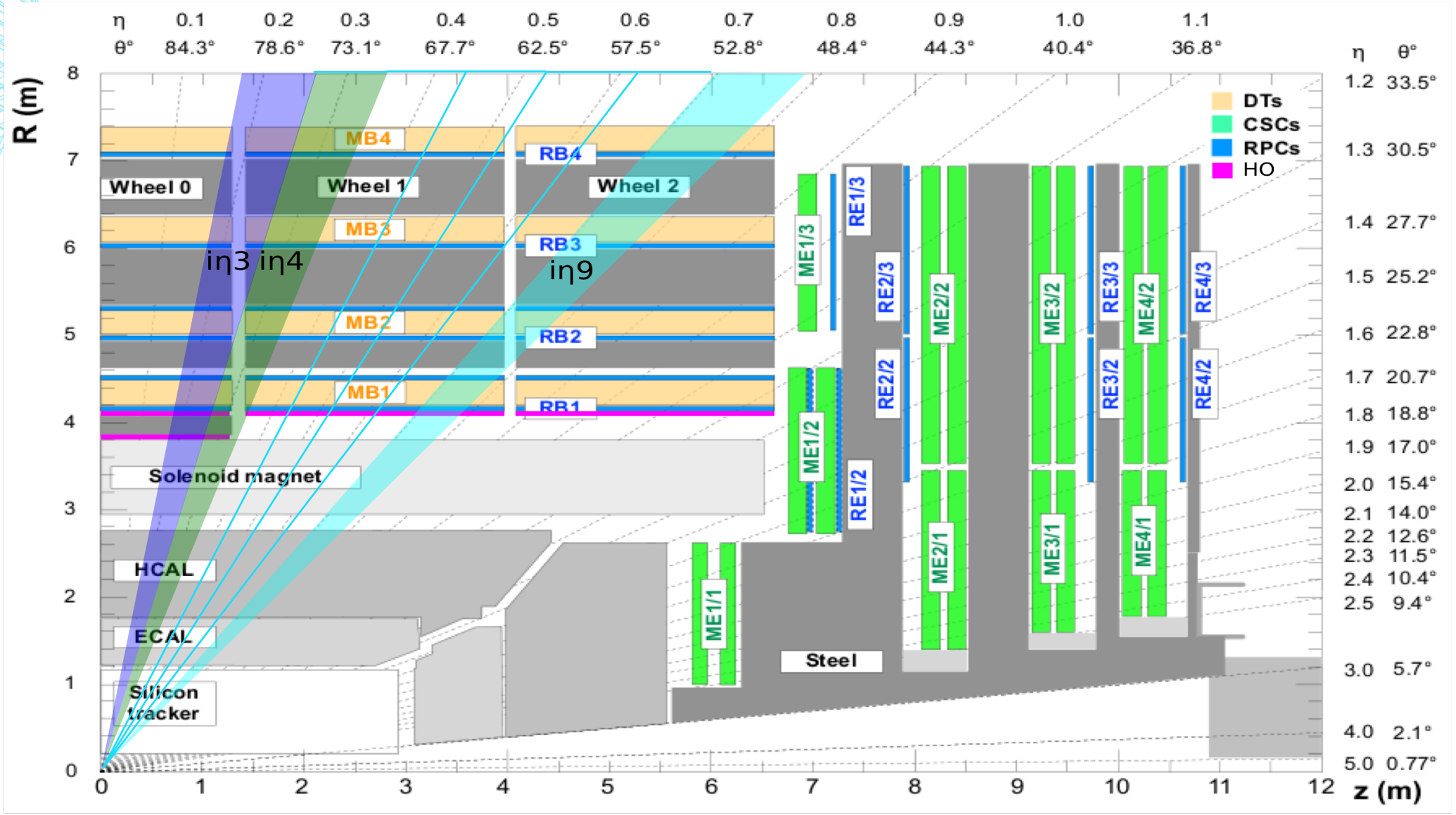
HO MB1 REDUNDENCY

Ashraf Mohamed

DESY, RWTH AACHEN III A

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

