

# About trigger

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# Muon beam energy

While studying a possible trigger strategy for the experiment I realized that the probability a muon could produce an interesting event (\*) in the first module is of the order of  $p = 5 \cdot 10^{-4}$ .

As a consequence the trigger rate in the the first module is:  
 $5 \cdot 10^{-4} \cdot 5 \cdot 10^8 \cdot 0.25 \sim 6 \cdot 10^4$  trigger/s,  
here 0.25 is the efficiency factor, due to the duty cycle.

**$5 \cdot 10^8$  muon/s**  
**Running a la Carlo's**  
**"multi-muon mode"**

We need  $N = (0.03 / 10^{-5})^2 = 9 \cdot 10^6$  events to check beam energy the stability at the required precision of  $10^{-5}$ .

To get it takes a time:  
 $Dt = 9 \cdot 10^6 \text{ events} / 6 \cdot 10^4 \text{ event/s} = 1.5 \cdot 10^2 \text{ s.}$   
to get the required statistics.

Let's assume  $\sim 1$  hour as the order of magnitude.

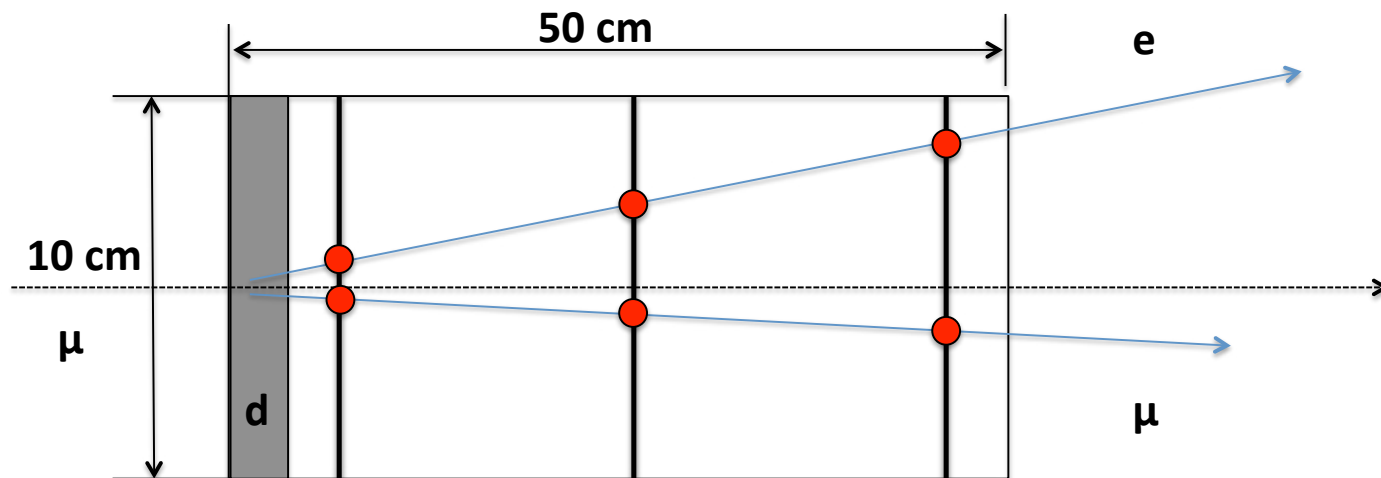
It is conceivable that the accelerator run in **stable conditions**, at this level of stability, on the required time scale?

Could we count on the reproducibility of the accelerator working conditions to this precision level?

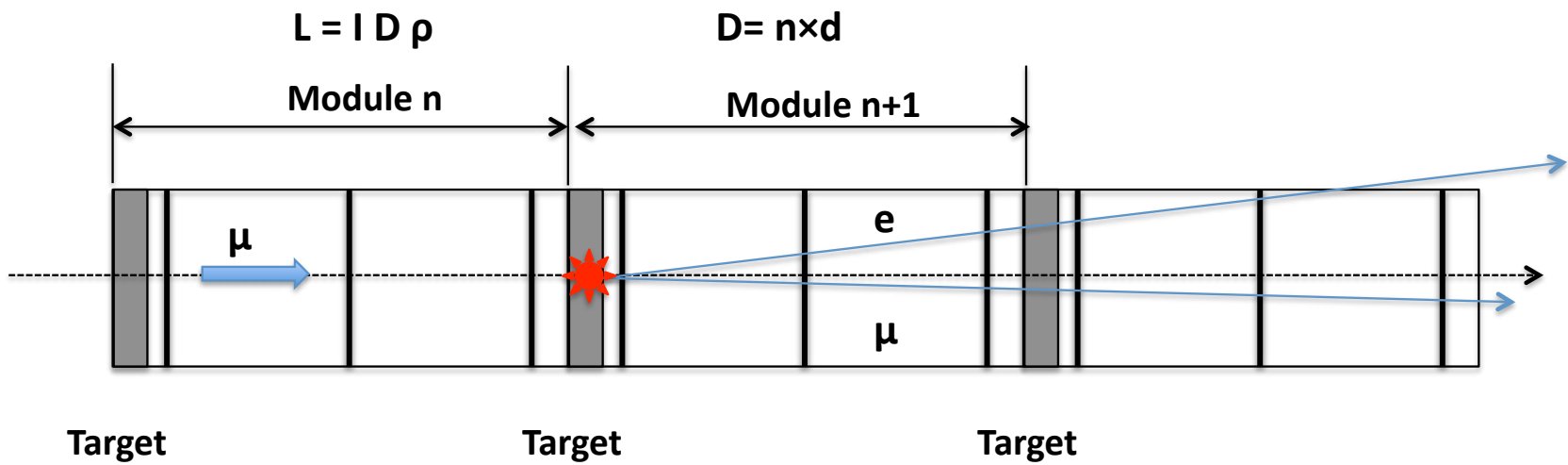
(\*) Interesting events are defined as those events for which in a given module there are at least 2 hits in each of the three tracking stations.

