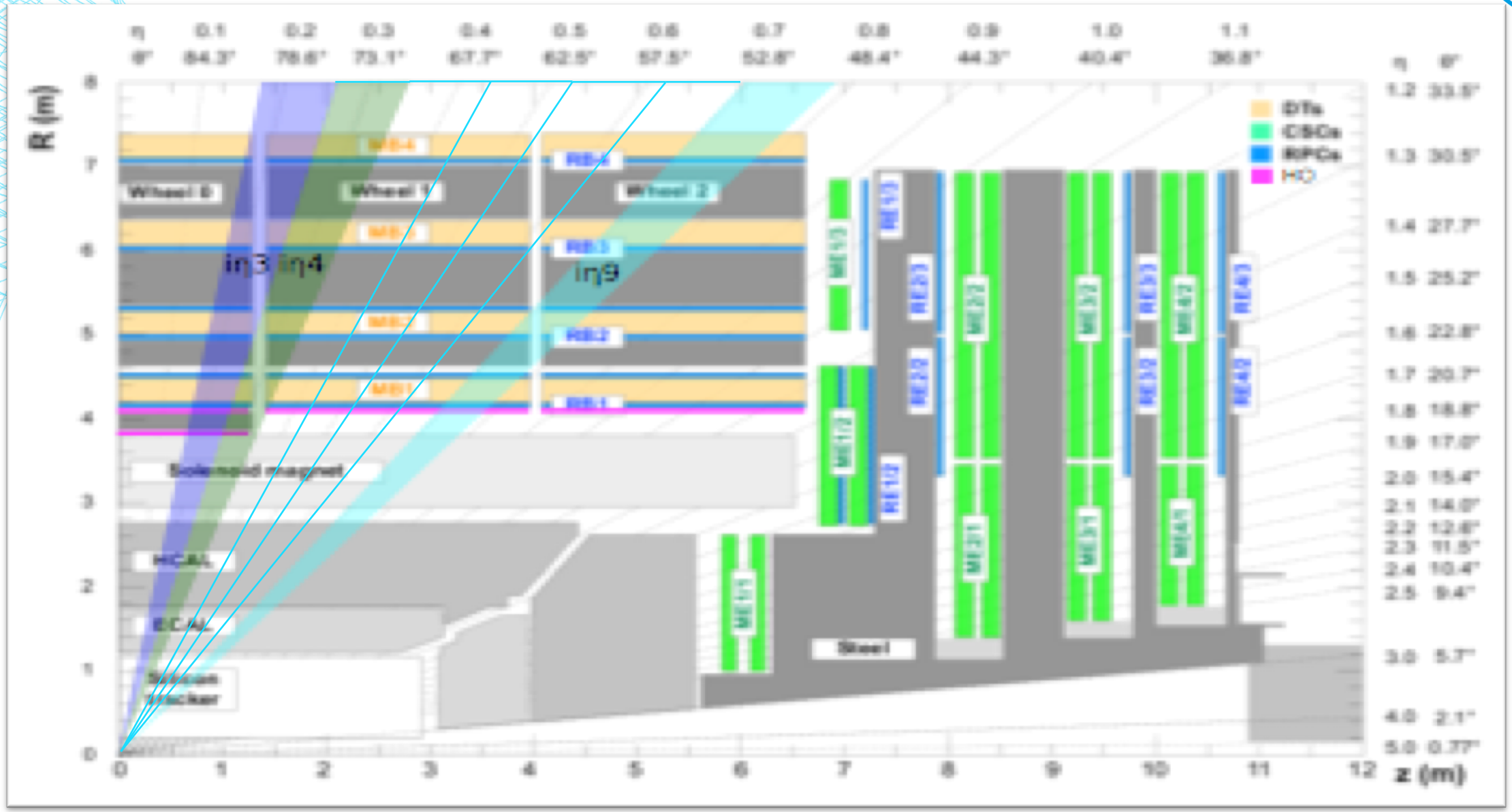
HO MB1 REDUNDENCY

Ashraf Mohamed

DESY, RWTH AACHEN III A

In collaboration with **Mitzi V. Urquiza González,** DESY summer student

HO SEGMENTATION



A. Mohamed, SUSY 1Lep ,DESY, RWTH

MB1-HO redundancy

NEW ALGORITHM

- Getting the BMTFs that are matched to muon TP in the same station and wheel and then apply $\Delta\phi$ cut of 0.4. (excluding wh+/-2)
- Match these tracks with reco-muons with $\Delta R < 0.4$.
- Choose the fraction of these BMTF tracks that are formed only with MB1X information. (they will be completely lost if MB1 is out of service)
- Find the nearest HO hit to the MB1X track and match with ΔR of 0.4.
- Once the HO MB1X matching fulfilled apply some extra geometrical cuts[1*]
- Categorize MB1X HO matched tracks according to at which MB station HO coincidence founded. MB1+HO ---> HO matched to MB1X tracks and DTTP coincidence in MB1 … and so on

