Muon Scan Testbeam 2024

Comparison sim vs dati
04.03.25

Data set

Data:

- Muon energy beam scan **110 GeV - 170 GeV**, intervals of 10 GeV (7 points)
- N° events ~ 20k (except 110 GeV, with 95k)

Simulation:

- Muon energy beam scan **40 GeV - 160 GeV,** intervals of 20 GeV (7 points).
- N° events 20k

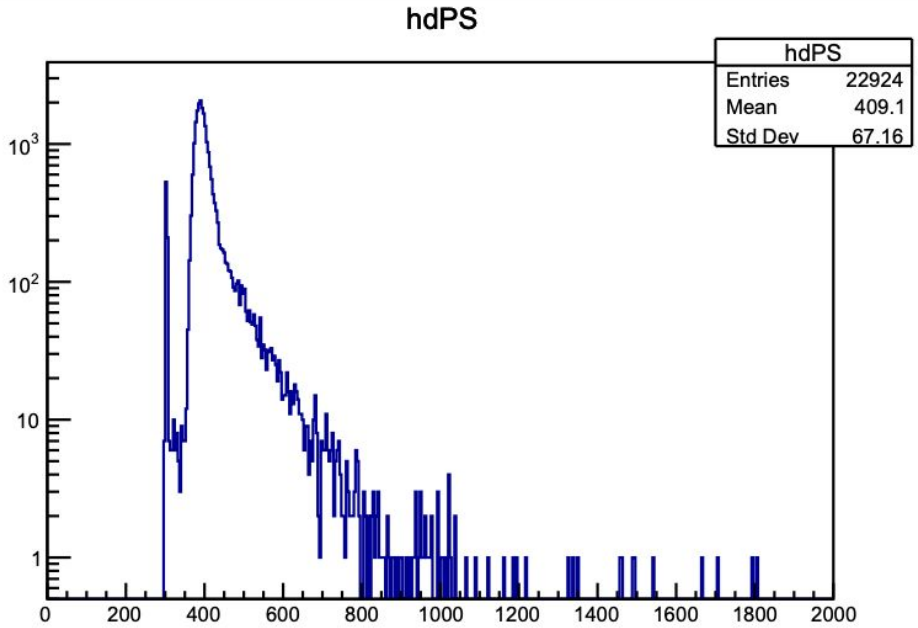
Procedure

- All the checks are done considering the 120 GeV scan point.
- First I did a comparison with data before any cuts (full list here).
- Then I did the comparison after the discussed cuts. In this stage, I considered ~ 15k events for data and simulation.
- After the comparison of Signal Mean vs Muon Energy scan is presented.

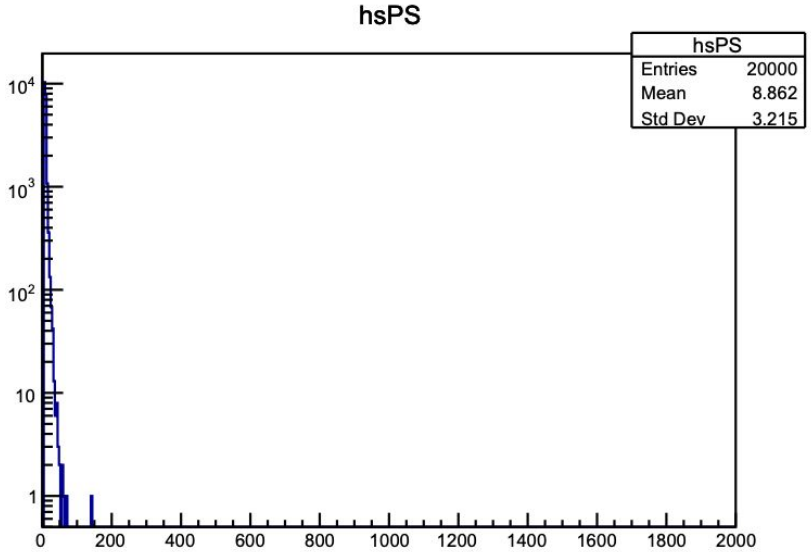
Warning: I am working on improving the plot aesthetics, stay tuned.

