

Recent update on H0 trigger

HO Trigger Weekly Meeting

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Overview

- > Unpacker is well tested on 2017B dataset
 - Validity of new Emap was most critical to establish, has been done. ~98 % consistency has been cross-checked.
 - I have push my private code setup of unpacker in branch **hotp-unpacker** in github
- > Now, the commissioning of the links is ongoing using the unpacker testing. I have spotted two issues:
 - No safeguard for useless data in TwinMUX, example: data corresponding to unconnected fiber is also accepted
 - Some highly spurious TP are present and correlated to bunch crossing number
- > Presented the status in Tuesday's L1 Trigger meeting [*].
 - Suggestion was to use 'valid' bit in TwinMUX payload, which should raise flag for not-good data.
- > Implemented this 'GoodDataMarker-flag' (ie Valid) in unpacker, tested on same 2017B dataset, results are shown...

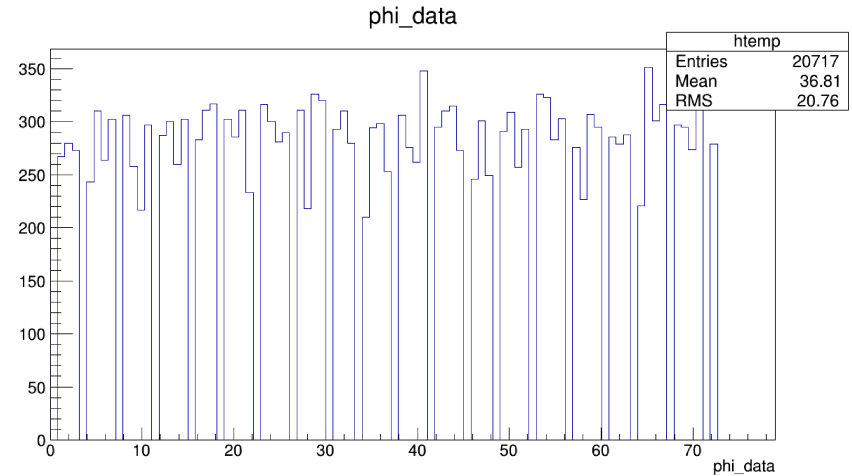
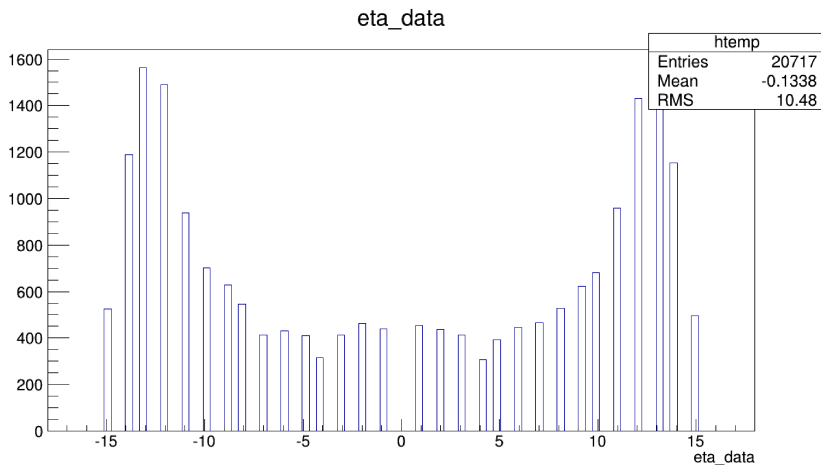
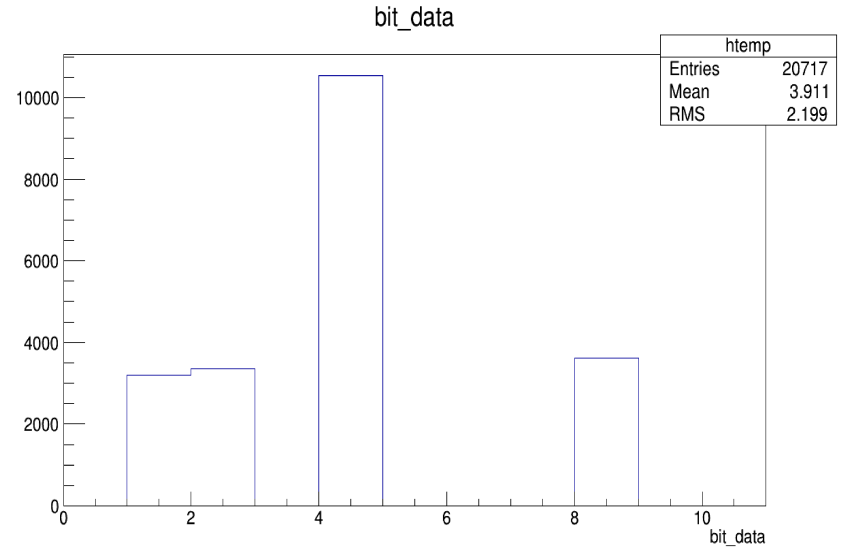
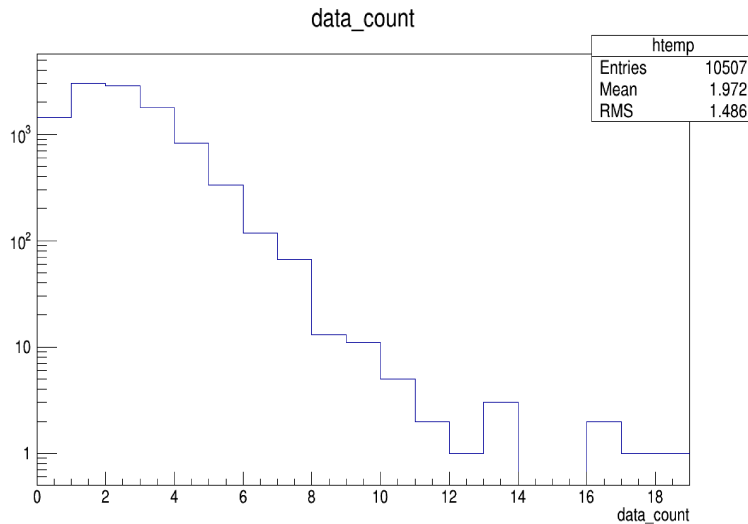
[*] <https://indico.cern.ch/event/655486/>