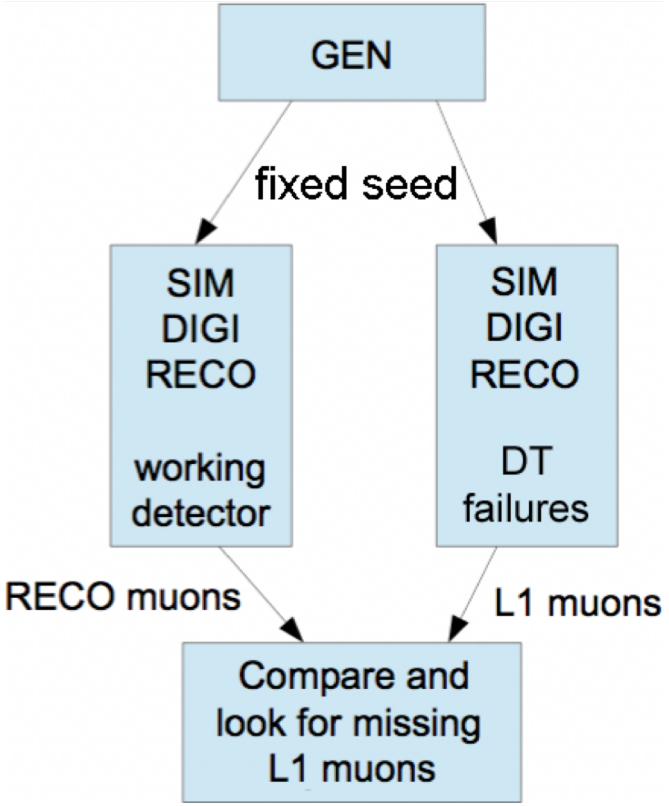
HO SEGMENTATION



MB1-HO redundancy

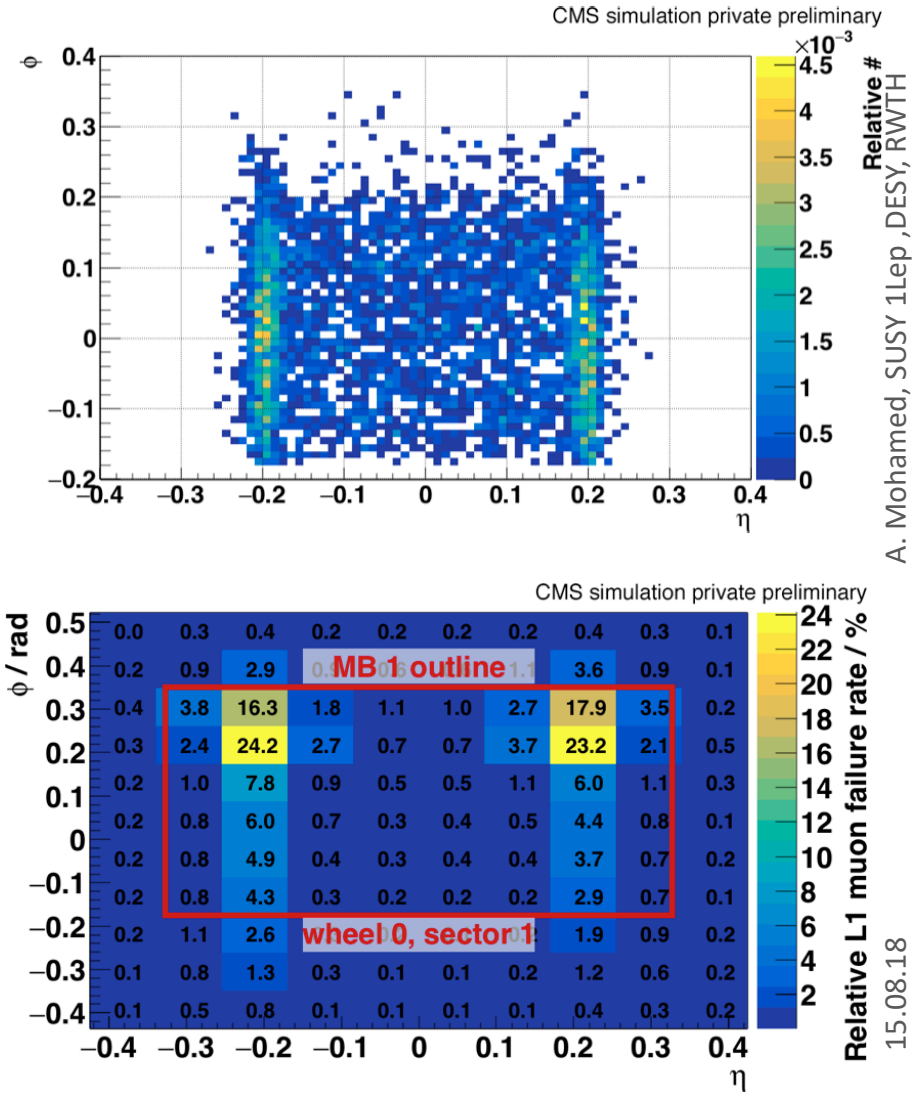
OLD SCHEME

- 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.



