

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

```
hju8707@localhost:~/fadc
파일(F) 편집(E) 보기(V) 검색(S) 터미널(T) 도움말(H)
Run Name      : 2bar2trig
Run Number    : 3
Output file    : 2bar2trig0003.dat
Trigger Number: -1
Total Elapsed Time: 0 hours 0 mins 58 secs
Succeed.
fdaq > help
Commands:
inidev iniout findev finout start reset
stop status config pricon setmon runnum
runname help quit exit
Succeed.
fdaq > status
Print the current status.
Manager Status: Running
Run Name      : 2bar2trig
Run Number    : 3
Output file    : 2bar2trig0003.dat
Trigger Number: -1
Total Elapsed Time: 0 hours 1 mins 32 secs
Succeed.
fdaq > status
Print the current status.
Manager Status: Running
Run Name      : 2bar2trig
Run Number    : 3
Output file    : 2bar2trig0003.dat
Trigger Number: 1968
Total Elapsed Time: 65 hours 5 mins 38 secs
Succeed.
fdaq > status
Print the current status.
Manager Status: Running
Run Name      : 2bar2trig
Run Number    : 3
Output file    : 2bar2trig0003.dat
Trigger Number: 2007
Total Elapsed Time: 66 hours 27 mins 1 secs
Succeed.
fdaq > 
```

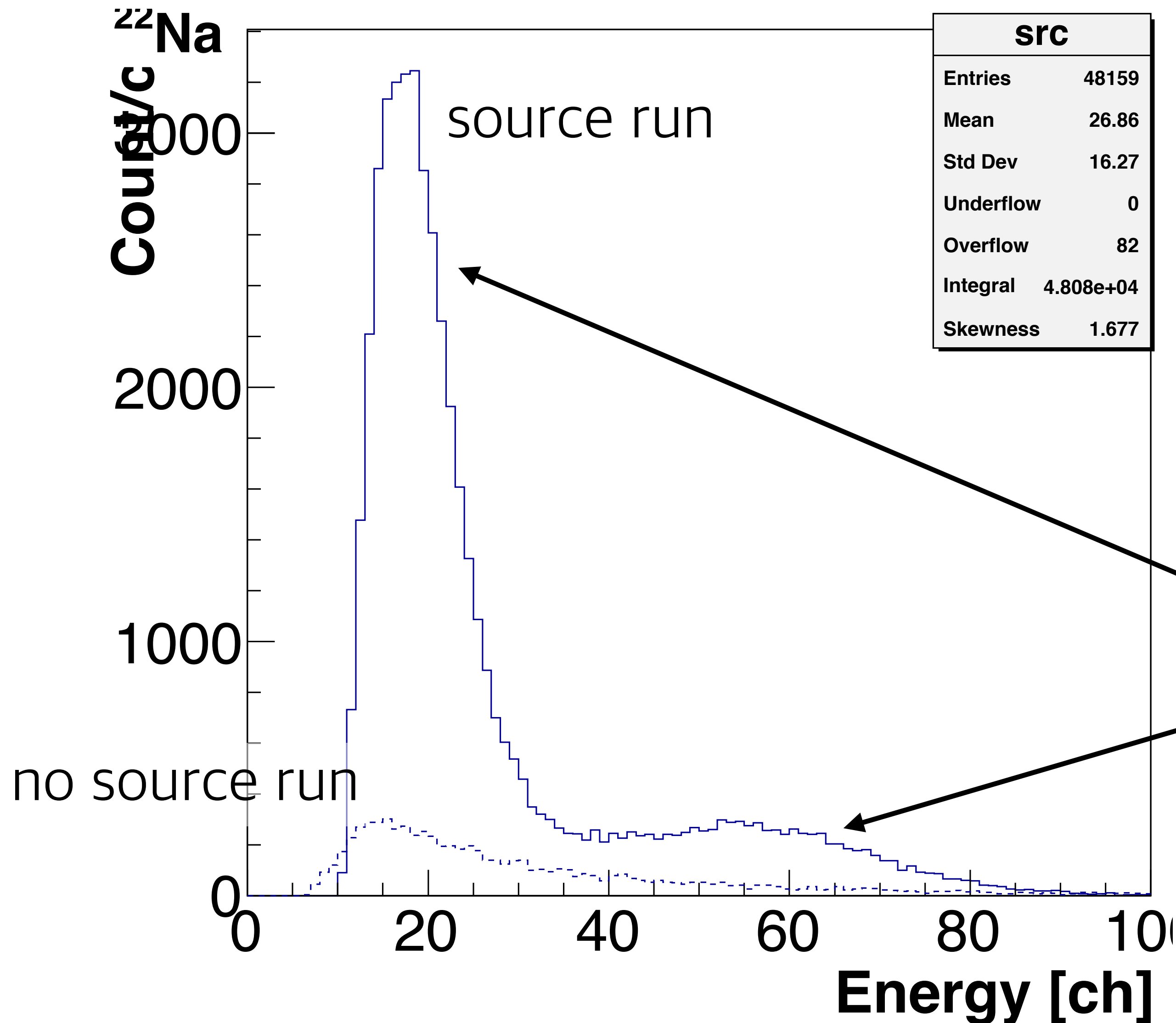
DAQ: Modification

- 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)

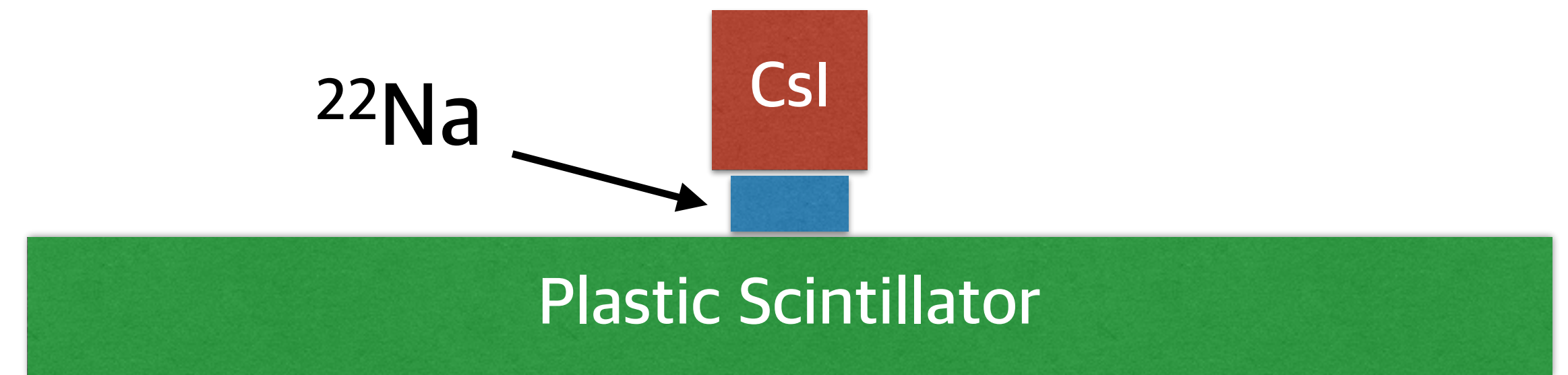
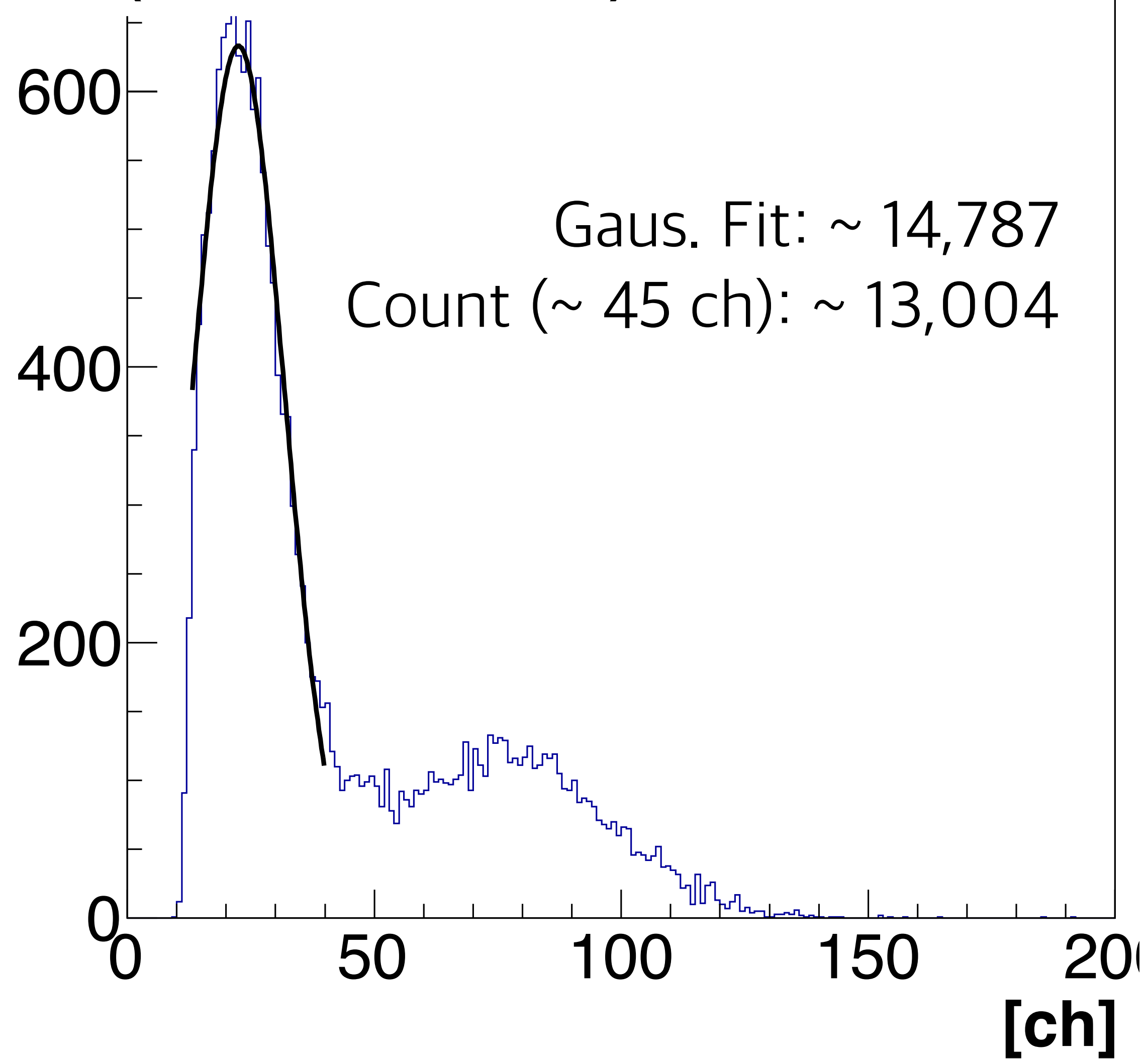
0.046 ch / keV

