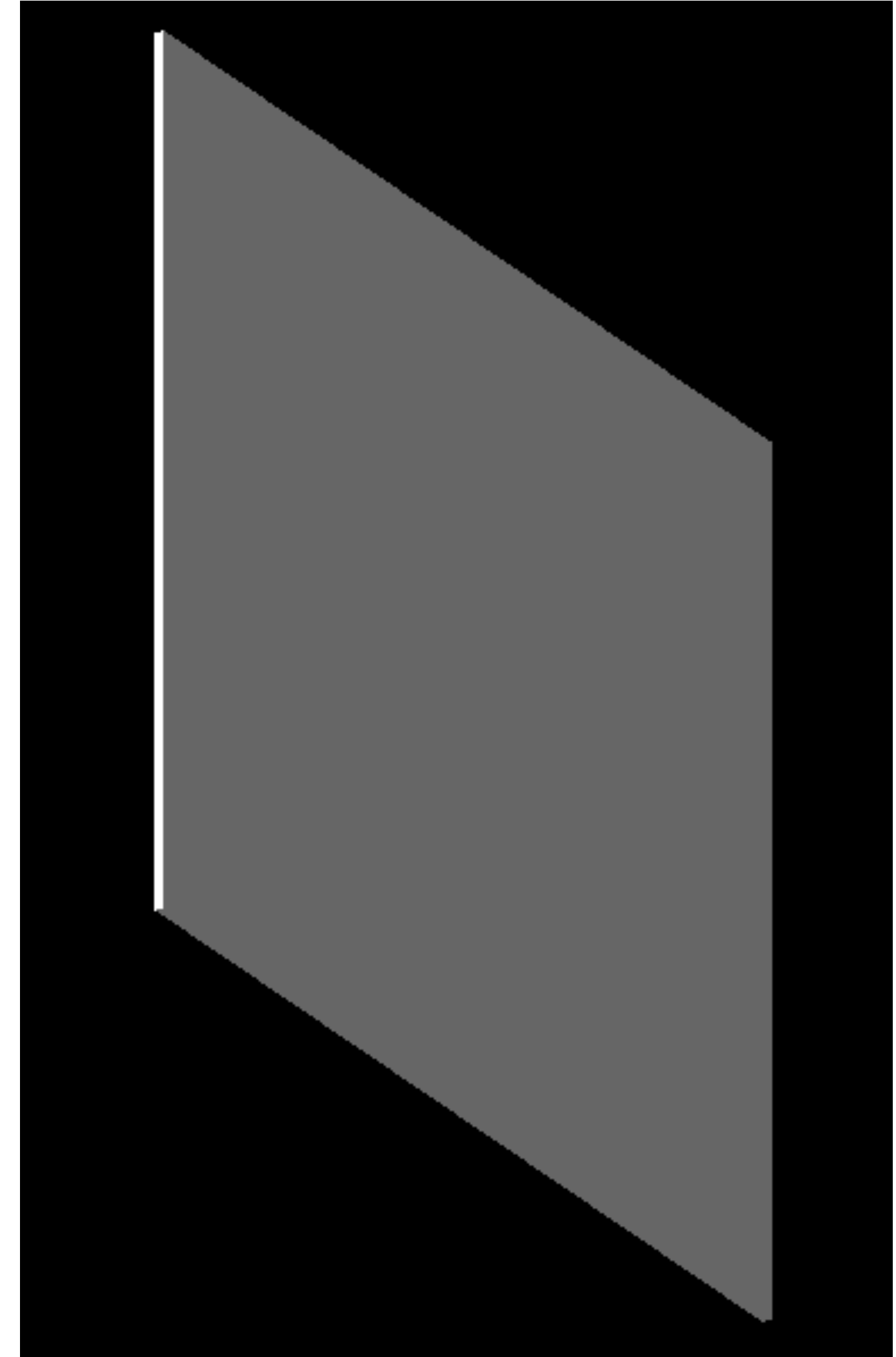


Status report (1 Feb. 2017)

Jongwon Hwang

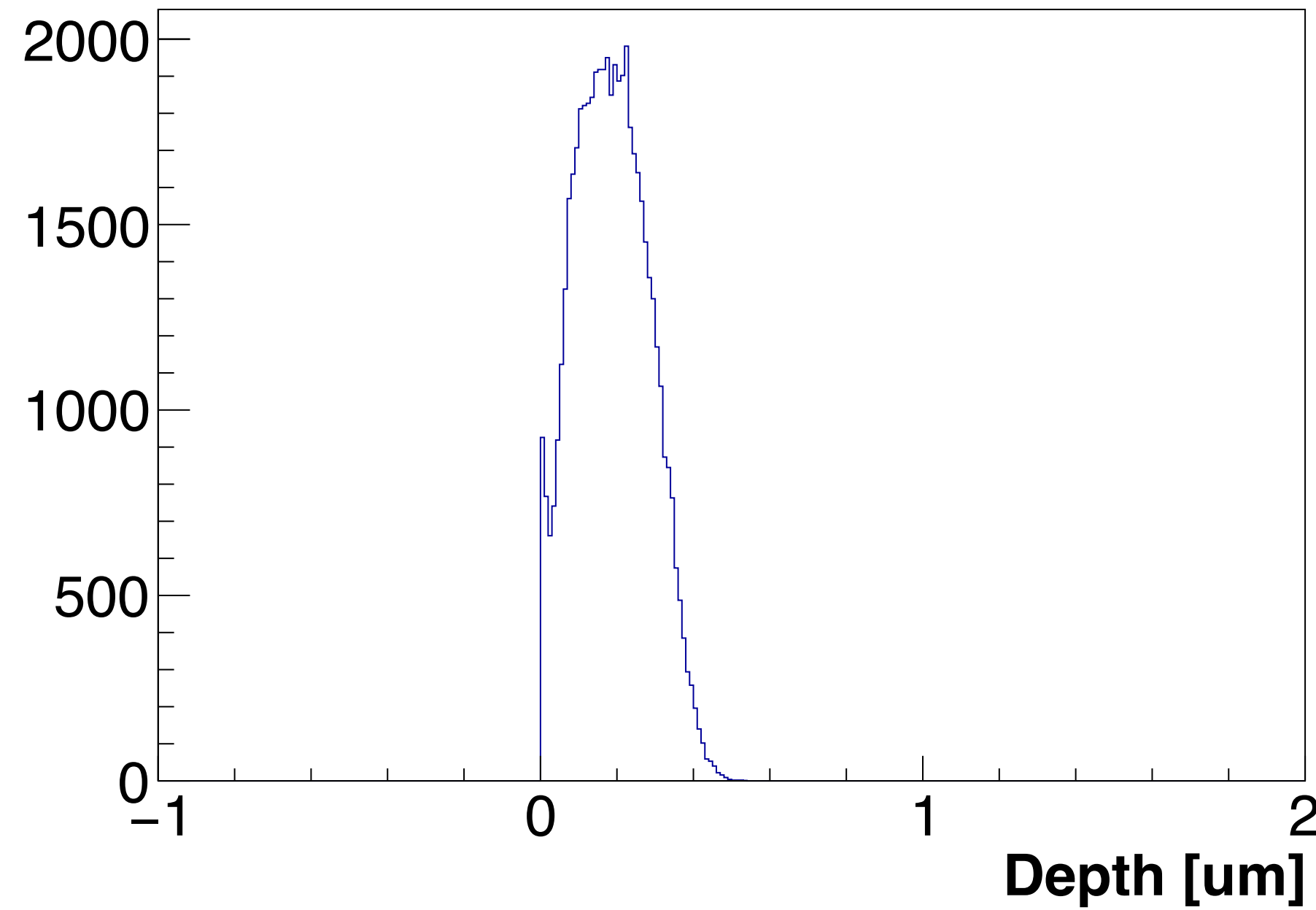
Simulation for “doping”

- dope
 - Using Geant4 library
 - 10 μm -thick Au or Cu plate
 - 18 keV-electro or 200keV-triton
(not tritium maybe)