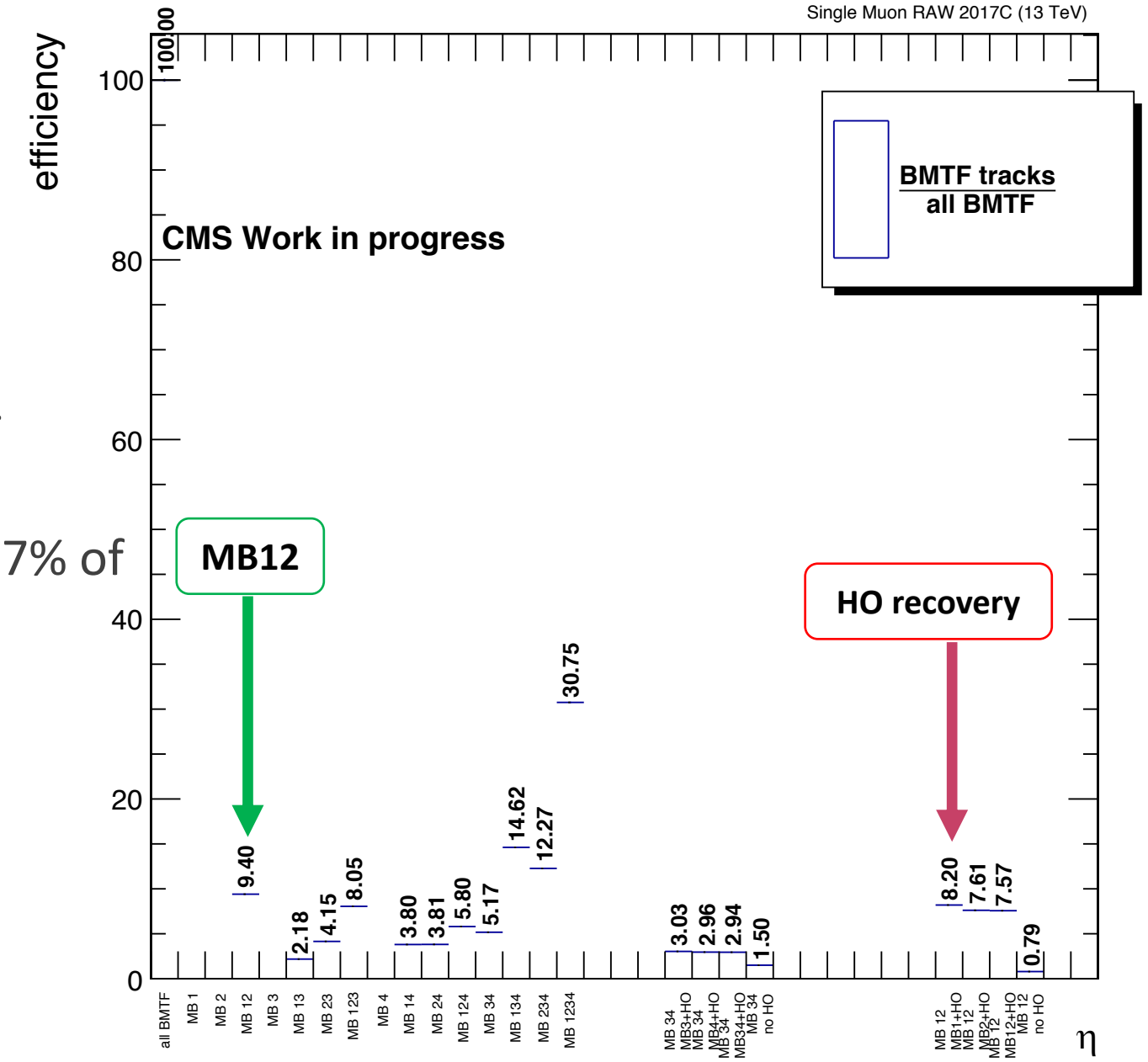
[1*]- HO in iEta1/2/3/4, MB1 in wh0.
- HO in ieta4 allow to be in wh0/wh1.
- HO in iEta4, MB2 in wh1.
- HO in iEta5/6/7/8/9/10, MB1 in wh1.
- HO in iEta4/5/6/7/8, MB2 in wh1.
- HO in iEta9/10, MB1 in wh1.
- HO in iEta7, MB1 in wh1.
- HO in iEta10, MB2 in wh2.

Results and interpretations

Done using -- SingleMuon_Run2017C-ZMu-PromptReco-v3_RAW-RECO

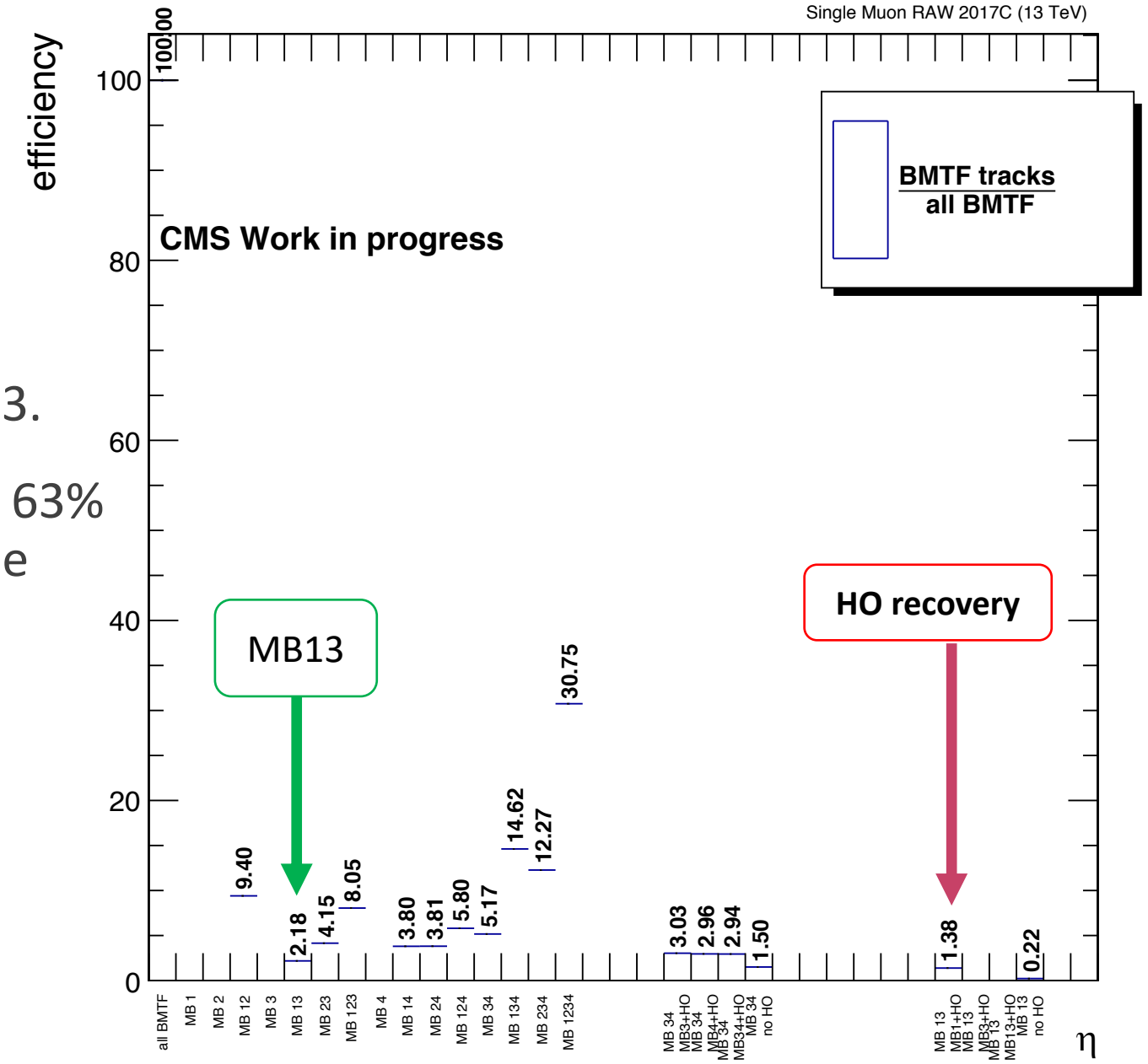
RESULTS

- 9.4% will be lost from MB12 tracks.
- HO can recover 8.2% i.e ≃ 87% of the lost MB12 track can be recovered.