HO TPs from HCAL FEDS



HO Tps from HCAL FEDs



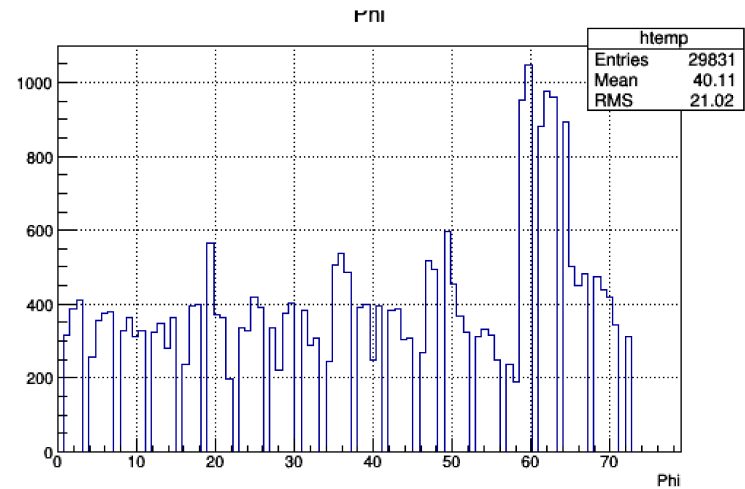
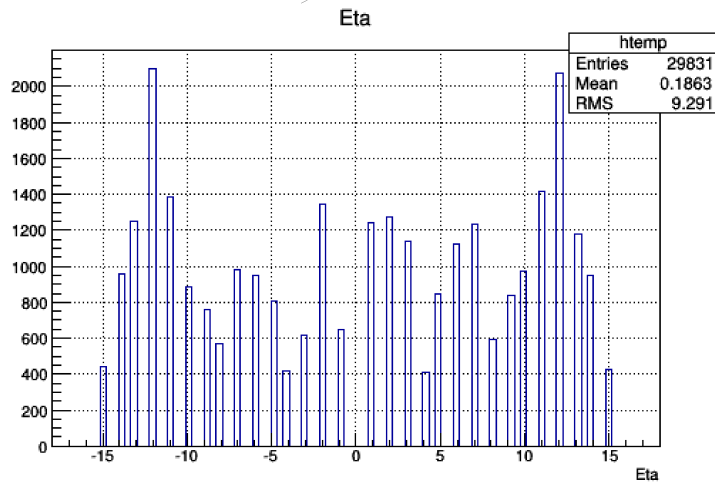
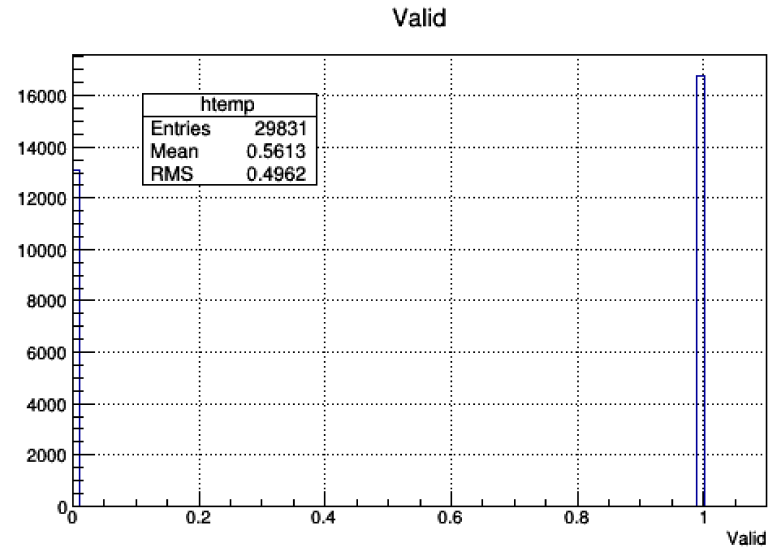
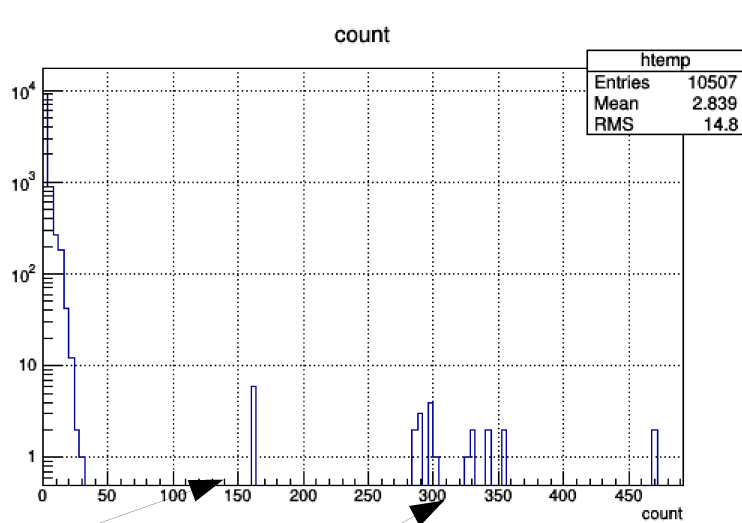
- TP distribution (data_count) looks reasonable and maximum value is less than 20.