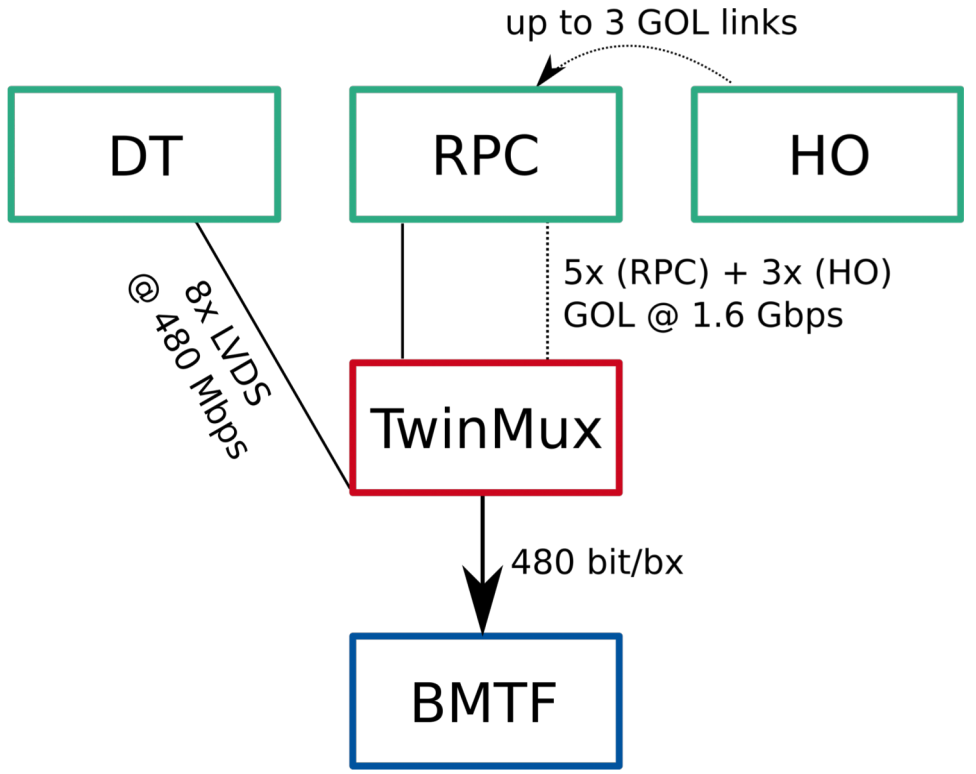
OLD SCHEME

- 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.



NEW ALGORITHM

- Getting the BMTFs that are matched to muon TP in the same station and wheel and then apply Δϕ cut of 0.4. (excluding wh+/-2)
- Match these tracks with reco-muons with ΔR < 0.4.
- Choose the fraction of these BMTF tracks that are formed only with MB12 information. (they will be completely lost if MB1 is out of service)
- Find the nearest HO hit to the MB12 track and match with ΔR of 0.4.
- Once the HO MB12 matching fulfilled apply some extra geometrical cuts[1*]
- Categorize MB12 HO matched tracks according to at which MB station HO coincidence founded. MB1+HO ---> HO matched to MB12 tracks and DTTP coincidence in MB1 … and so on