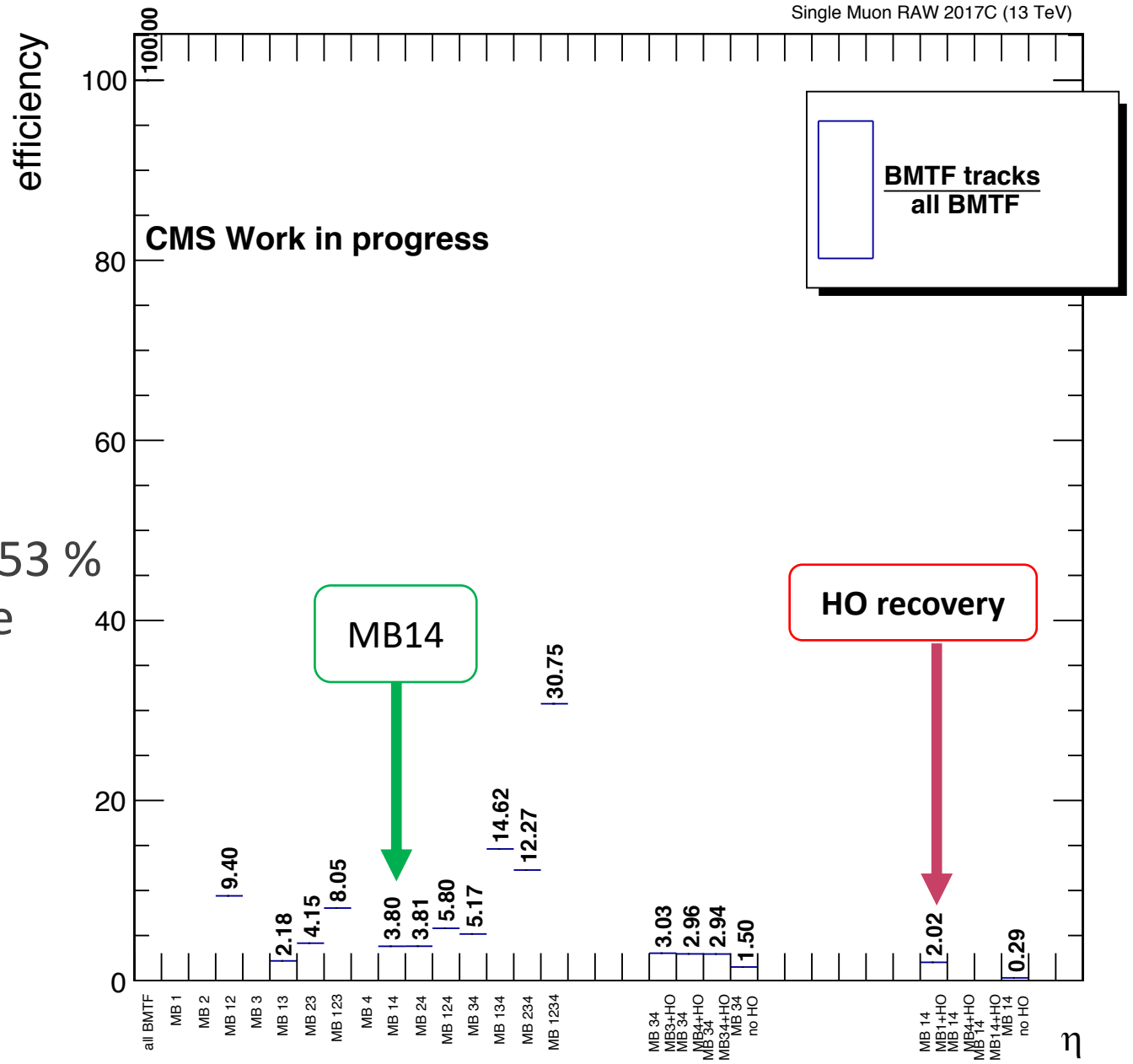
RESULTS

- 2.18% will be lost from MB13.
- HO can recover 1.38 % i.e ≃ 63% of the lost MB13 track can be recovered.