Pre Shower - Pre Cut

DATI

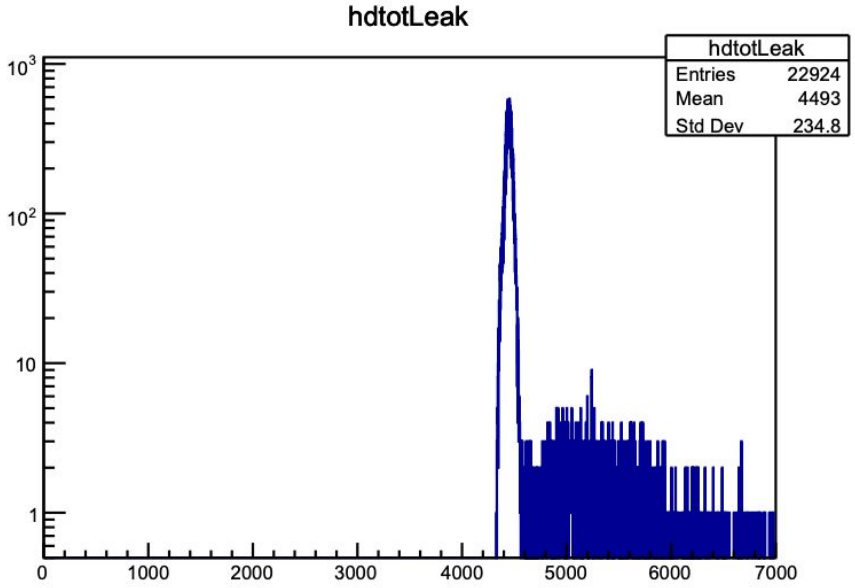


SIMULAZIONE

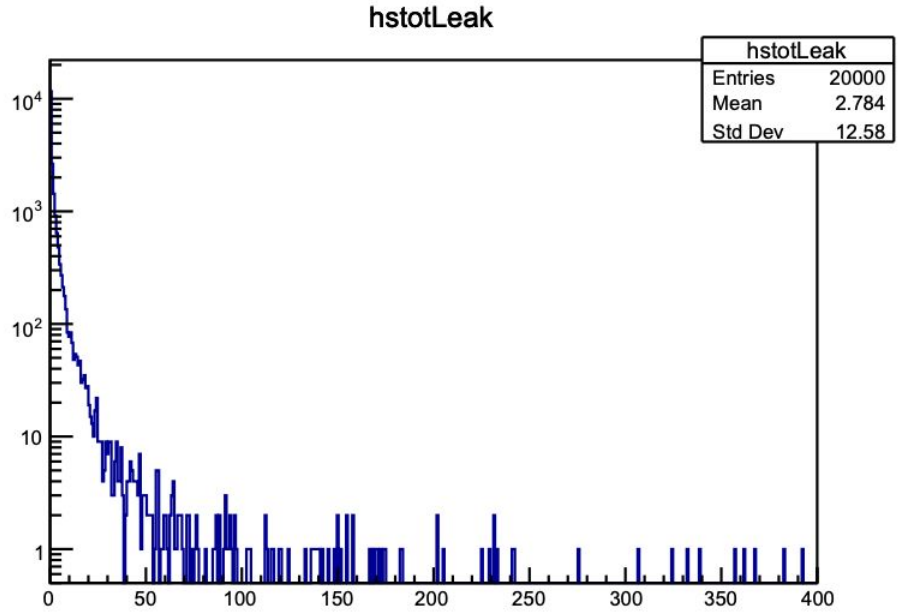


Tot Leakage - Pre cut

DATI

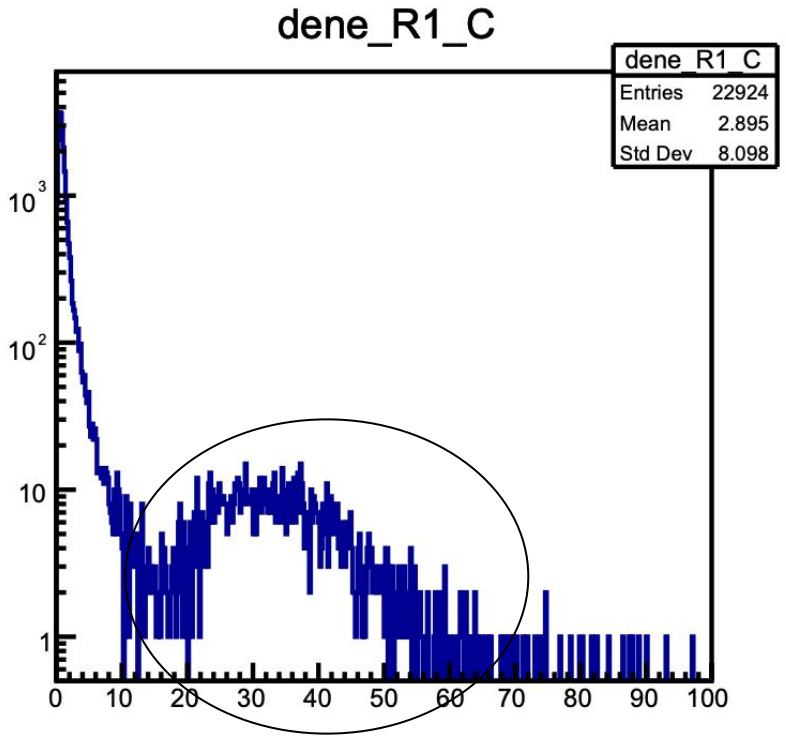


SIMULAZIONE

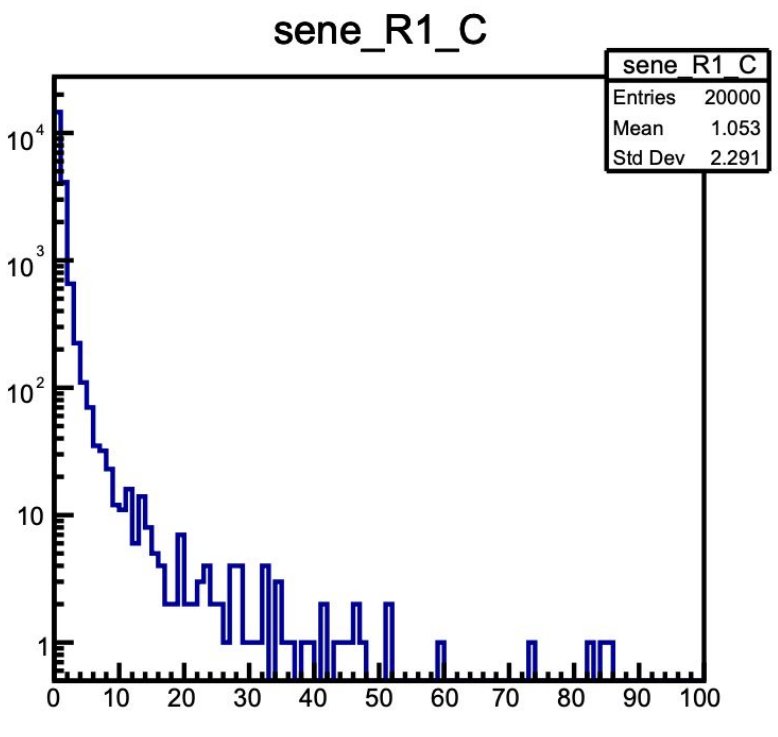


Ene R1 Cherenkov

DATI

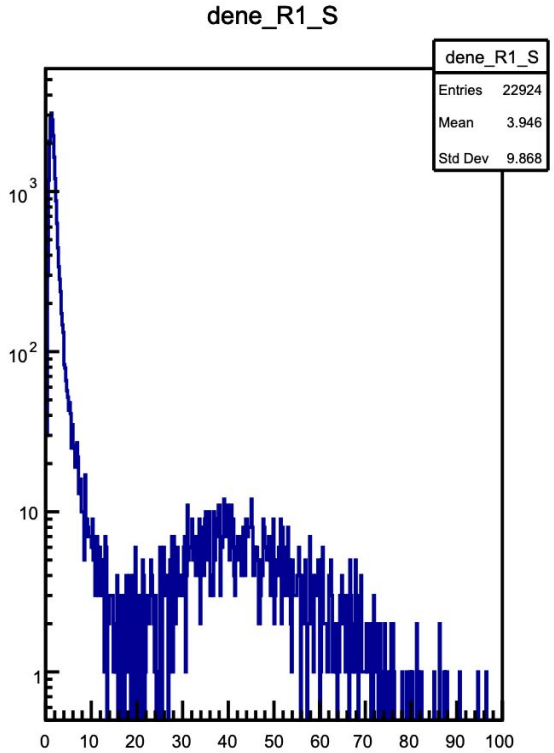