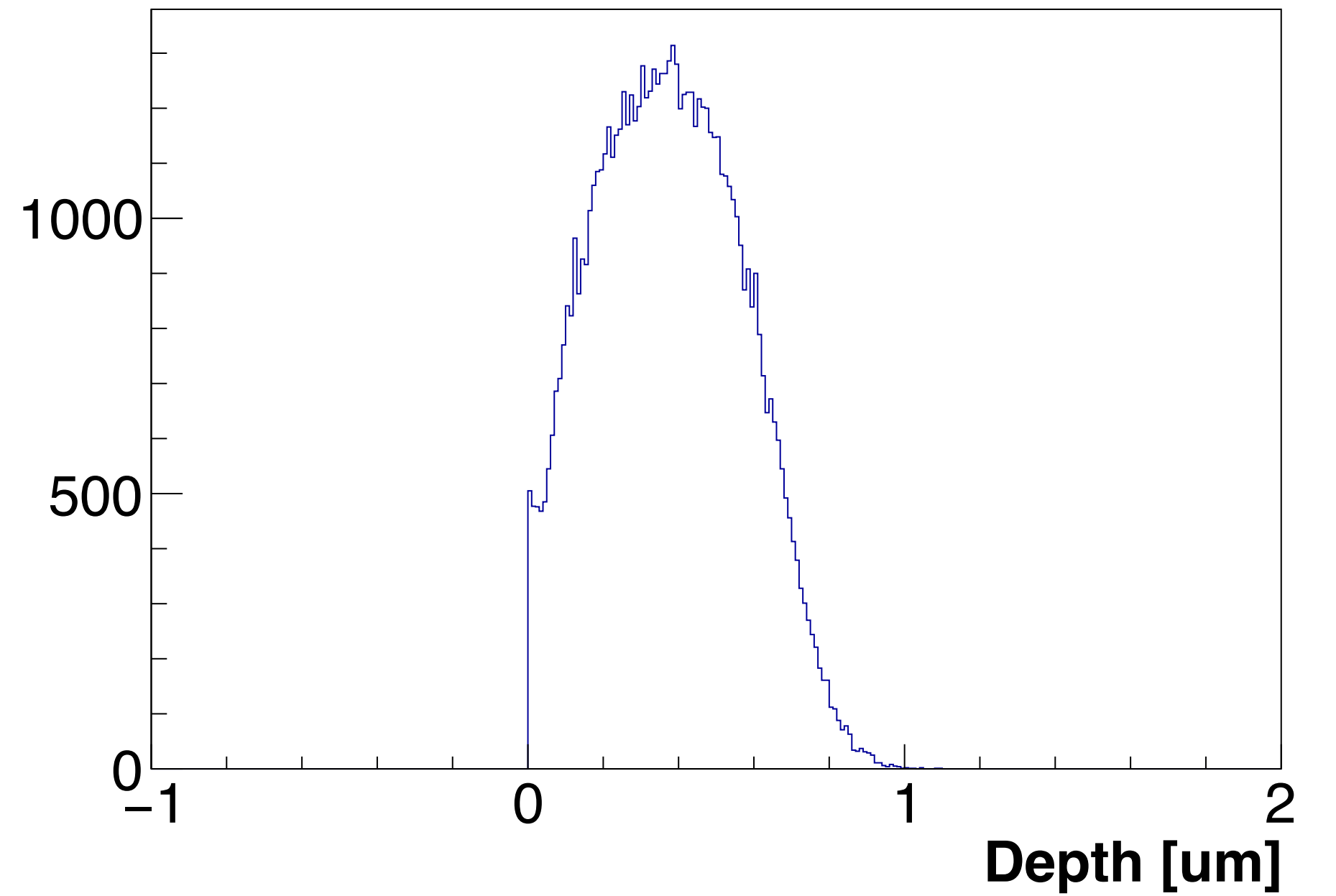


Simulation
for
“doping”:
electron

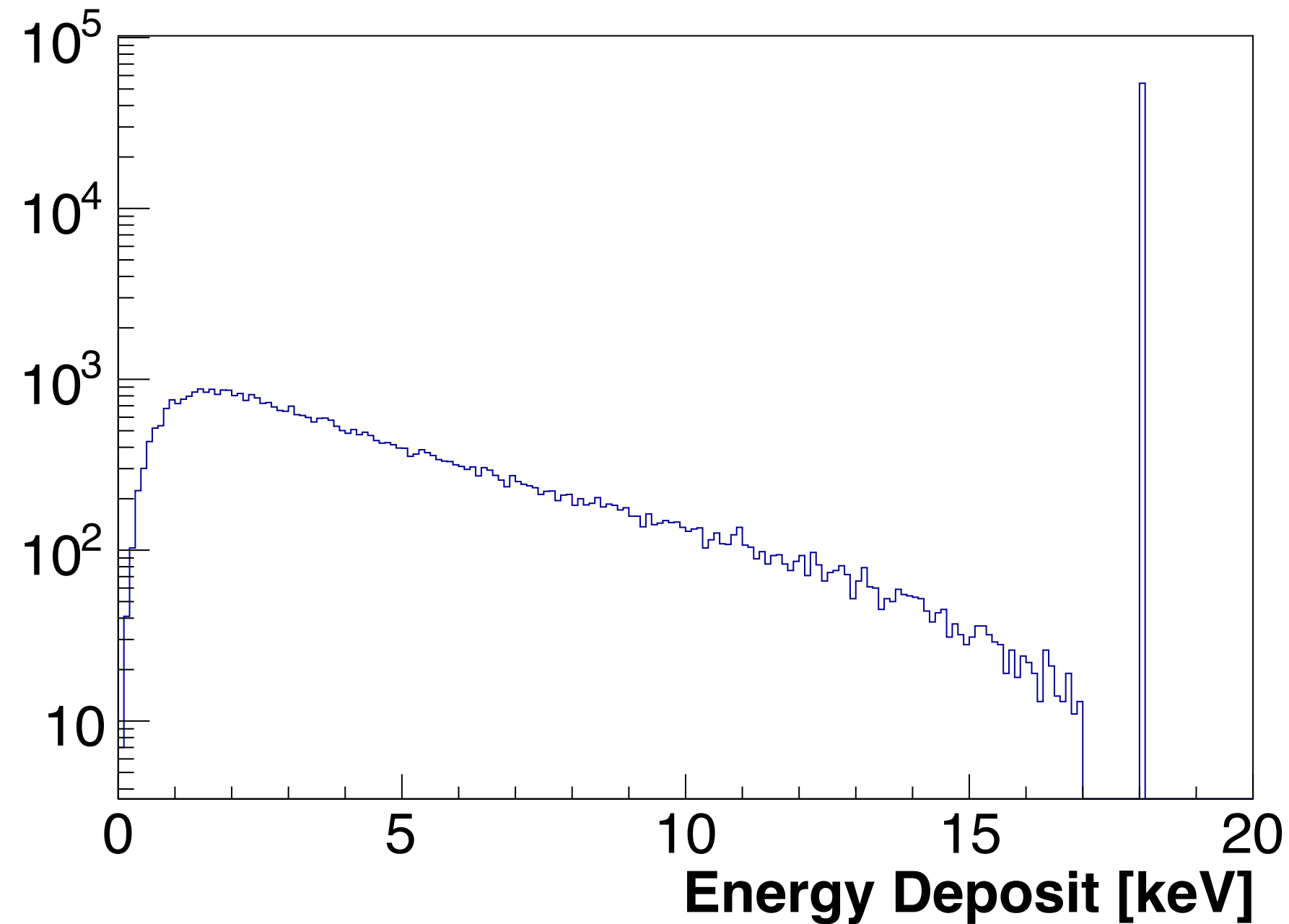
electron_Au



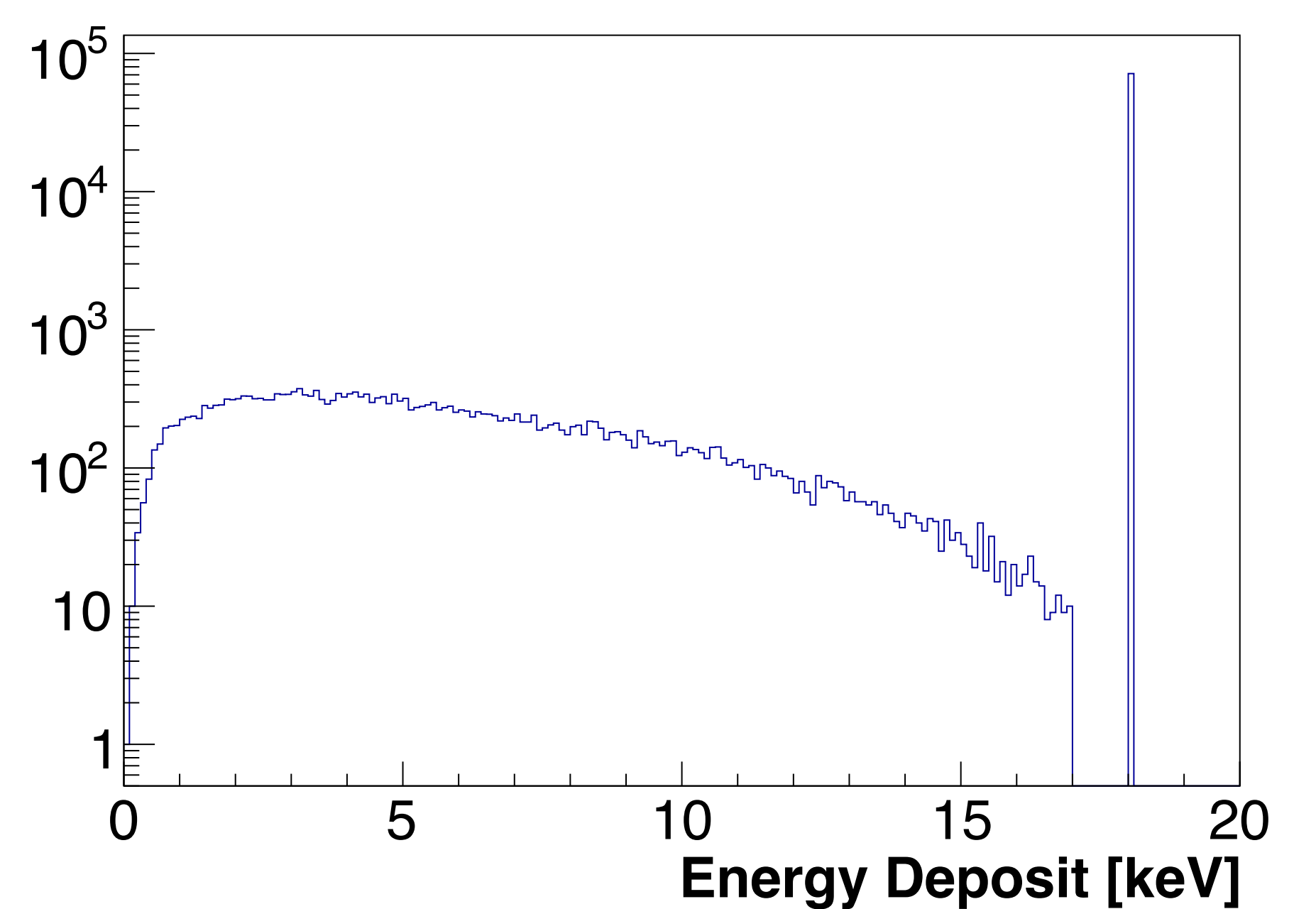
electron_Cu



electron_Au

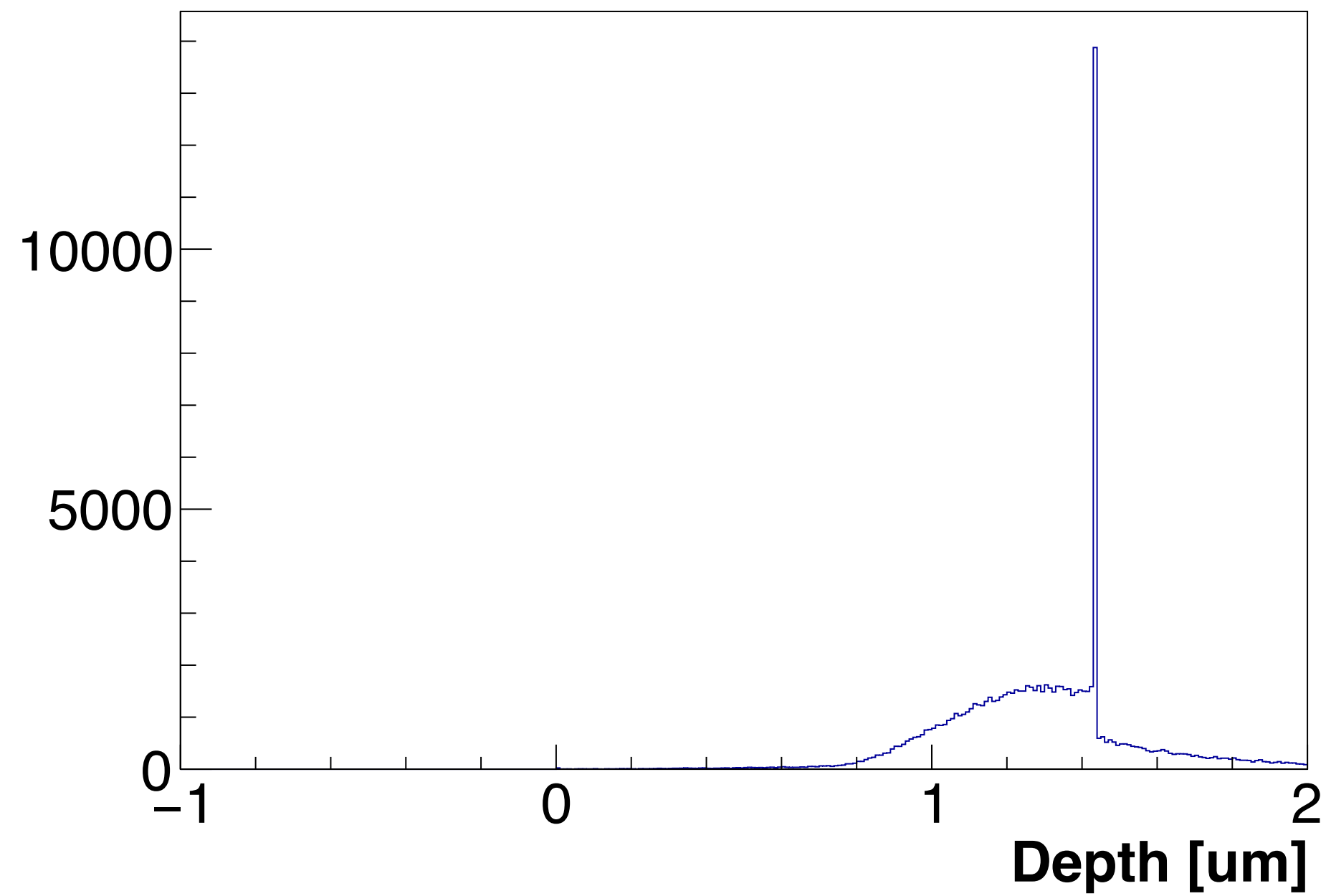


electron_Cu



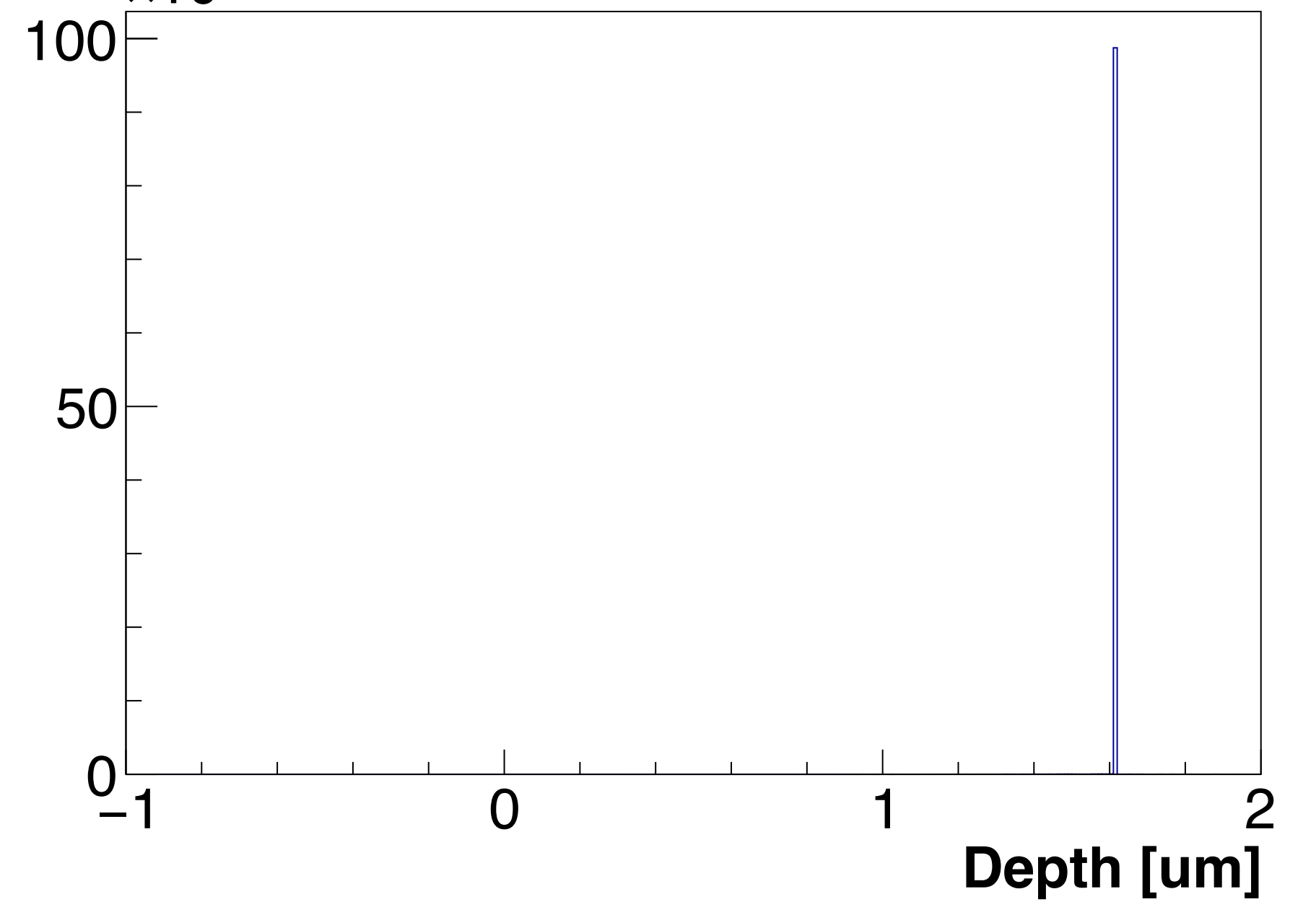
Simulation
for
“doping”:
triton