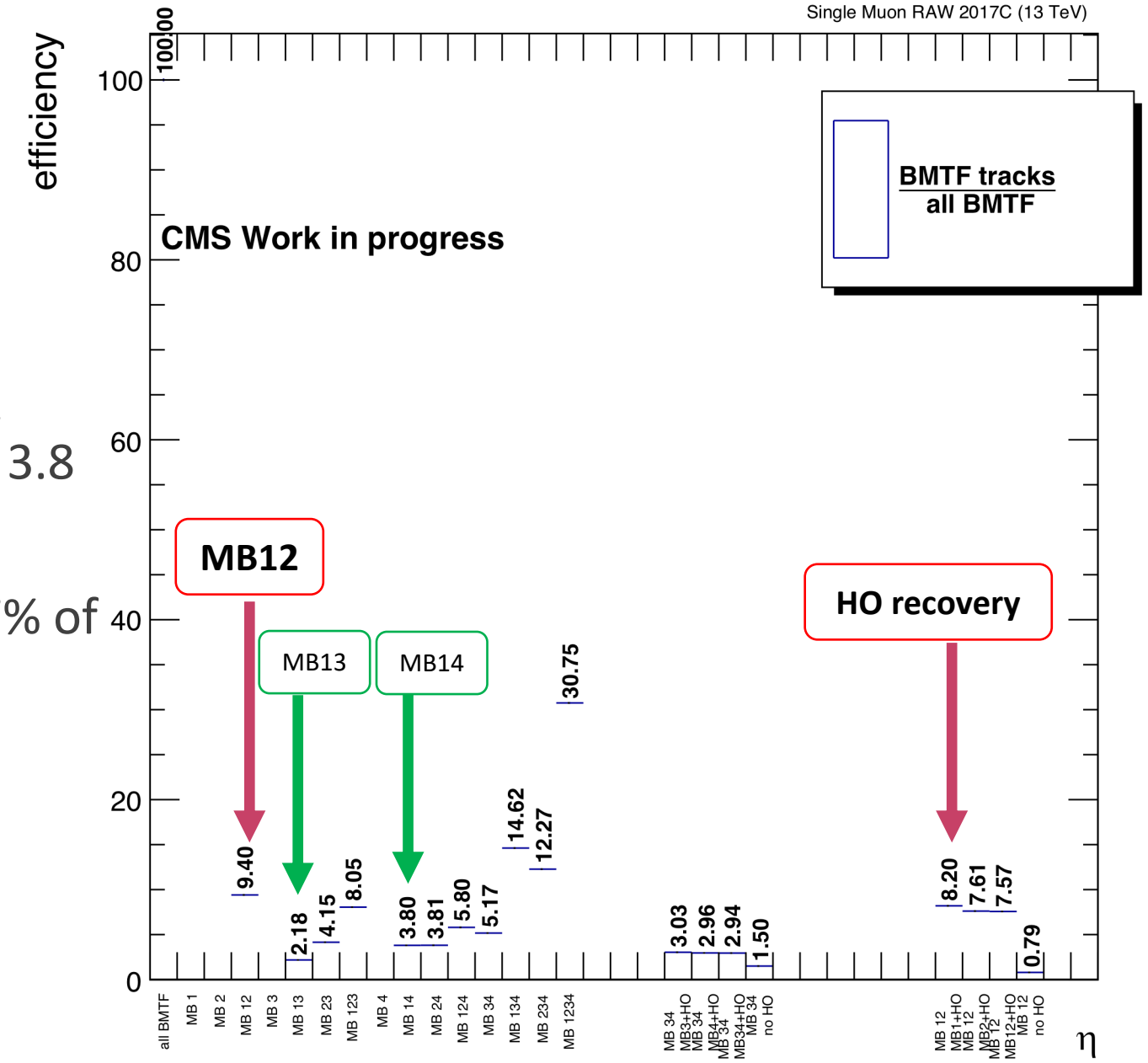
[1*]- HO in iEta1/2/3/4, MB1 in wh0.
- HO in ieta4 allow to be in wh0/wh1.
- HO in iEta4, MB2 in wh1.
- HO in iEta5/6/7/8/9/10, MB1 in wh1.
- HO in iEta4/5/6/7/8, MB2 in wh1.
- HO in iEta9/10, MB1 in wh1.
- HO in iEta7, MB1 in wh1.
- HO in iEta10, MB2 in wh2.