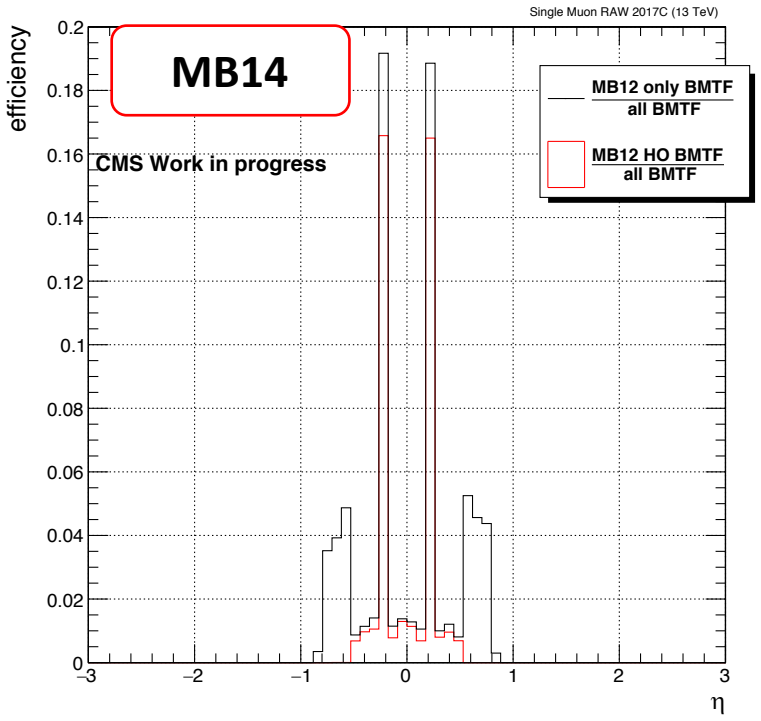


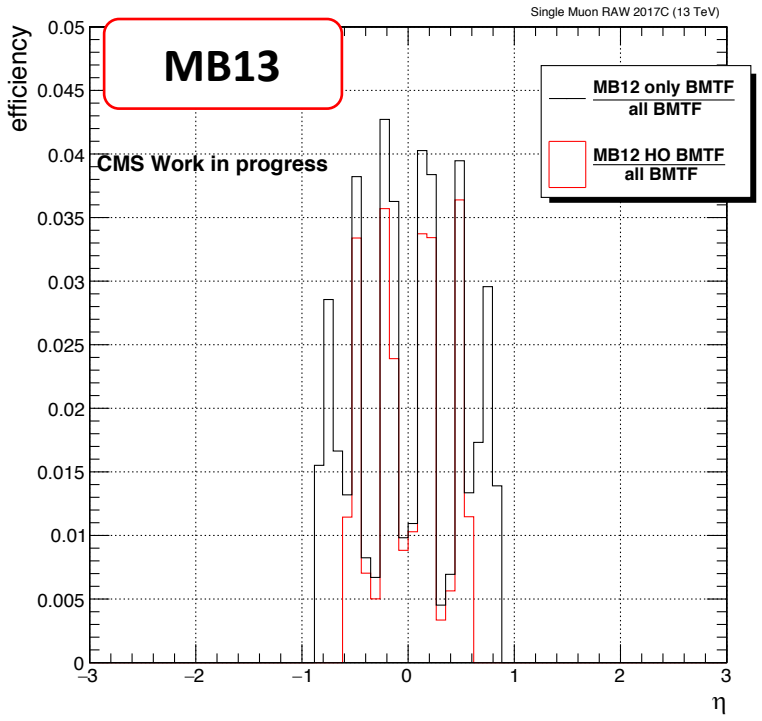
RESULTS

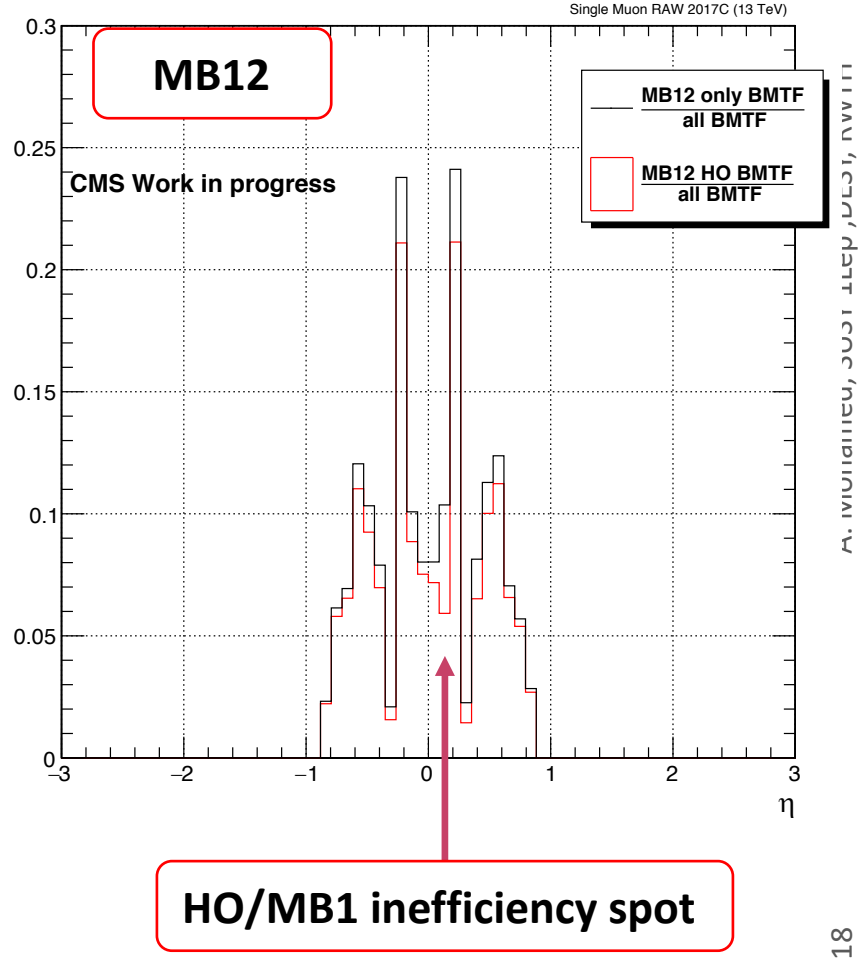
- 3.8 % will be lost from MB14 tracks.
- HO can recover 2.02 % i.e ≃ 53 % of the lost MB14 track can be recovered.



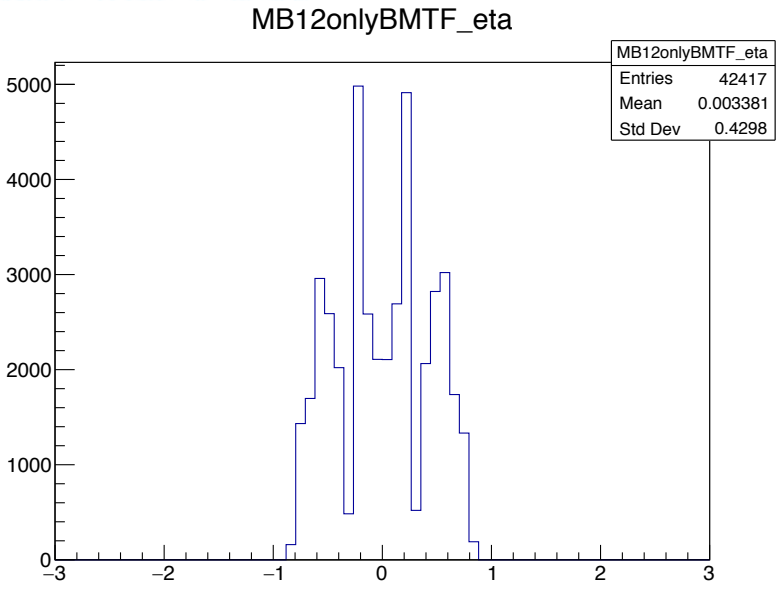
RESULTS

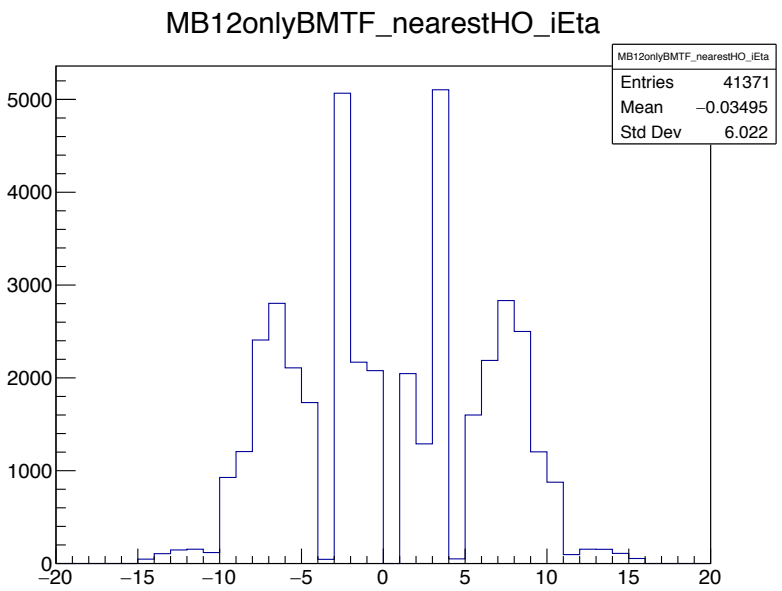

Single Muon RAW 2017C (13 TeV)
MB14
CMS Work in progress
MB12 only BMTF / all BMTF
MB12 HO BMTF / all BMTF
efficiency
η

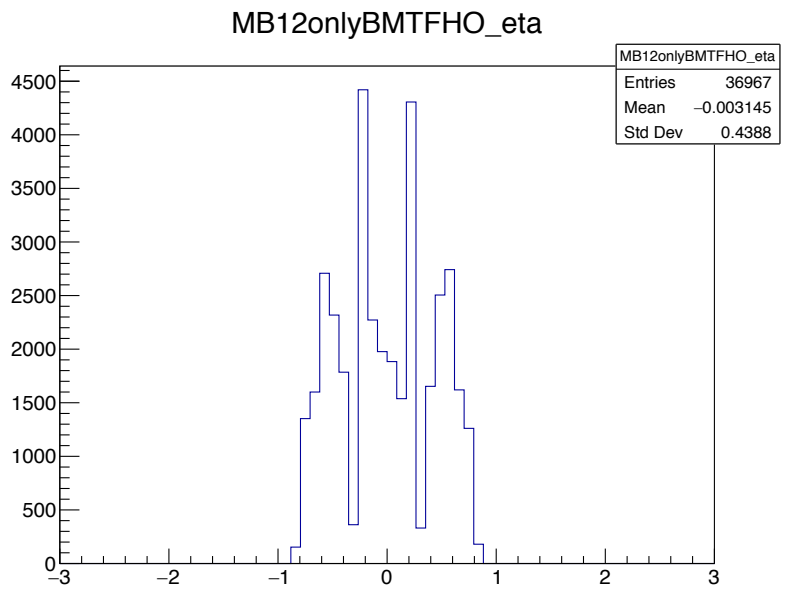

Single Muon RAW 2017C (13 TeV)
MB13
CMS Work in progress
MB12 only BMTF / all BMTF
MB12 HO BMTF / all BMTF
efficiency
η