triton_Au

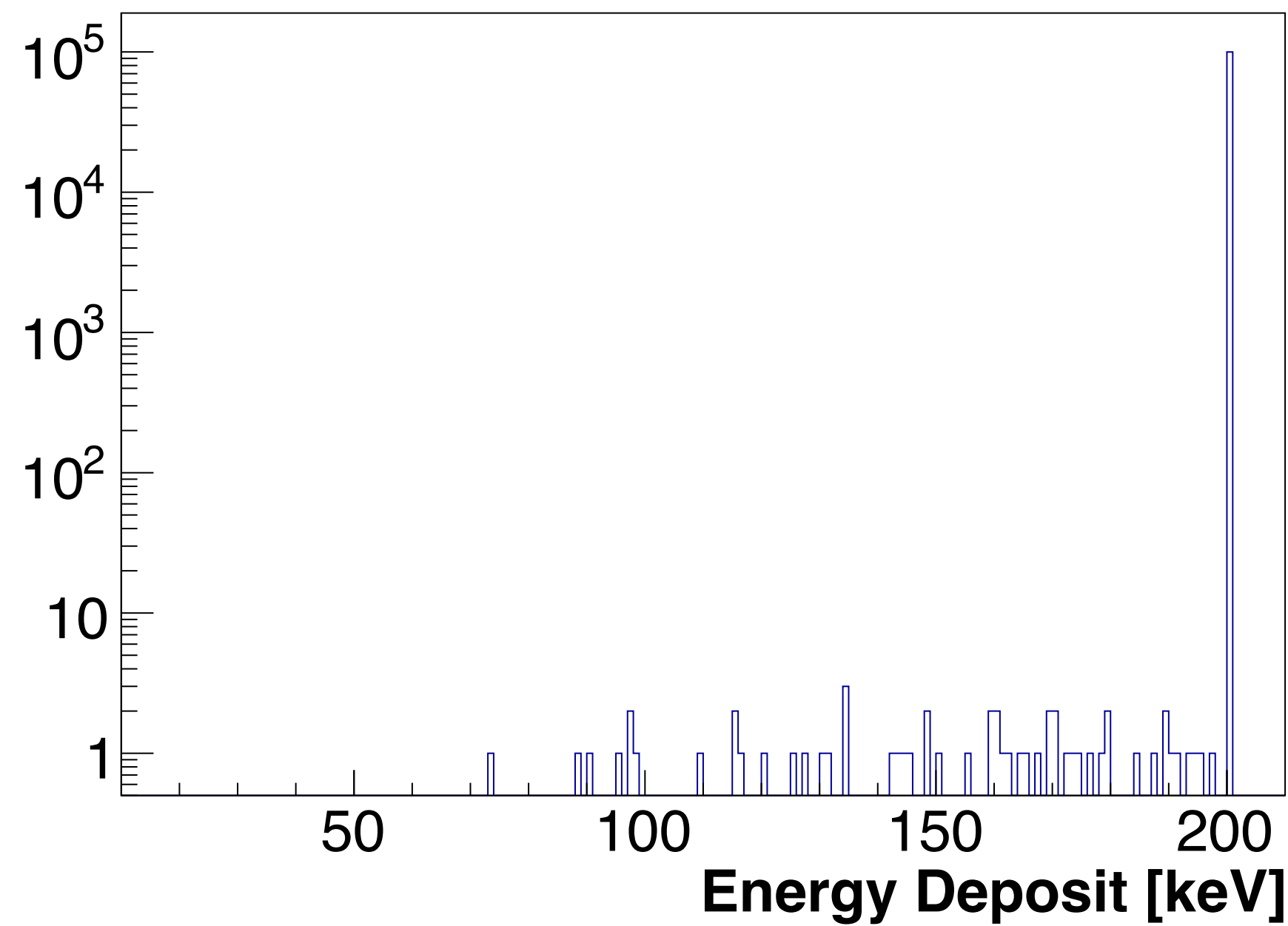


triton_Cu

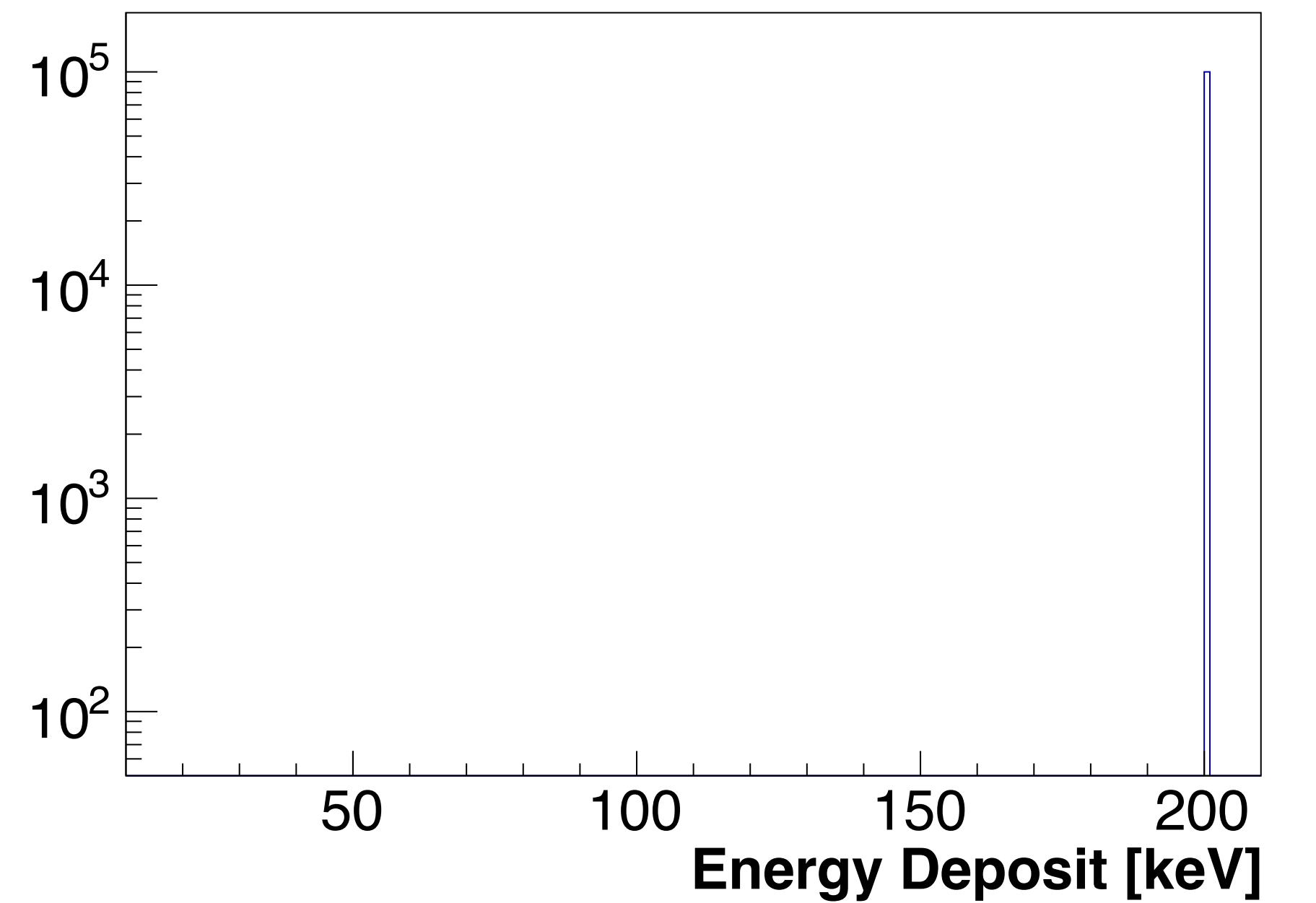
$\times 10^9$



triton_Au



triton_Cu

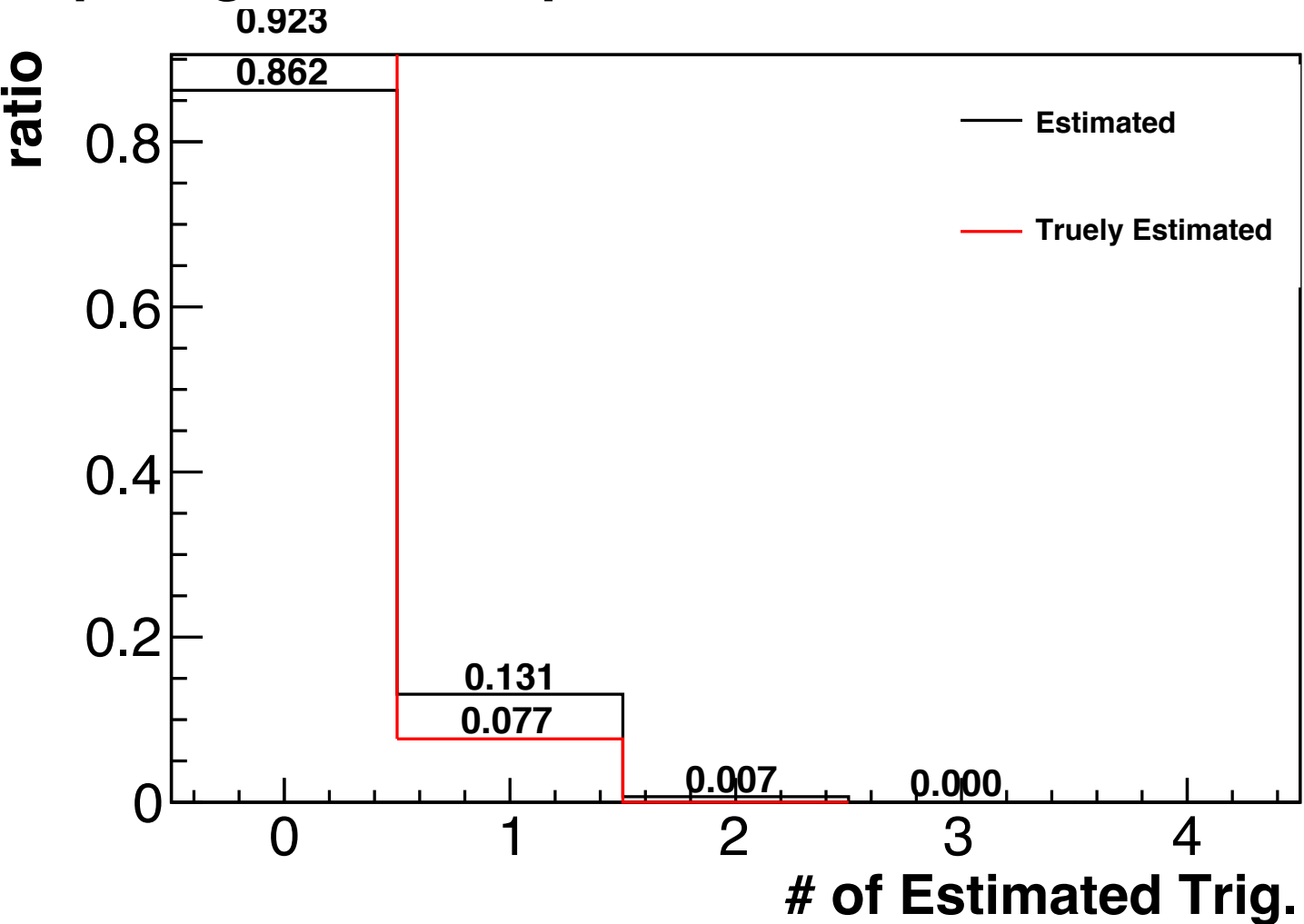


Simulation: anti-p + cosmic-rays

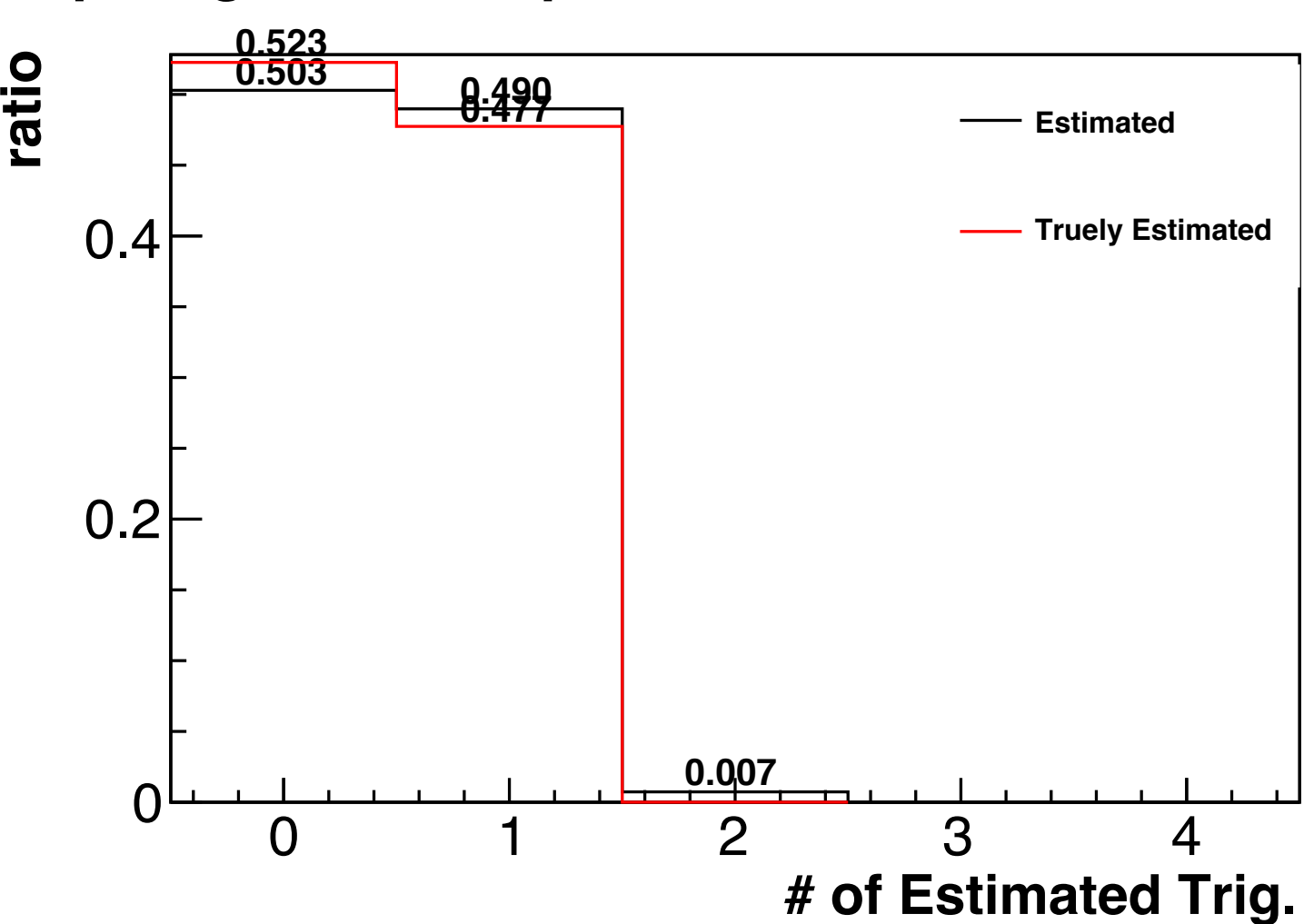
- Preliminary test of cosmic-ray rejection
 - Without clustering / 0.3 MeV threshold for energy deposit (each hit)
 - Neglect 1-hit events
 - Only Top-Bottom combination for 2 or more hits (at least 1 hit at Top and Bottom)
 - (time difference between T-B) < 2 ns
 - **Good Rejection = Only ONE Trigger selected**
 - **Successful Rejection = Good Rejection & selected Trig. from Annihilation**