Results and interpretations

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

RESULTS

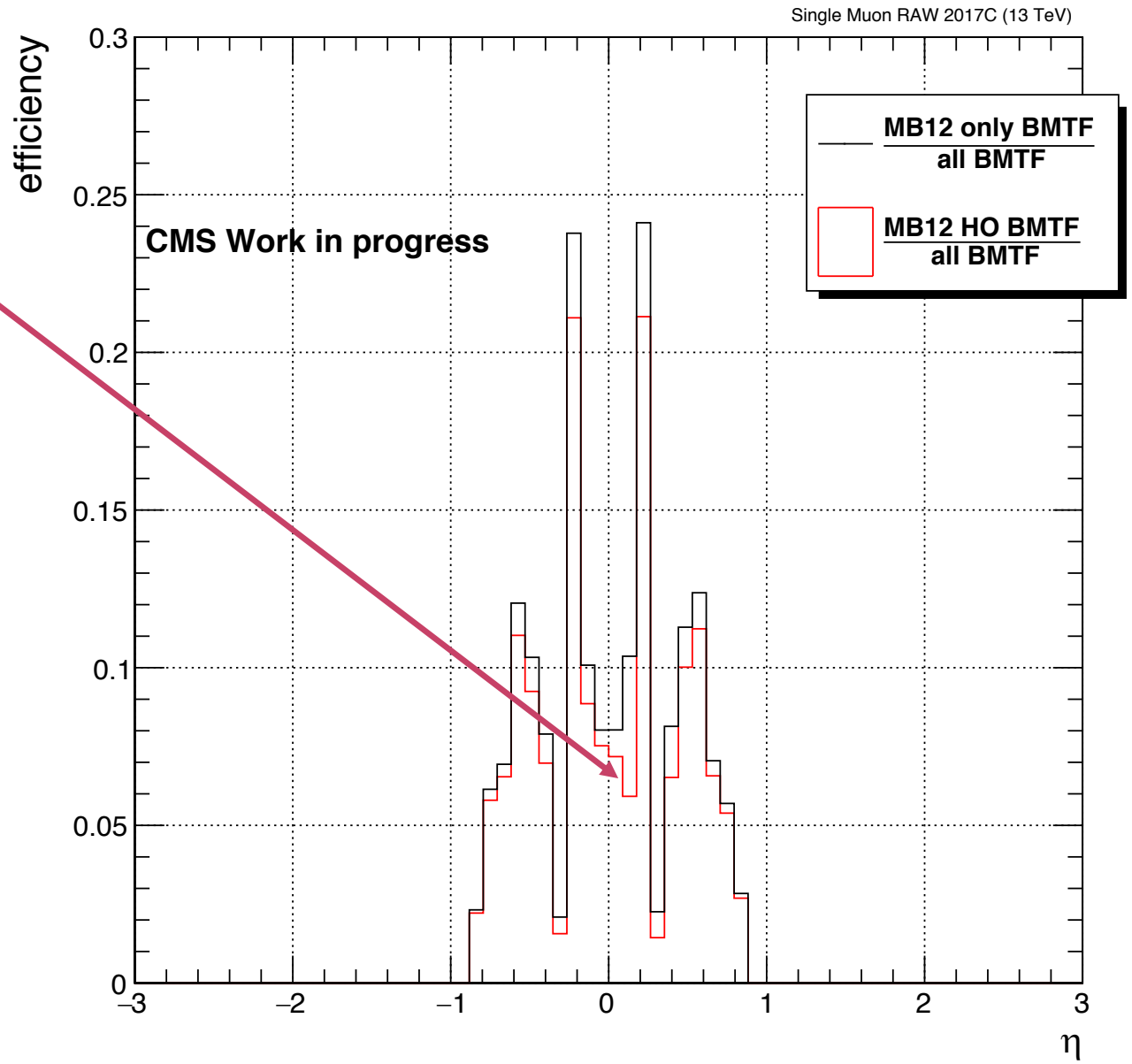
- 9.4% will be lost from MB12 tracks, 2.18 from MB13 and 3.8 from MB14
- HO can recover 8.2% i.e ~87% of the lost MB12 track can be recovered.