(10 ch = 217 keV)

(100 MeV = 4600 ch)

DAQ: ^{22}Na Source

^{22}Na (CsI 511keV Gated): Pla.



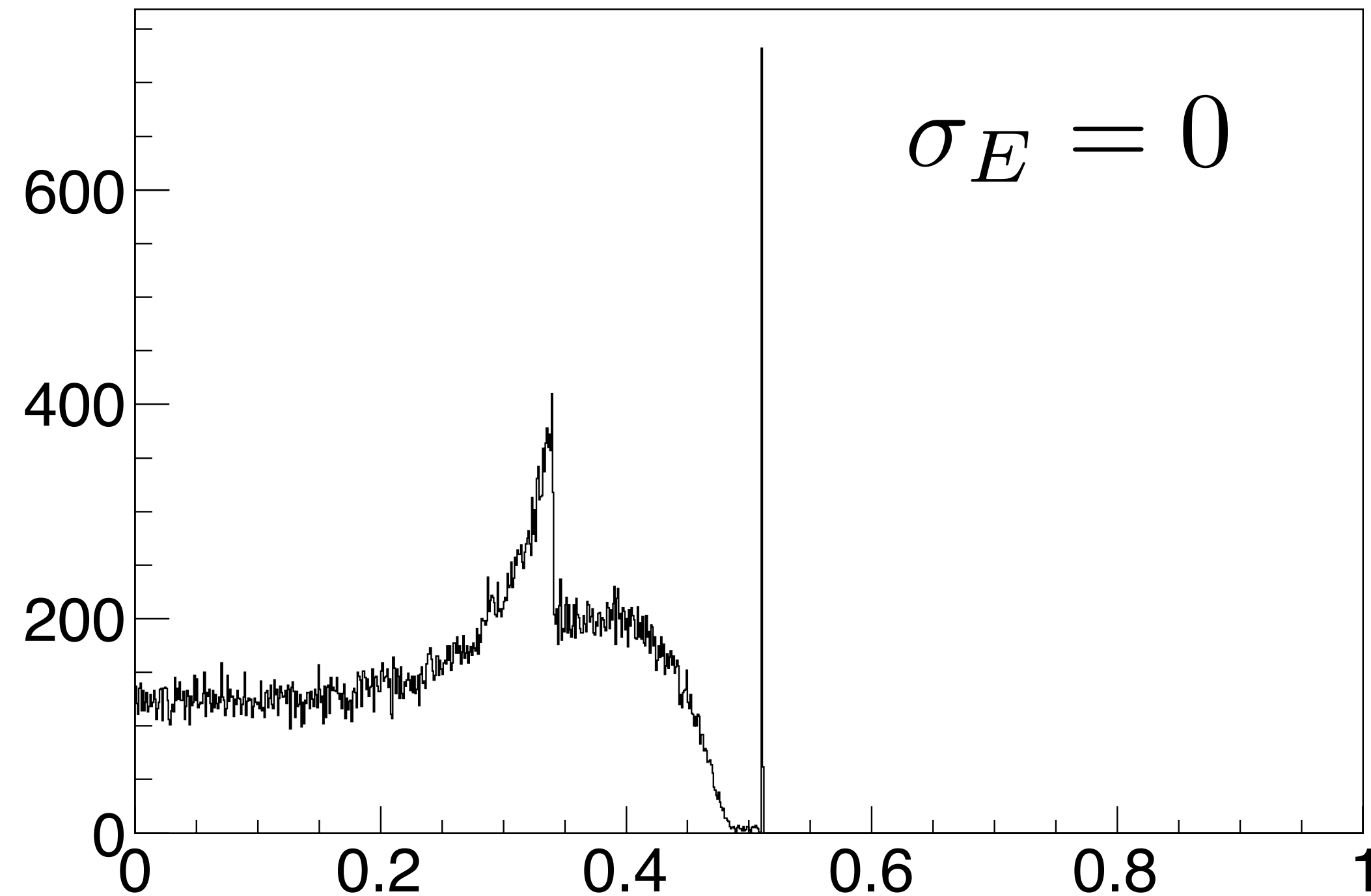
CsI & Pla. coincidence
Threshold = -10 mV
HV = - 1650 V
Trigger = CsI

Roughly,

$$\epsilon = \frac{14,787}{45,194} = 32.7\%, \text{ or}$$
$$\epsilon = \frac{13,004}{45,194} = 28.8\%$$

DAQ: ^{22}Na Source (Simulation)