Simulation: anti-p + cosmic-rays

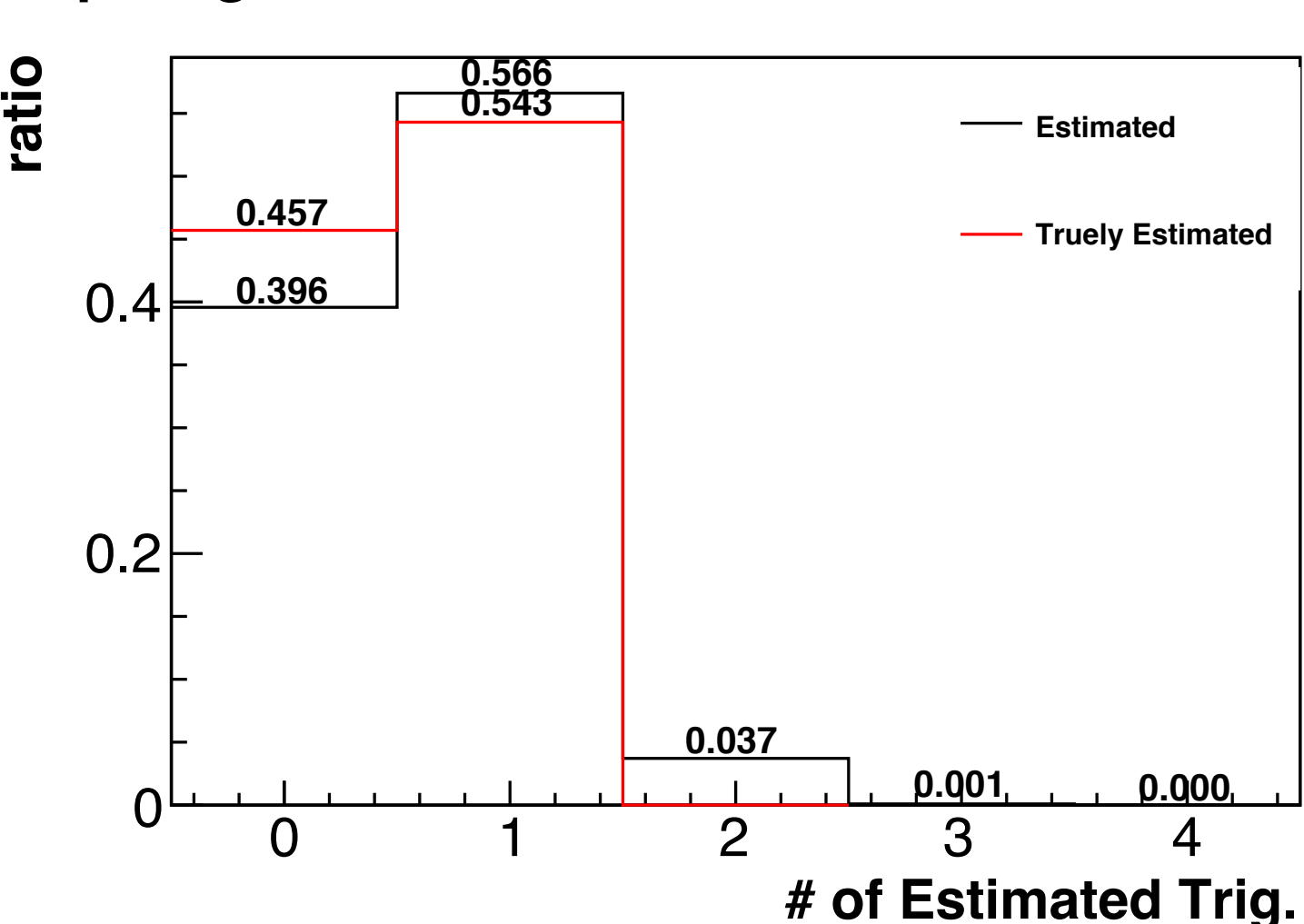
Top height: 425, Top



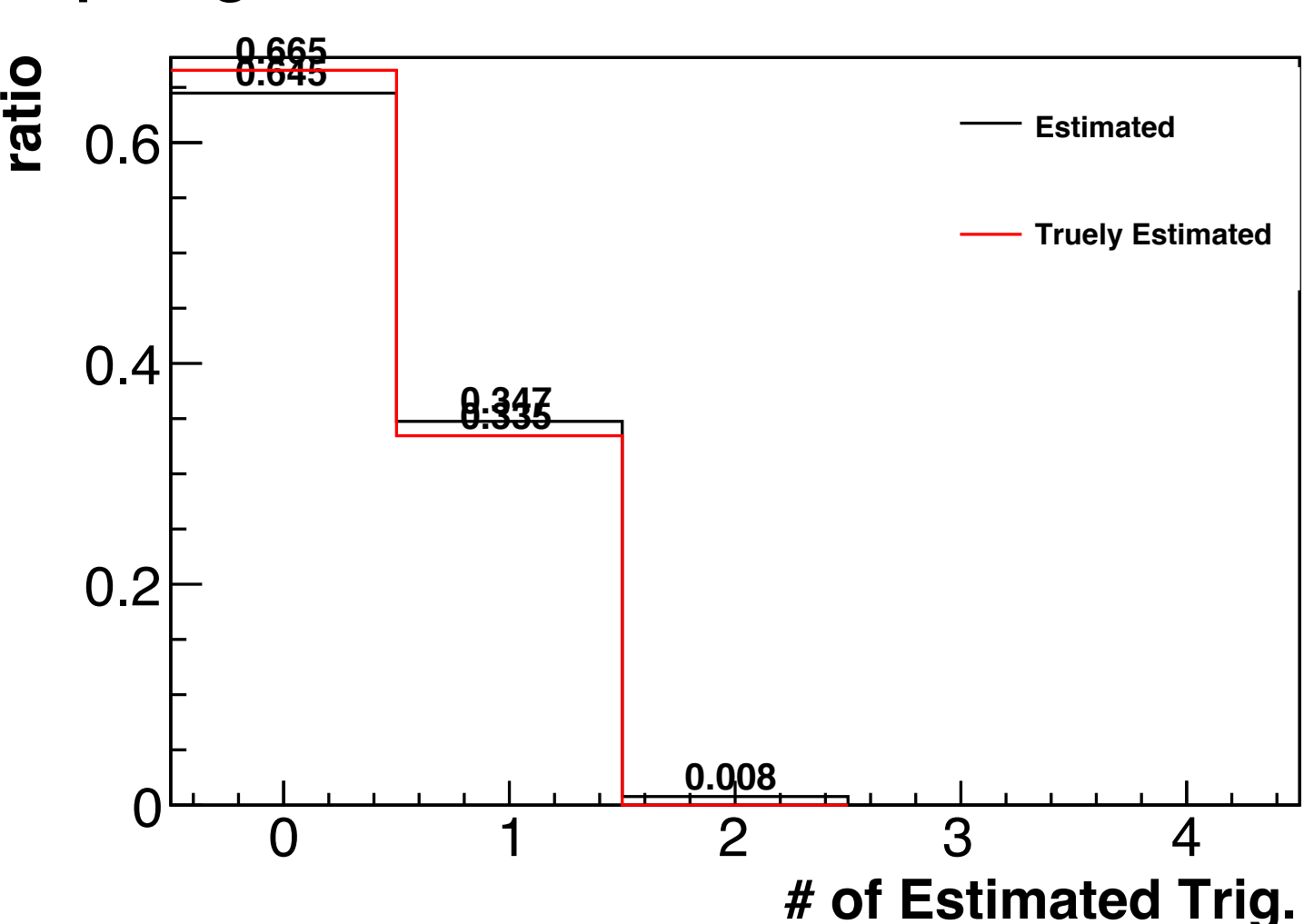
Top height: 825, Top



Top height: 425, Bot



Top height: 825, Bot



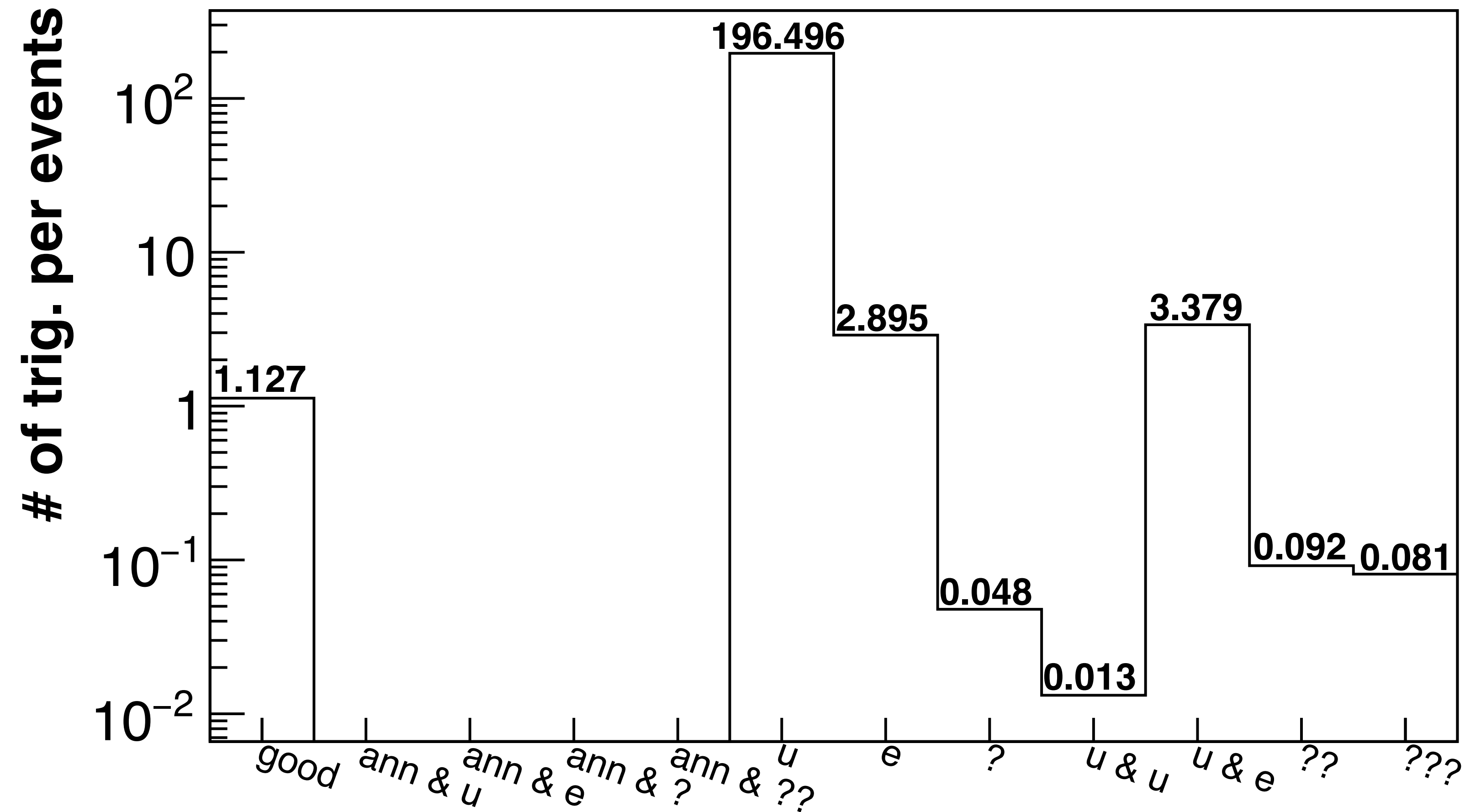
500 ms-event window

Good rate	425 mm	825 mm
Top	13.08%	48.98%
Bottom	56.61%	34.75%
Successful rate	425 mm	825 mm
Top	7.67%	47.74%
Bottom	54.3%	33.45%
Accuracy	425 mm	825 mm
Top	58.64%	97.47%
Bottom	95.92%	96.26%

Simulation: Case Study

- Which particles cause the trigger?
- For whole triggers
- 825-mm Top detector / Top annihilation

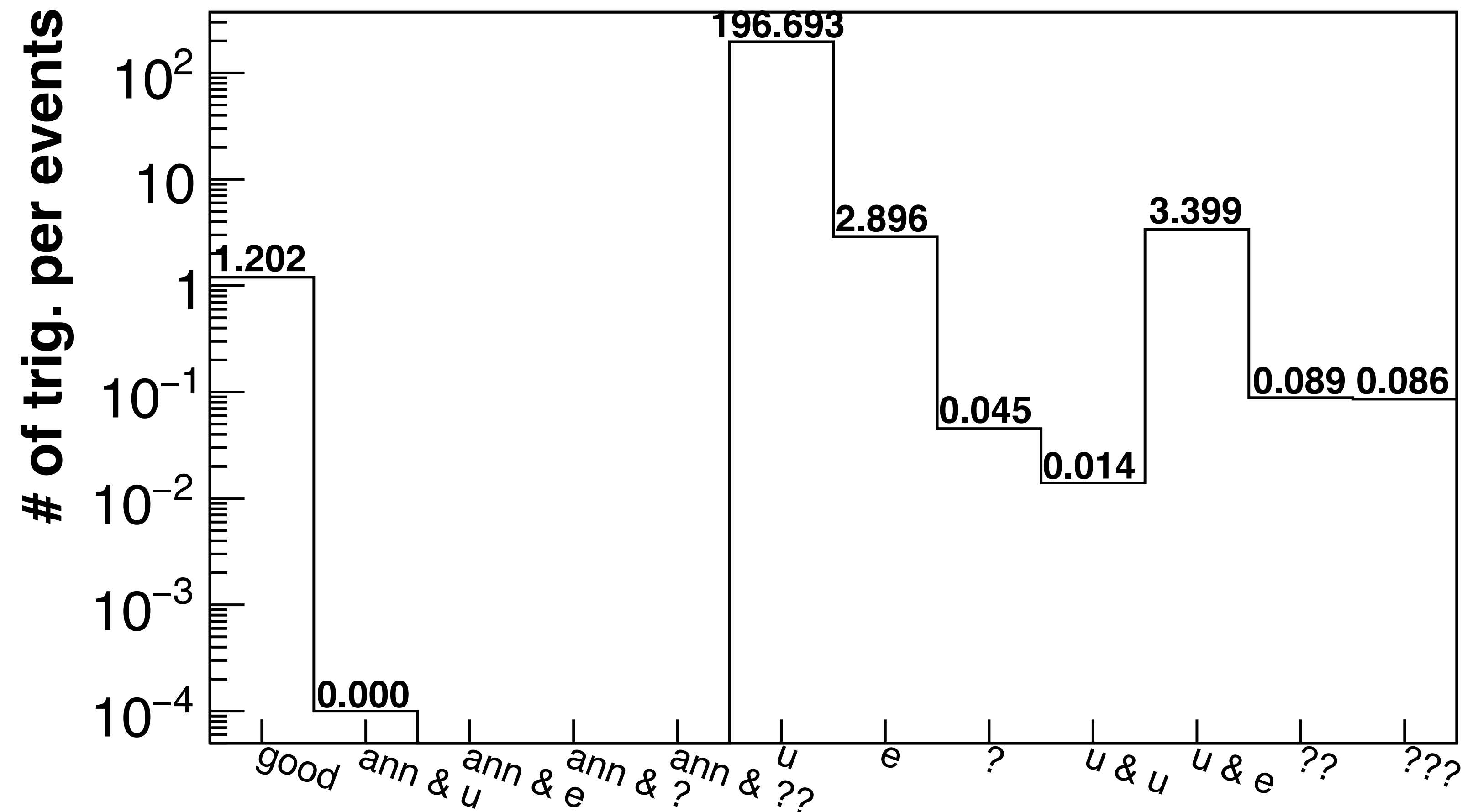
Sort of Trig. (825/Top)