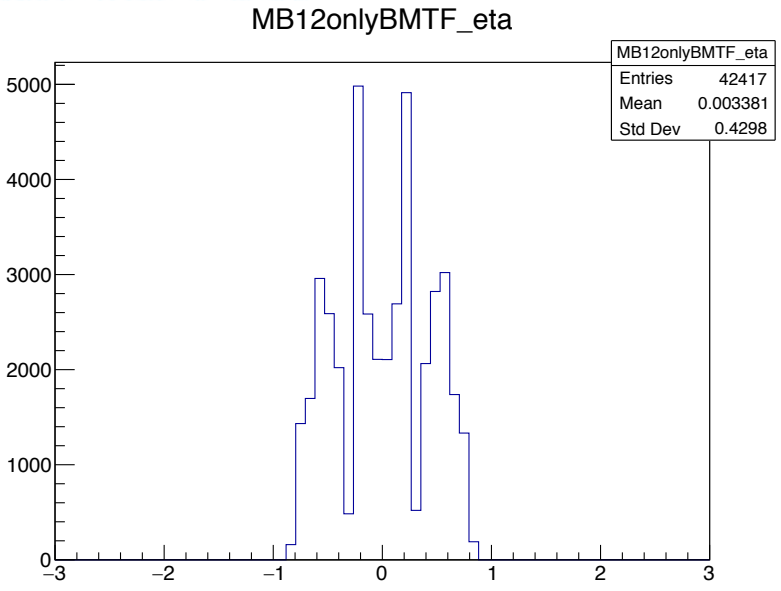
RESULTS

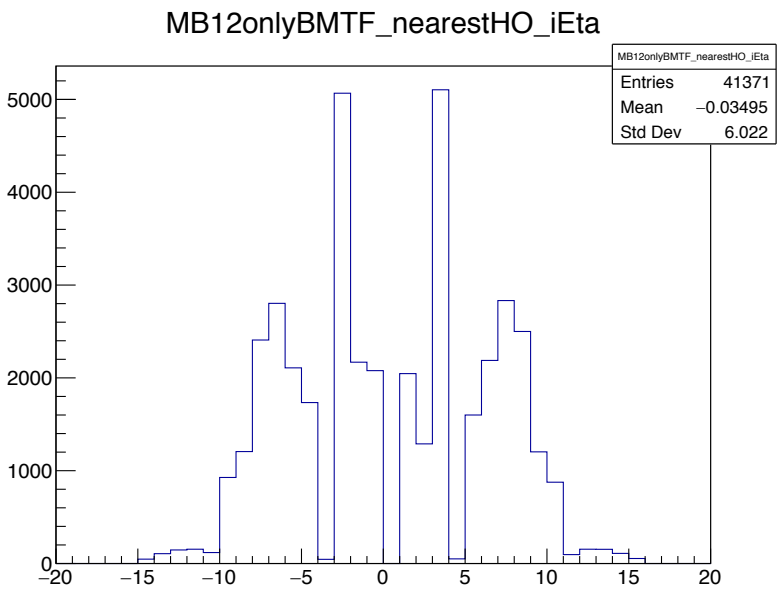
HO/MB1 inefficiency spot

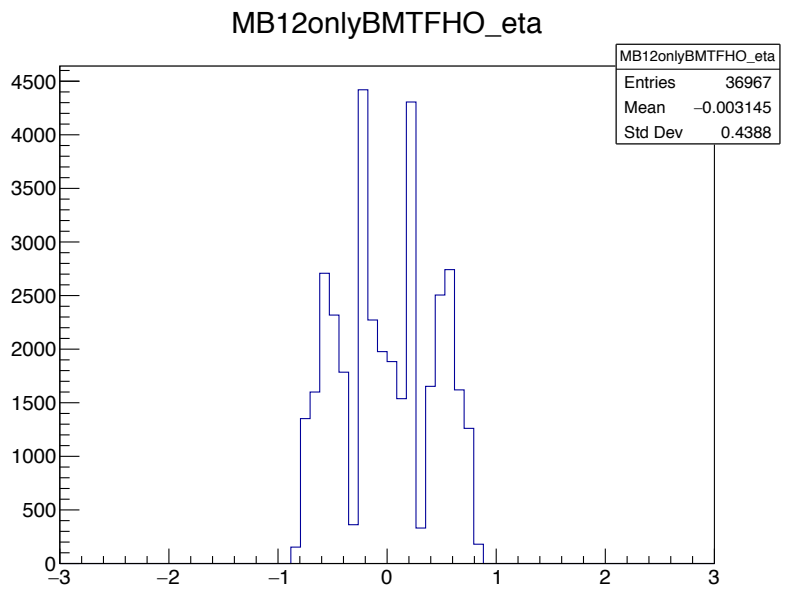
- In iη ~ +2 some inefficiency in recovery.