Single Muon RAW 2017C (13 TeV)
MB12
CMS Work in progress
MB12 only BMTF / all BMTF
MB12 HO BMTF / all BMTF
η
HO/MB1 inefficiency spot

RESULTS

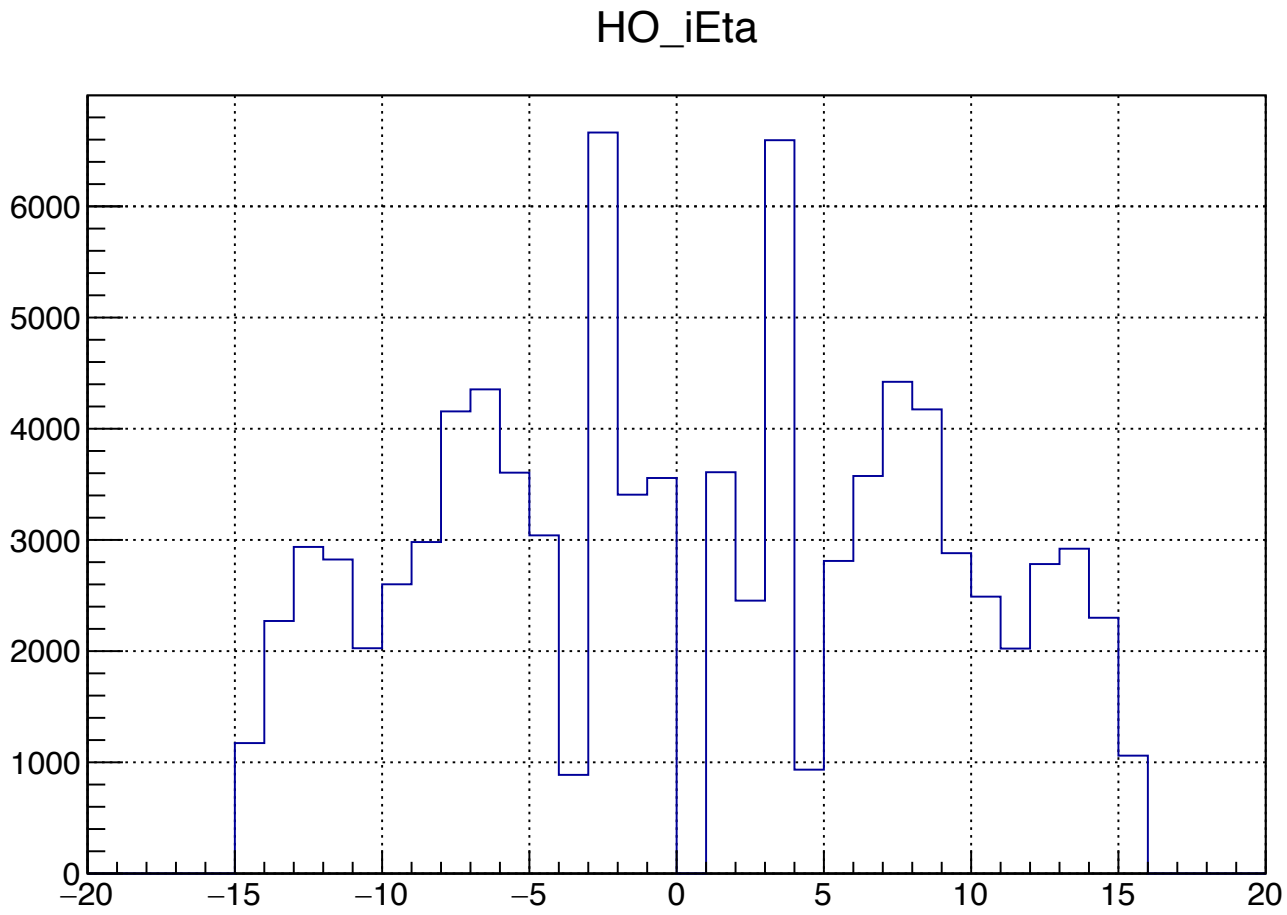




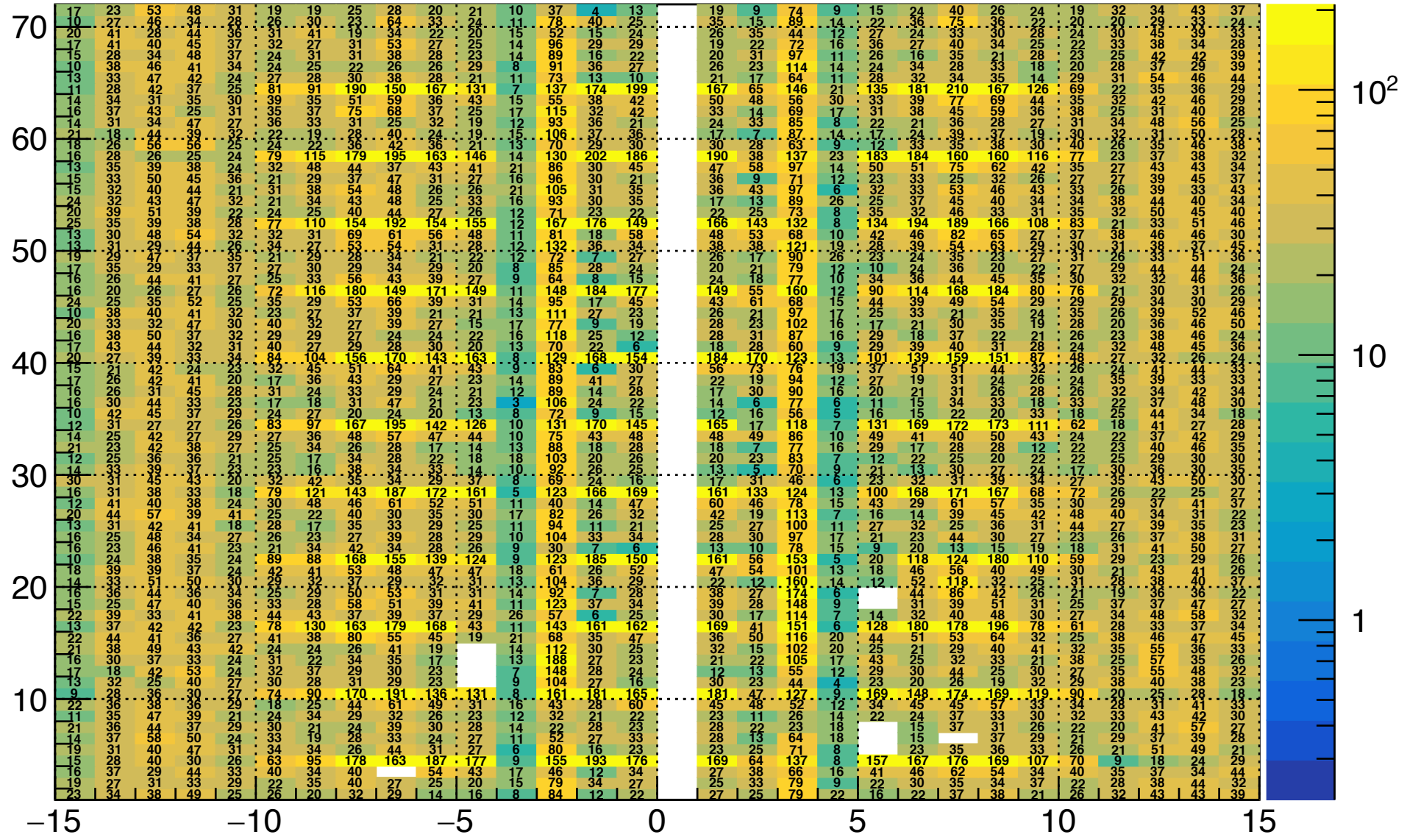


Before matching HO with MB12 we look for the nearest HOTP to match with.
For this iη we don't have HO hits as much as MB12 BMTFs to match with.

RESULTS



Pure HO iη shows that iη+2 has less entries compared with iη-2
No problem in the matching at all



Iη x iϕ map prove there is no special problem in iη+2 →it might be the physics of the events

CONCLUSION

- Study on HO L1Mu recovery to MB1X type tracks has been presented.
- L1Mu will loose 9.4% + 2.18% + 3.8% = 15.38% from MB1X.
- HO can recover 8.2% + 1.38 + 2.02 = 11.6% of all the tracks i.e. 75.4% of the lost L1Mu.