Simulation: Case Study

- Which particles cause the trigger?
- For whole triggers
- 825-mm Top detector / Bottom annihilation

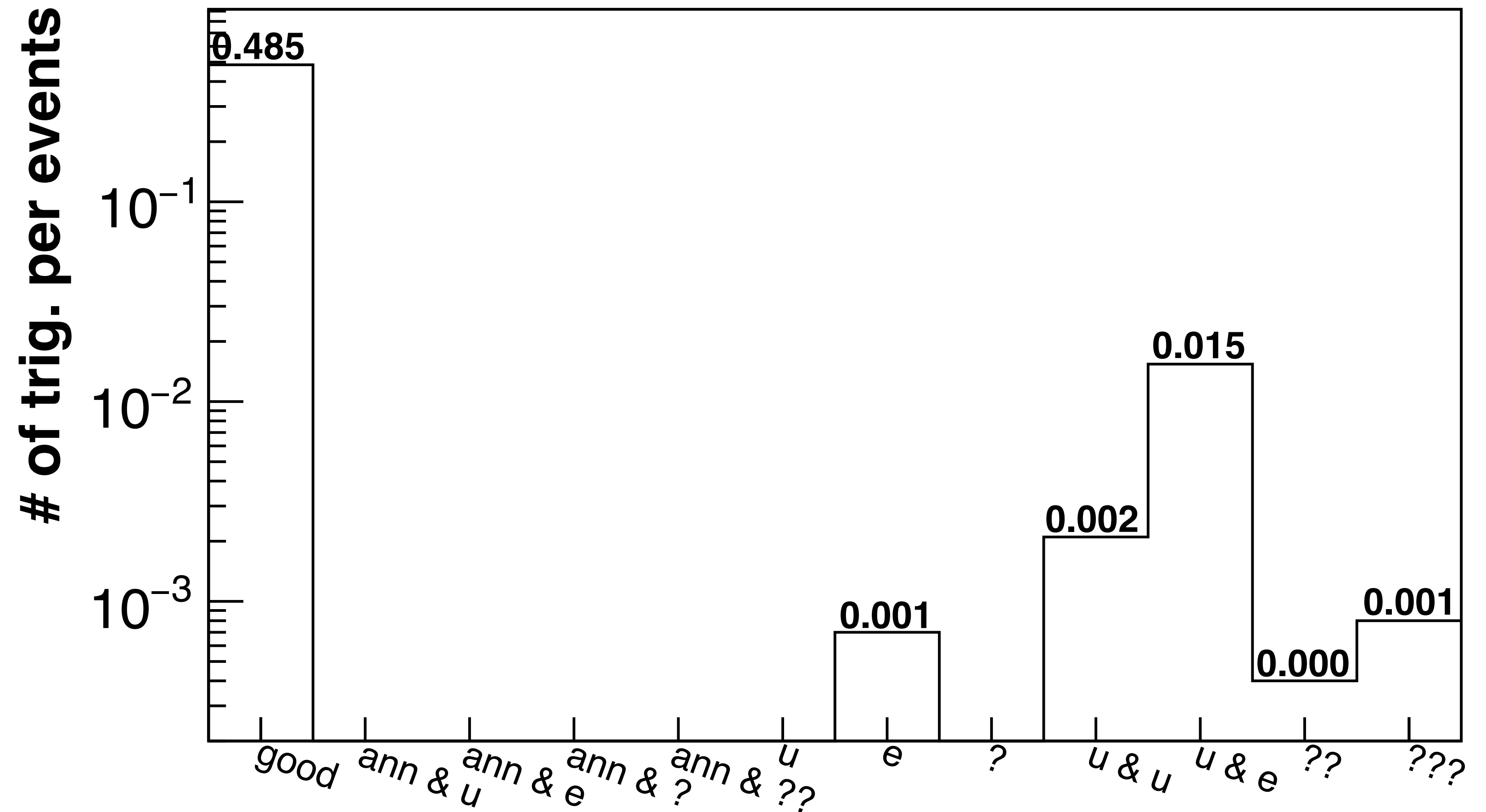
Sort of Trig. (825/Bot)



Simulation: Case Study After Rejection

- Which particles cause the trigger?
- Triggers selected by rejection
- $V_{th} = 0.3$ MeV
- 825-mm Top detector / Top annihilation

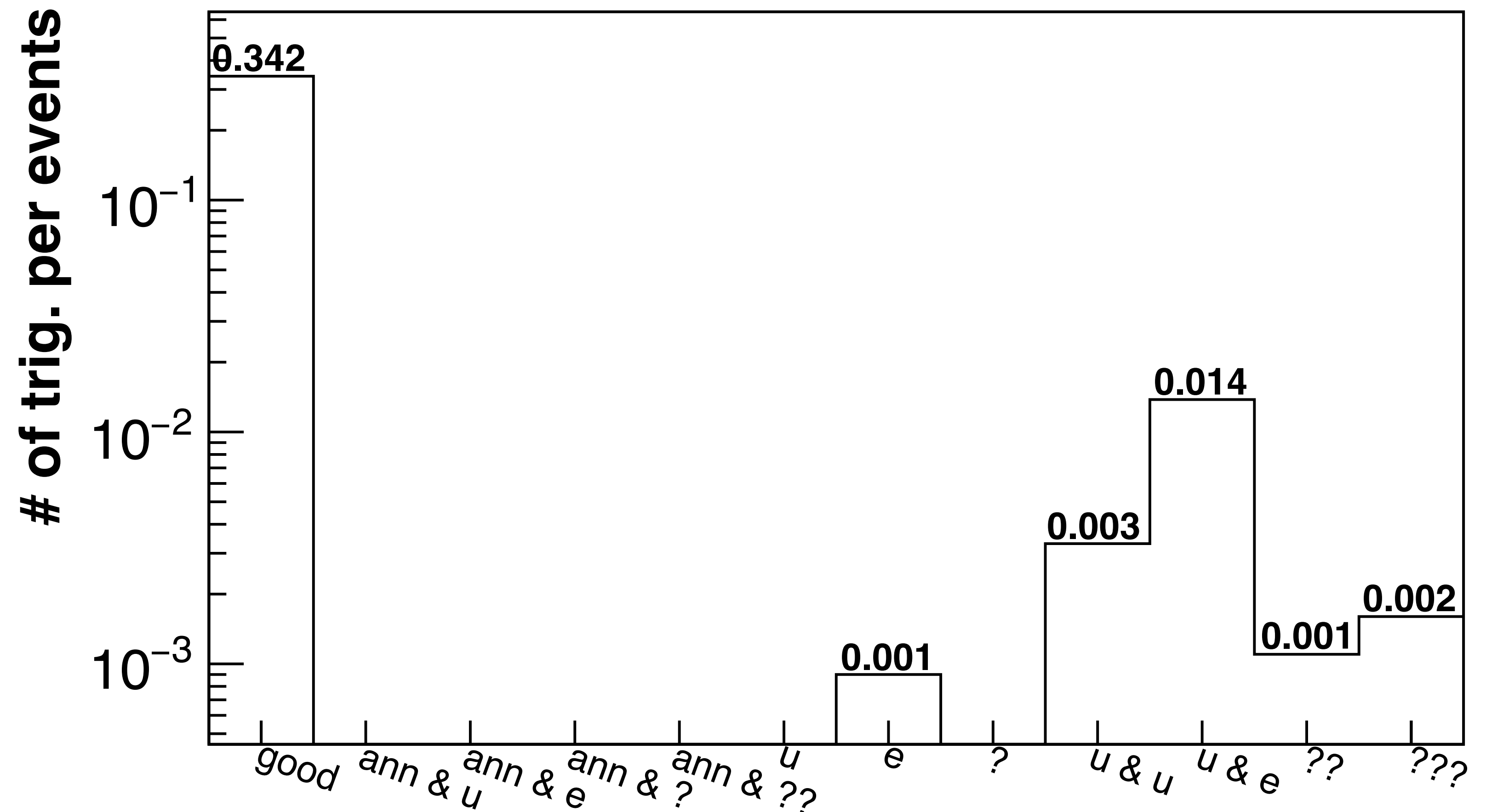
Sort of Trig. After Ref. (825/Top)



Simulation: Case Study After Rejection

- Which particles cause the trigger?
- Triggers selected by rejection
- $V_{th} = 0.3$ MeV
- 825-mm Top detector / Bottom annihilation

Sort of Trig. After Ref. (825/Bot)