SIMULAZIONE

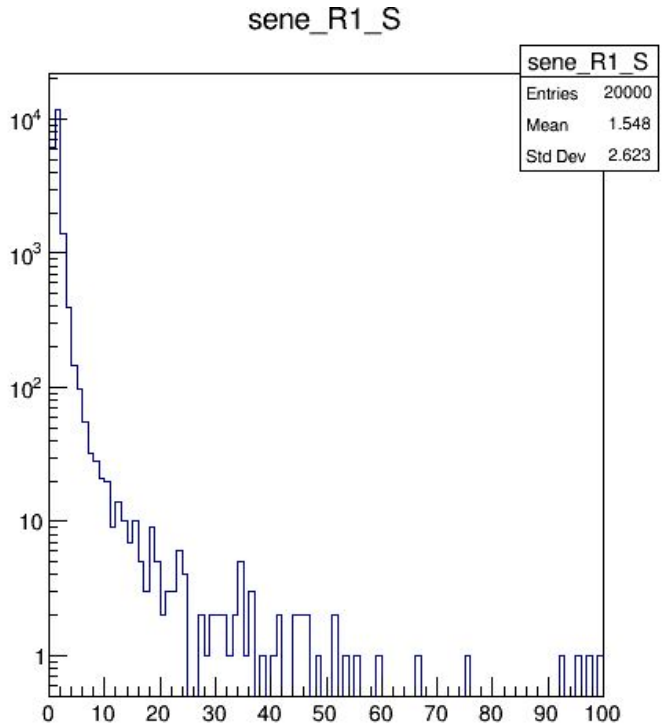


Ene R1 Scintillante

DATI



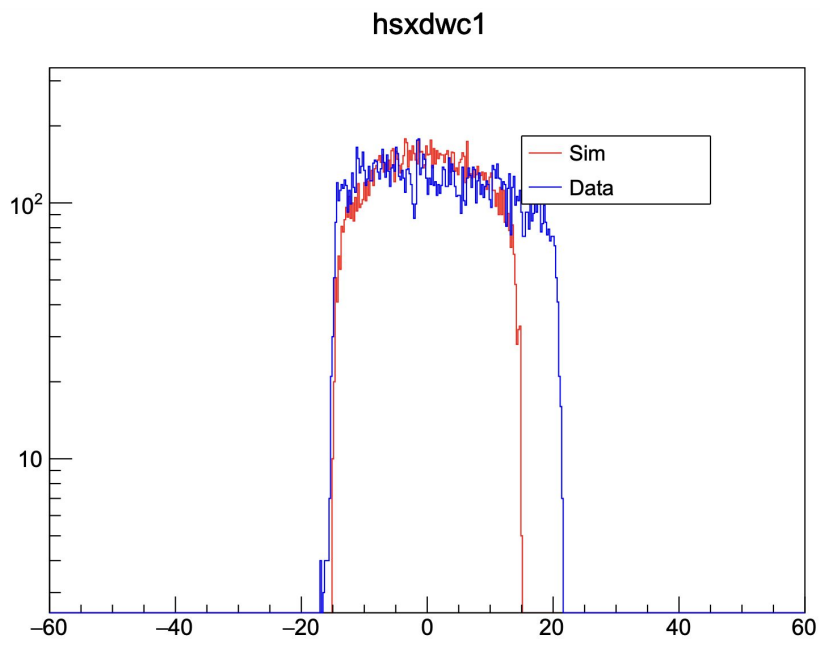
SIMULAZIONE

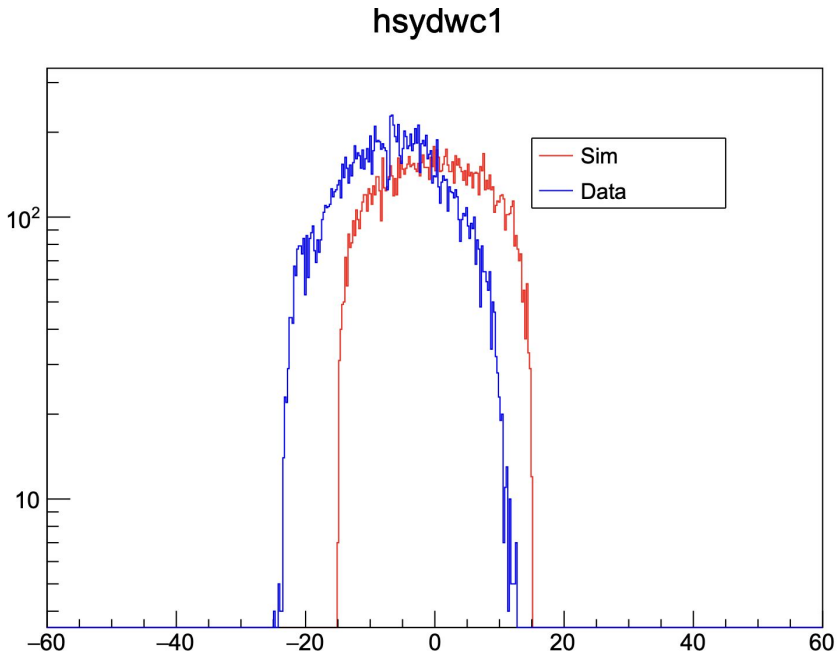


Pre - Cut comments

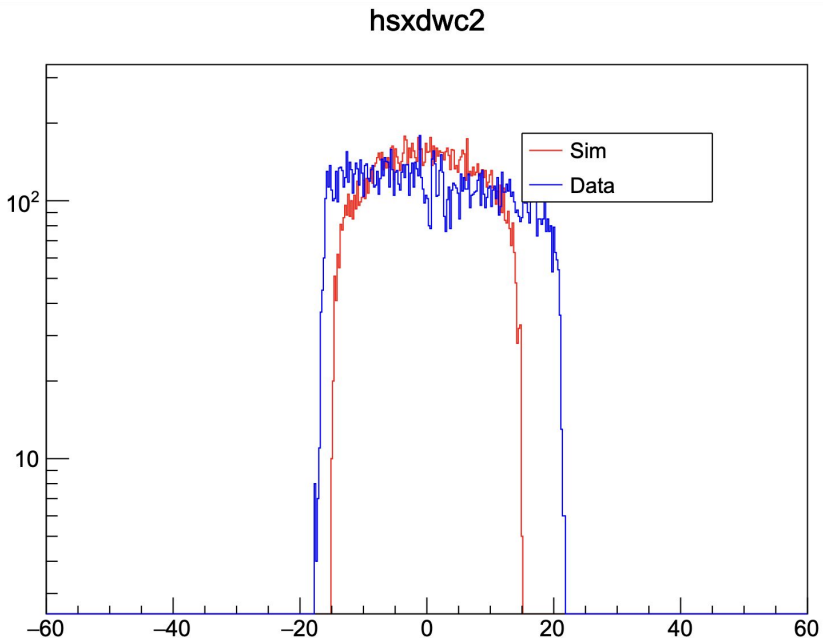
- In general evident gaussian peak for the total energy and especially in R1 not present in the simulation (as expected).
- Data show more tails than simulation, in particular for energy and position distributions.
- The ancillaries are quite different, but not easy to compare due to different calibrations and tailC and Muon counter are not in the ntupla for the moment.