RESULTS

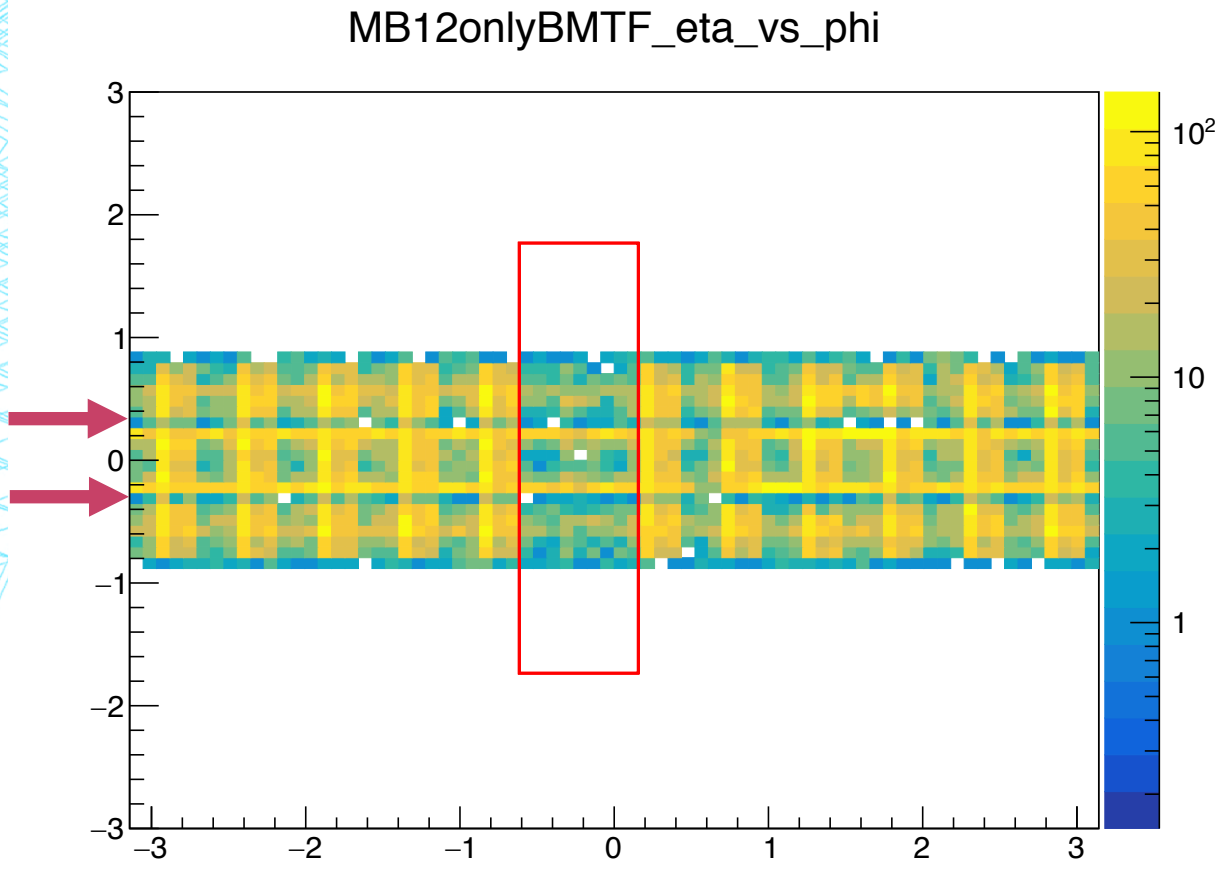


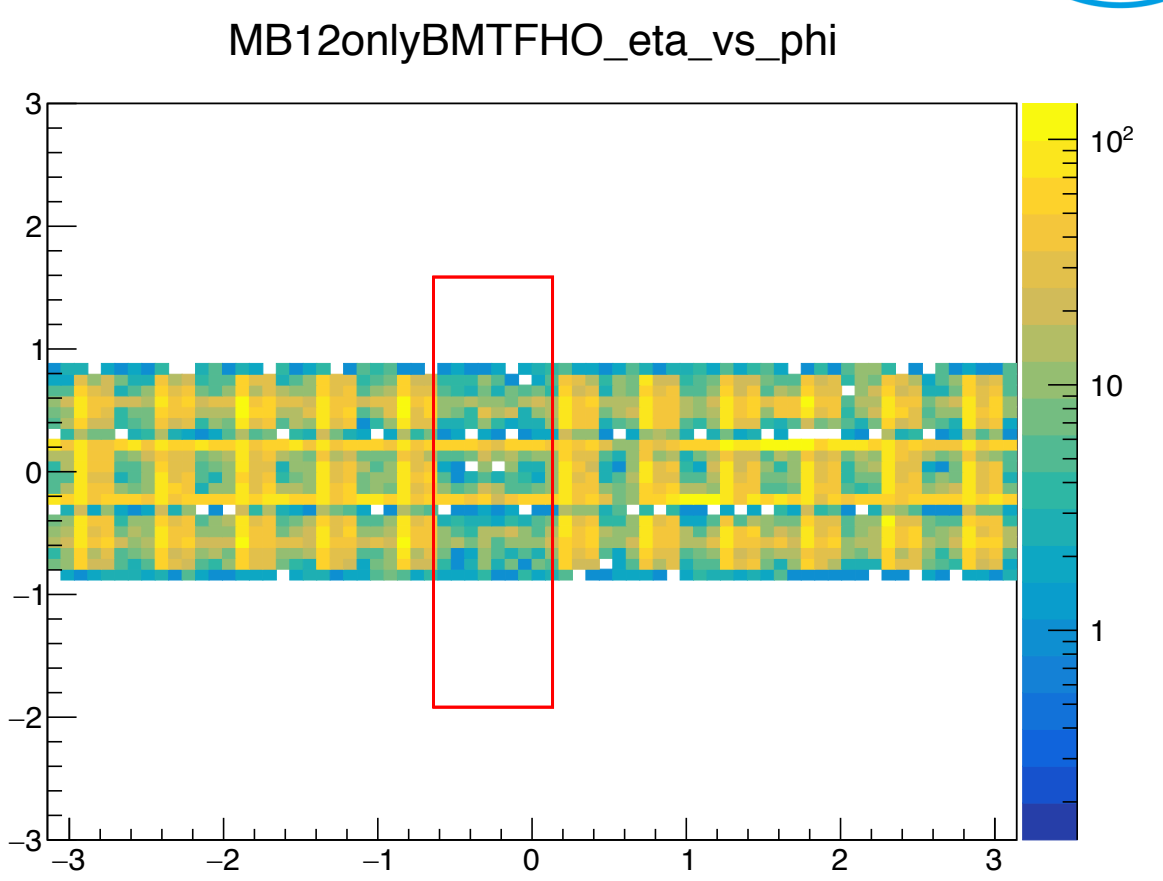




Before matching HO with BM12 we look for the nearest HOTP to match with.
For this iη we don't have as much as MB12 BMTFs to match with.

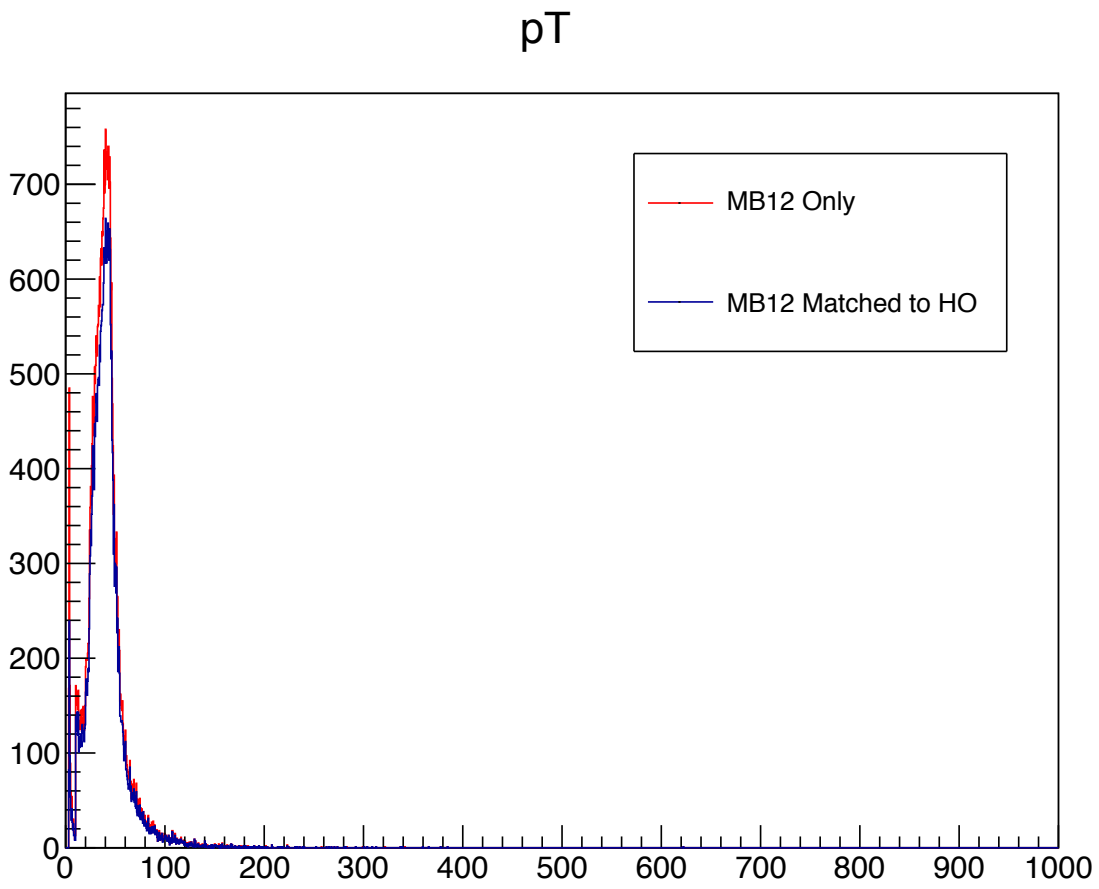
RESULTS





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

CONCLUSION

- Study on HO L1Mu recovery to MB12 type tracks has been presented.
- L1Mu will loose 9.4% from MB12 only.
- HO can recover 87% of them.
- L1Mu will loose 2.18 % and 3.8% from MB13 and MB14 respectively.
- MB13, MB14 recovery study will be done soon.

15.38% will be lost from the L1Mu due to MB1 switch-off.
HO can recover 8.2% from MB12 type track only.

Danke

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Thanks