- Next : rate study – pT resolution and $\Delta\phi_b$ check.
- HO-DN has been submitted and now under revision.
- Very positive feedback received from the reviewers and we should receive their comments in few days.
- We requested HO slot in the next FSP meeting.

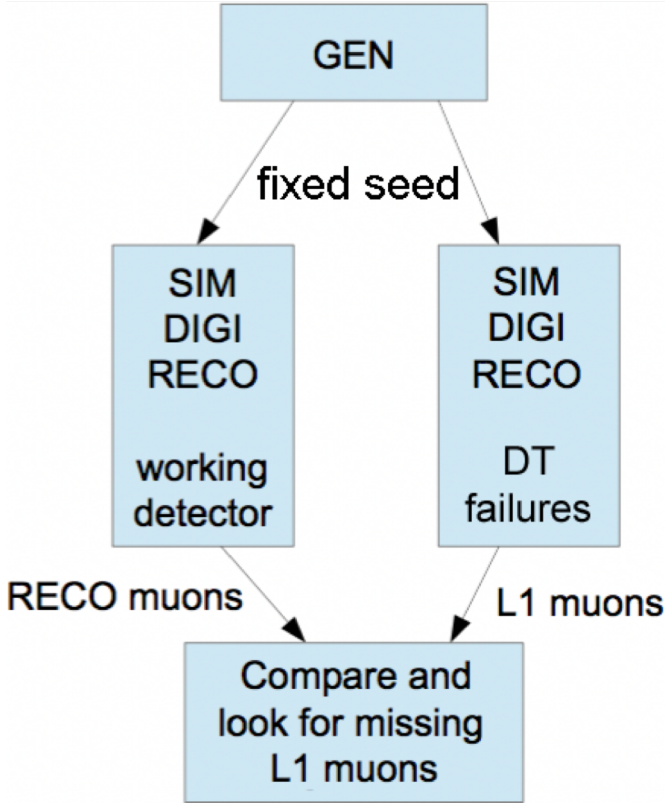
Danke

شكرا

Thanks

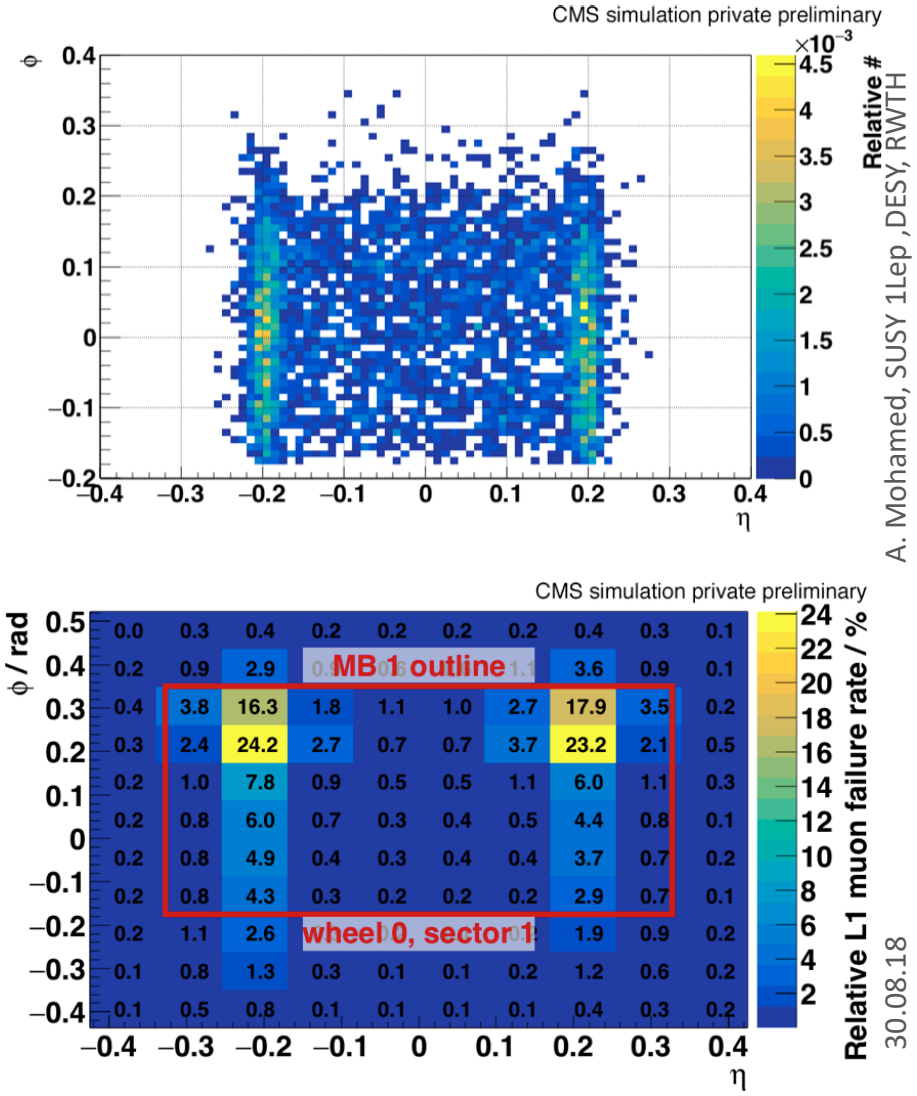
OLD SCHEME

- Since muon system is likely to suffer from aging and radiation damage.
- Previously the DT Failure scenario studies done by **Florian** based on simulated data by producing events with fully working detector and failing detector from the same GEN level information.
- With GEN level matching, one can estimate how many events we loose due to the failure of a specific part of the detector.
- Matching is done by ΔR and ΔpT.