Energy



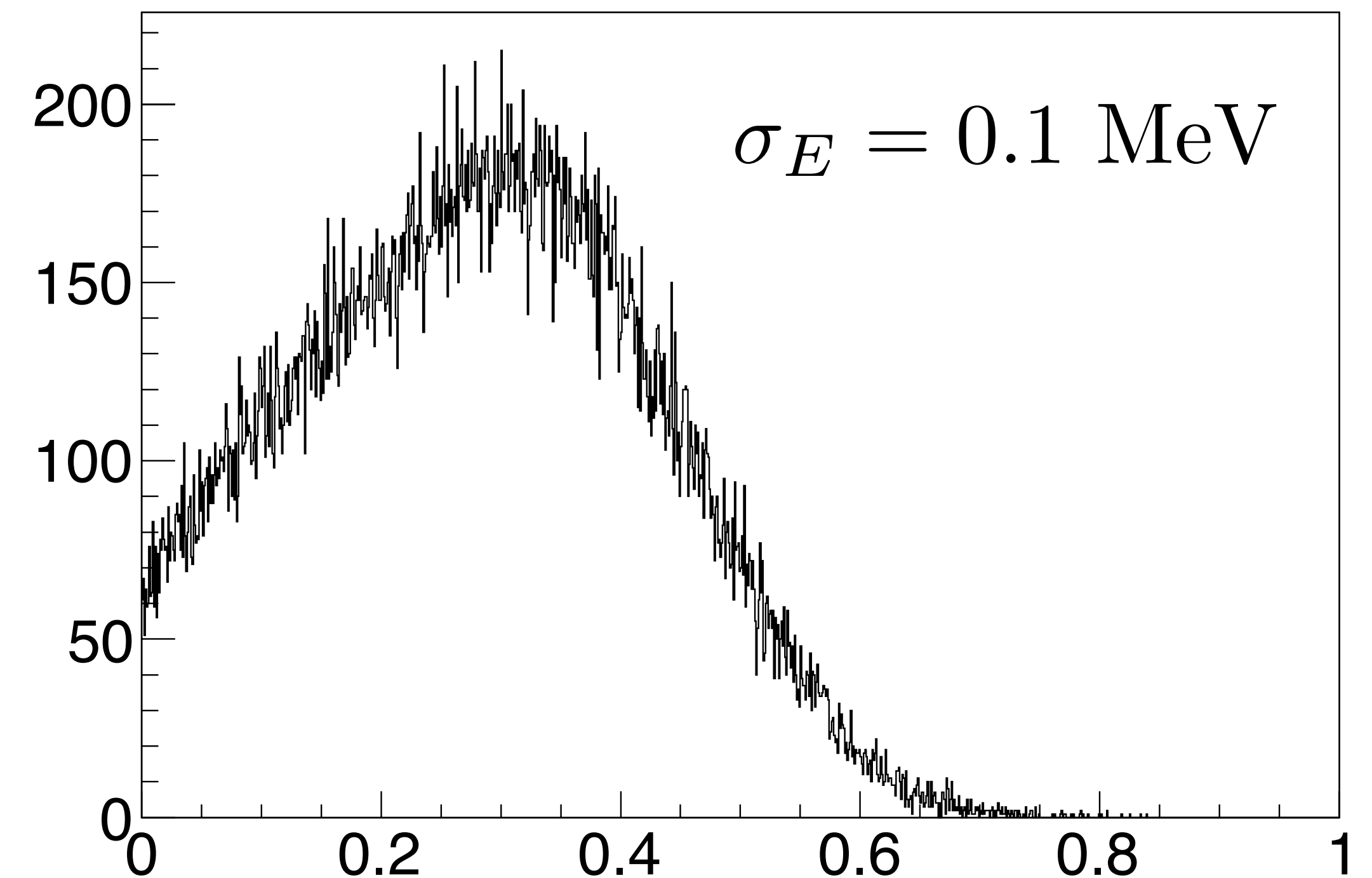
77,064 Hits / 100,000 Events

^{22}Na



Plastic Scintillator

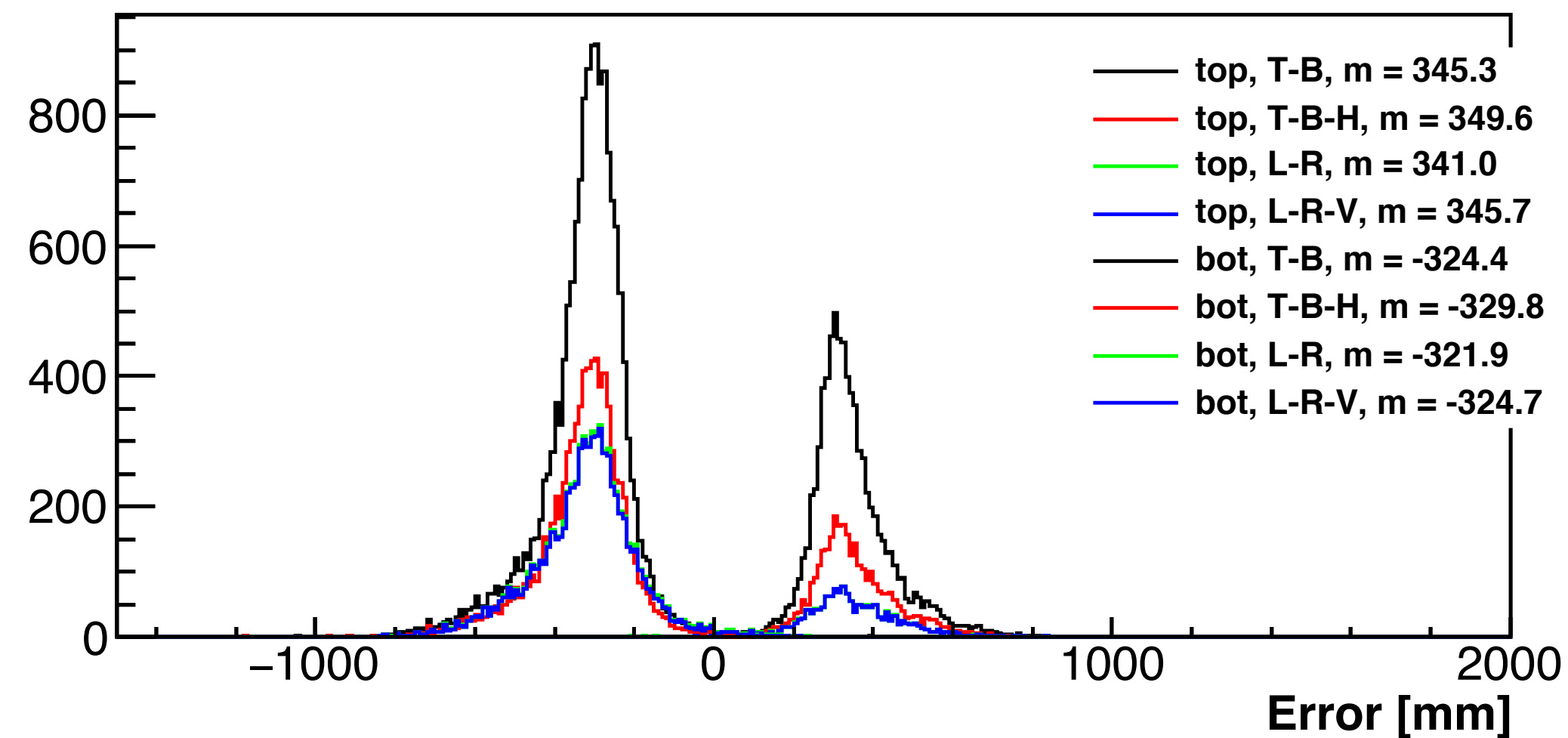
Energy



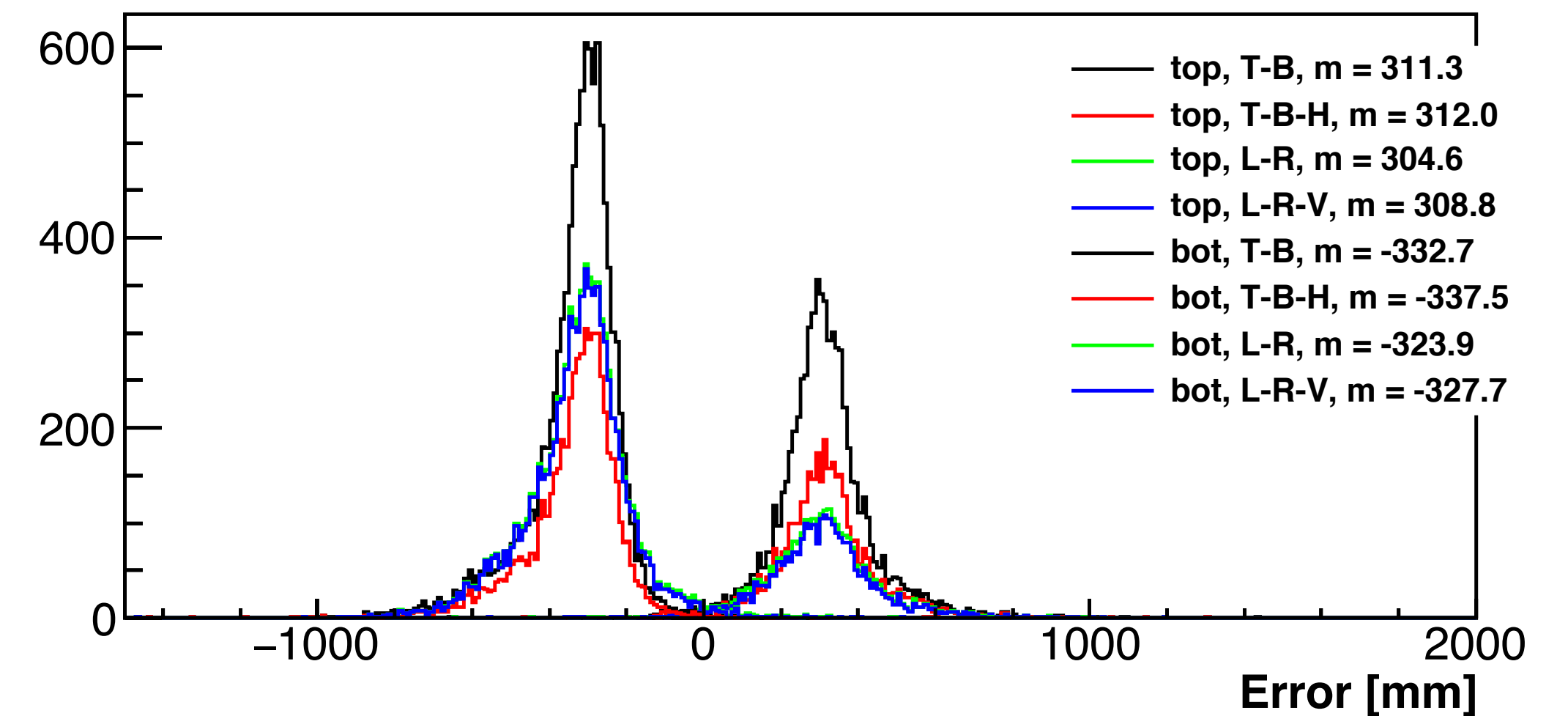
Simulation: Test the trilateration algorithm