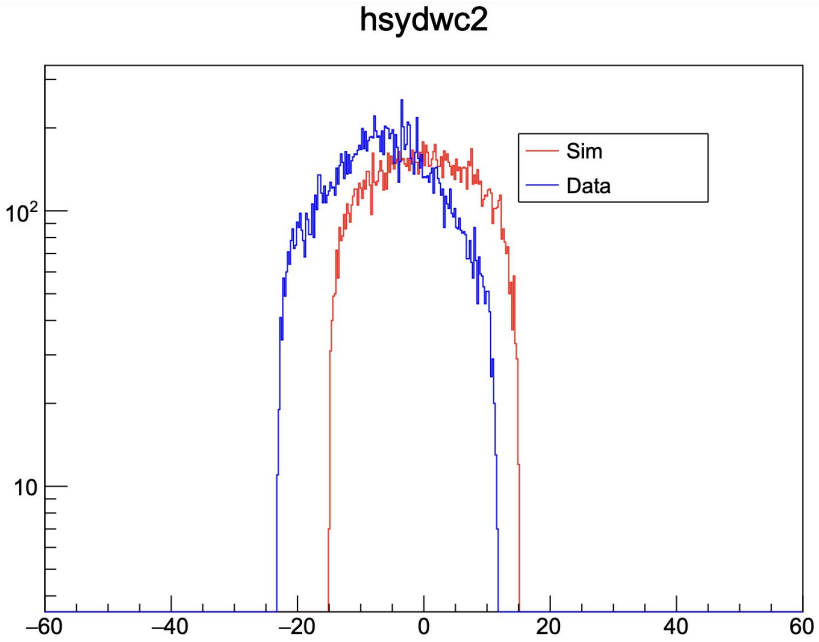
DWC 1 - Post cut





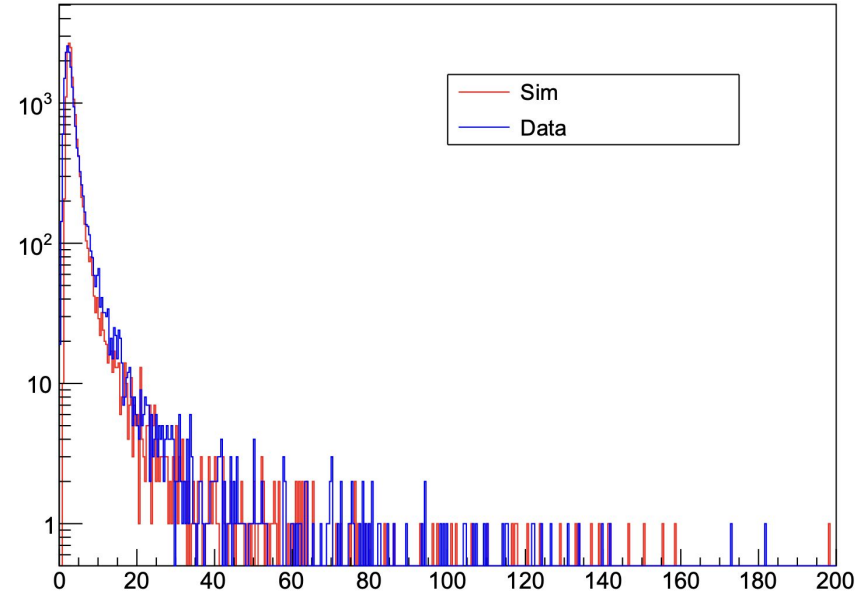
DWC 2 - Post cut



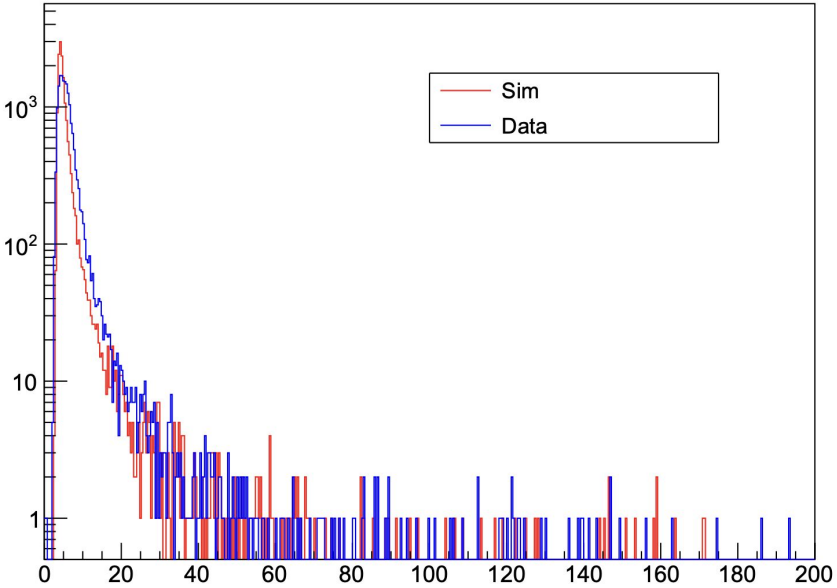


Total Energy - Post Cut

Cerenkov

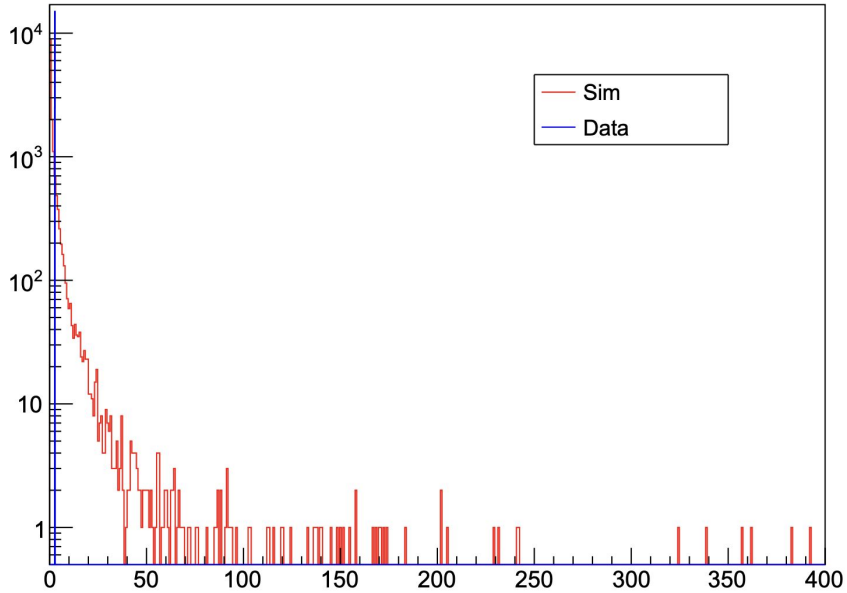


Scintillante

