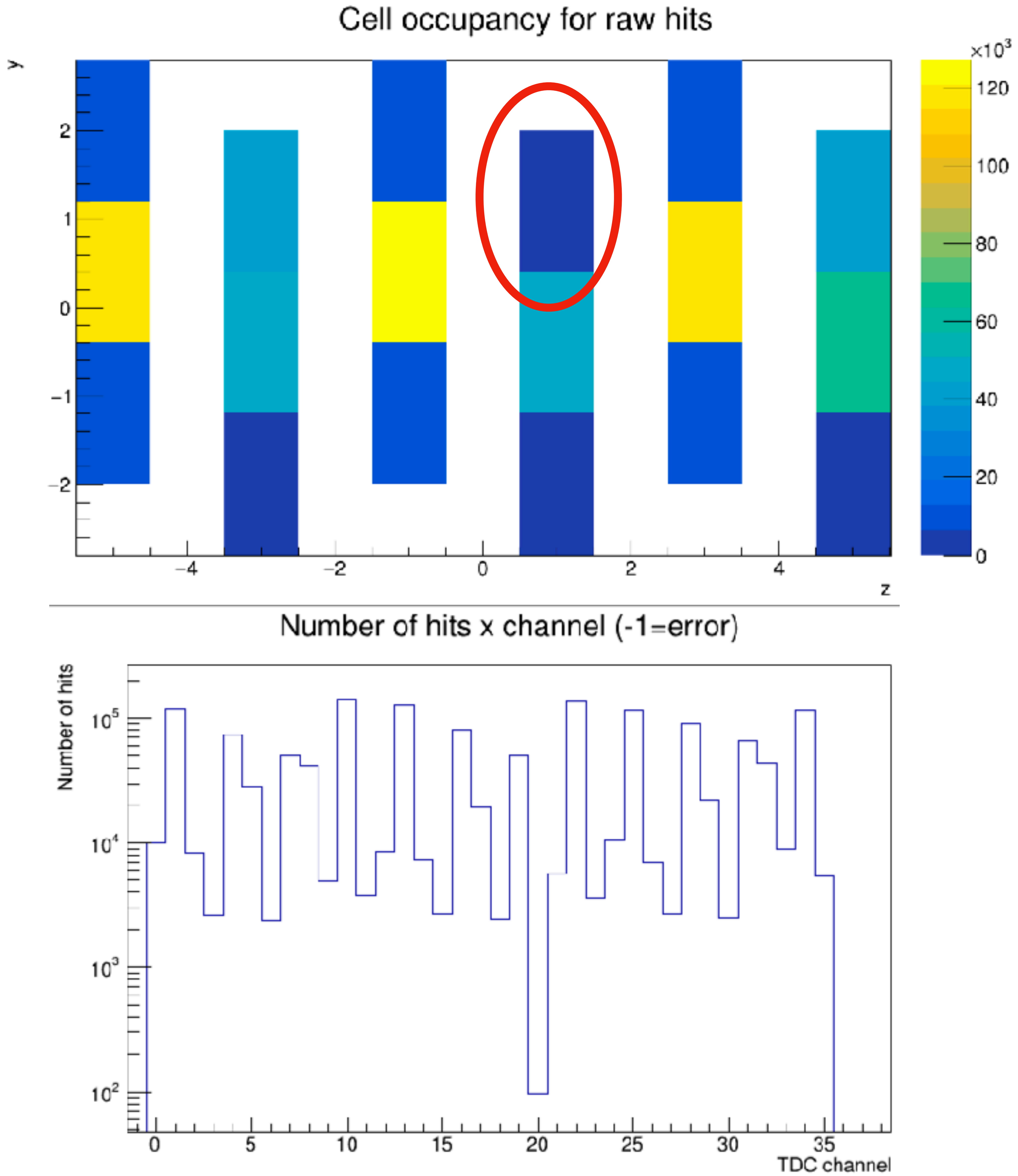
BM updates

FOOT performance meeting
Yunsheng Dong
07/02/2024

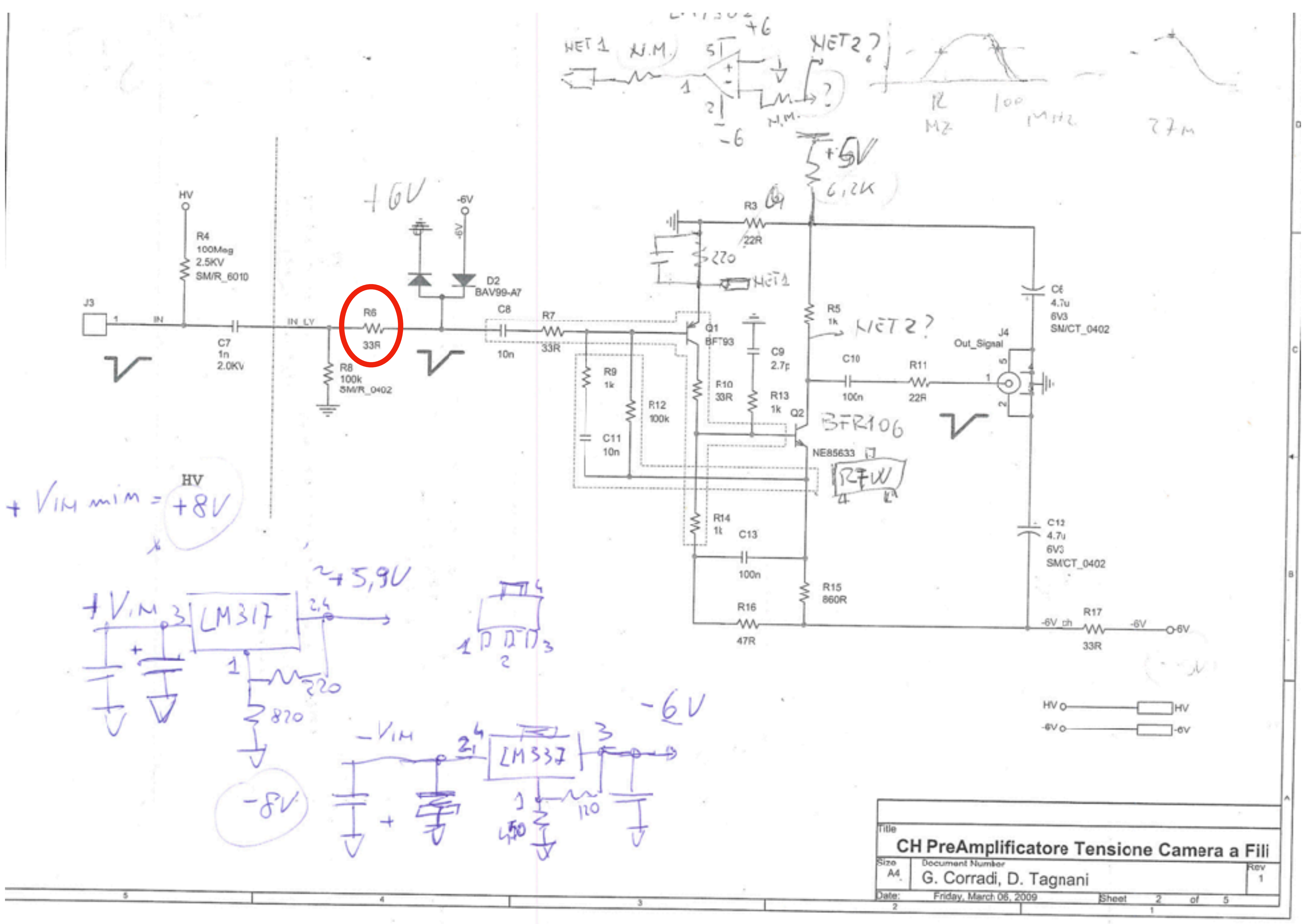
Dead channel

At the general meeting:



- One of the BM cell didn't work properly. The signals were too low and not properly shaped.
- Need to check the channel in the Lab (the detector is at CNAO at the moment)
- Due to the redundancy, this effect can be mitigated, but it's not negligible

Channel fix



This electric scheme is of the miniDC, the BM scheme is lost,

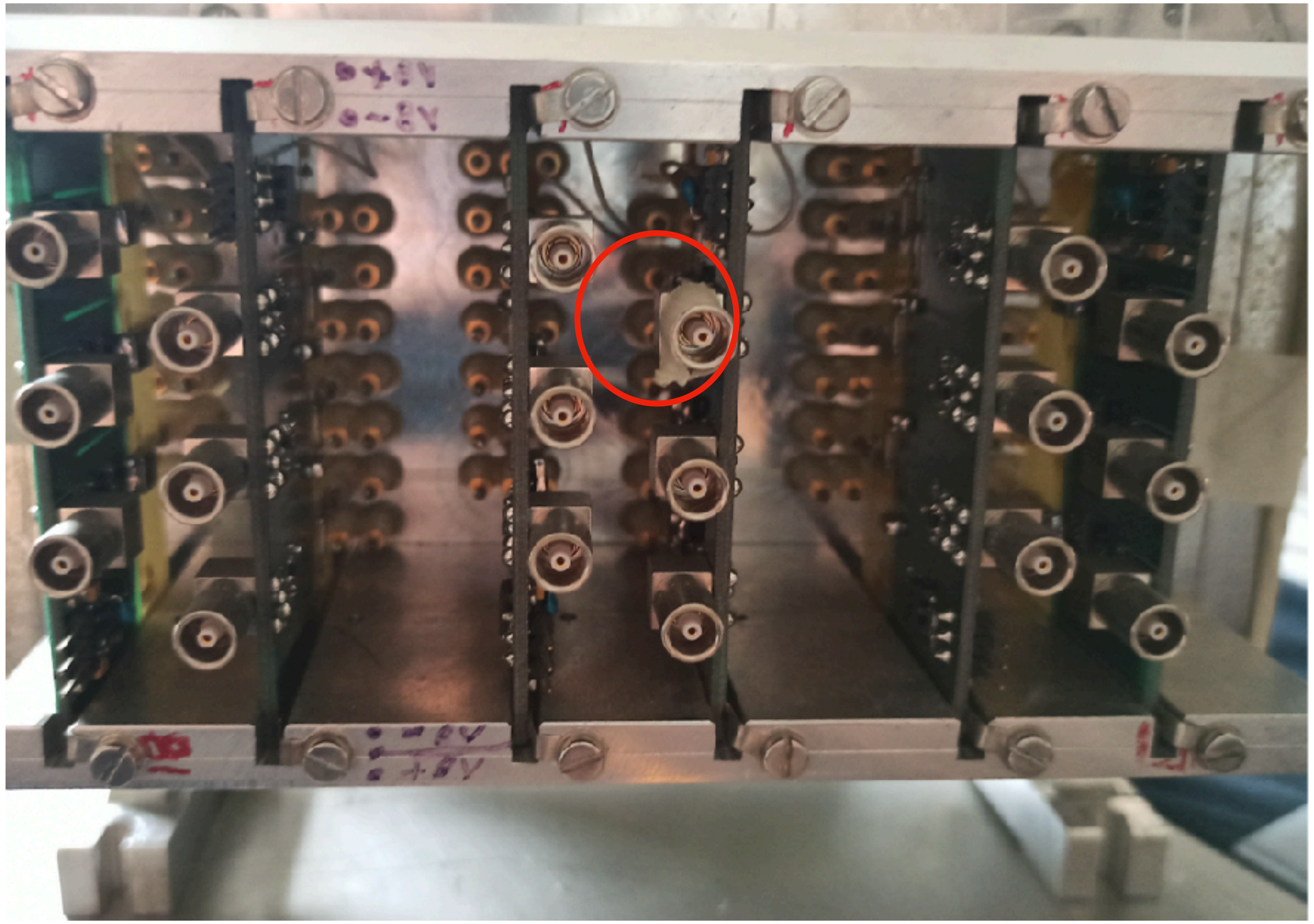
but it should be similar to this one

- We tested the channel in the laboratory and find out a problem of connection
- One “safety” resistance was disconnected

So there were three possibility:

1. Unmount the readout board to fix the resistance
2. Try to extract the wire signal and create a custom additional preamplifier
3. Weld the wire