(Vertical position (Z), Resolution, $\pi^\pm$ & γ from π^0 , $v = 0.9c$)

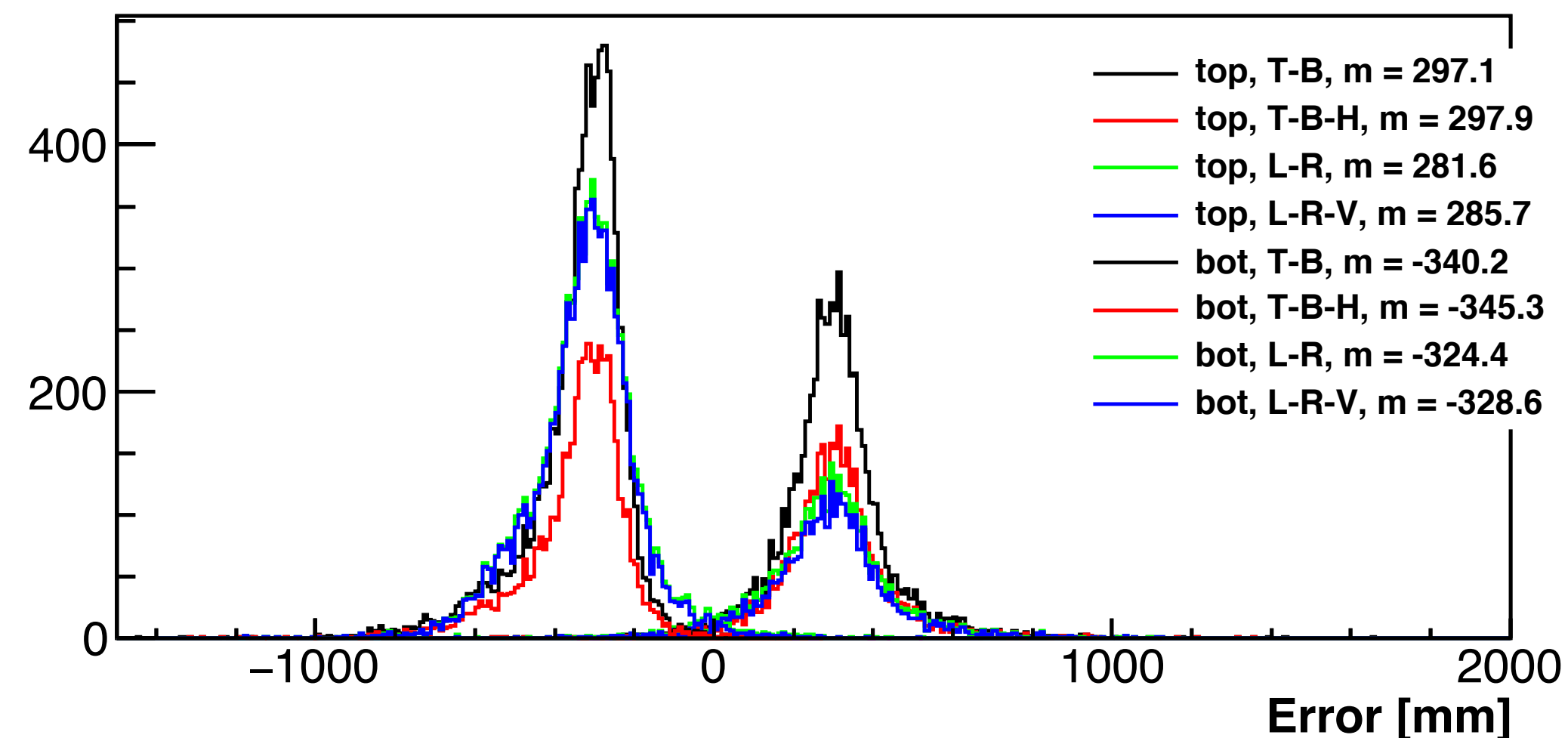
425 mm



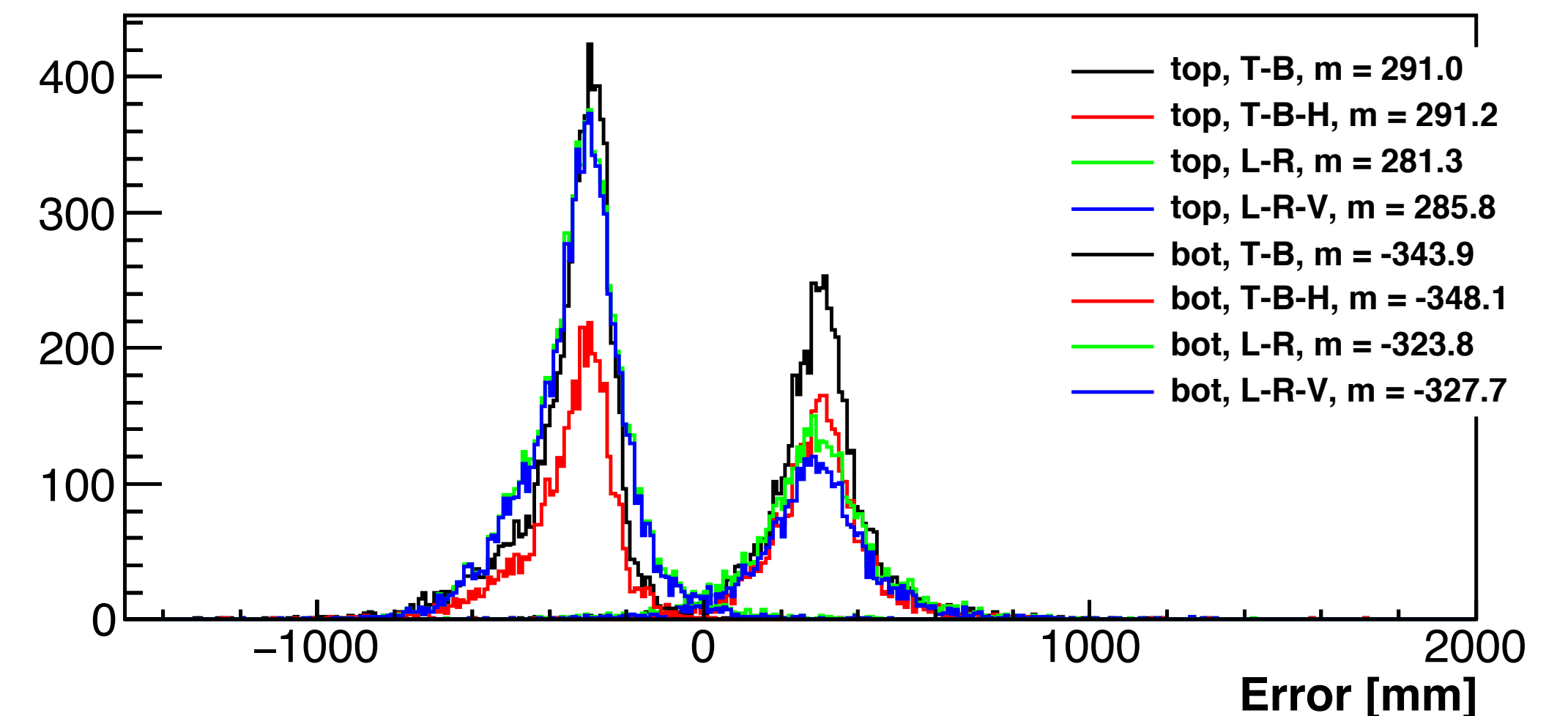
625 mm



725 mm