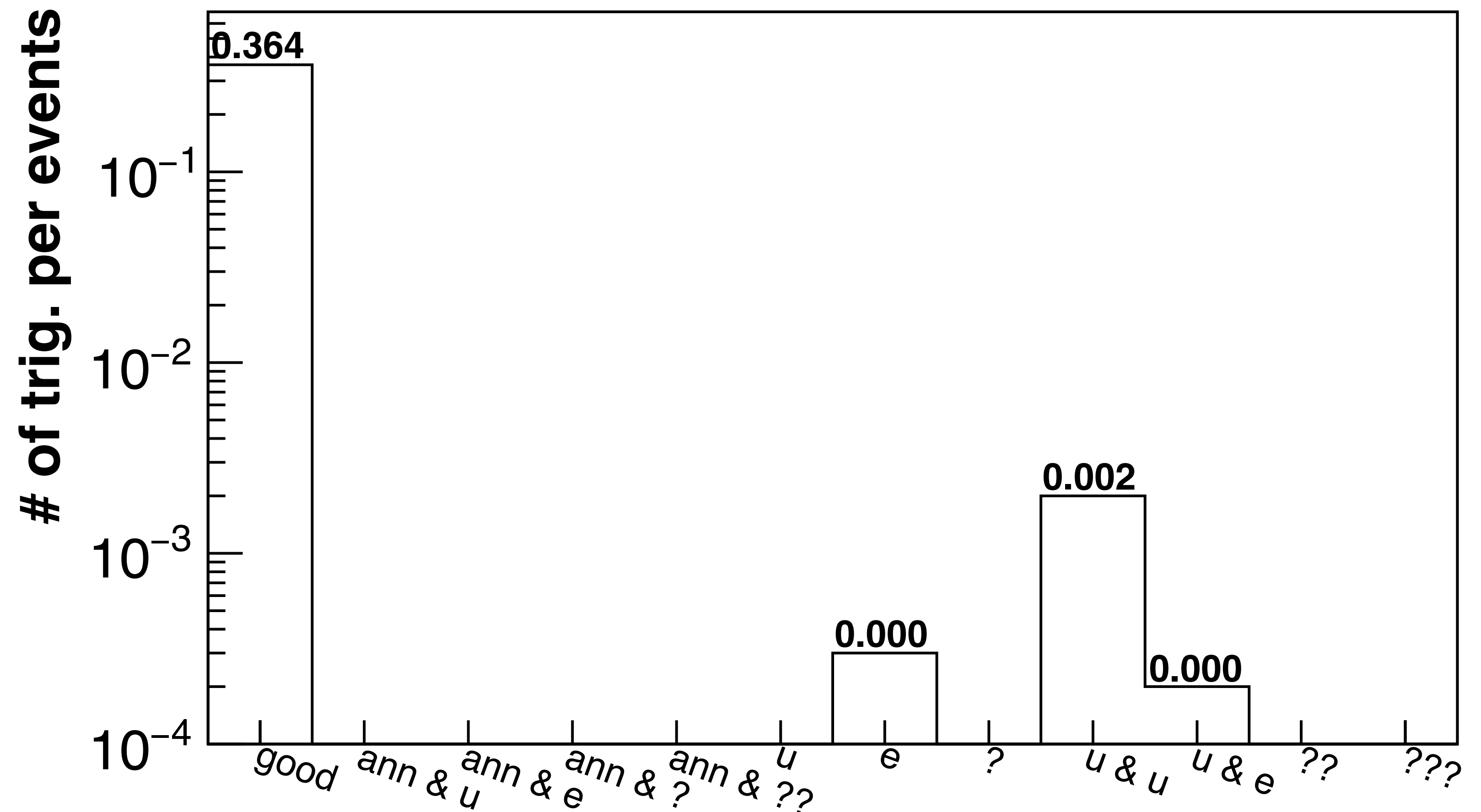
How to improve S/N ratio?

- Adjustable parameters
 - Energy deposit threshold
 - Number of hits in a trigger
 - Time difference cut: limit & targets
 -

Simulation: Case Study After Rejection

- Which particles cause the trigger?
- Triggers selected by rejection
- $V_{th} = 5$ MeV
- 825-mm Top detector / Top annihilation

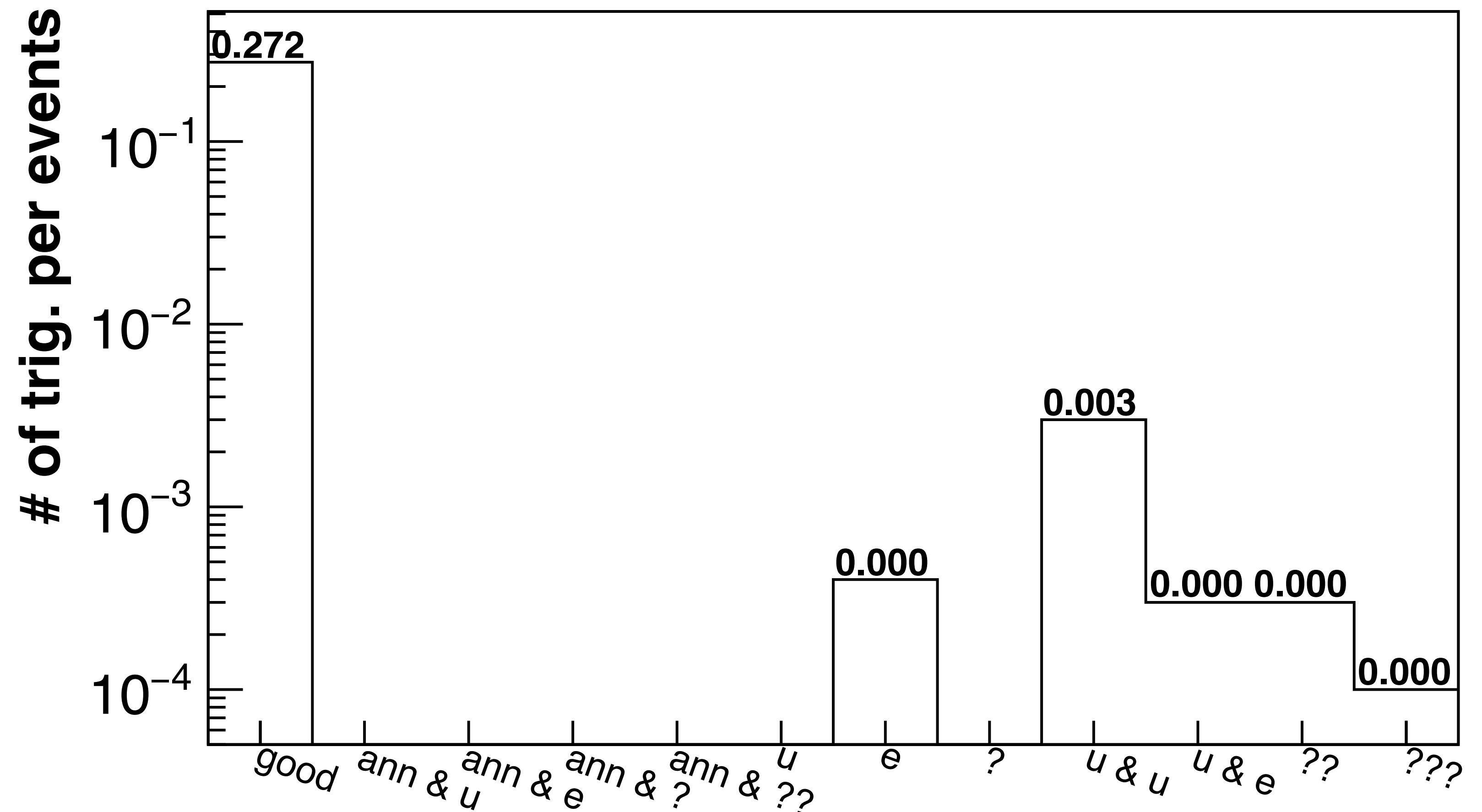
Sort of Trig. After Ref. (825/Top)



Simulation: Case Study After Rejection

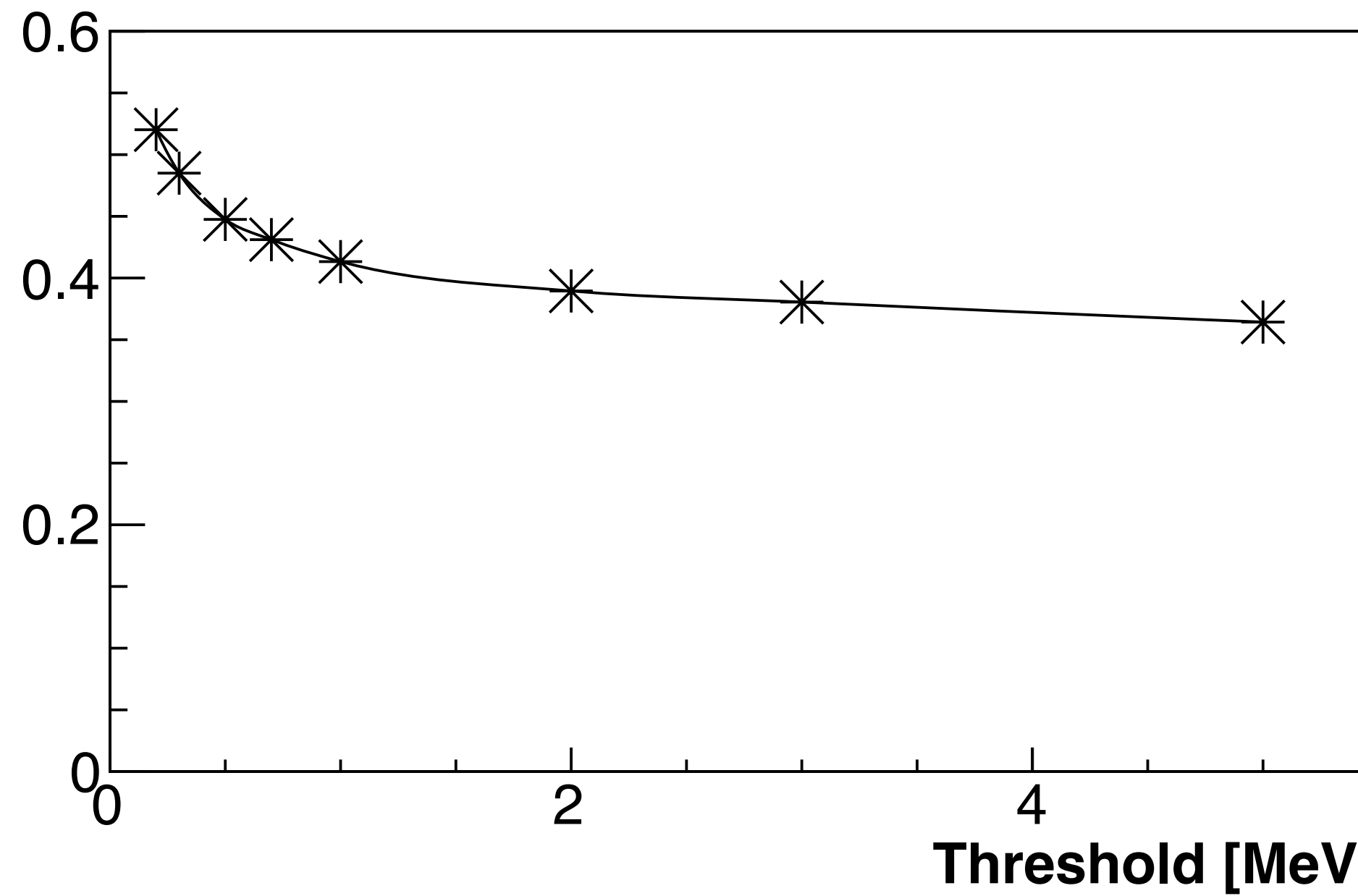
- Which particles cause the trigger?
- Triggers selected by rejection
- $V_{th} = 5$ MeV
- 825-mm Top detector / Bottom annihilation

Sort of Trig. After Ref. (825/Bot)