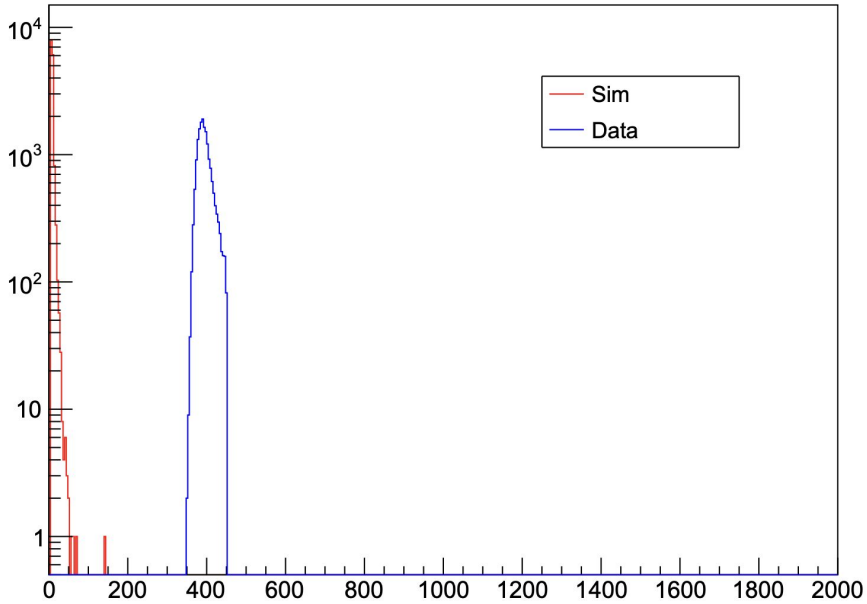


Ancillaries

total Leak

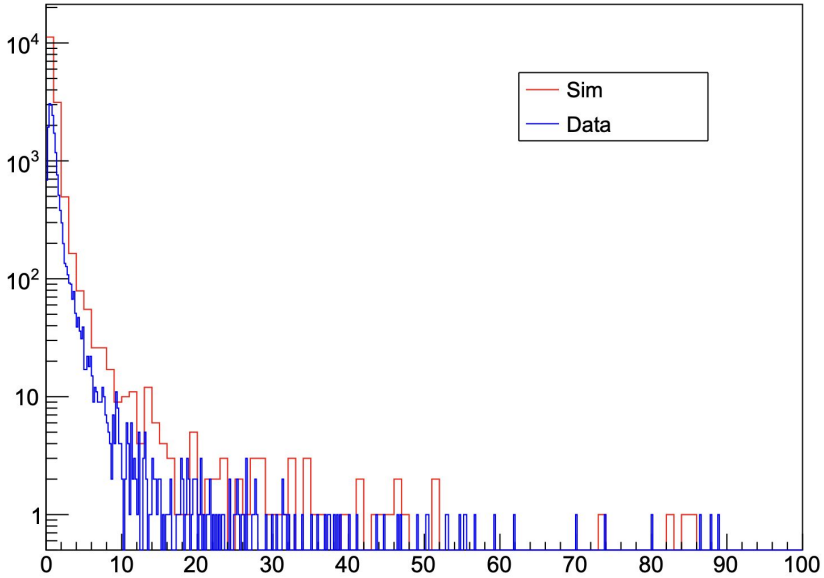


pre shower

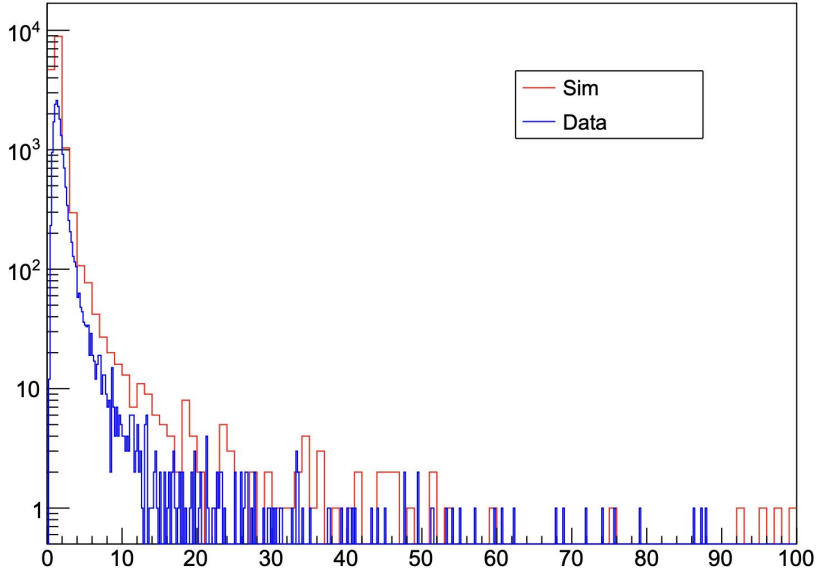


Energy Ring 1 - Post Cut

Cherenkov



Scintillante

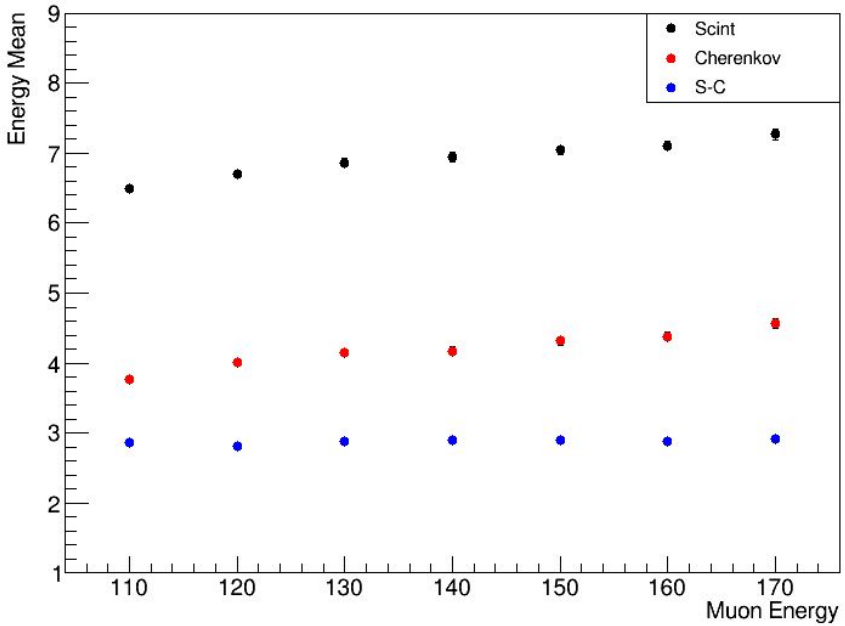


Post - Cut comments