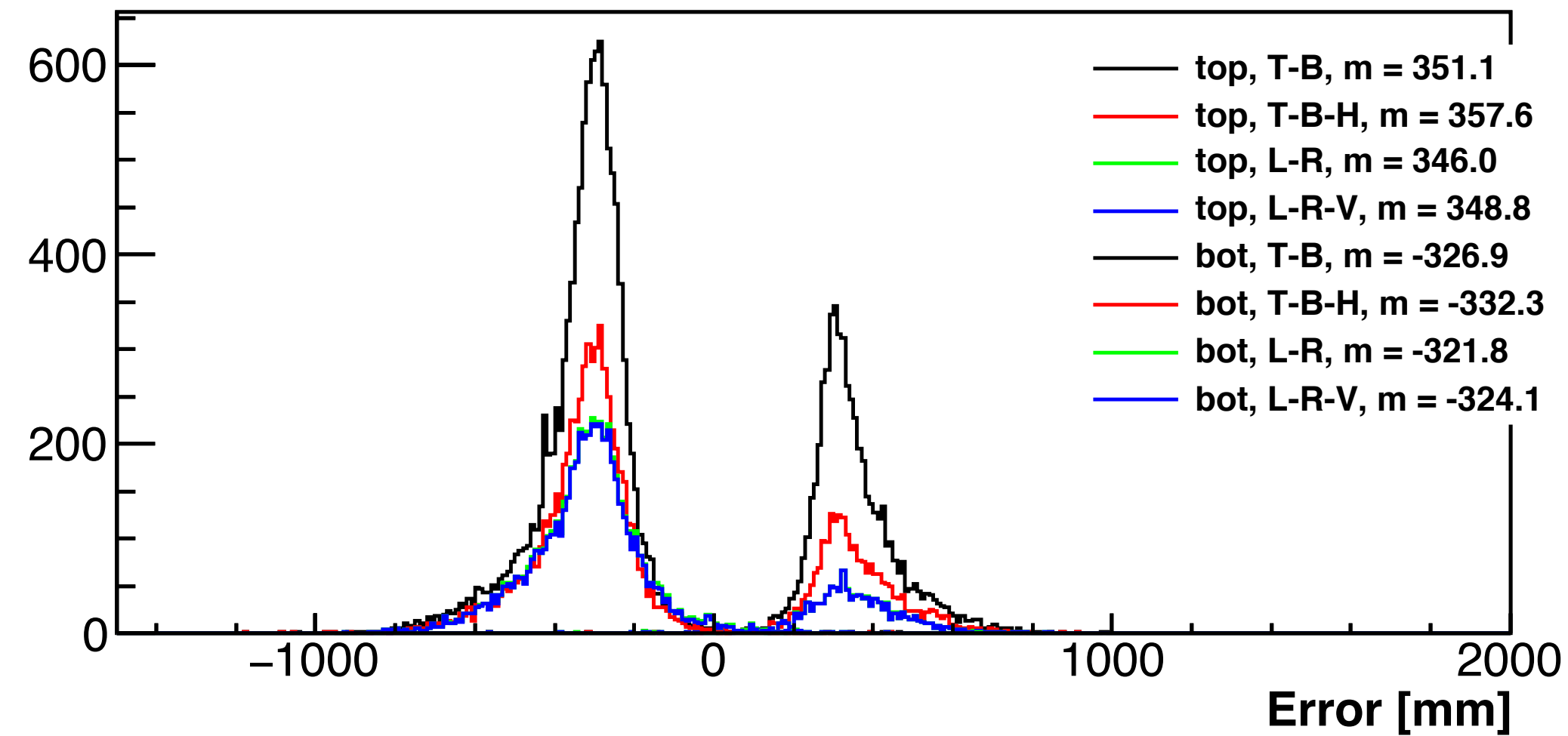
825 mm



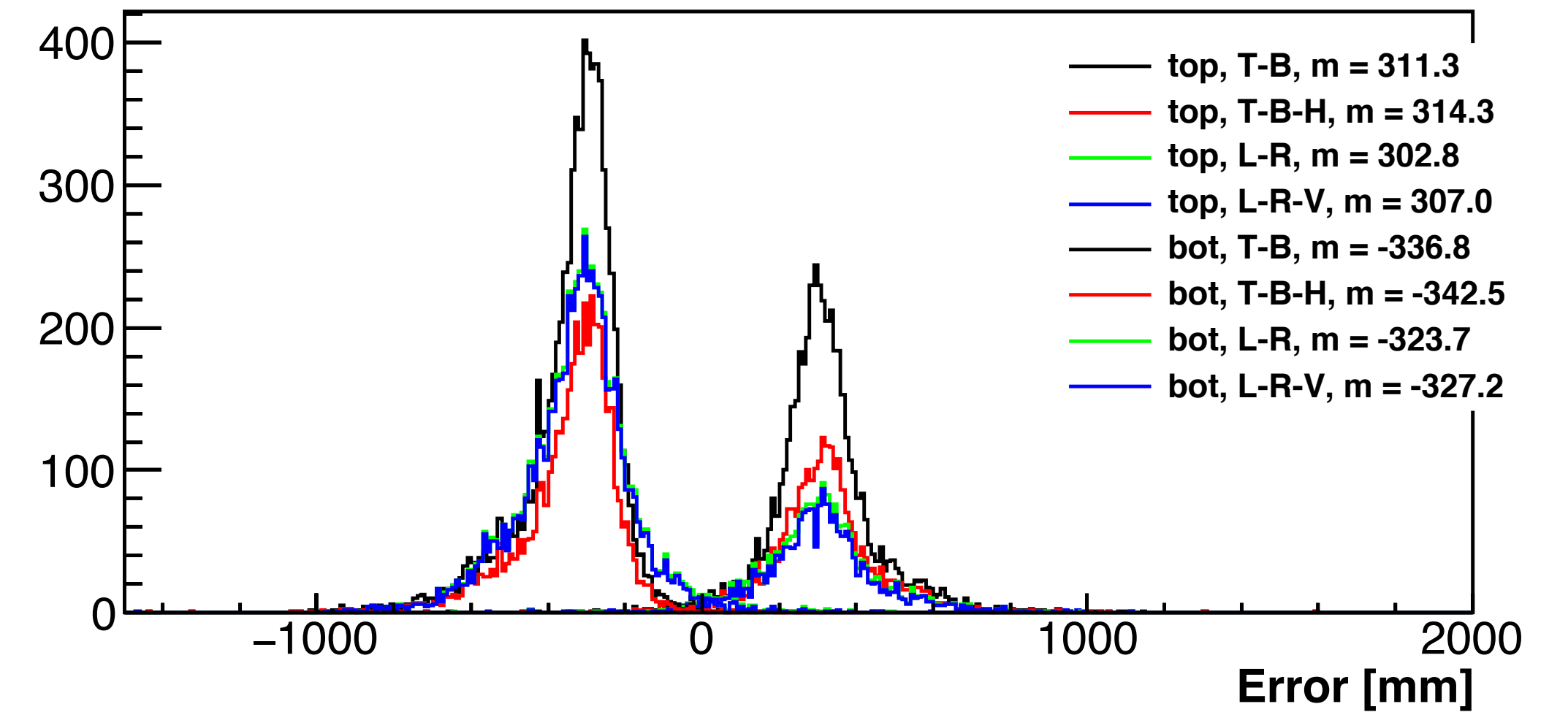
Simulation: Test the trilateration algorithm

(Vertical position (Z), Resolution, $\pi^\pm$, $v = 0.9c$)

