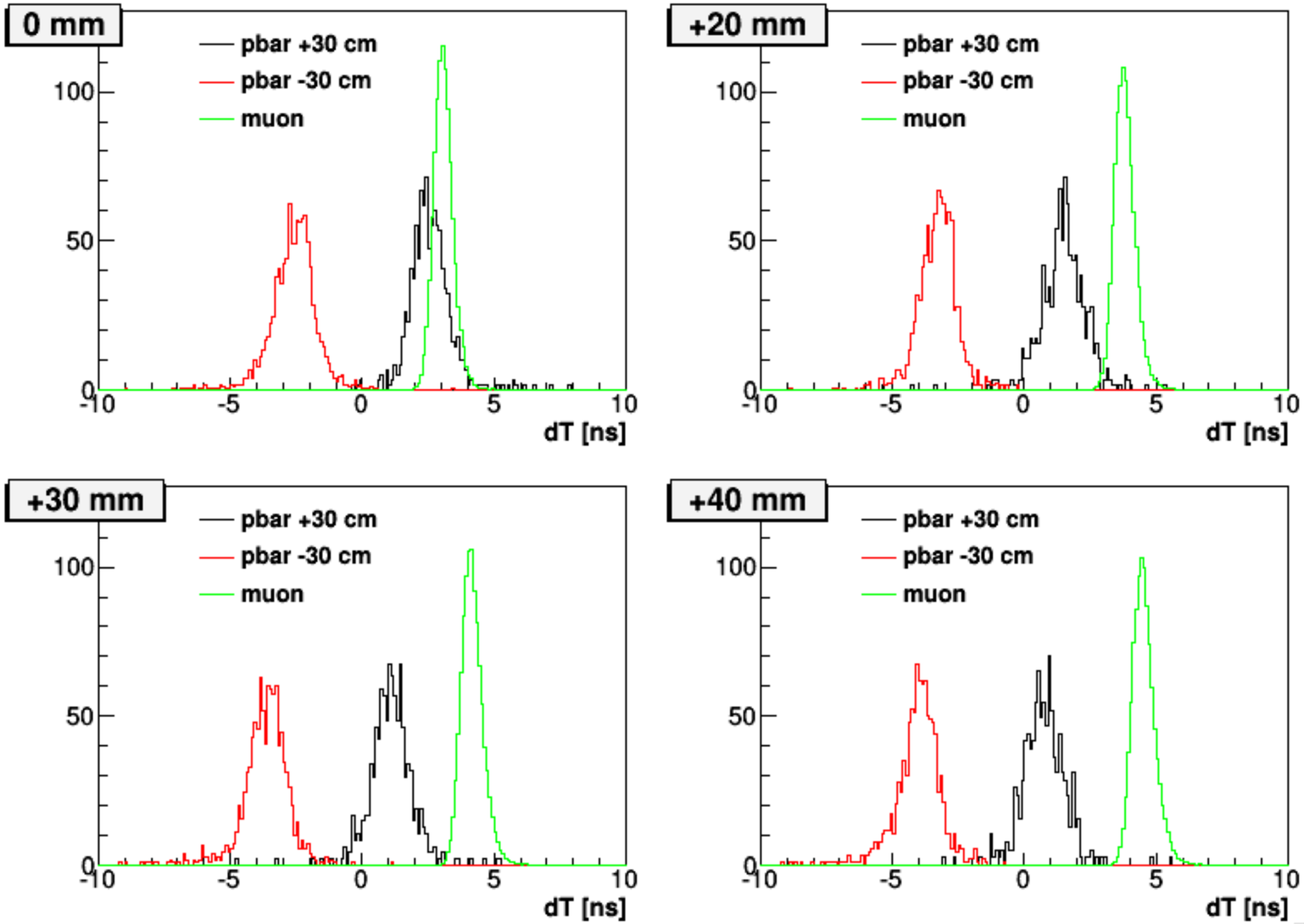
725 mm



825 mm



Top Detector Height Dependence Check



$$\Delta T = 0.2 \text{ ns } (\sigma)$$

Simulation: Hit Ratio ($\pi^{\pm}$ & γ from π^{0})