HO TPs from TwinMUX FEDS



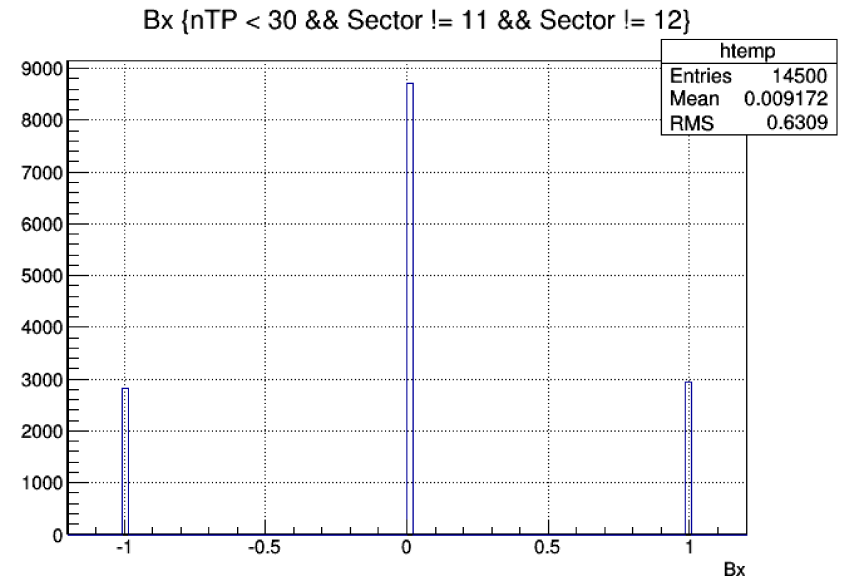
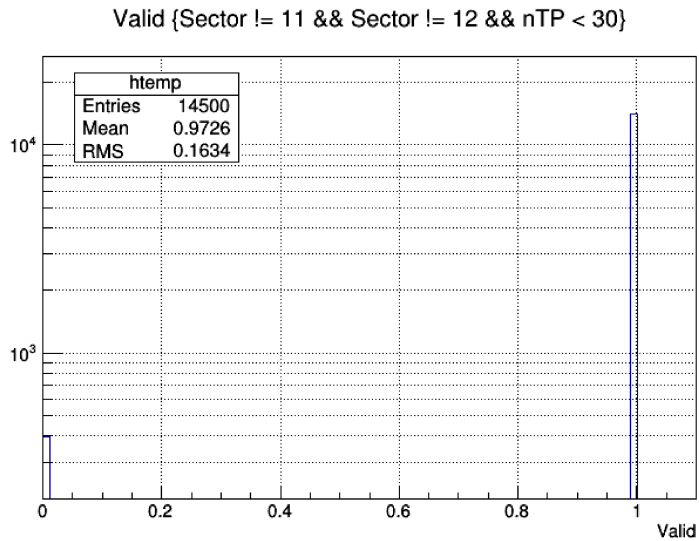