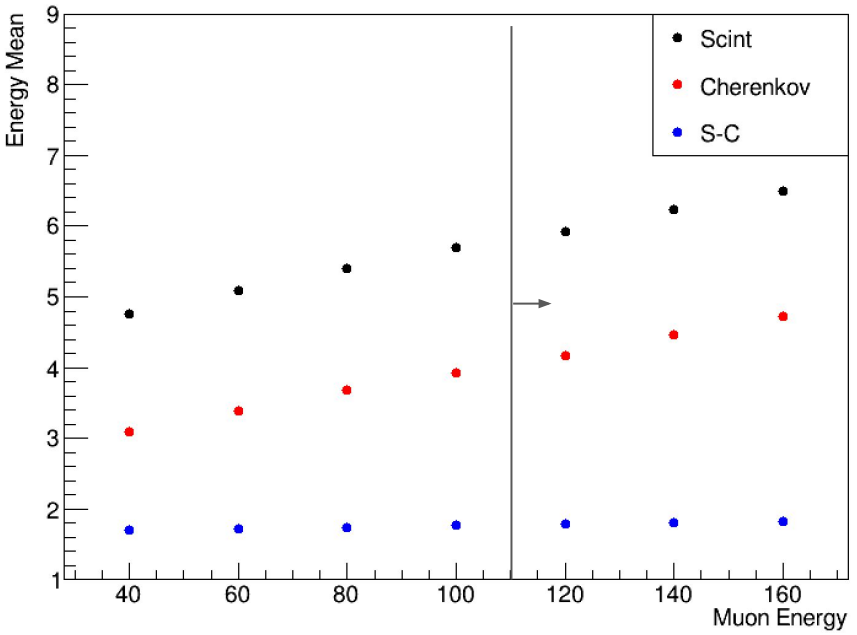
- In general, good agreement between data and simulation.
- Evident off-centering along the Y-axis.
- The simulated scintillant distribution looks more populated at low values than in the data (or more tails in the data).