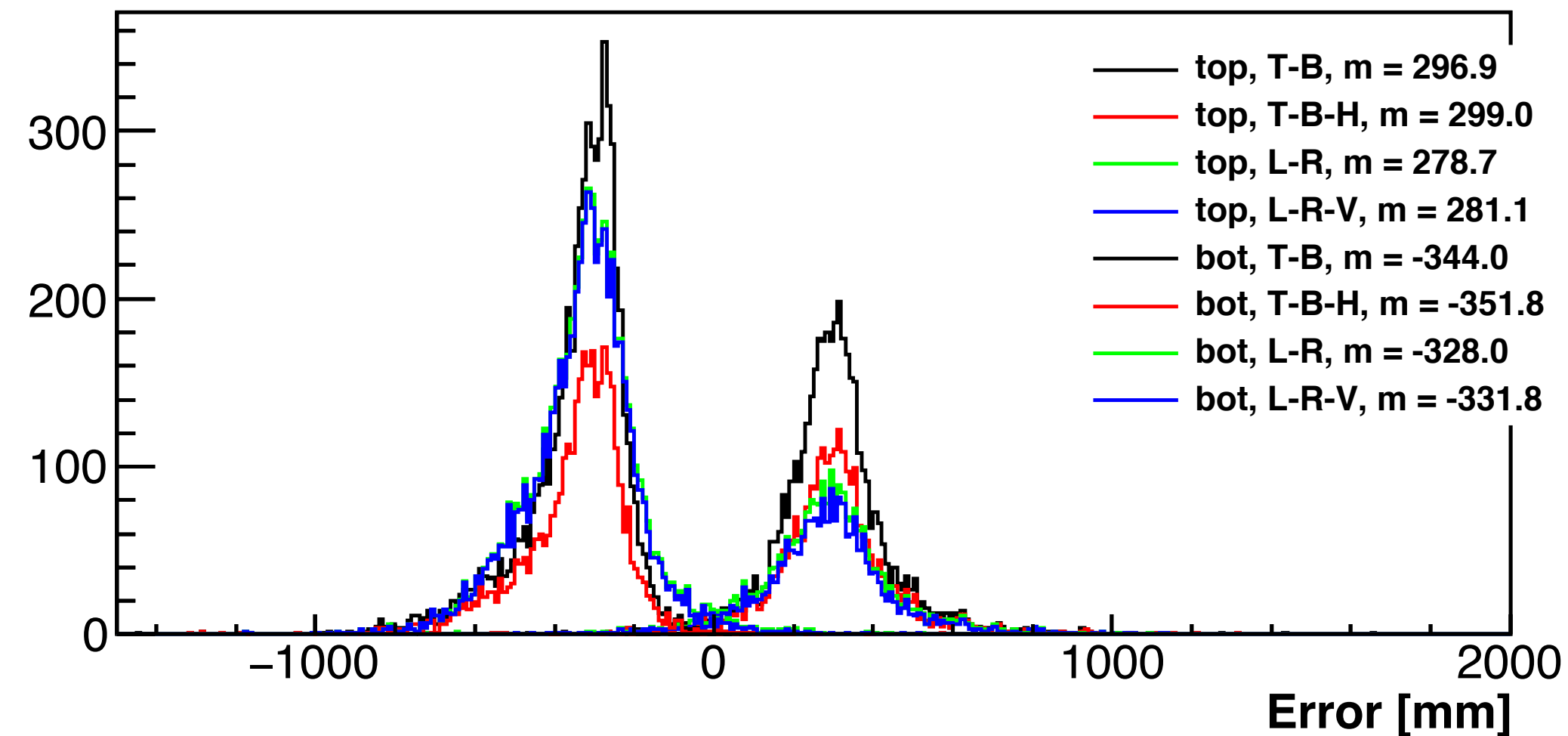
425 mm



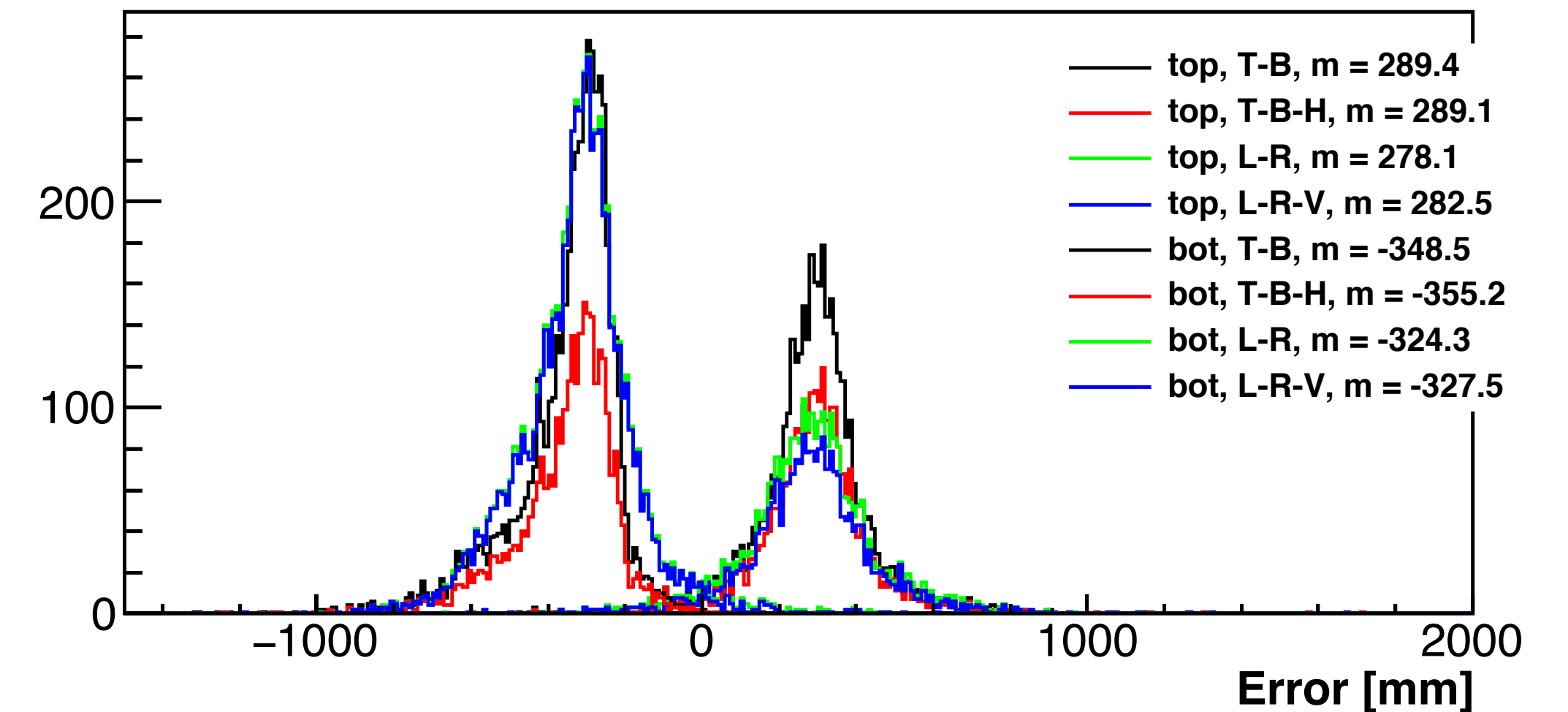