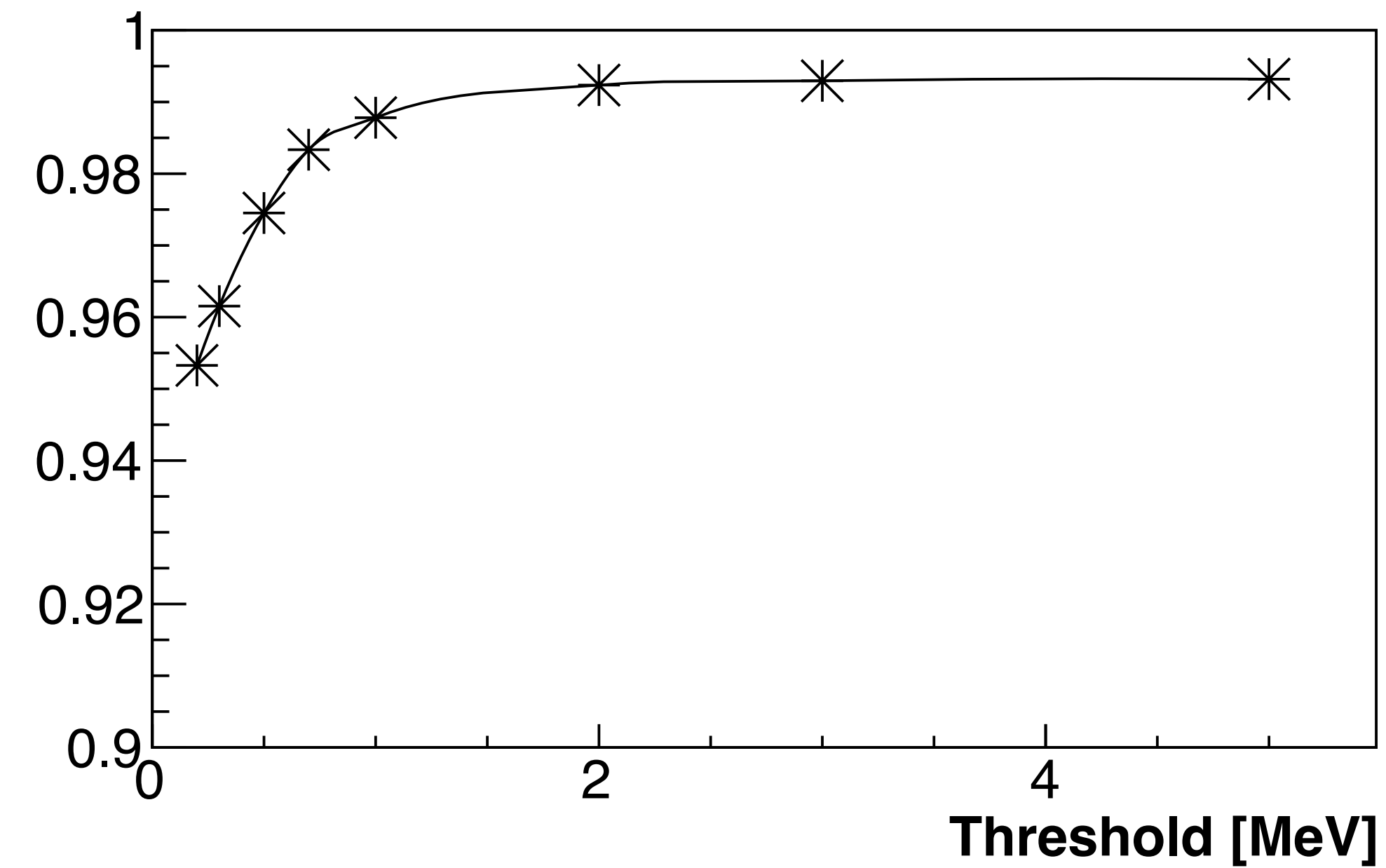


Threshold
Depende
nce
of
Efficiency
&
Signal
Ratio

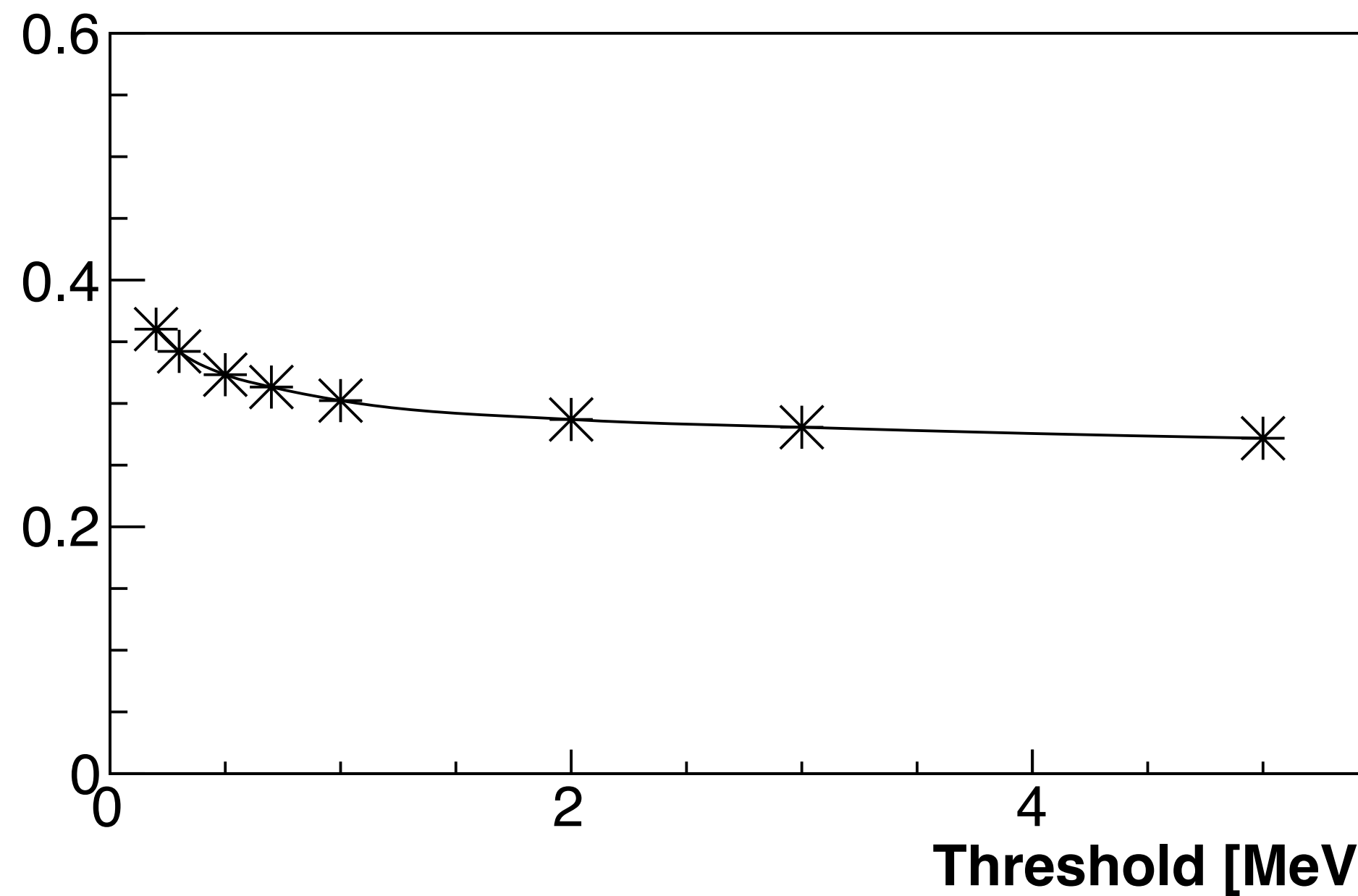
Eff. Thres. Dep. (825/Top)



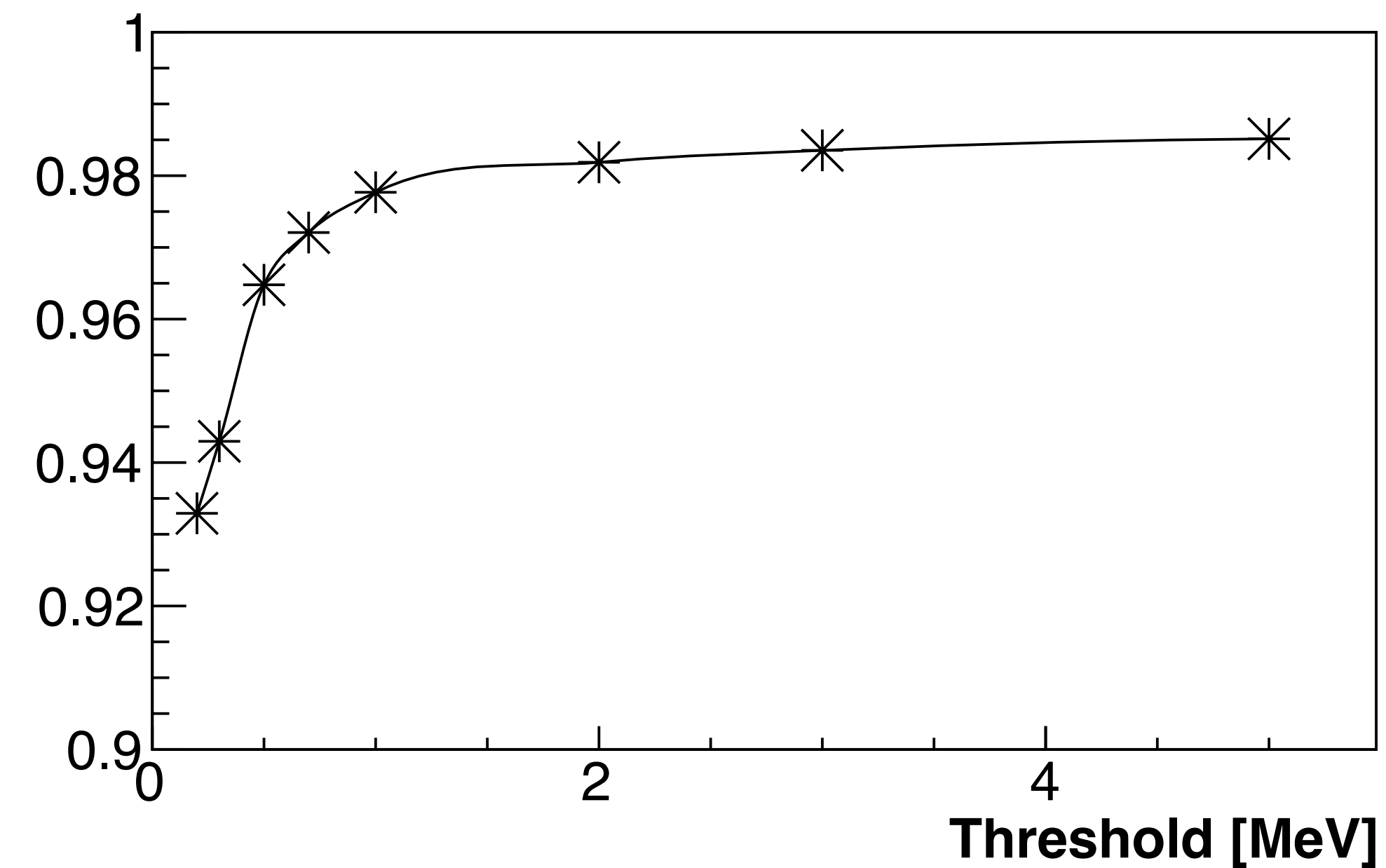
S/N Thres. Dep. (825/Top)



Eff. Thres. Dep. (825/Bot)



S/N Thres. Dep. (825/Bot)



To-do List

- Consider alternative algorithms for cosmic-ray rejection
 - Current: compare earliest hits for each Top/Bottom detector
→ Future: compare all combination of hits between those for Top/Bottom detector
- New cut for the number of hits in a trigger