- Applied calibration for total Leak, but, due to the applied cuts, the total leak is only a small peak.

Signal Mean vs Muon Energy Scan

Dati (post-cut)

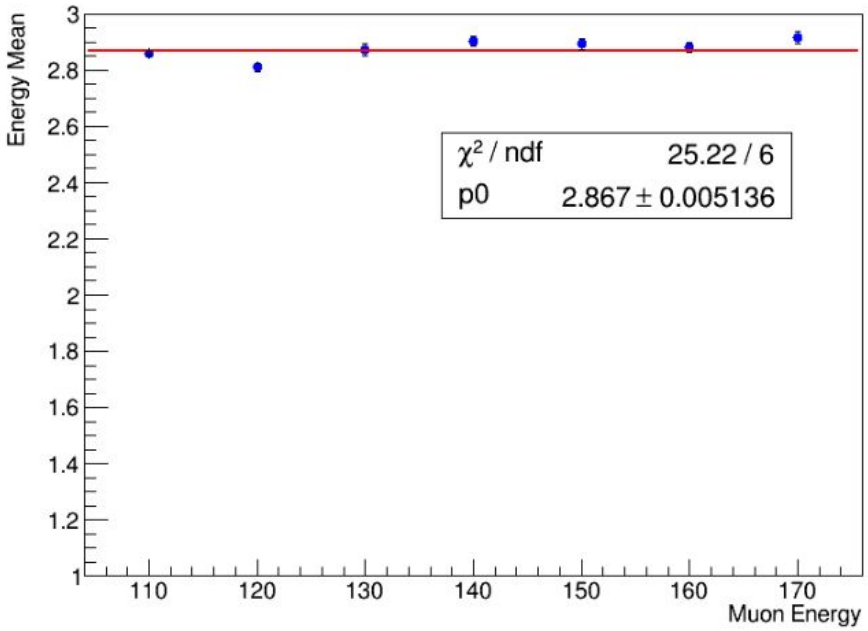


Simulazione (no cut)



S-C constant fit

Dati (post-cut)



Simulazione (no cut)