# Module

- Simulated the module response: Target, Tracking planes



# Detector

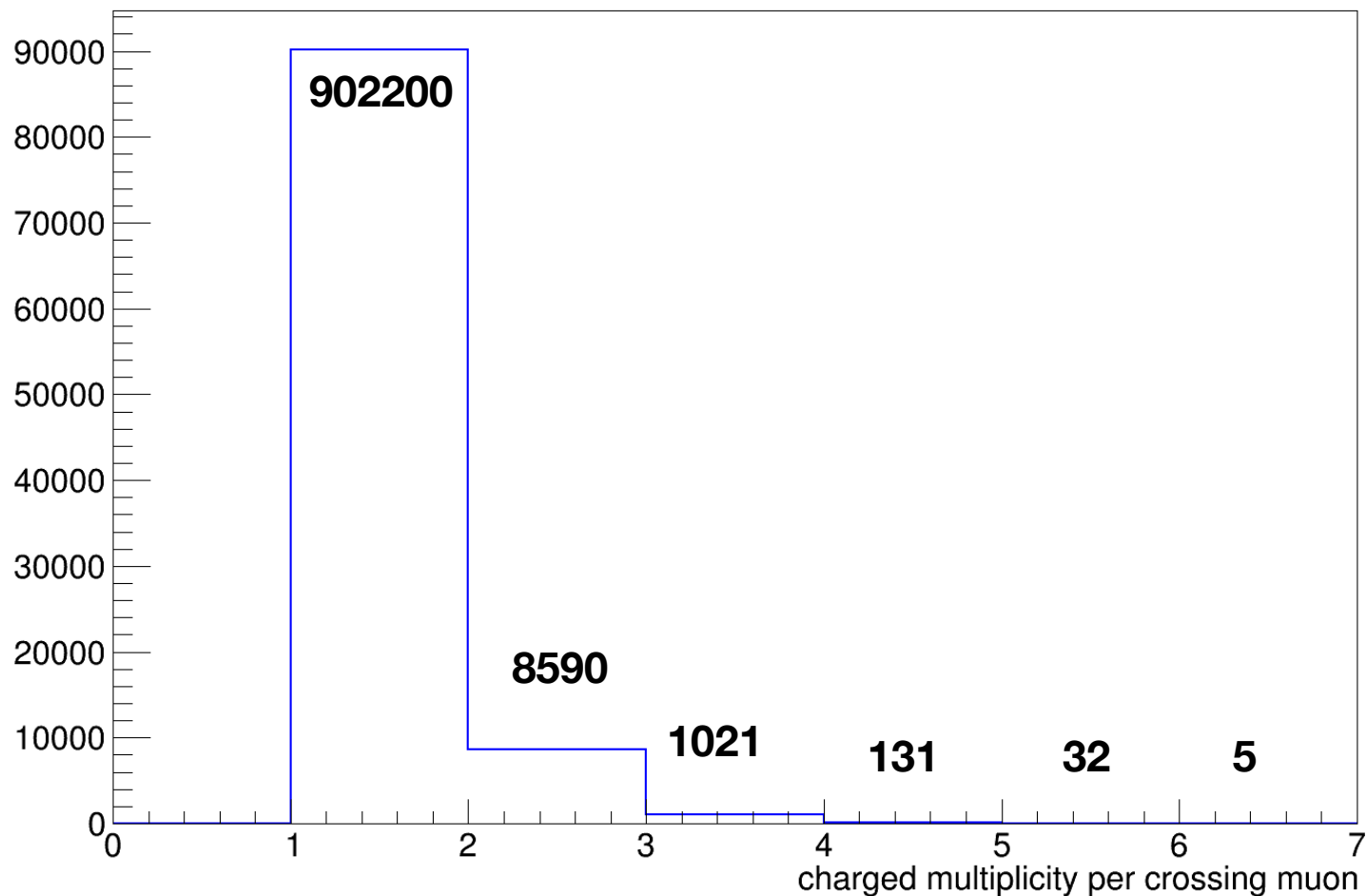


# Events

- **150 GeV muons on 10 mm of Carbon**
- **$10^6$  events**