Channel fix



1. Possibility to fully restore the channel, but it is very risky (last time an expert electronics guy unmounted the readout board and broken a signal wire)

2. Necessity to create a new readout board

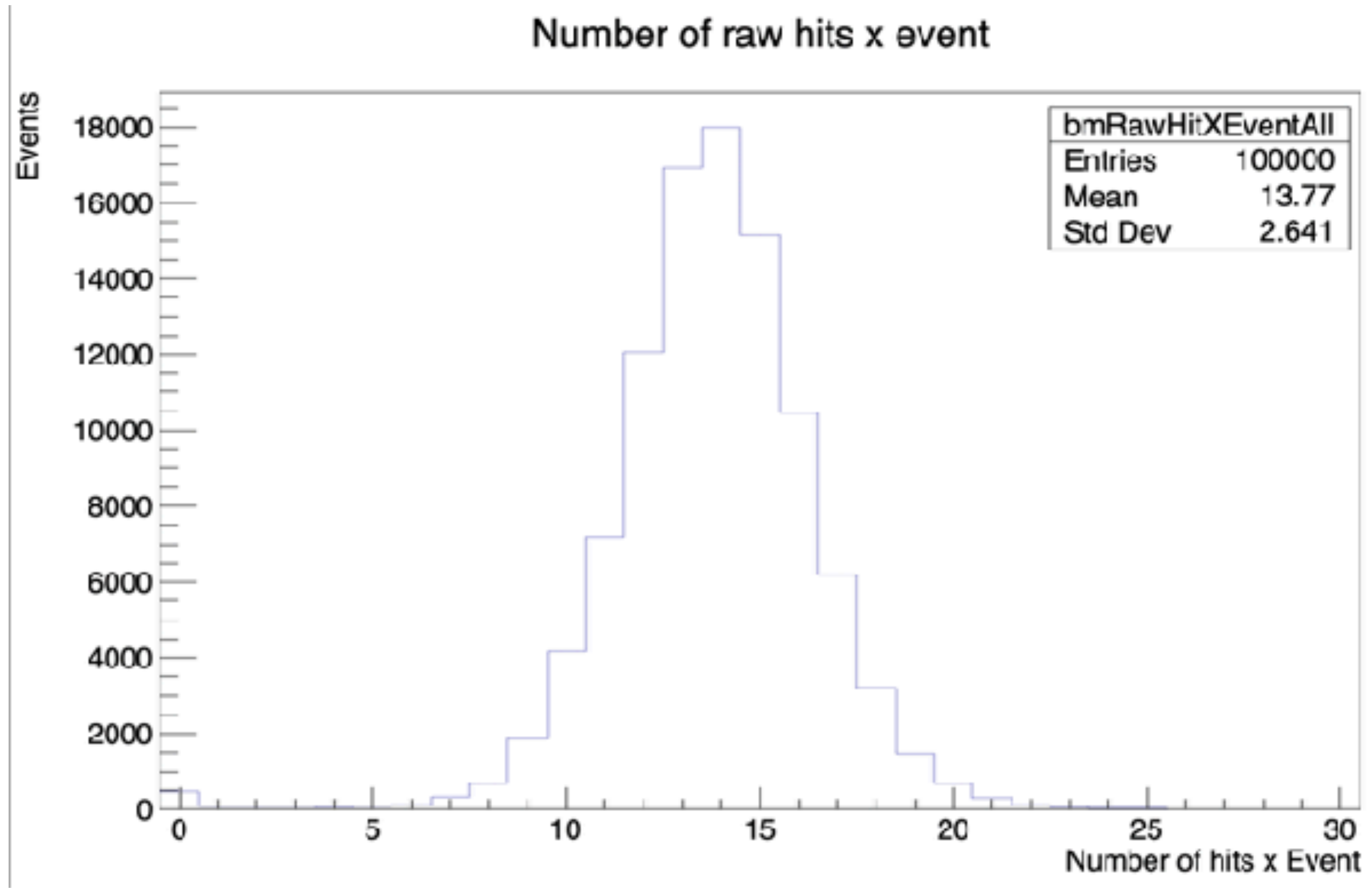
3. **“Easiest” solution, the lack of the resistance should have a negligible impact (higher signal) that can be compensated by the discriminator threshold**

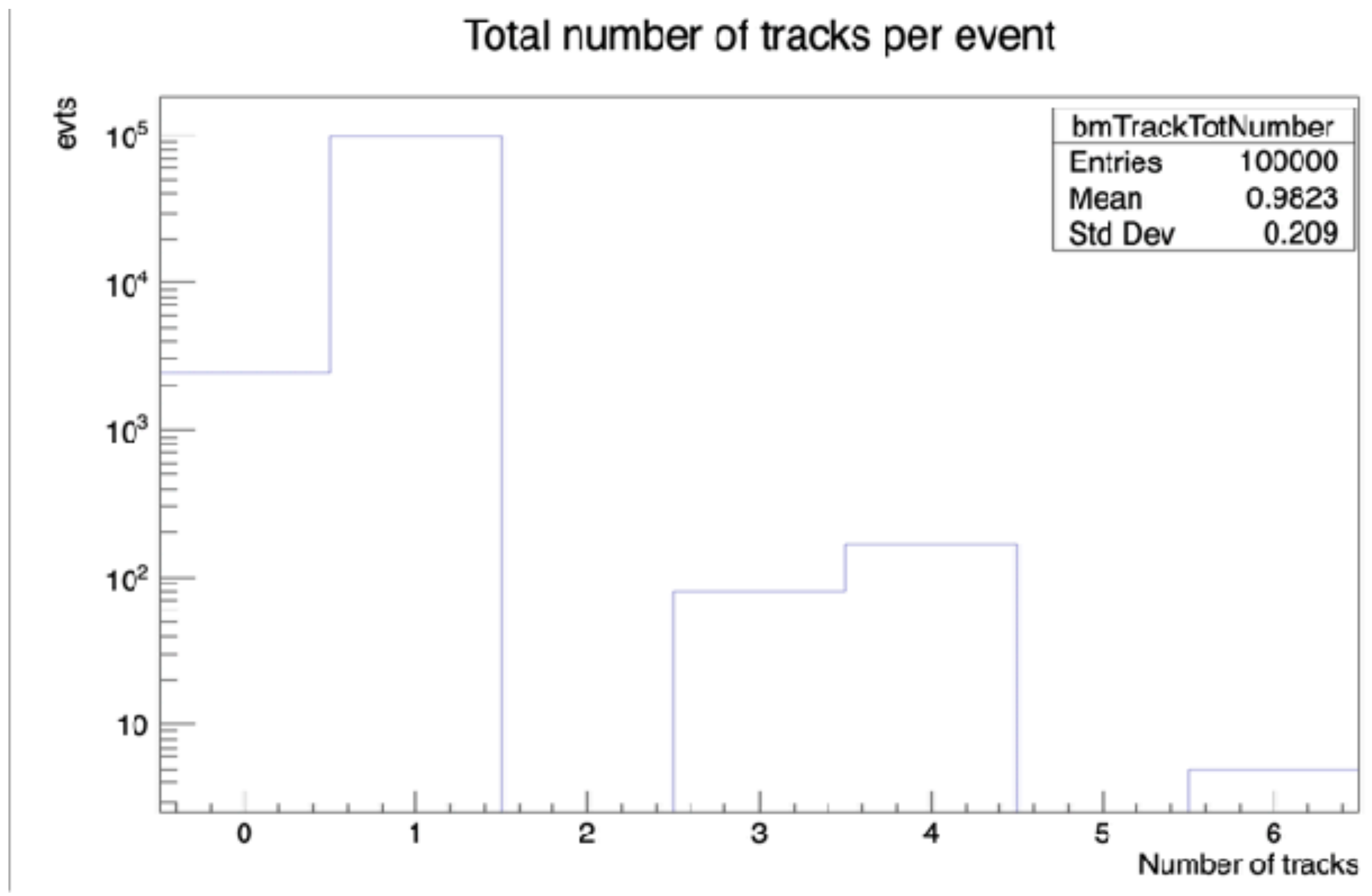
- **The solution 3 worked!**

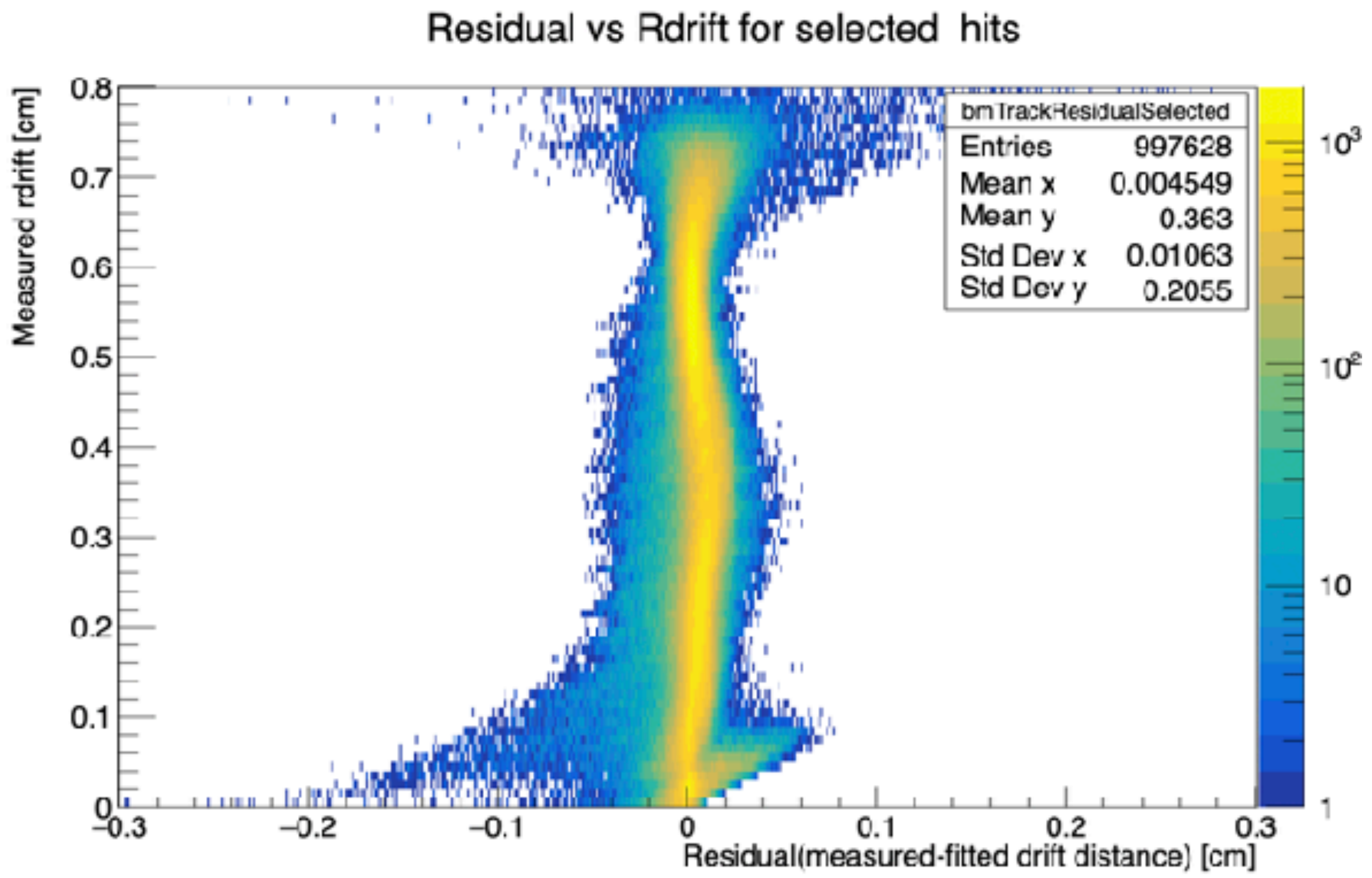
To do list

At the general meeting:

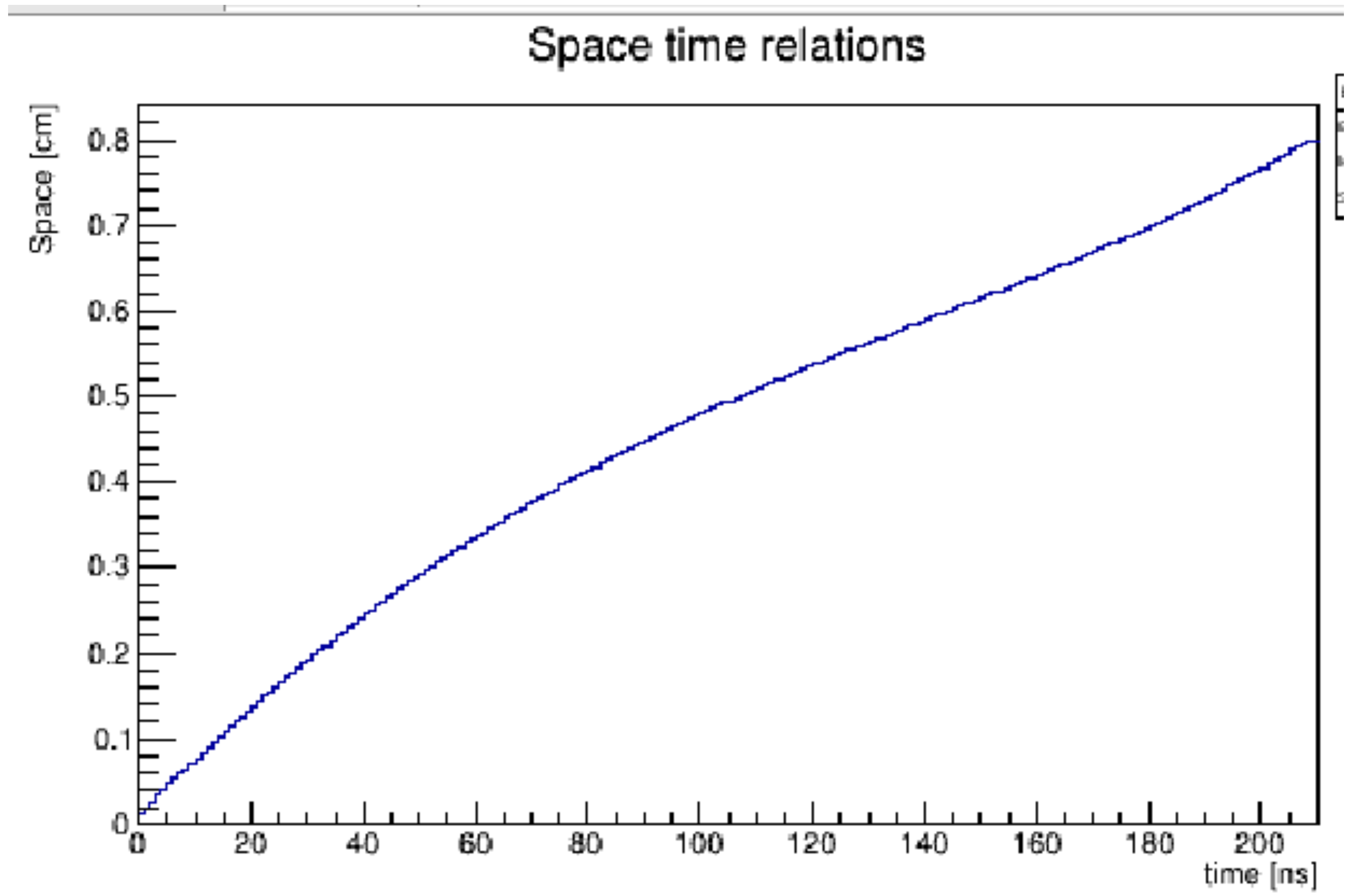
- Re-process of all the past campaigns ongoing, optimising the tracking parameters
- e.g.: CNAO2022, 5466: track efficiency ~ 97-98%, Space time relation and spatial resolution not fully optimized