625 mm



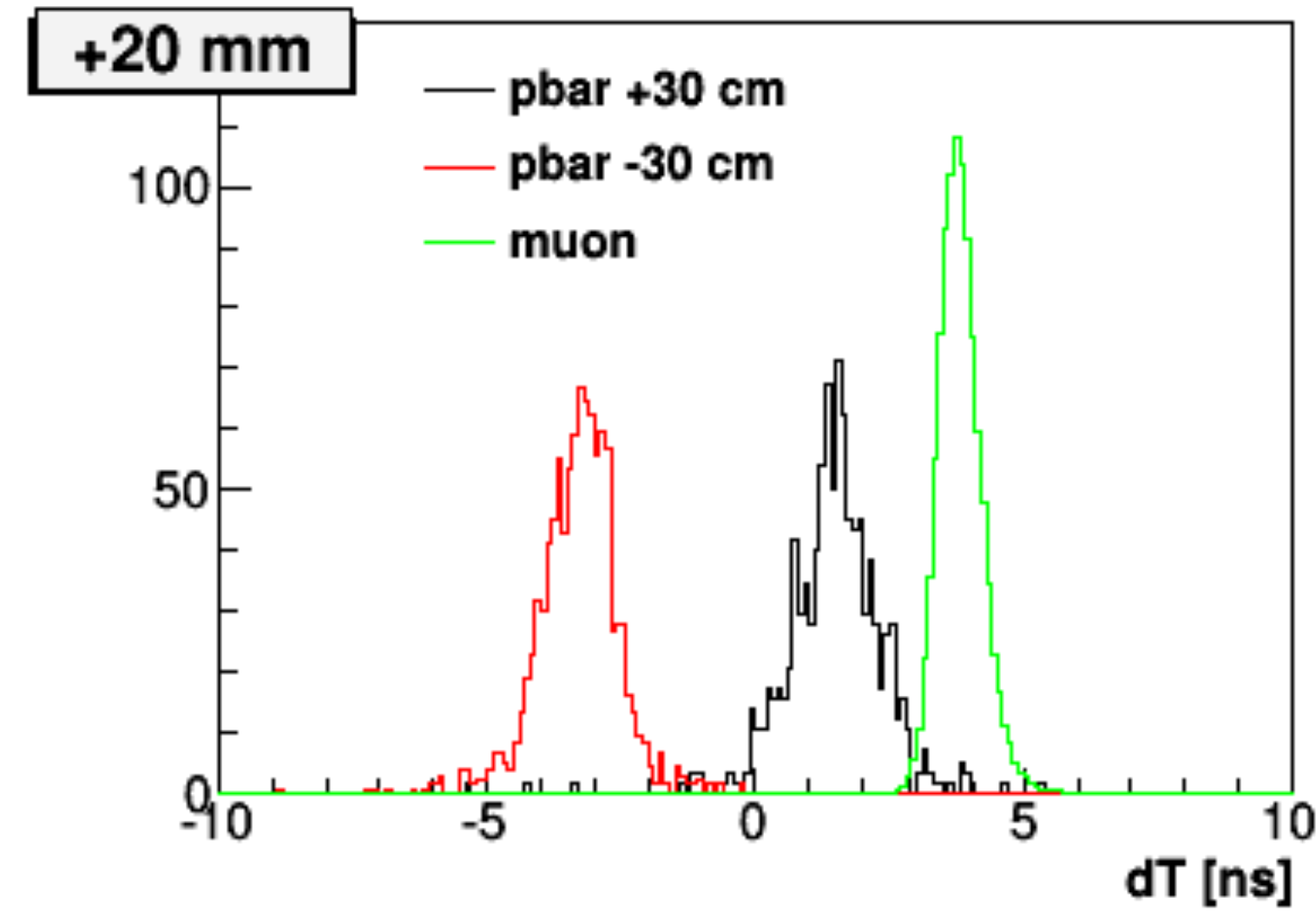
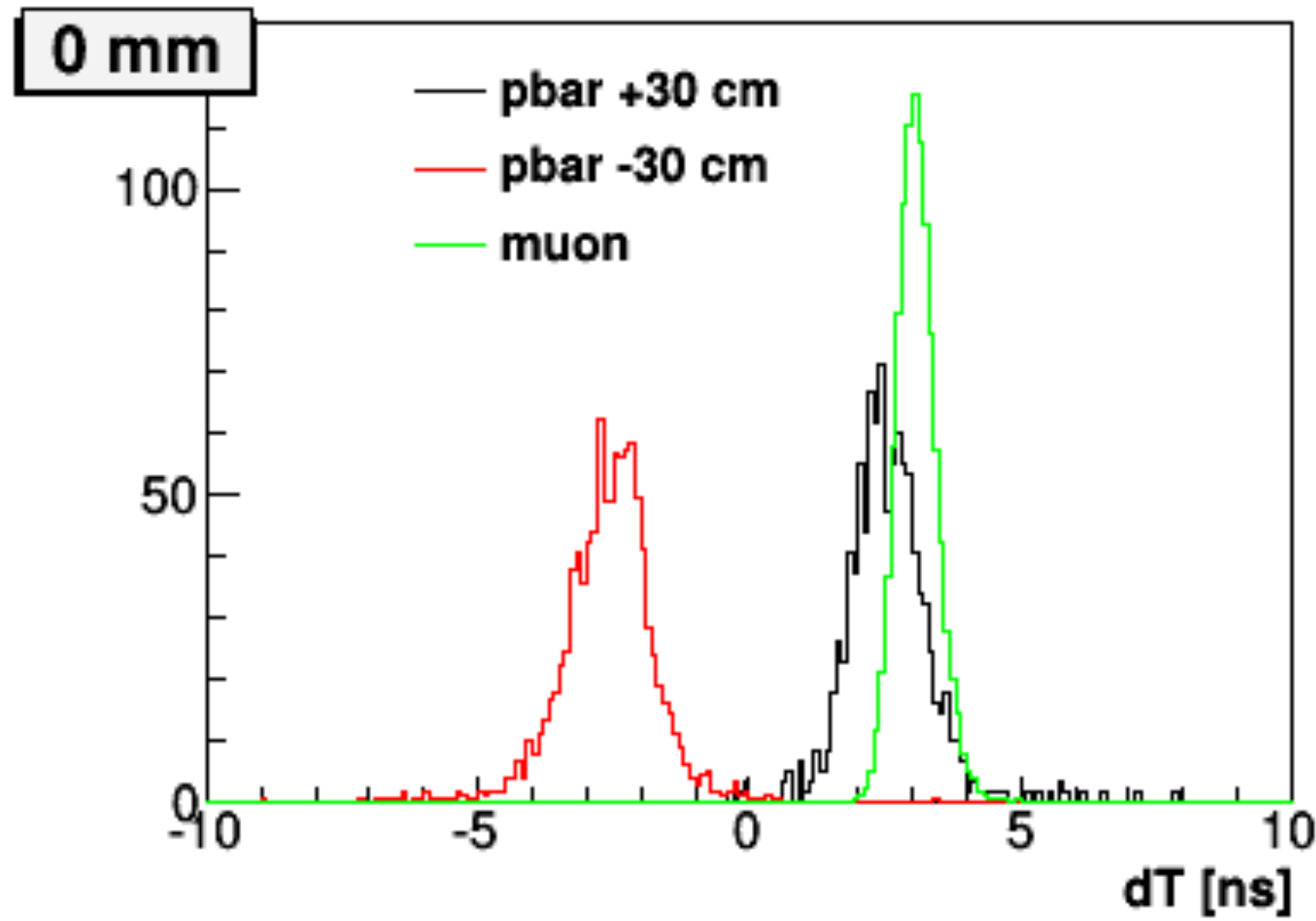
725 mm