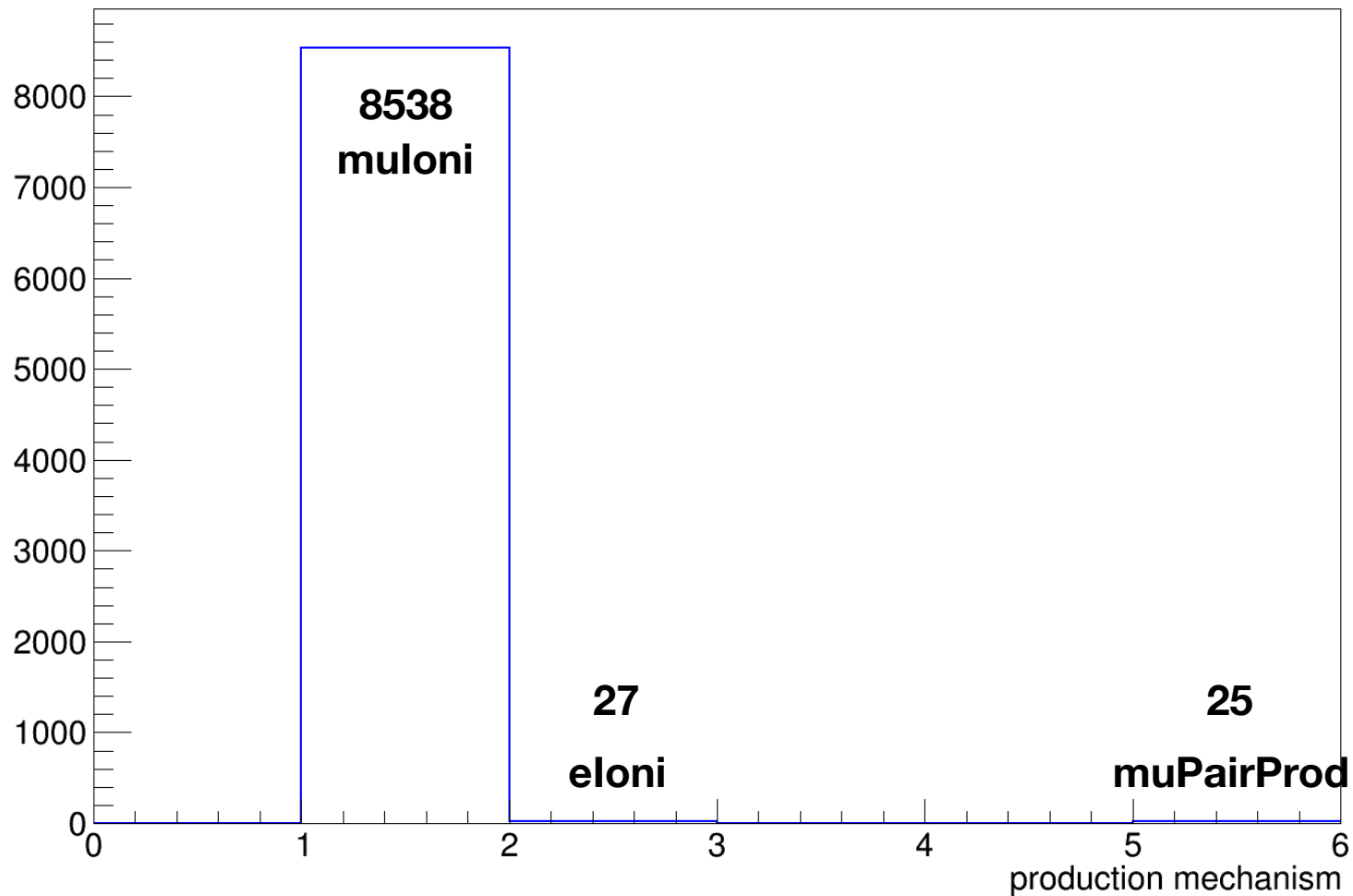
# Observable Charged Multiplicity out of the target

In ~ 10% of the cases there is at least one charged particle  
accompanying the muon