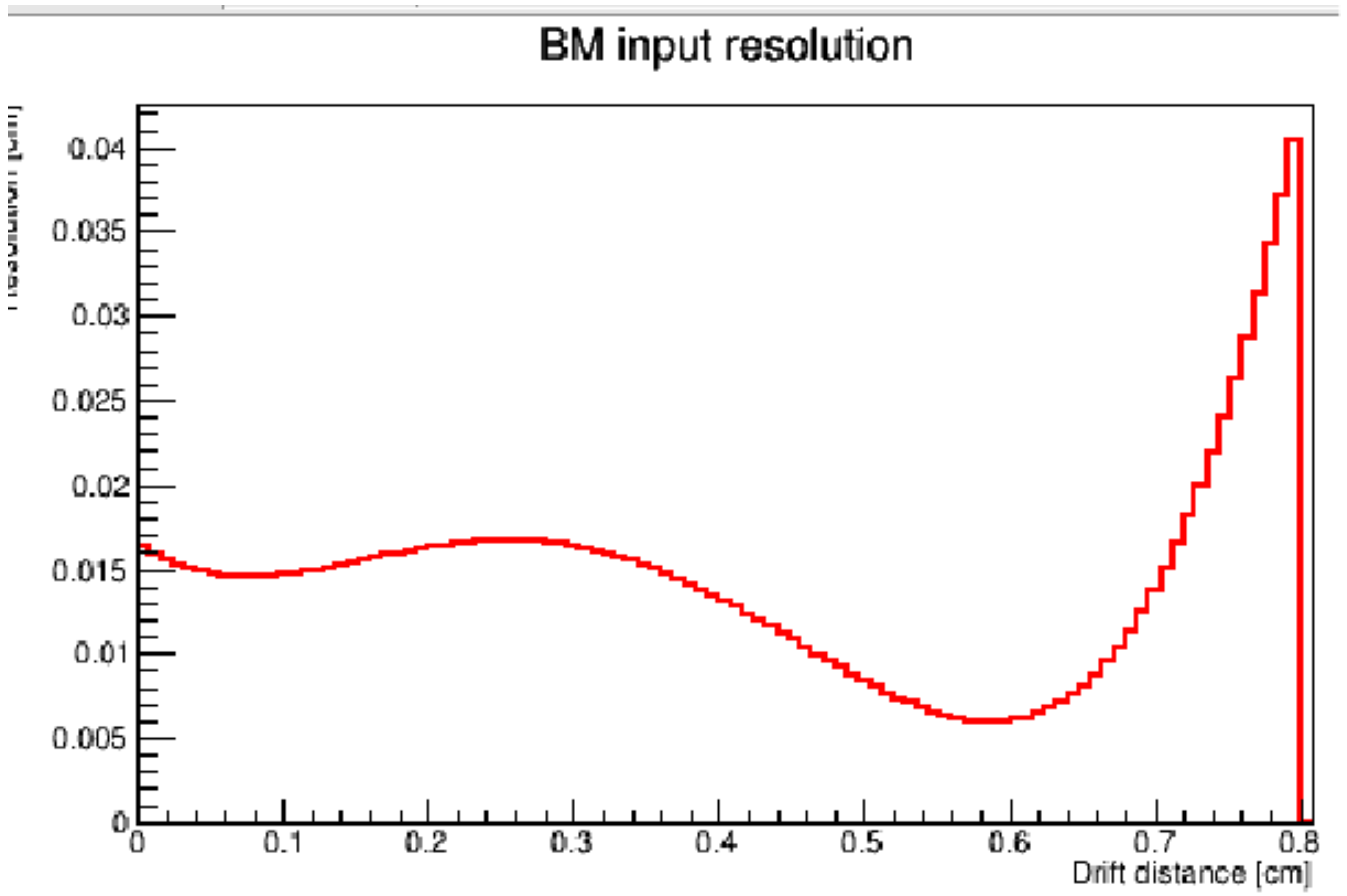






BM @ GSI2021: optimization

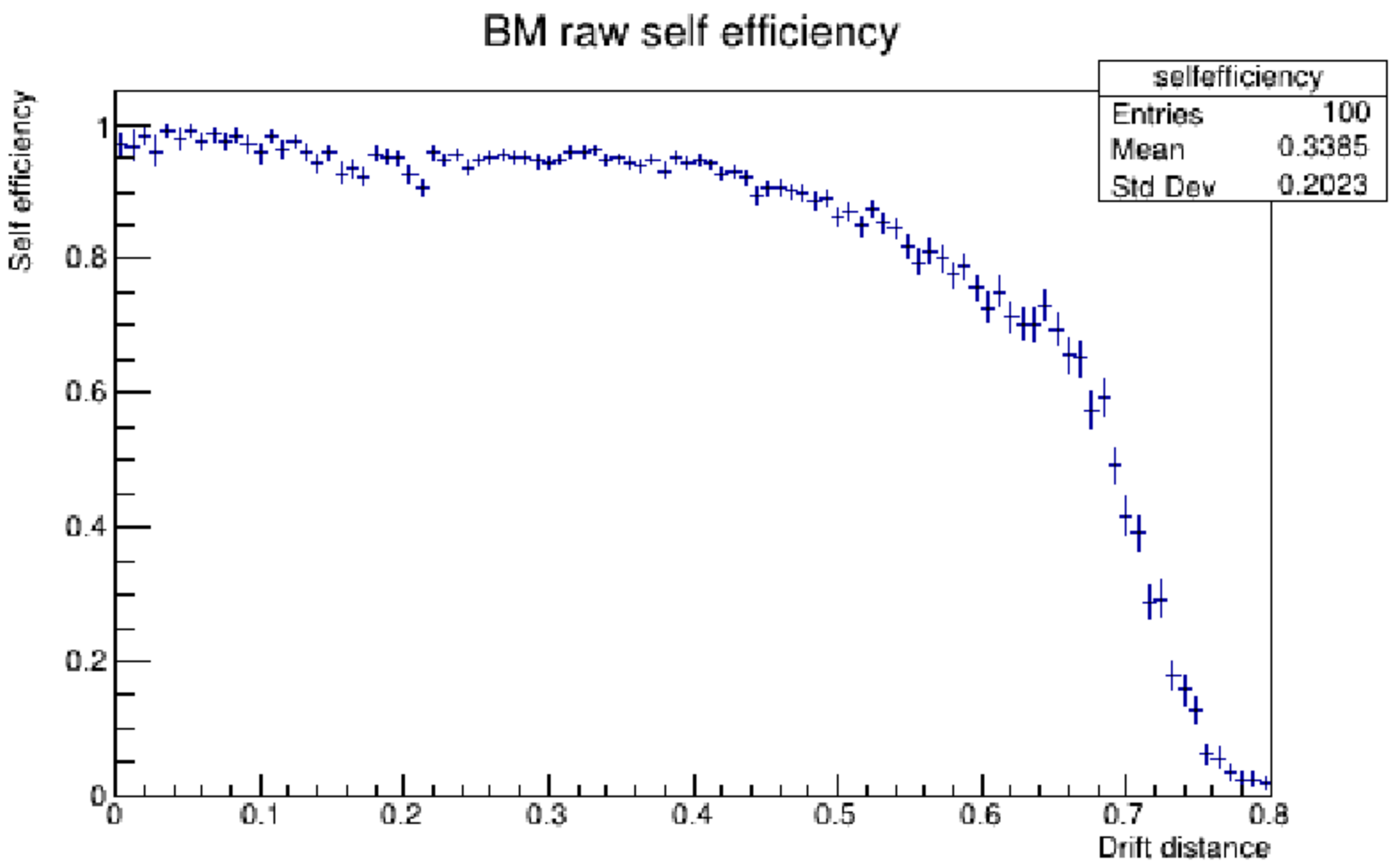


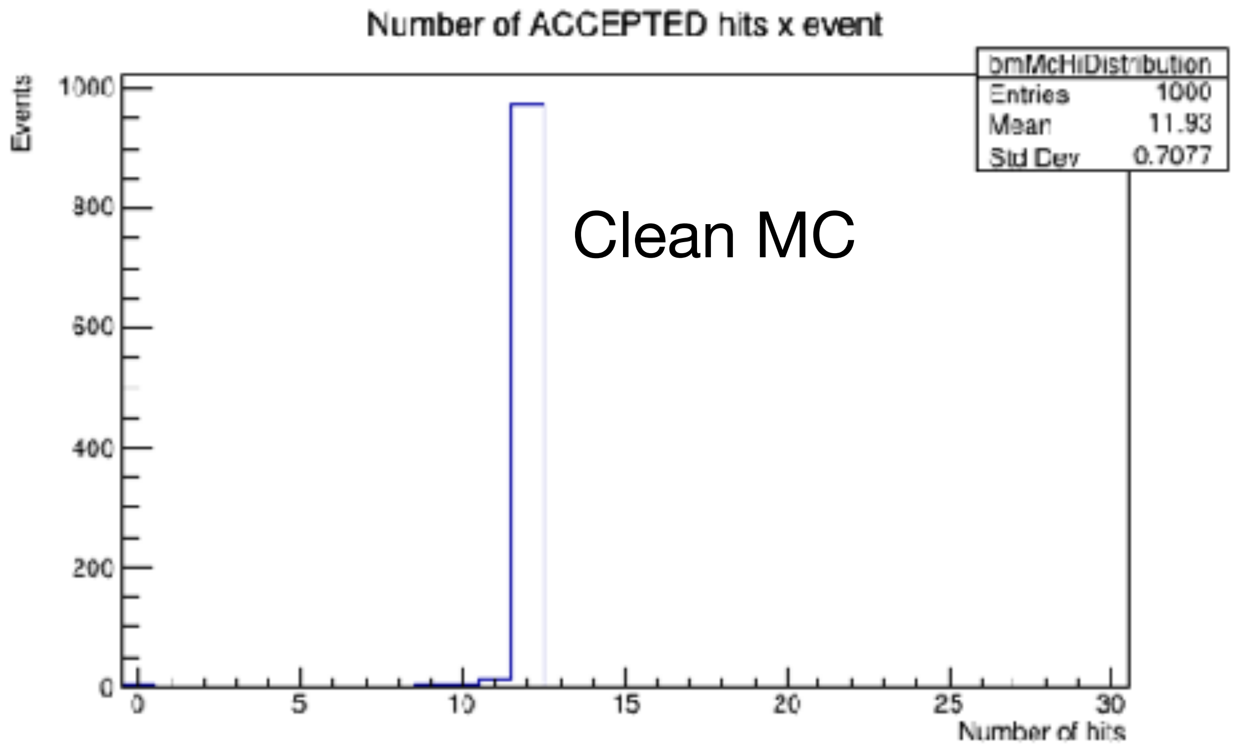


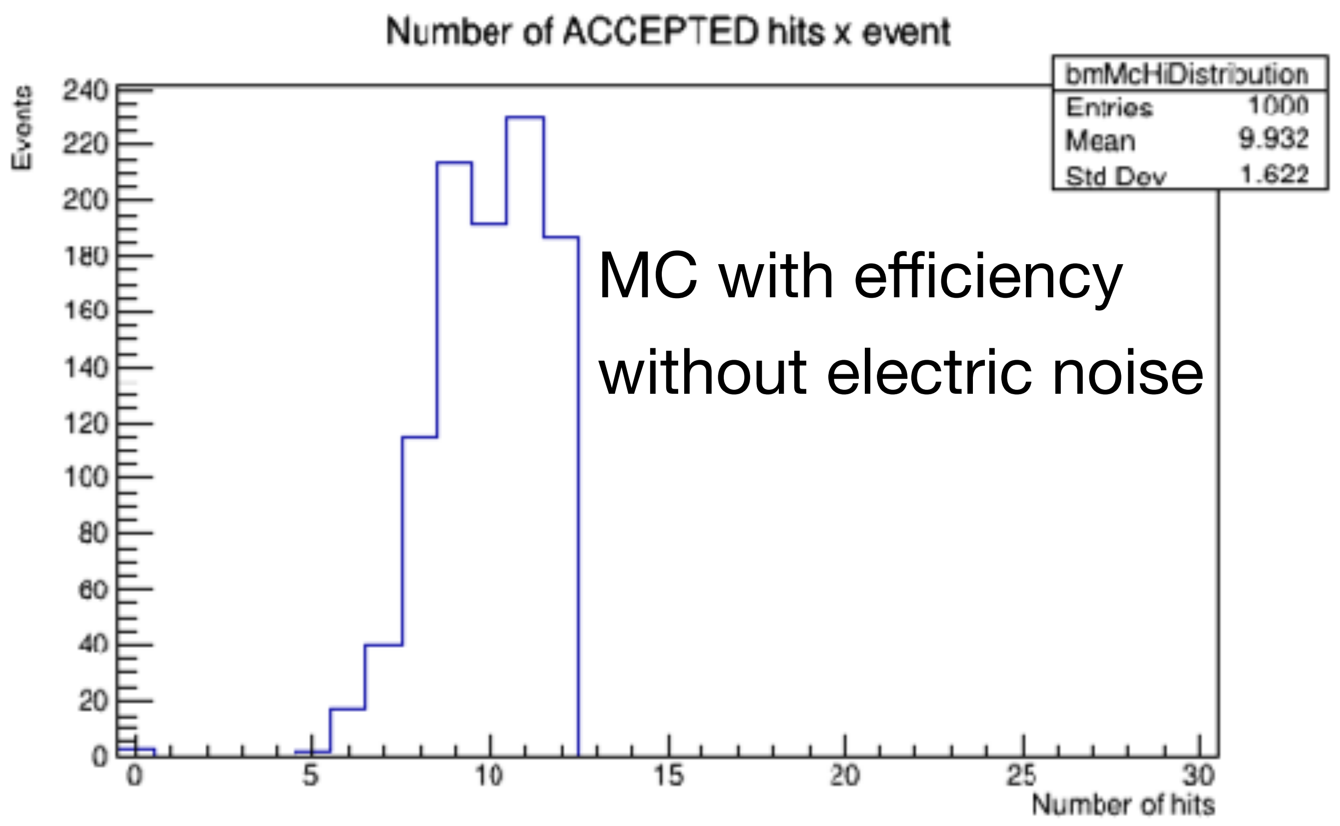
- "Maximum priority to GSI2021 for the cross section analysis" semicit.
- The BM Space time relations, tracking parameters and efficiencies has been optimised for the GSI2021 campaign
- BM space time relations are optimised combining the BM and the VTX measurements
- If the VTX is not present, a self calibration algorithm is used
- Then the spatial resolution is calculated
- Thanks to Tier1-CONDOR, there is the possibility to decode different runs in just few hours!

(Check R.Zarrella presentation: https://agenda.infn.it/event/37748/contributions/217769/attachments/114089/163743/FOOT_XV_General_Tier1.pdf or check the new FOOT TWIKI: https://baltig.infn.it/asarti/shoe/-/wikis/HTCondor)

BM @ GSI2021: efficiency







- The BM efficiency is calculated considering the BM tracks and checking the presence of a BM hit in a cell crossed by the track

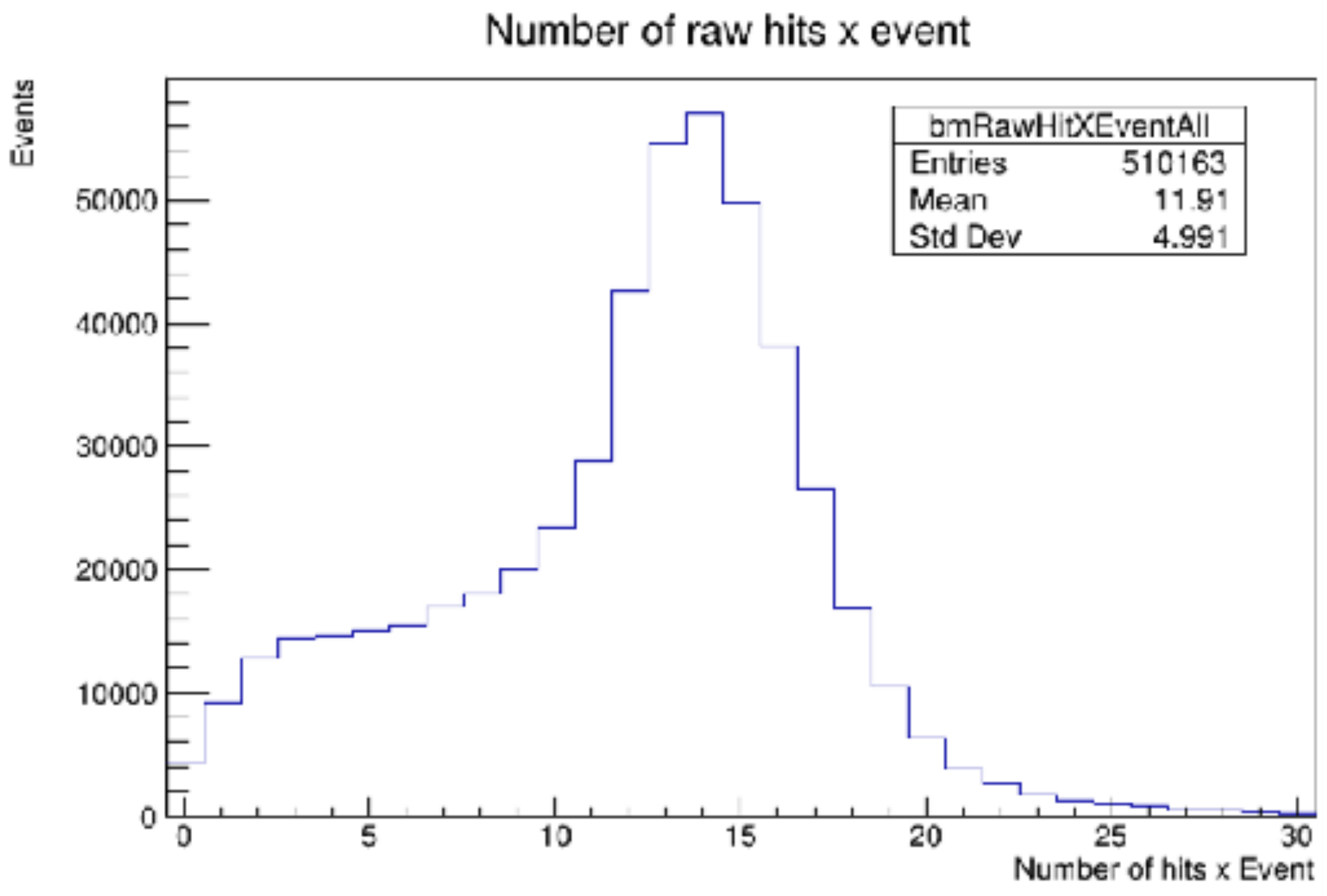
- The spatial resolution and the efficiency and can be considered in the MC simulations.