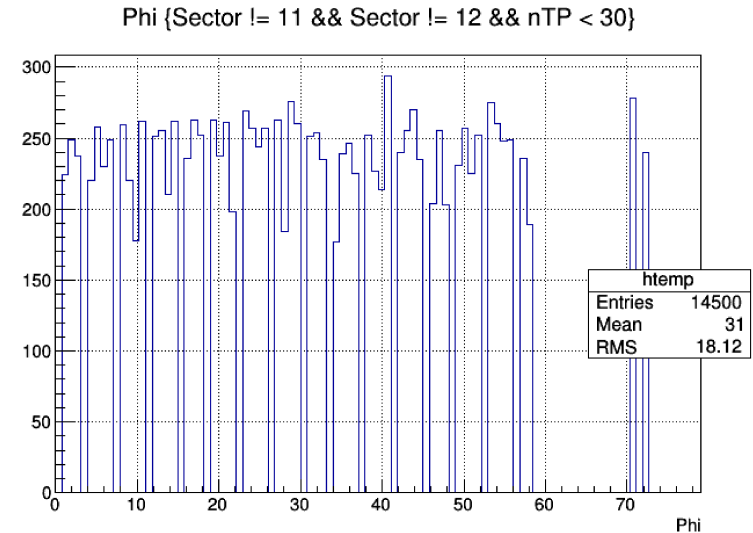
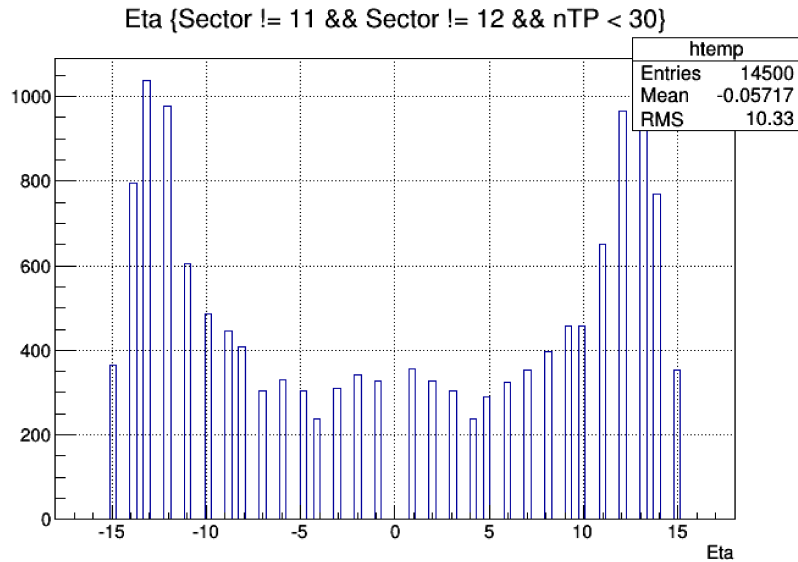
TwinMux HO TPs / No Selection