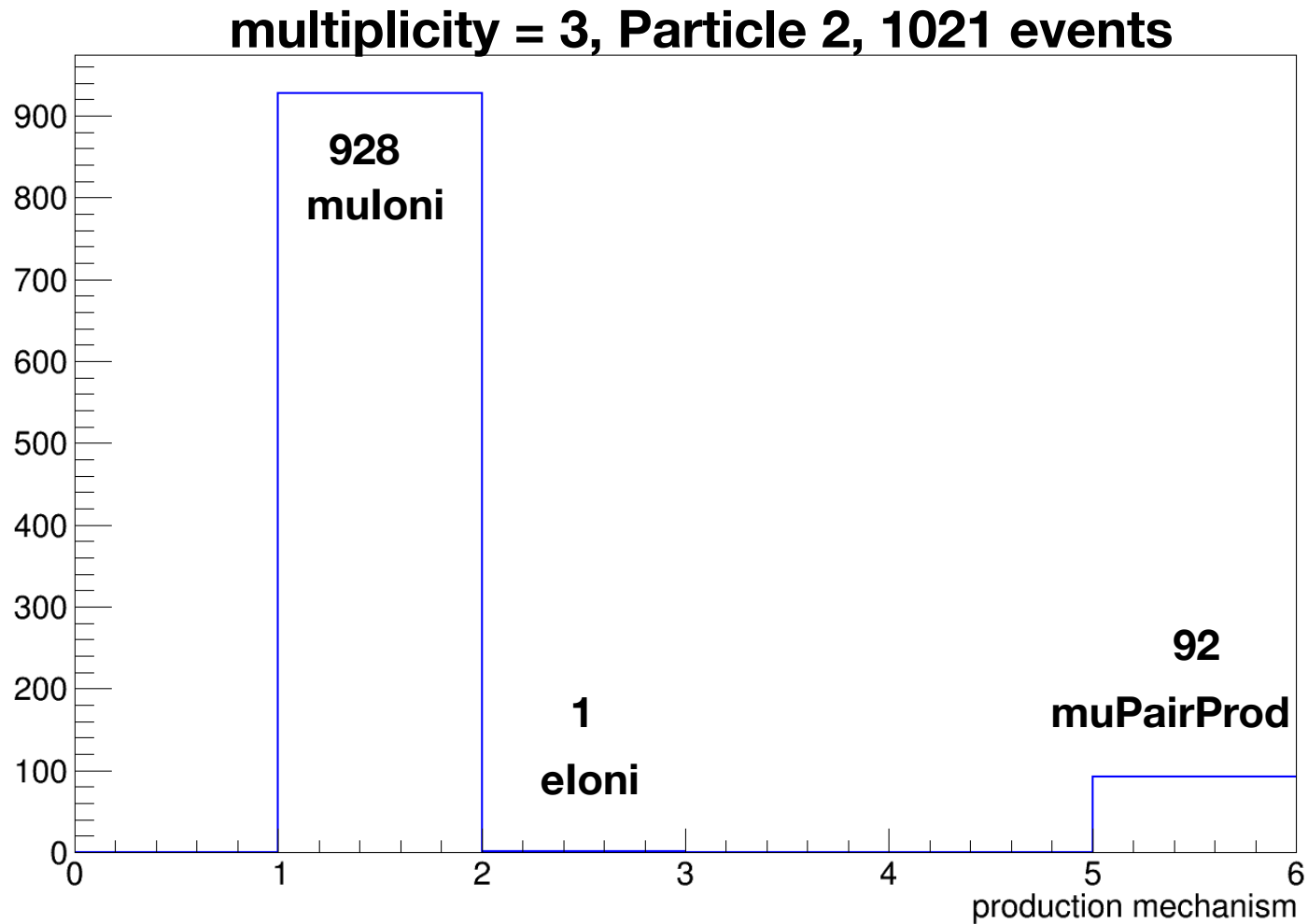


# Second track generating processes

**multiplicity = 2, 8590 events**

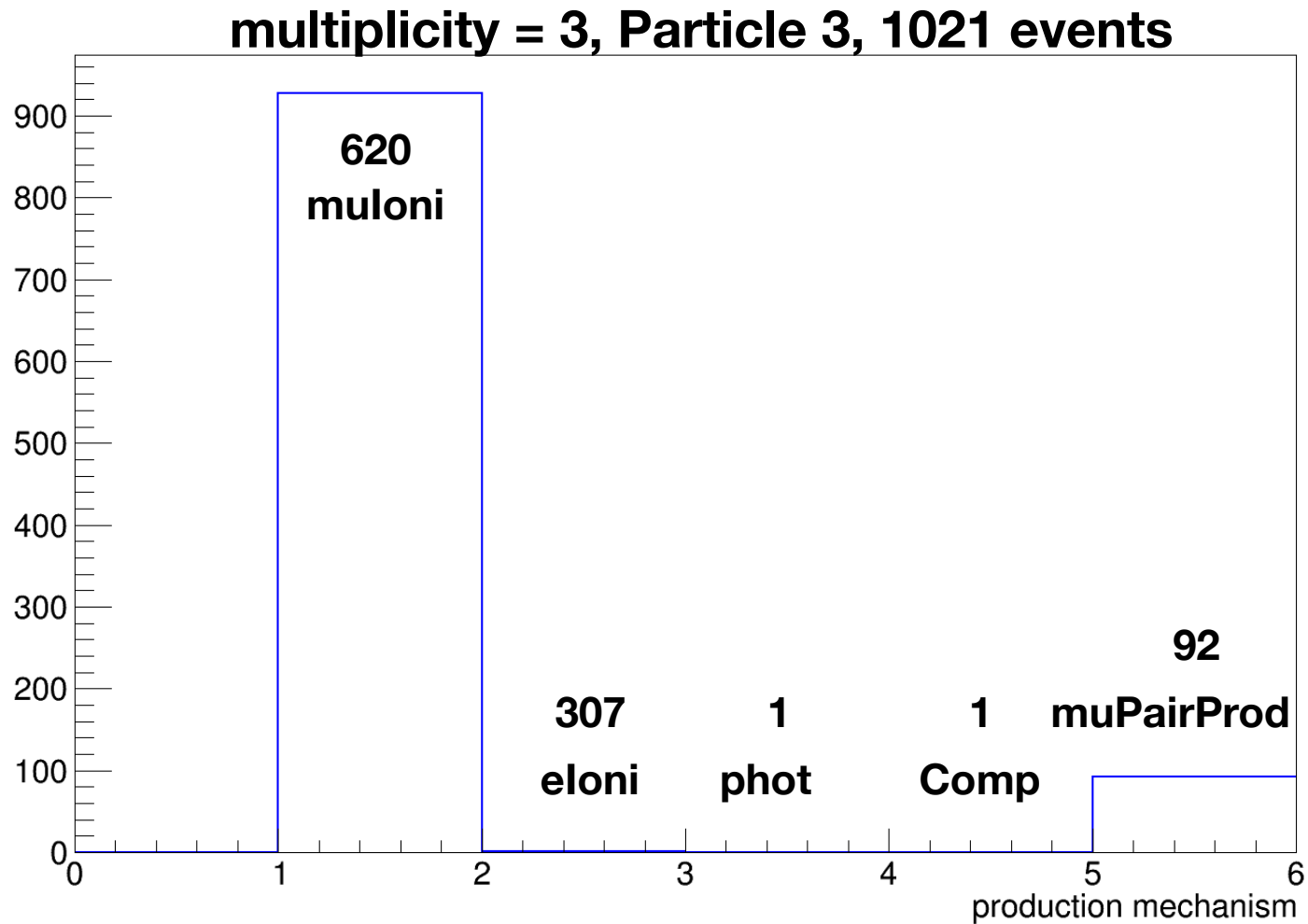


# Generating Processes





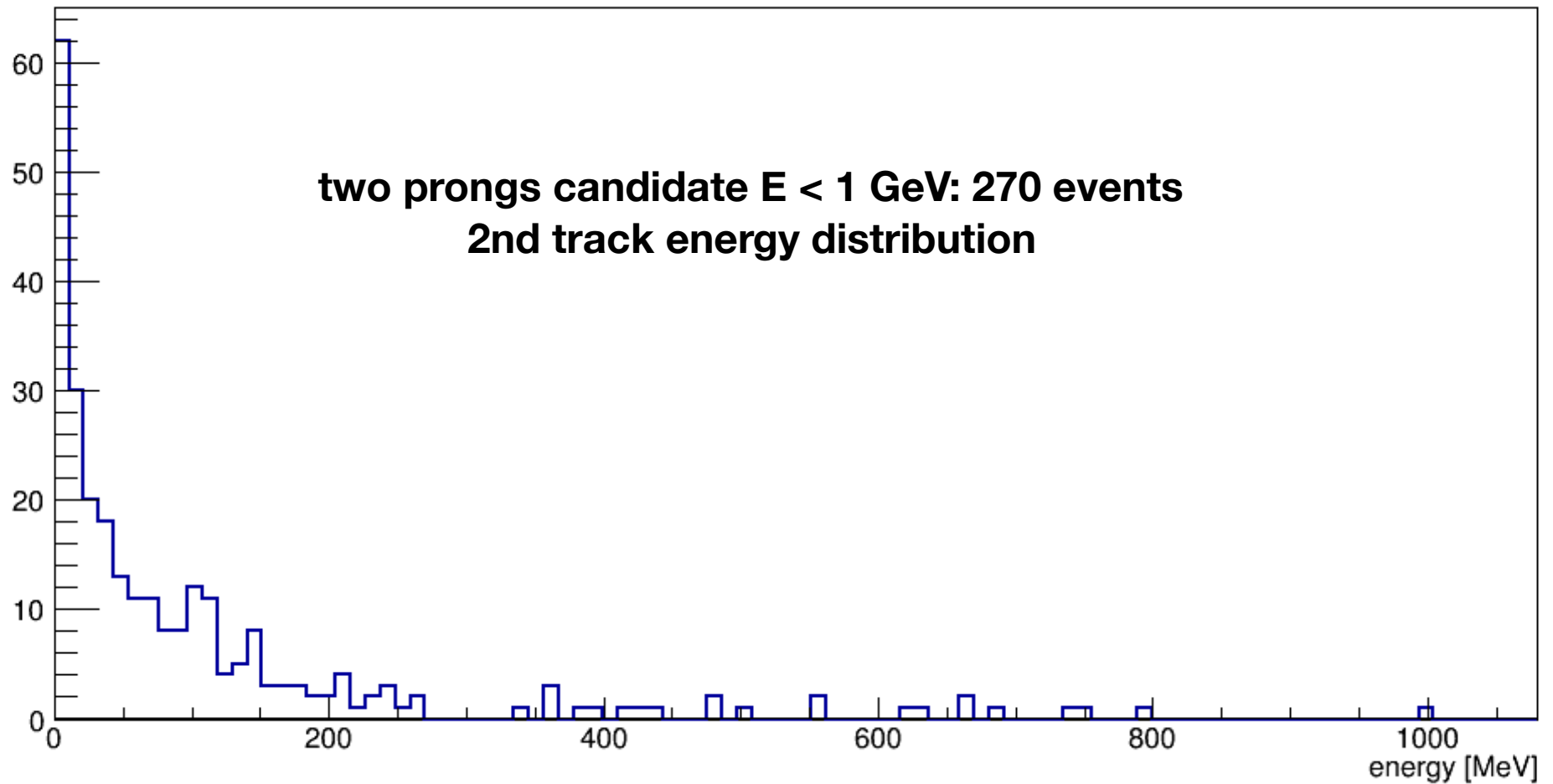
# Generating Processes



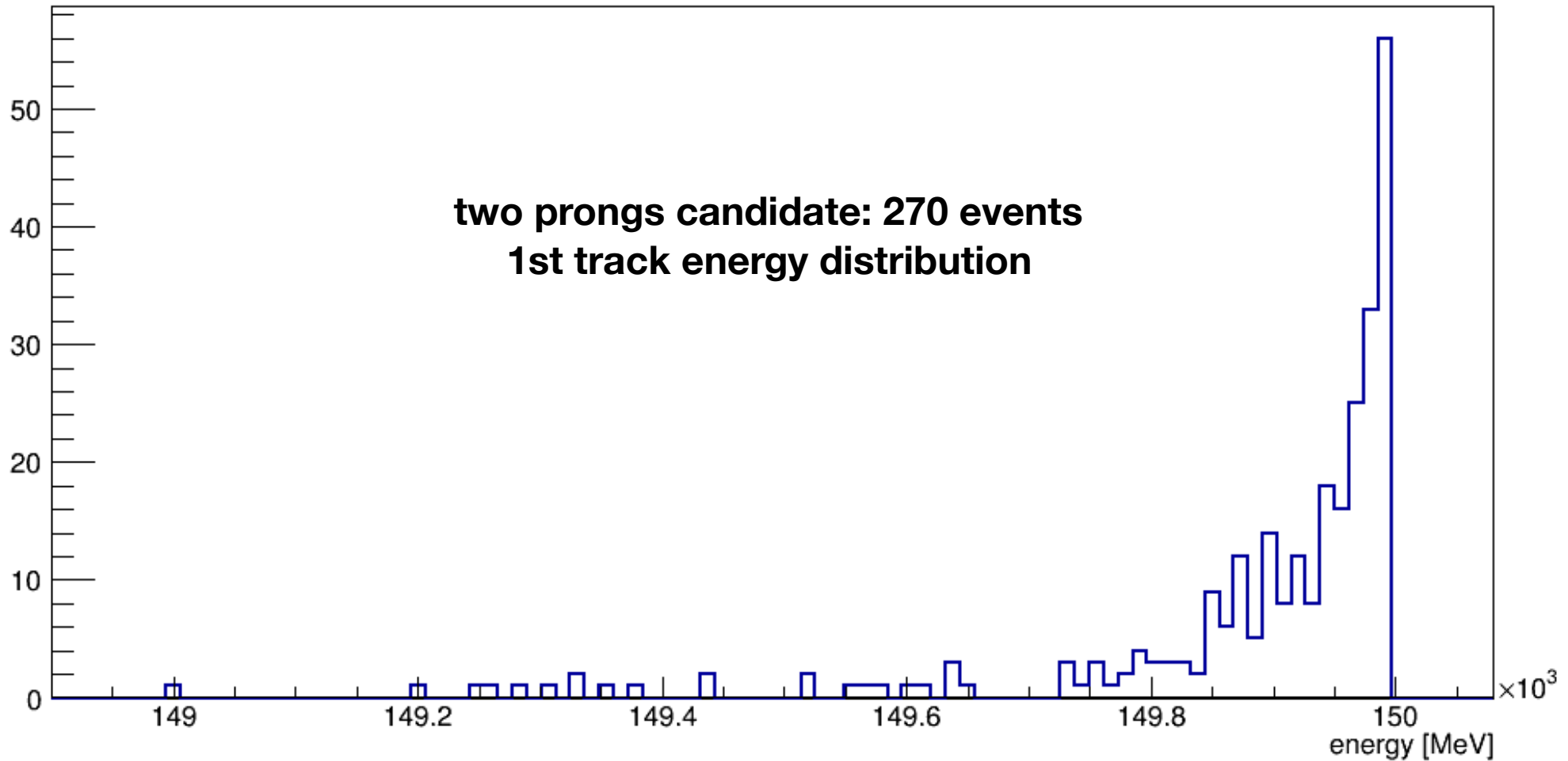
# 2 Tracks throughout the module

- Number of events:  **$10^6$**
- Number of events with 2 tracks out of the target: **8590**
- Number of events with two and only two hits at each tracking station: **289**
- Number of events with two and only two hits at each tracking station, due to **muon ionization**: **286**
- Number of events with two and only two hits at each tracking station with energy  $< 1$  GeV : **270**
- Number of events with two and only two hits at each tracking station with energy  $> 1$  GeV : **19**