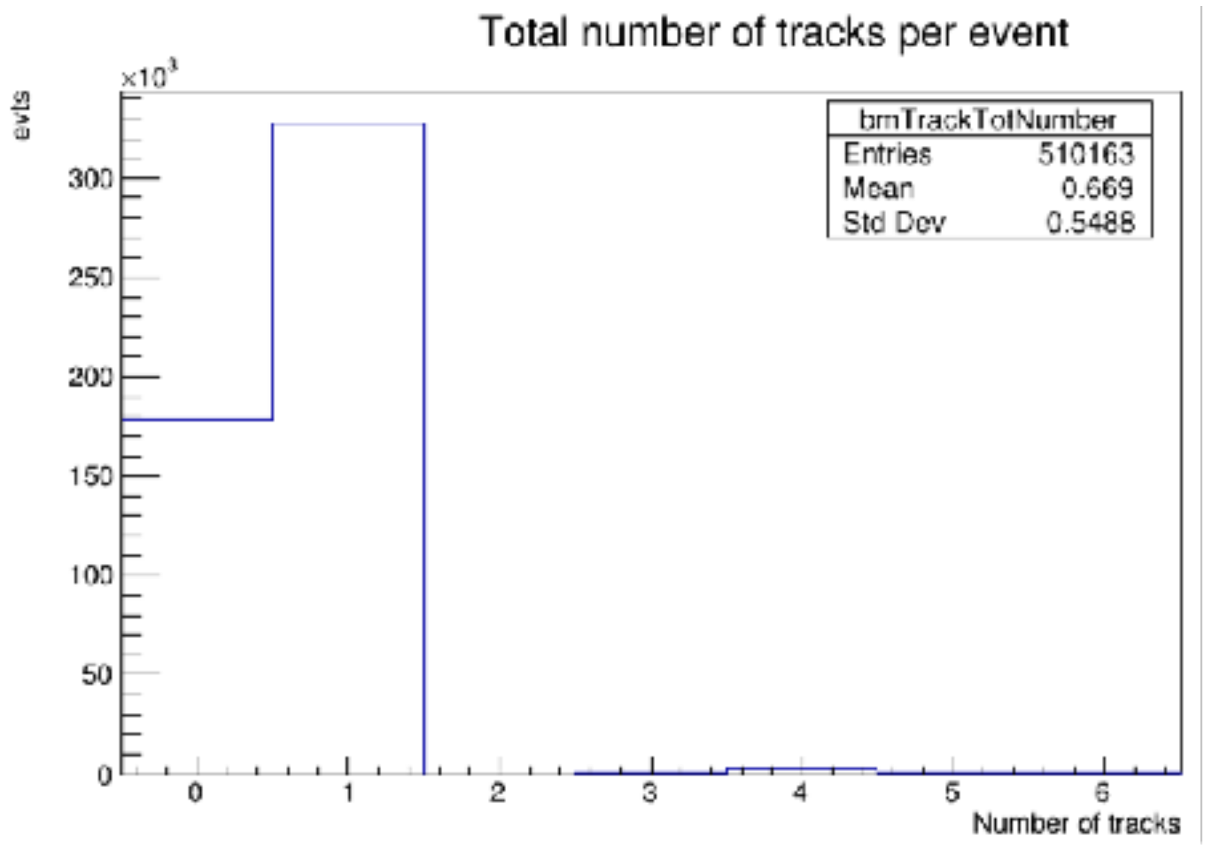
- Also the noise is considered in the MC simulations if in FootGlobal.par EnableElecNoiseMc: y

- The tuning of the BM noise has been done considering the experimental number of raw hit distribution

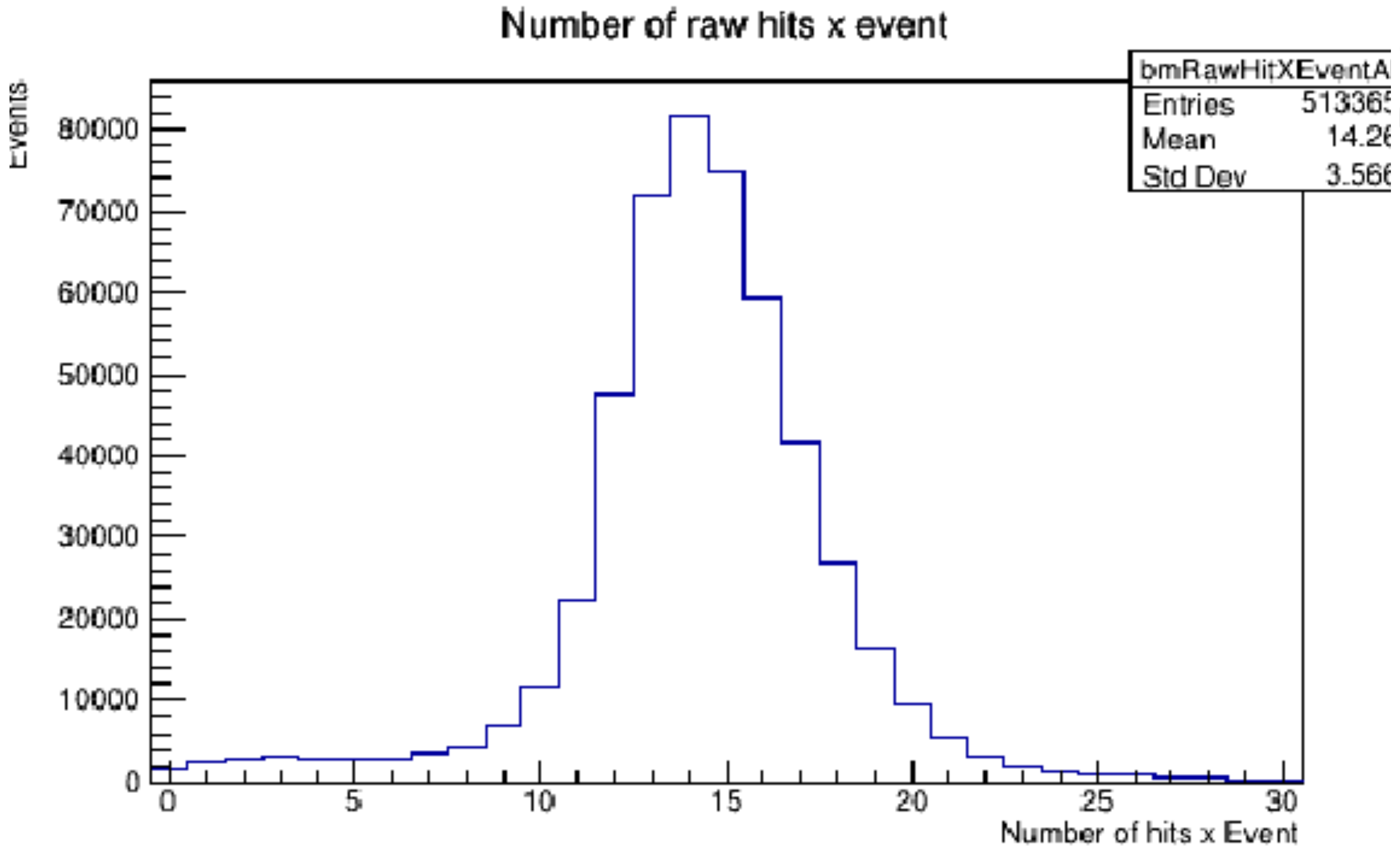
BM @ GSI2021: data vs MC

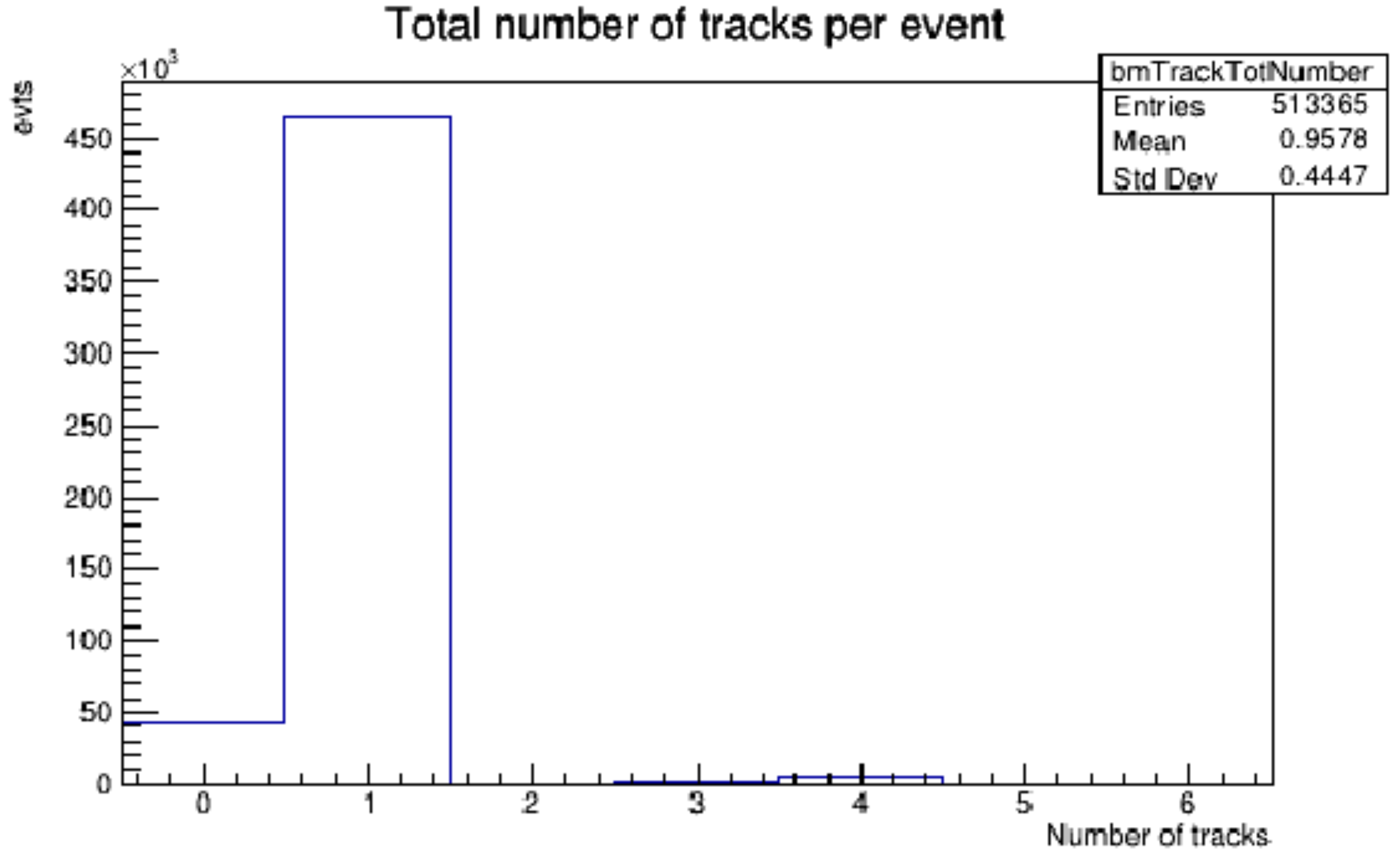
DATA: Frag (4308)