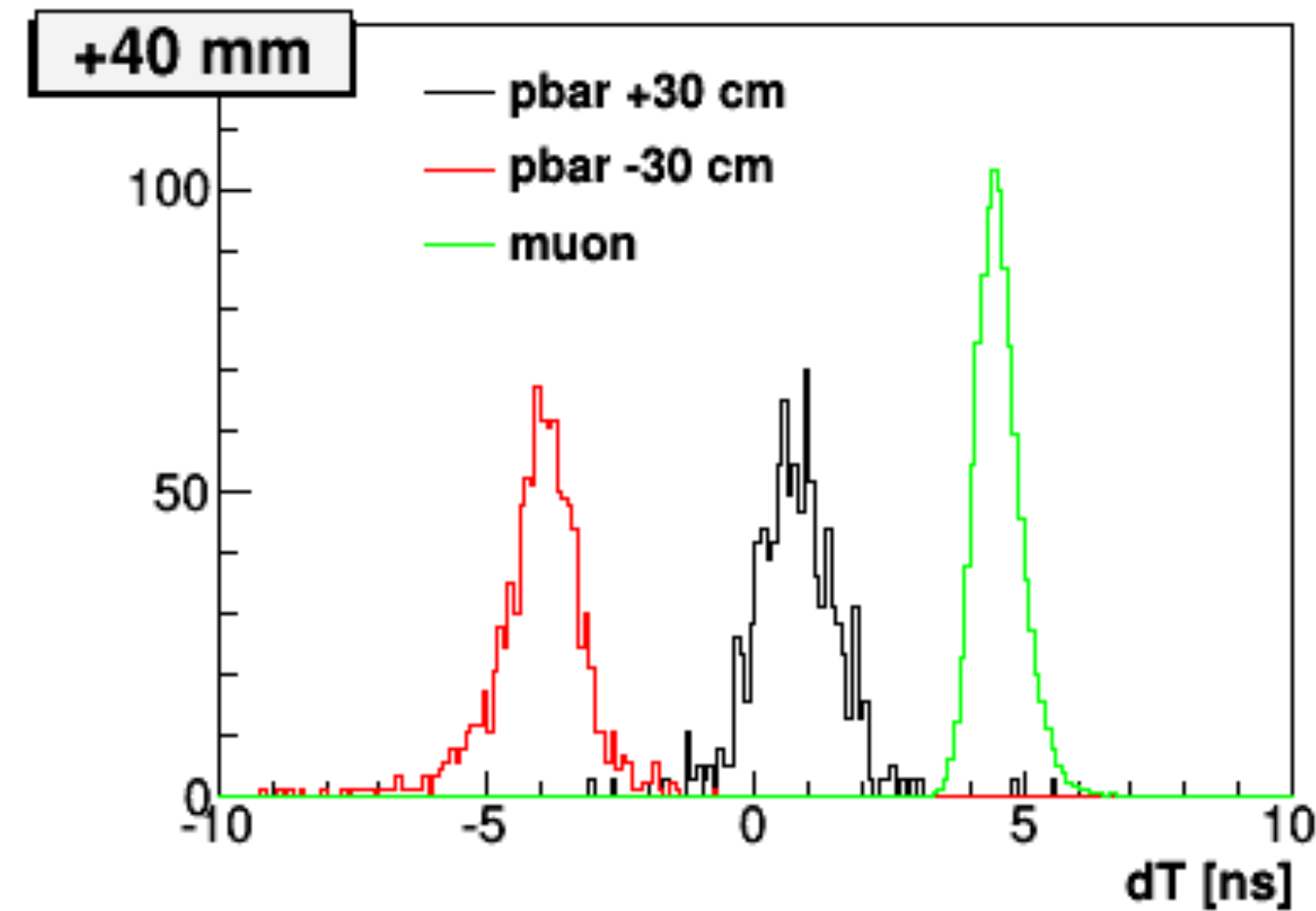
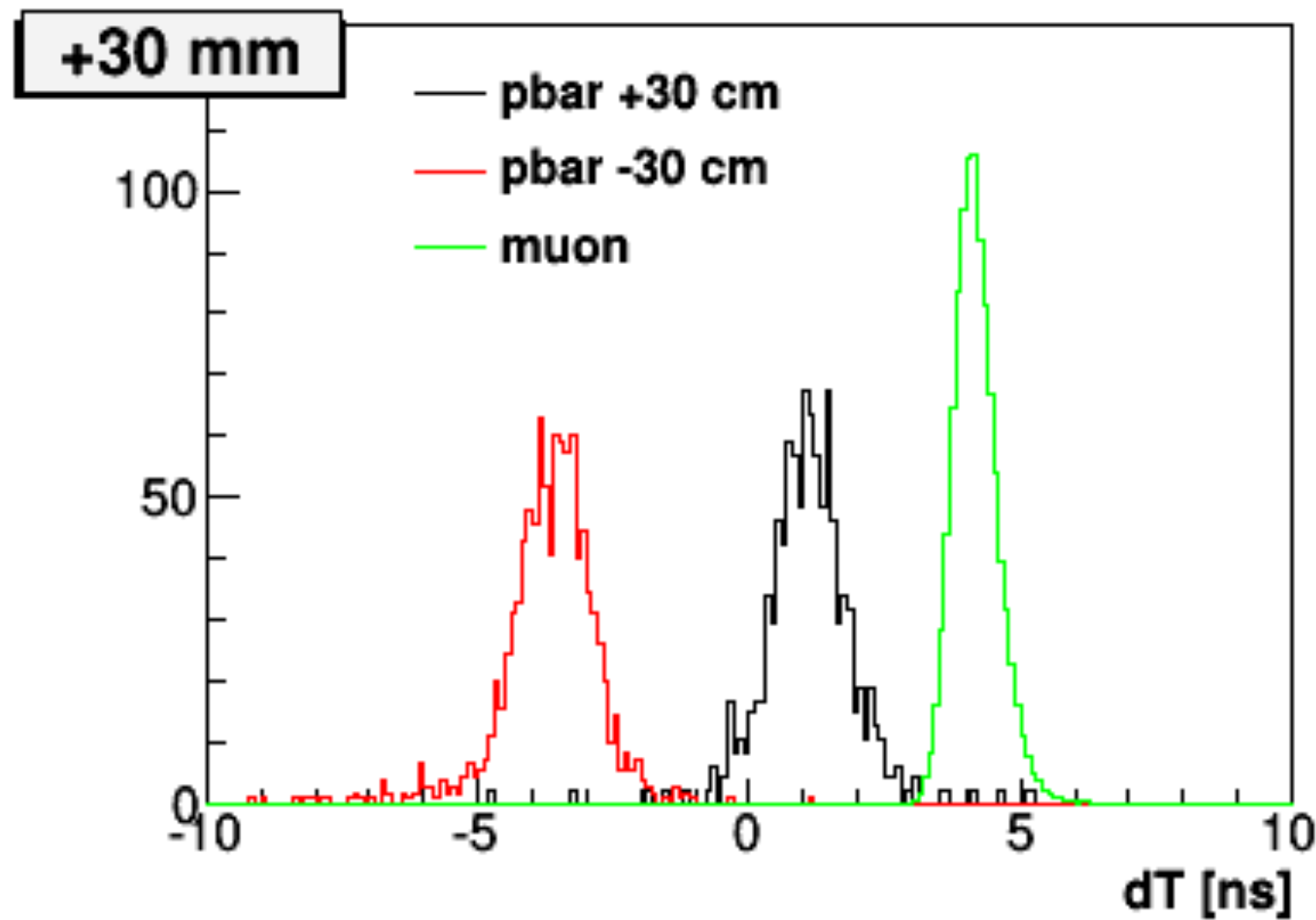
825 mm



Top Detector Height Dependence Check

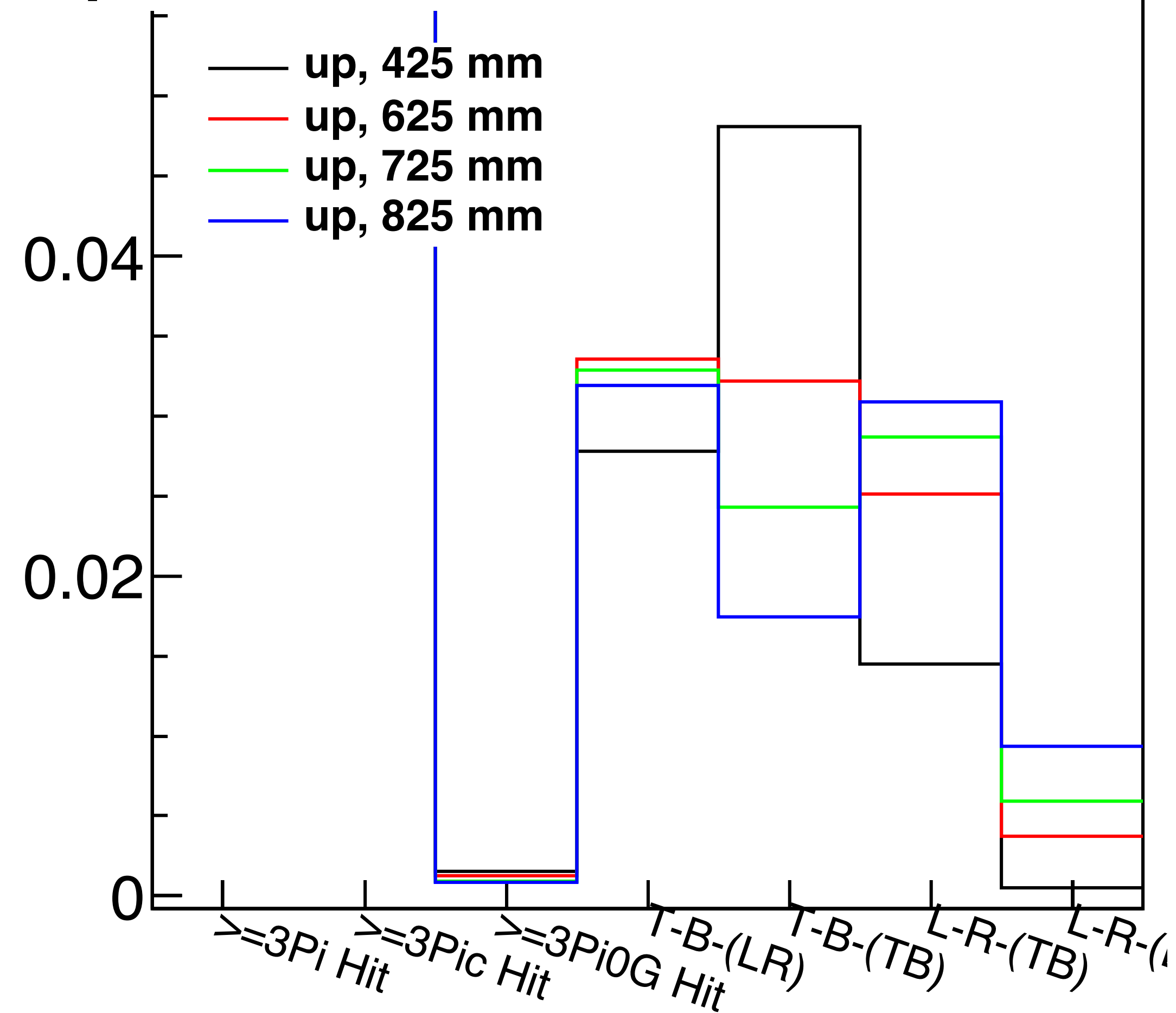


$$\Delta T = 0.2 \text{ ns } (\sigma)$$



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

Important Hit. Patt.



Important Hit. Patt.