- Spurious Tps (count) are visible (nTP > 20), not expected
- TPs are consistent with HCAL TPs for 56% cases, ie. valid is high for 56%

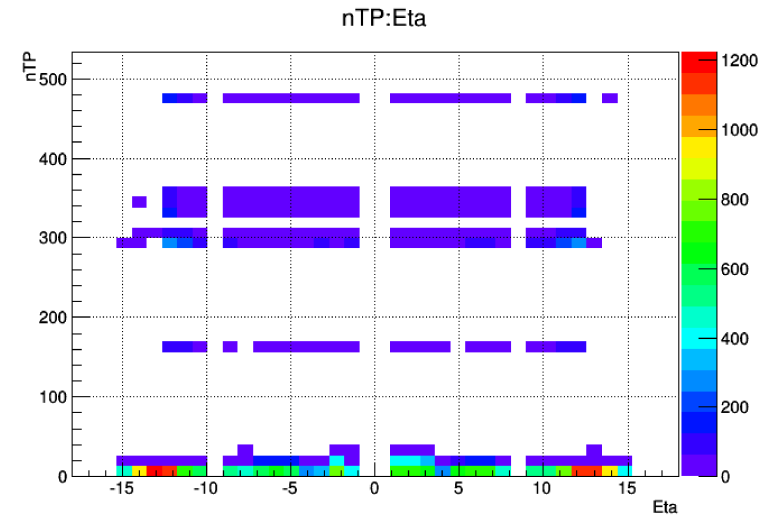
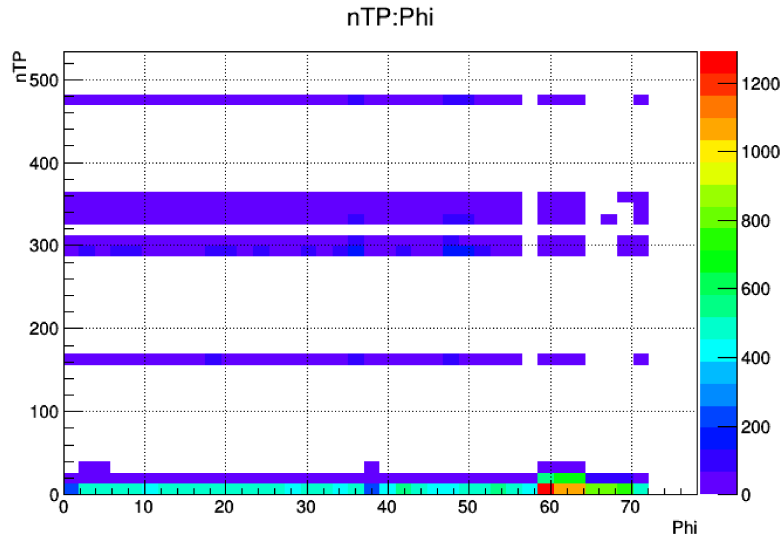
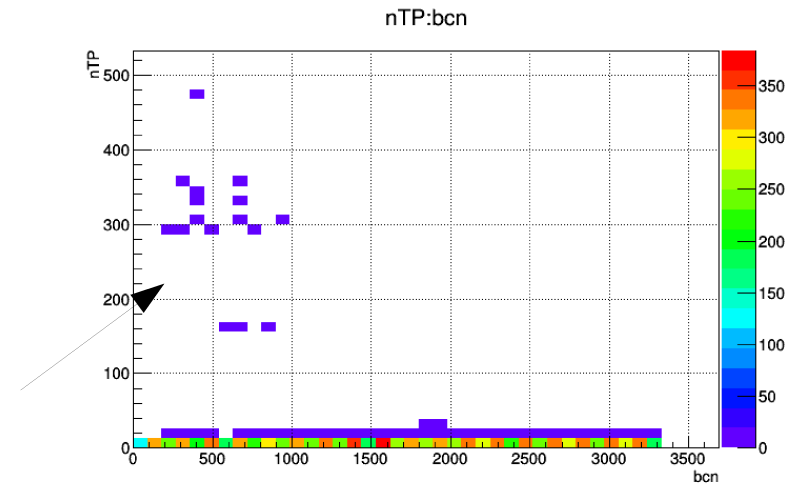
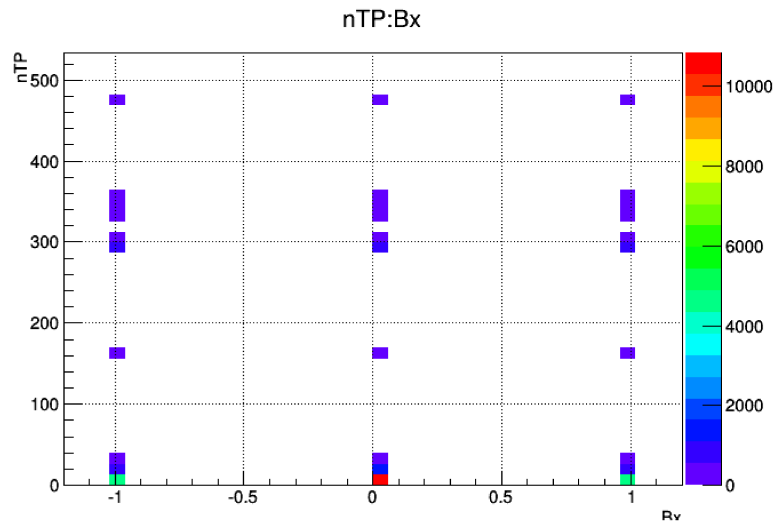


Selection : Sector != (11,12) && nTP < 30



- Above selection reduced this to 48%
- Out of this 48% events, valid is high for 97%.