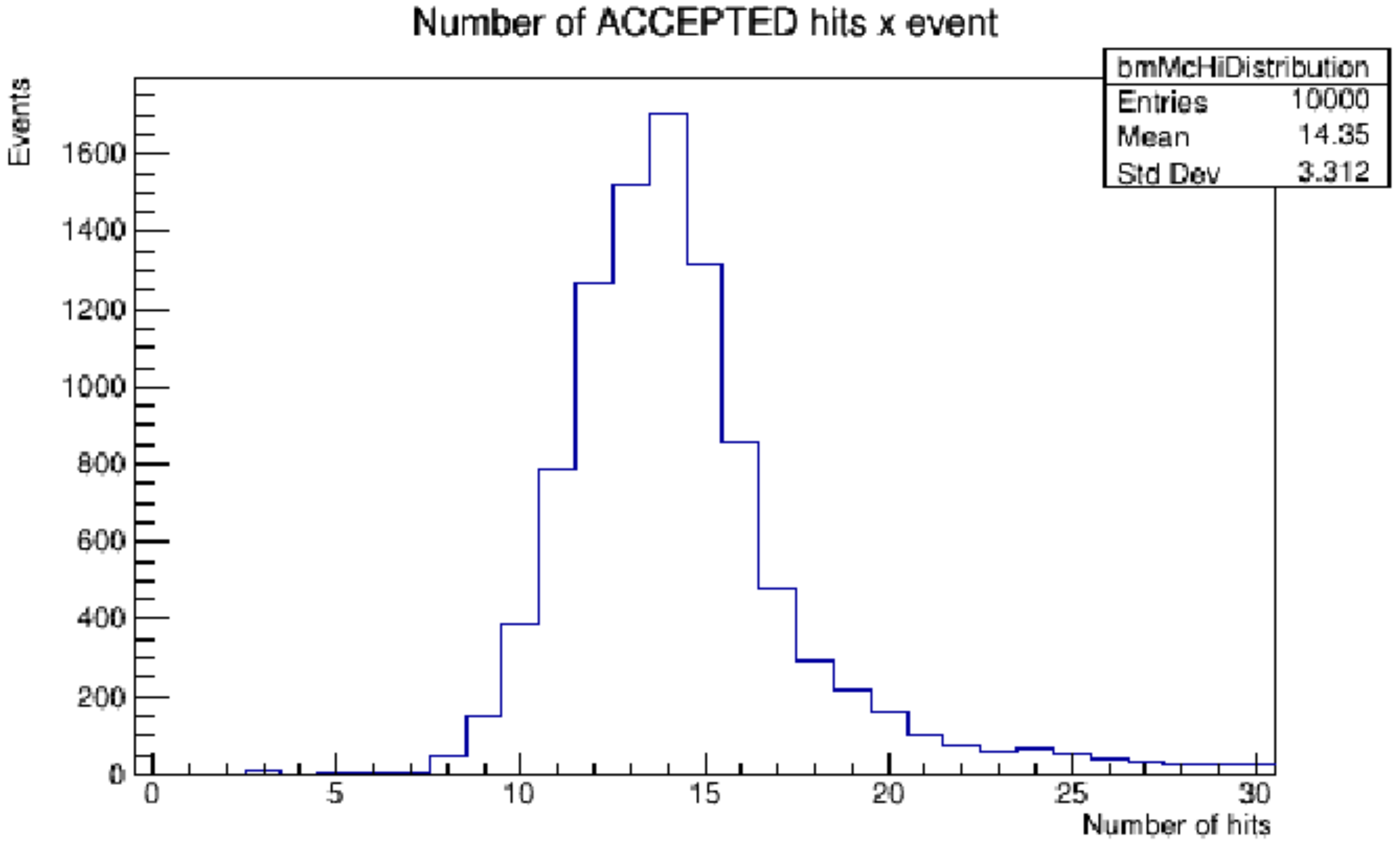


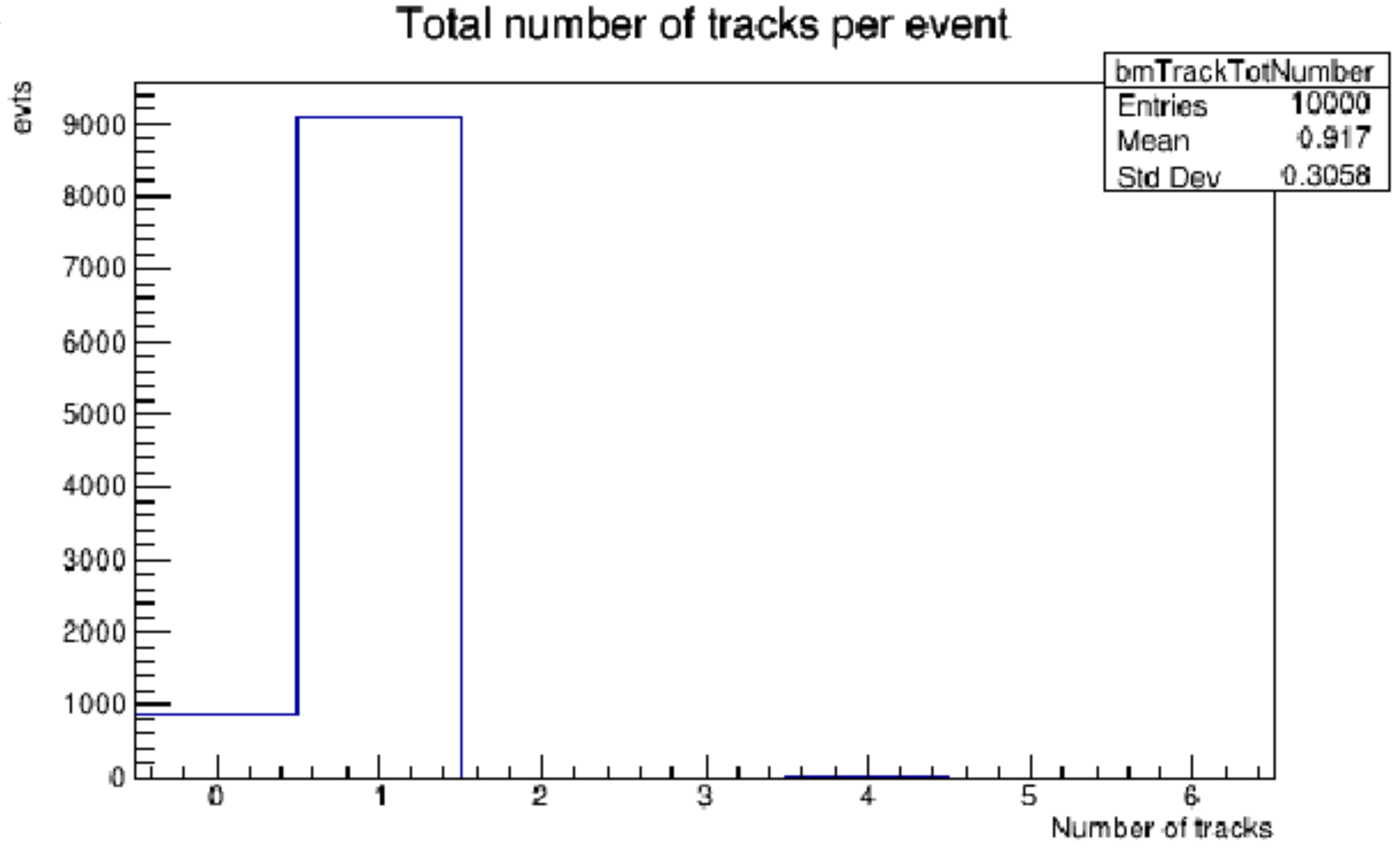
DATA: Majority (4307)