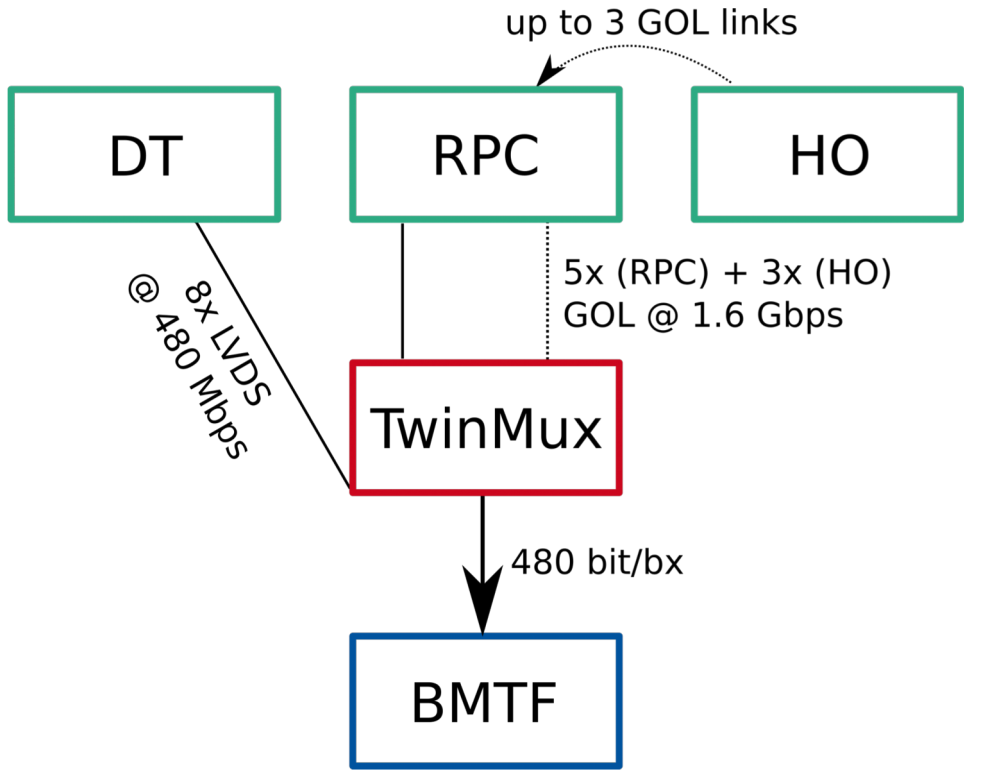
OLD SCHEME

- For specific sector/wheel the overall loose can be 30% of L1 muons.
- The HO can recover 40% of this 30% using this matching algorithm.
- This algorithm requires to simulate too many scenarios and produce dataset for each of them.