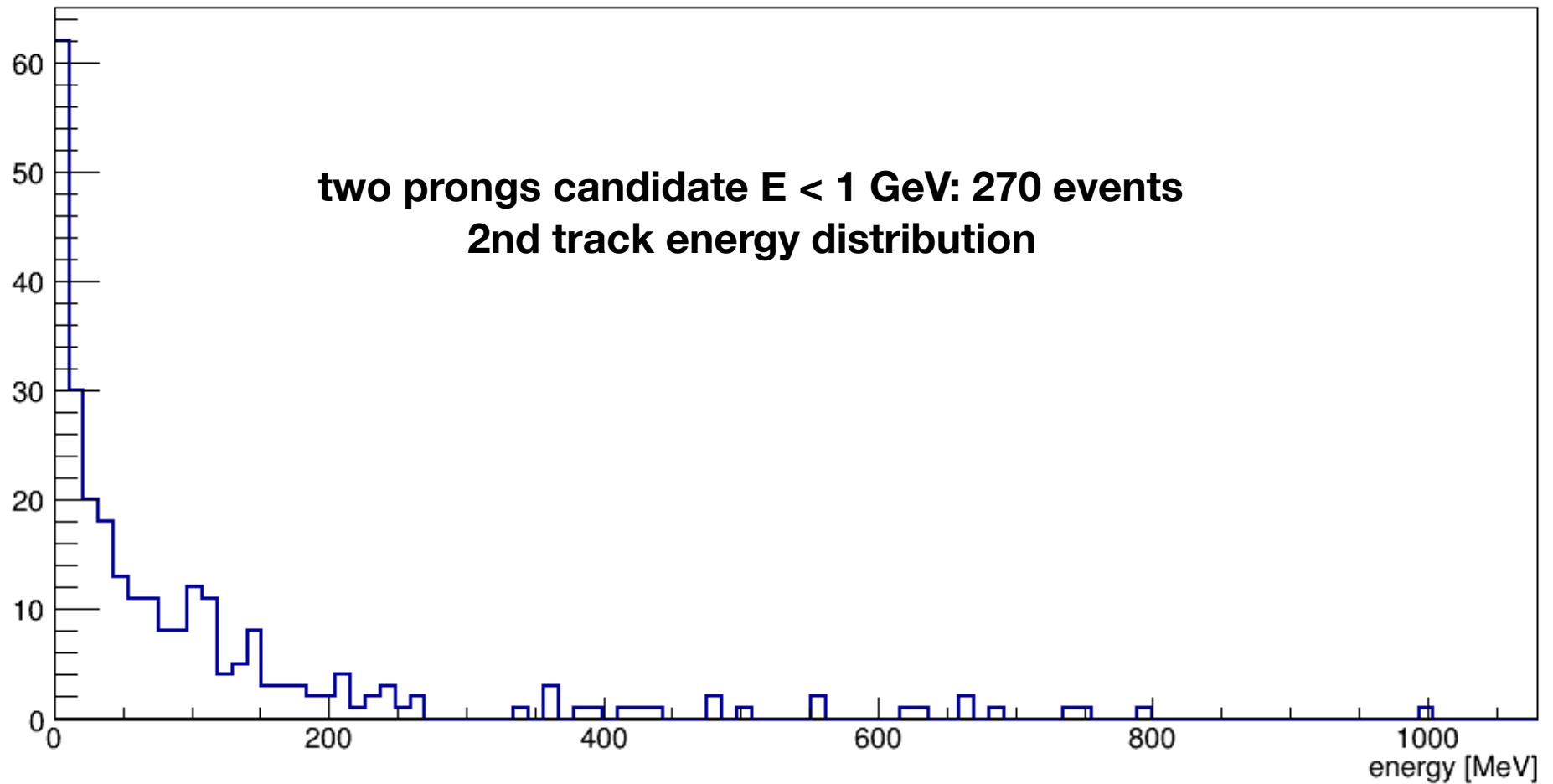
# Energy of the accompanying particles



# Energy of the incident particles



# Energy of the accompanying particles

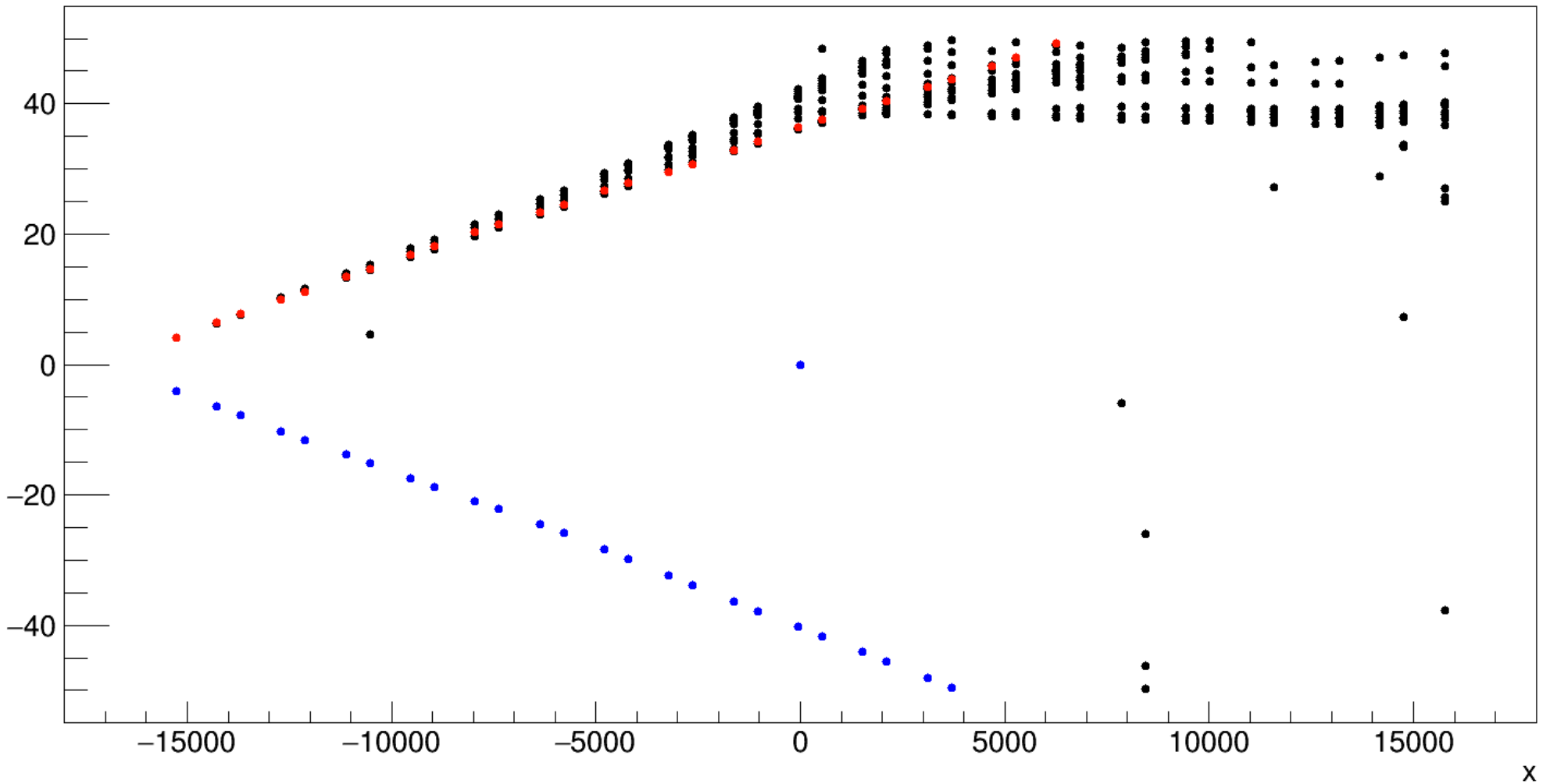


# $n \geq 2$ tracks throughout the module

- Number of events:  **$10^6$**
- Number of events with  $\geq 2$  tracks out of the target: **9779**
- Number of events with  $\geq 2$  hits at each tracking station: **531**
- Number of events with  $\geq 2$  hits at each tracking station  
2nd track with energy  $< 1$  GeV : **502**
- Number of events with  $\geq 2$  hits at each tracking station  
with energy  $> 1$  GeV : **29**

# Event display

Elastic scattering in the first module



# Event display (2)

Elastic scattering in the first module