MC



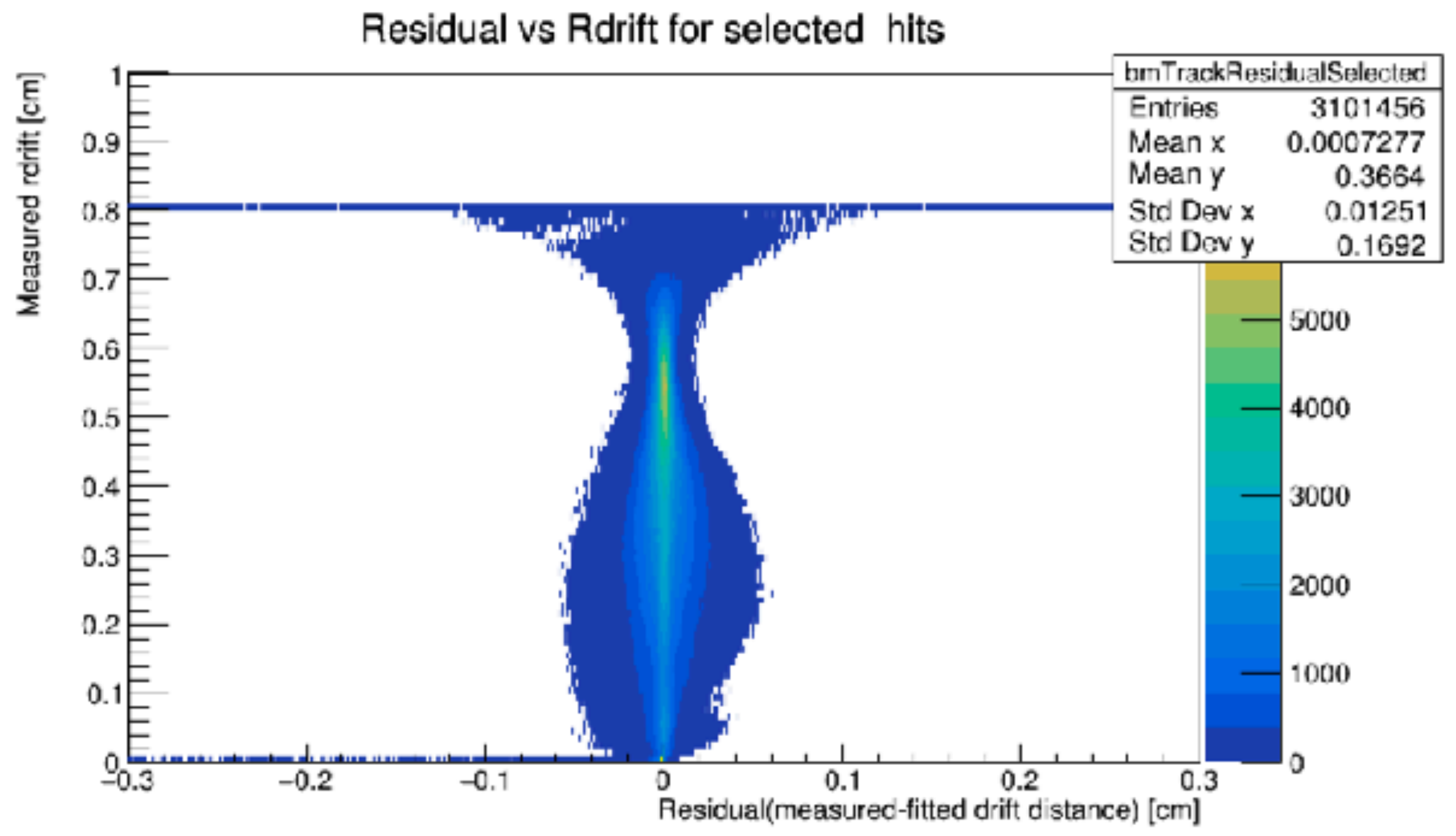


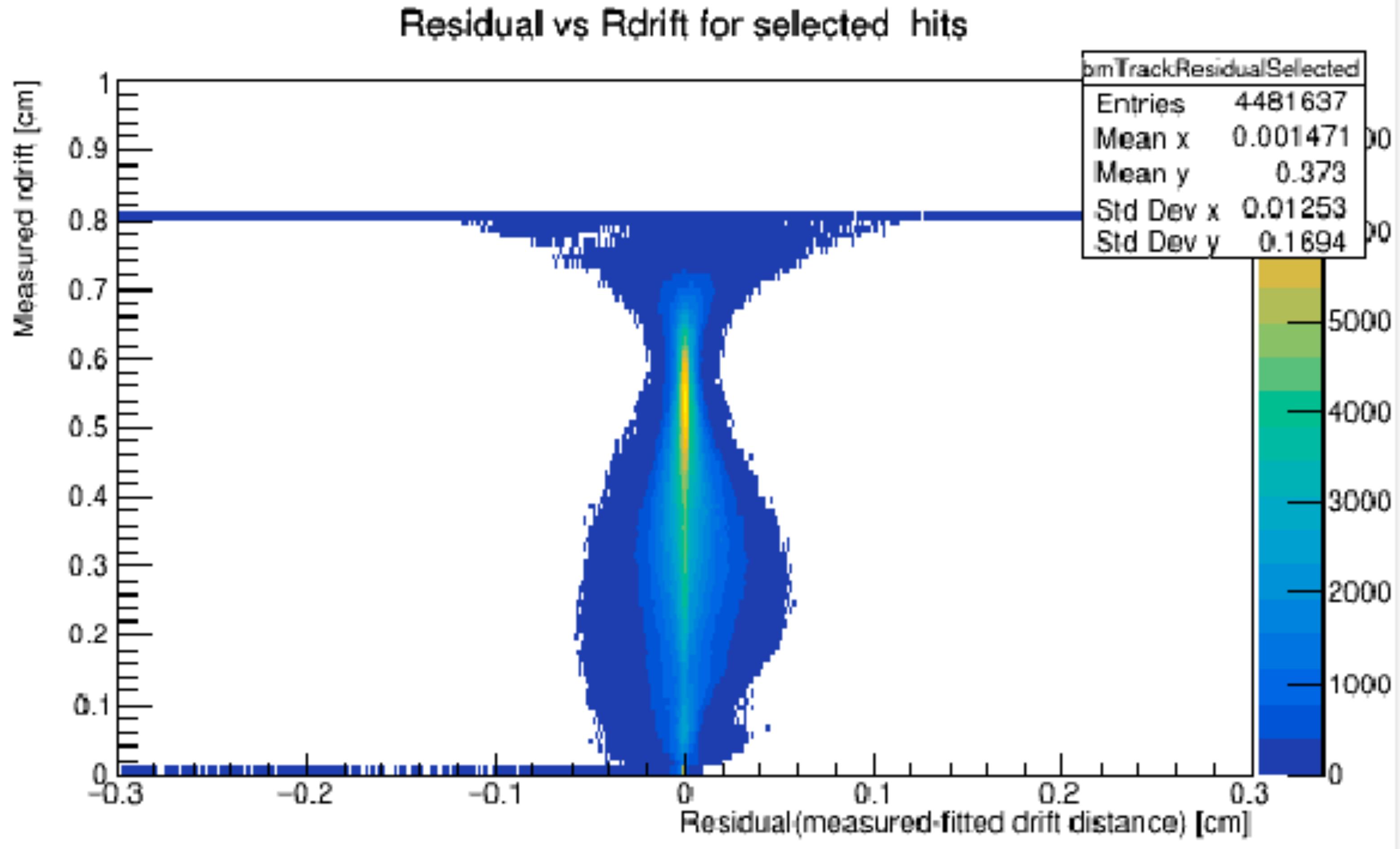
BM @ GSI2021: data vs MC

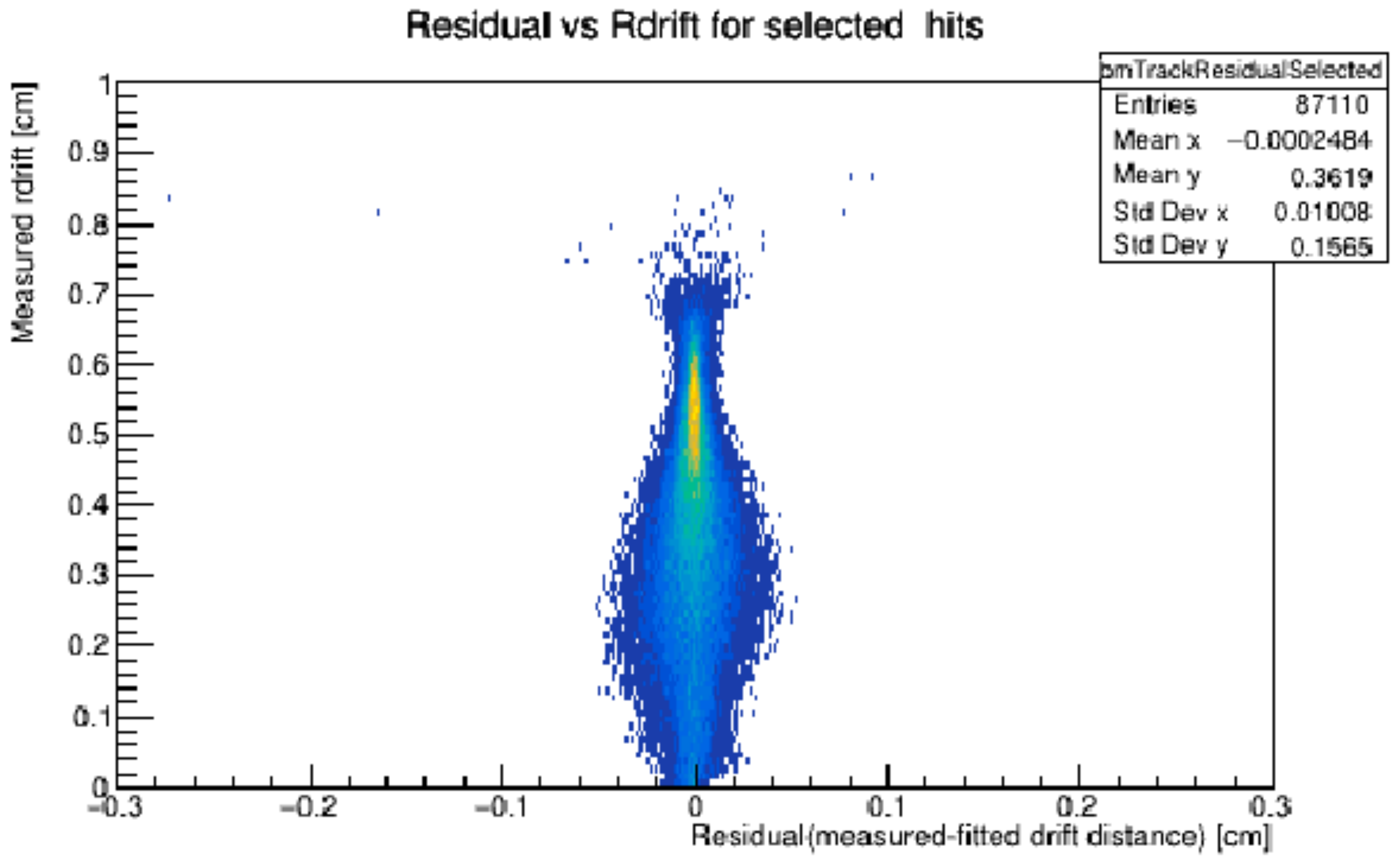
DATA: Frag (4308)

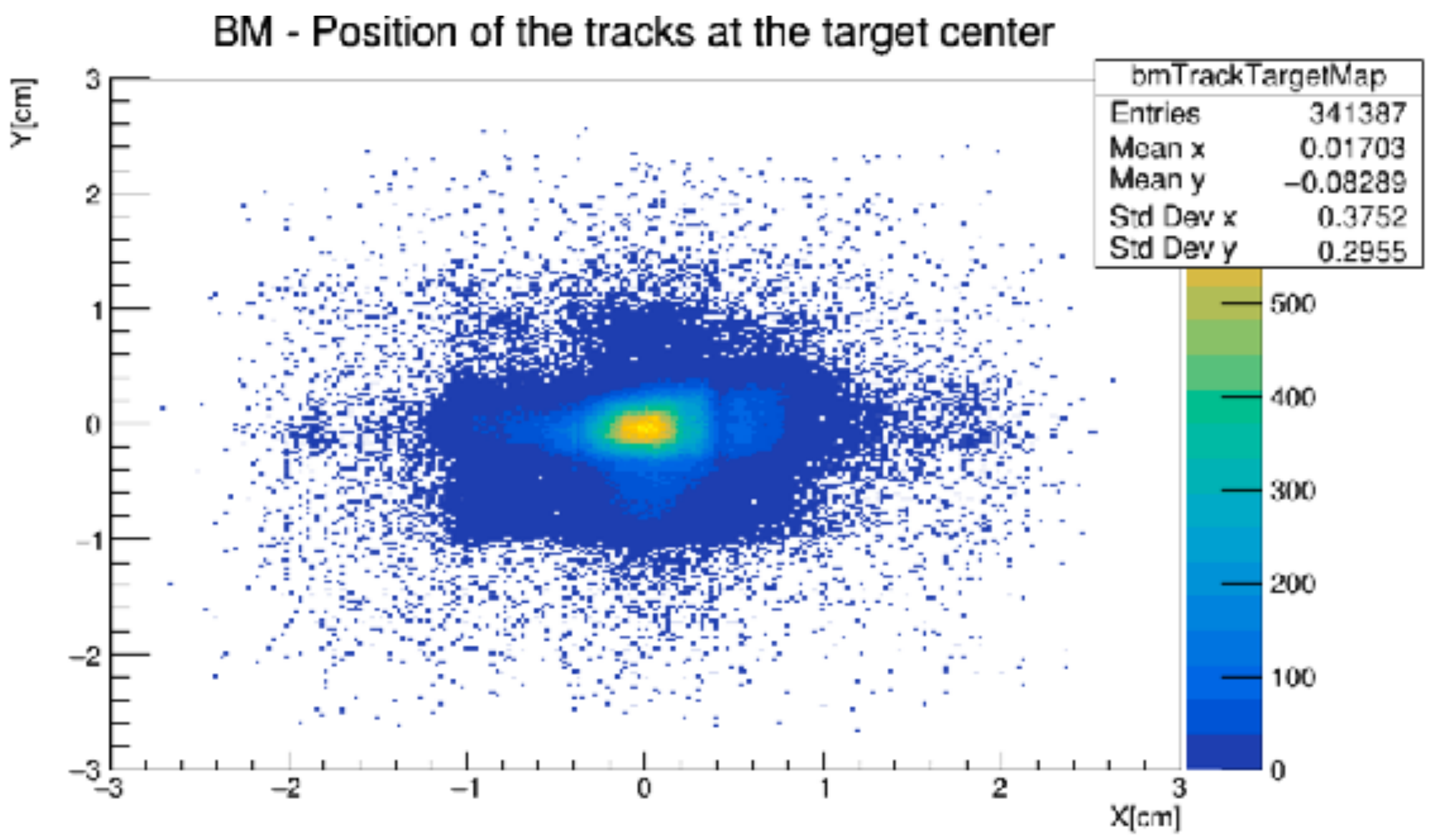
DATA: Majority (4307)