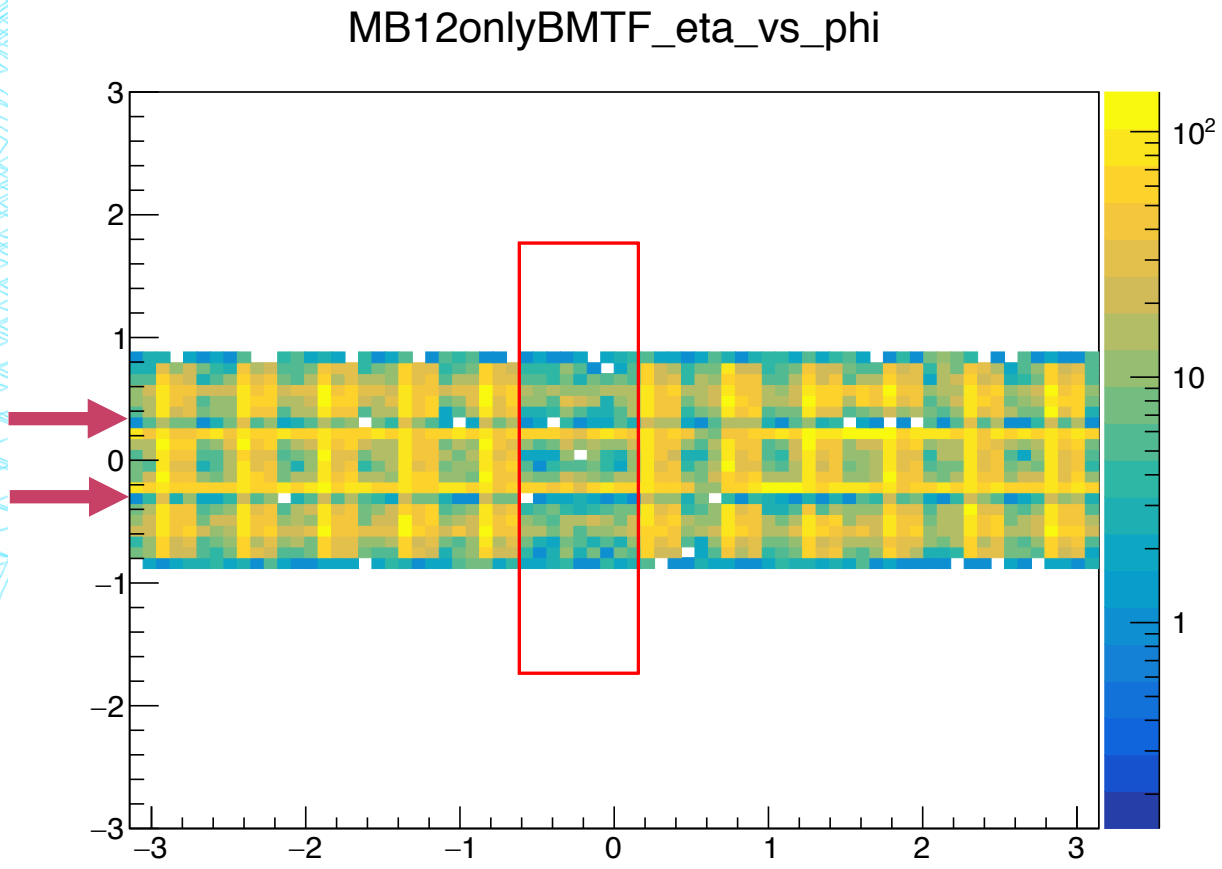


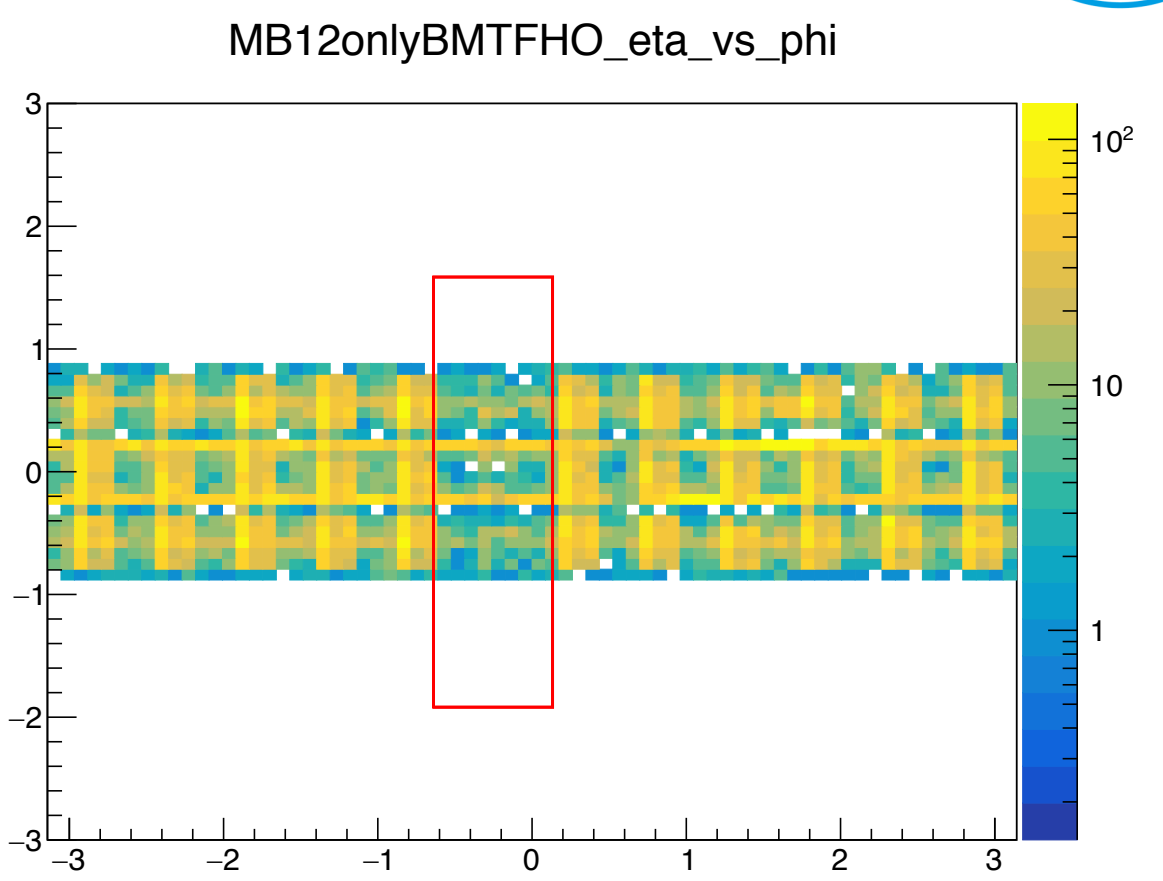
NEW SCHEME

- Since we have HO and MB1 information at the TwinMux, we can do the study with the real data.
- Since BMTF requires at least 2 different muon station to form a track, we can estimate the consequences of MB1 switch off.
- Study in MB1 failure (switch off) on the MB12 BMTF and how much HO can recover playing the role of MB1.



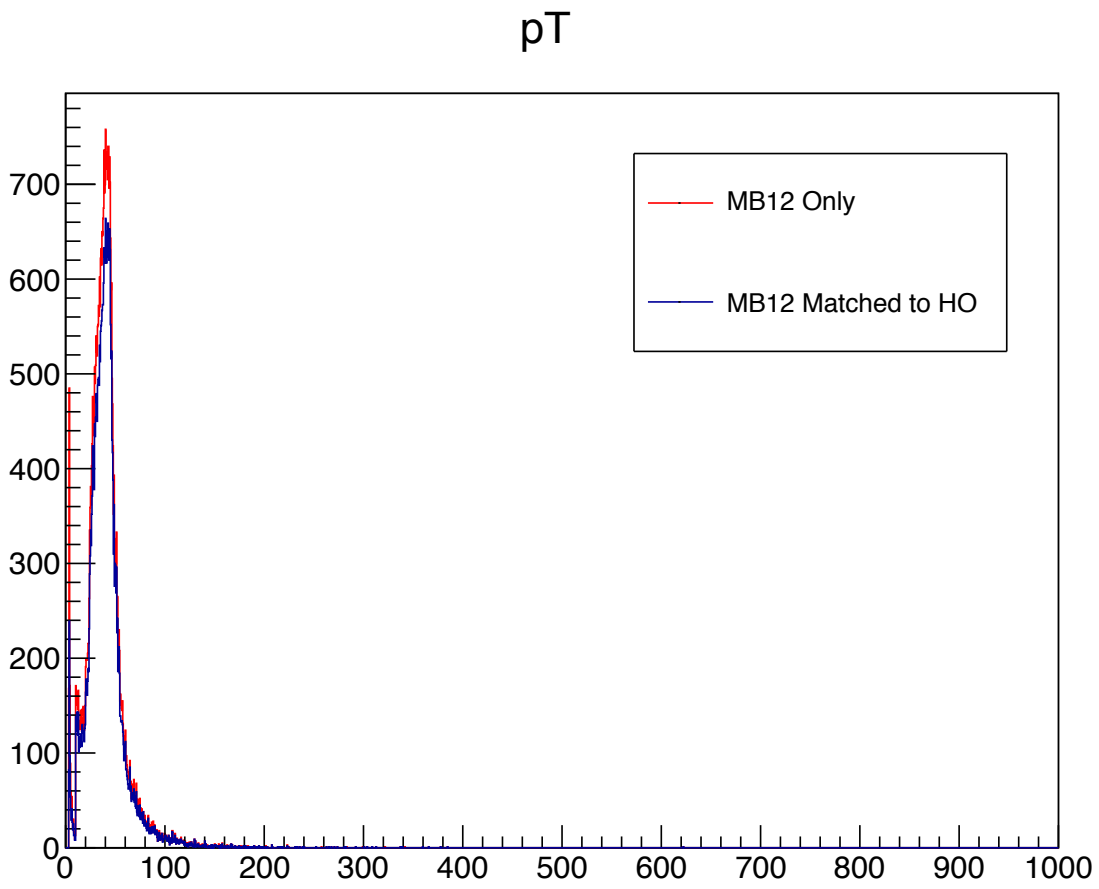
RESULTS





Reasonable distribution and green spots are due to the wheel/sector gaps

RESULTS



Reasonable pT distributions for both MB12 and MB12+HO and it can be used for father study in pT resolution but looks like the efficiency will also drop like in MB34 case