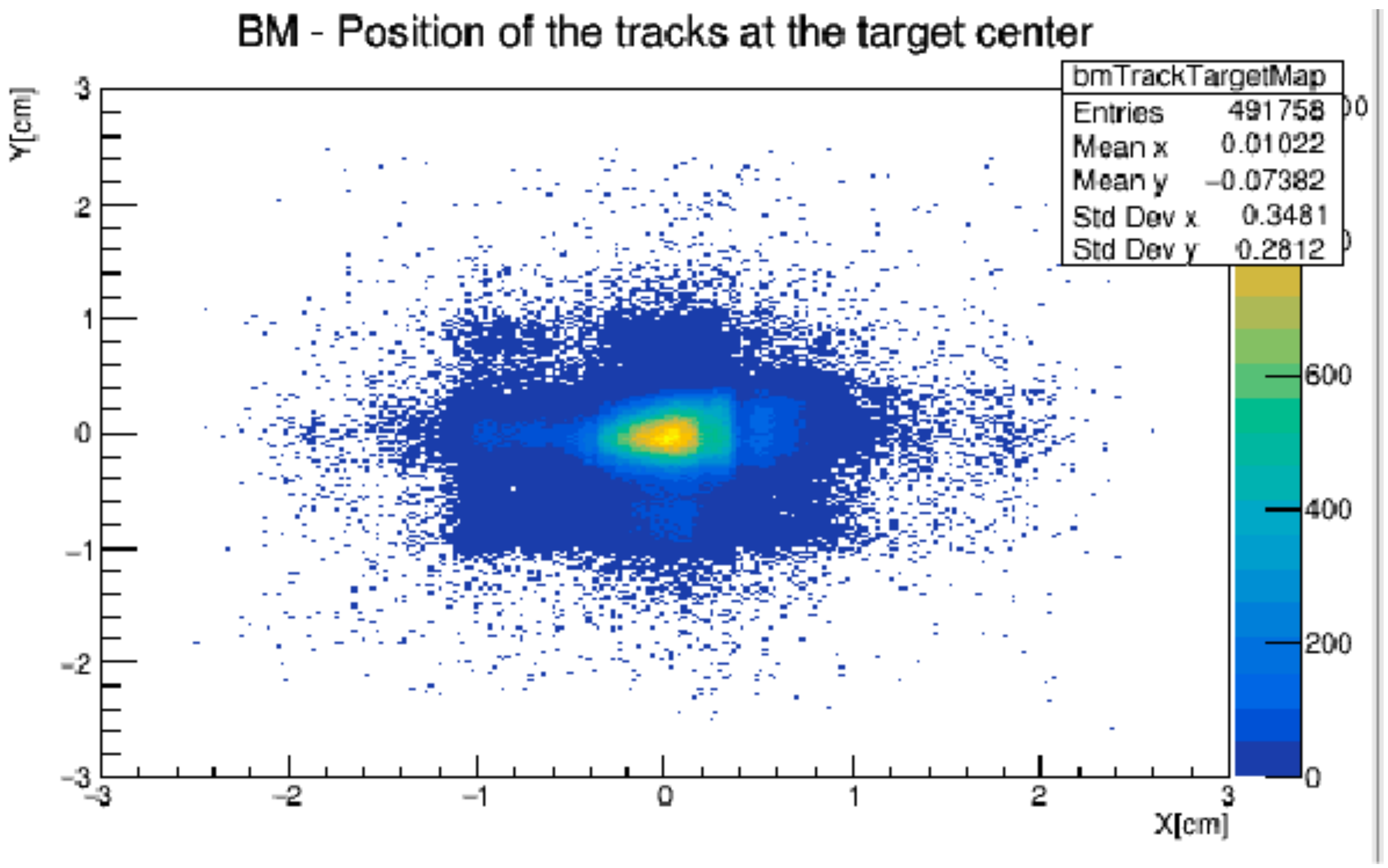
MC

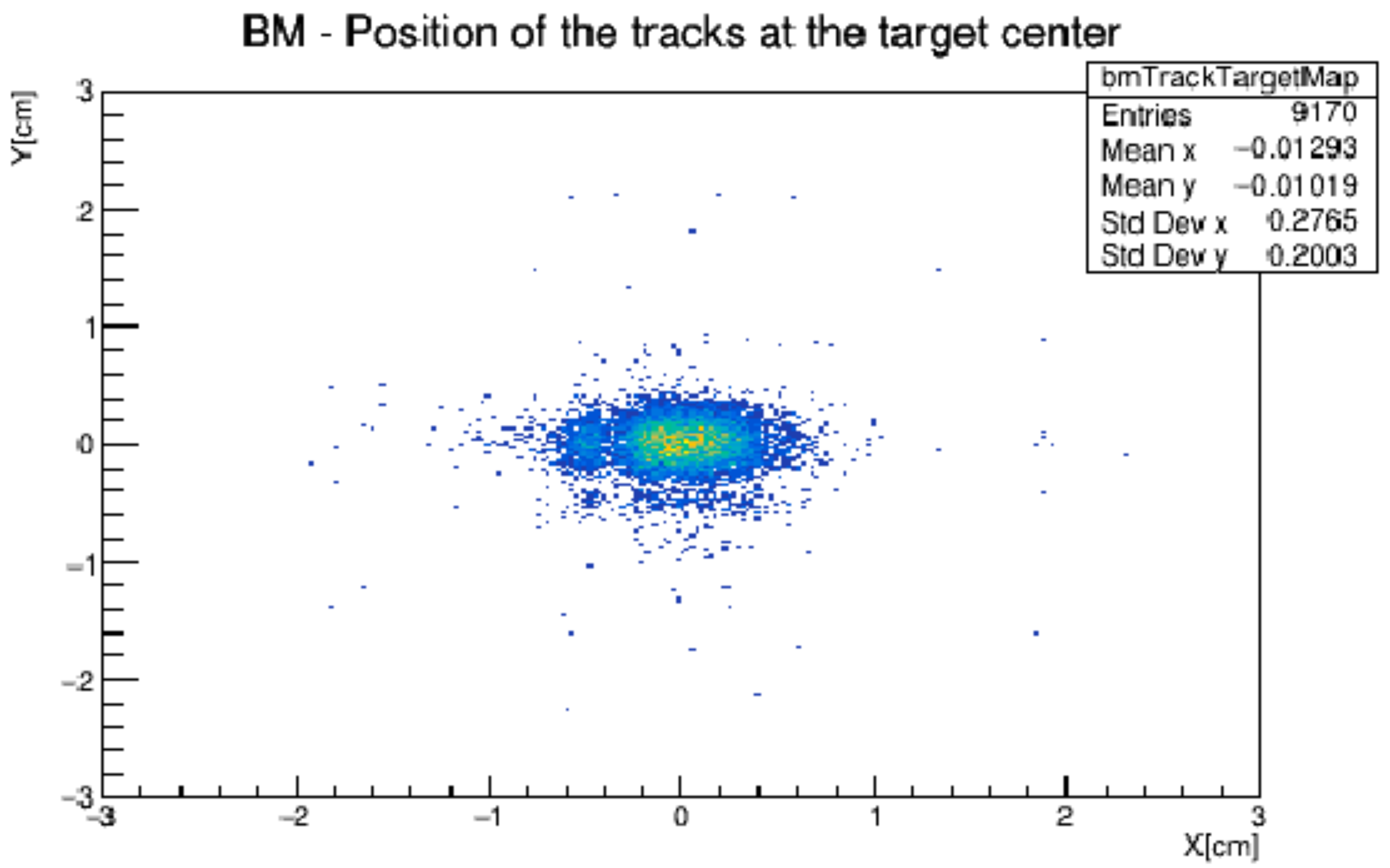




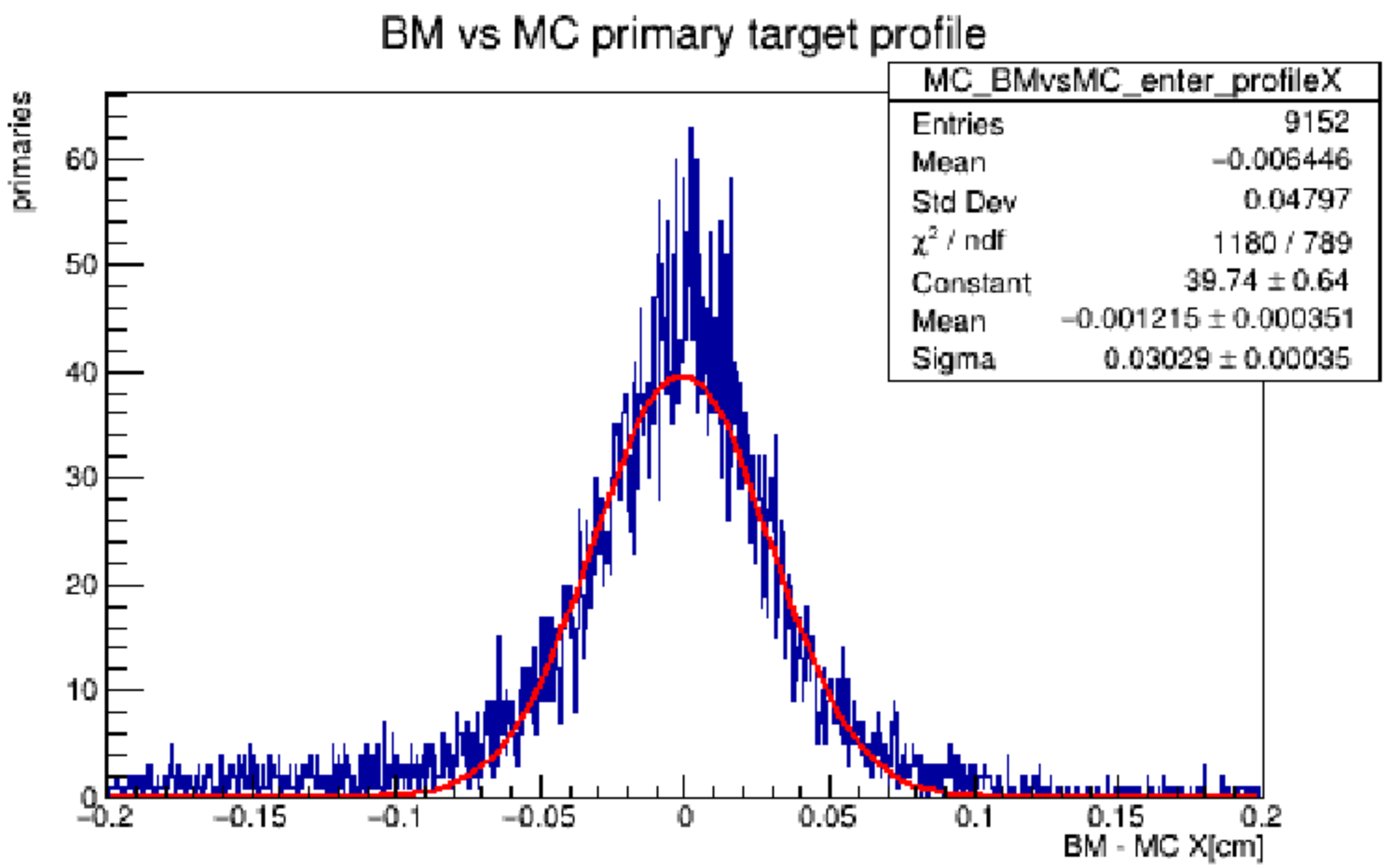


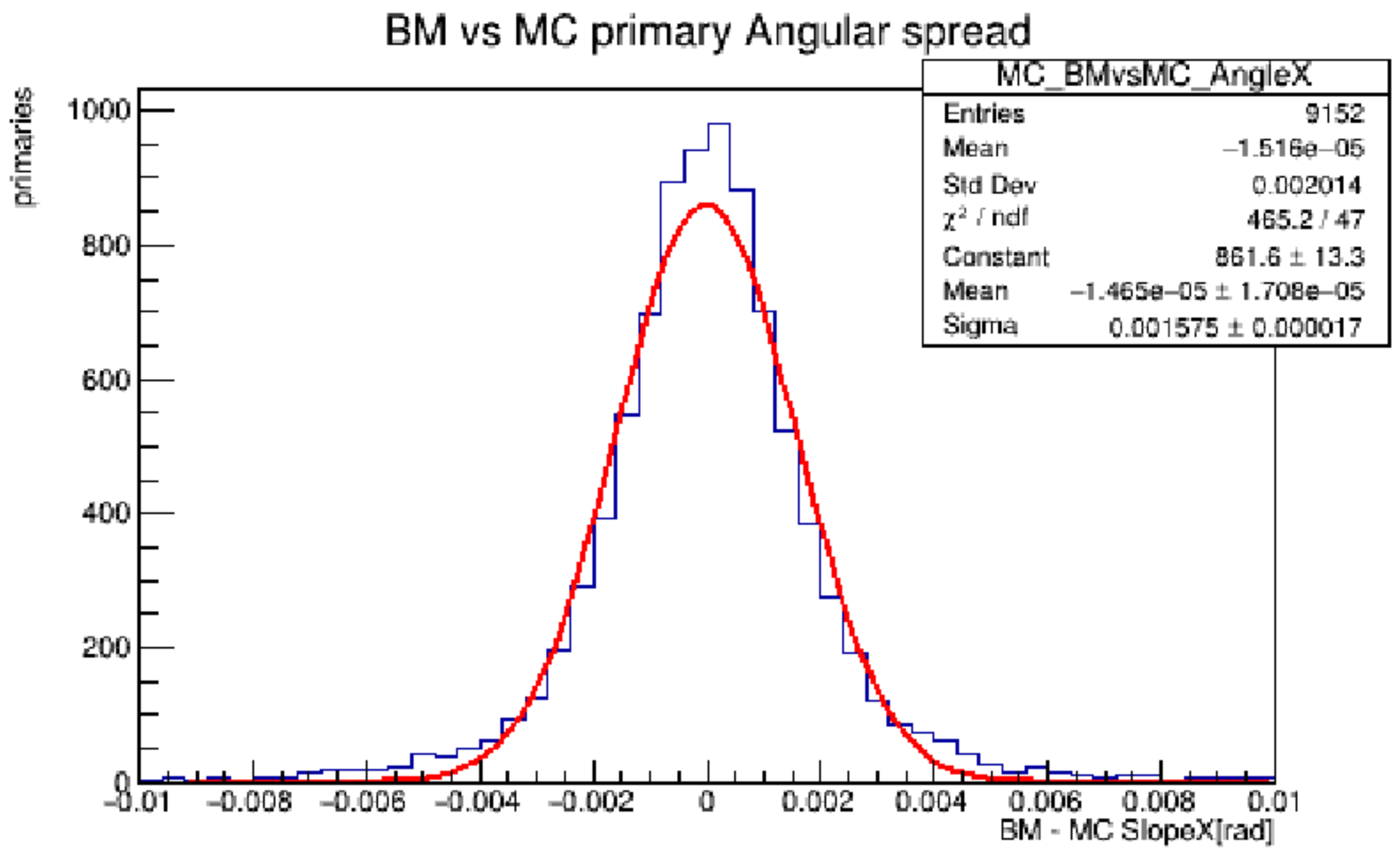






BM @ GSI2021: MC vs MCreco





TO DO LIST

- Finish the optimisation of the BM parameters for all the campaigns
- Push the changes in newgeom_v1.0 after some checks
- Add the BM relevance plot in the new shoe twiki!

https://baltig.infn.it/asarti/shoe/-/wikis/home