Peaking into Spurious Tps / 2D distributions



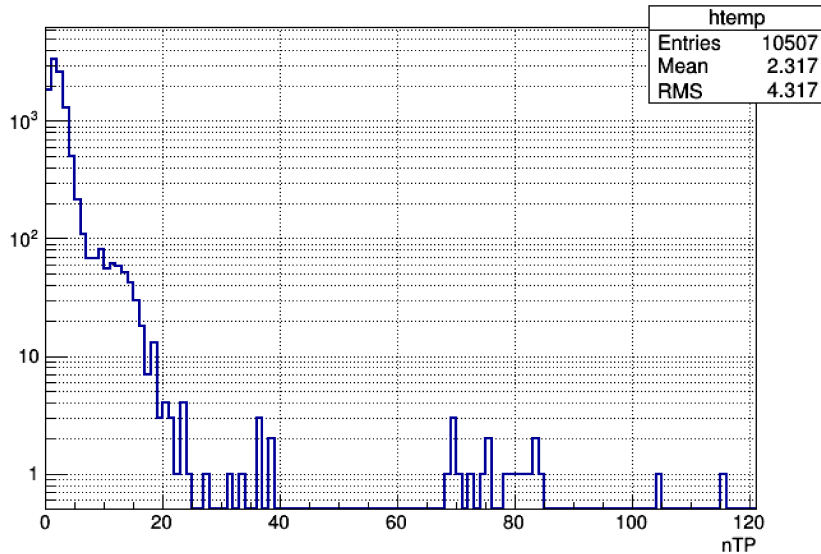
- Higher inconsistent TPs are correlated with bcn (bunch crossing number)

HO TPs from TwinMUX FEDS
(GoodDataMarker flag ON)

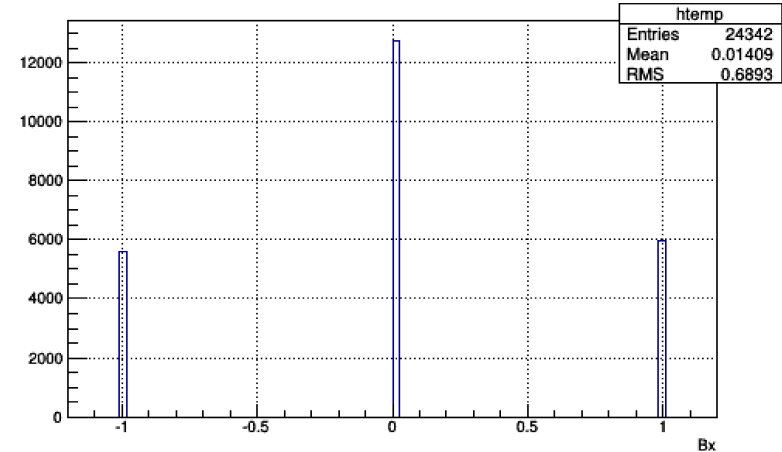


No Selection

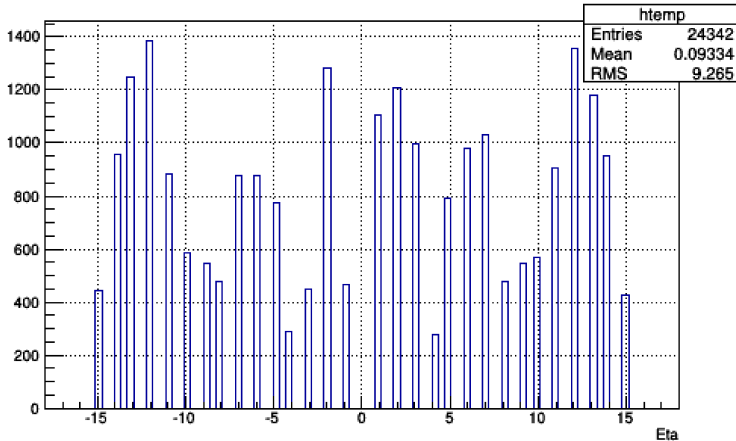
nTP



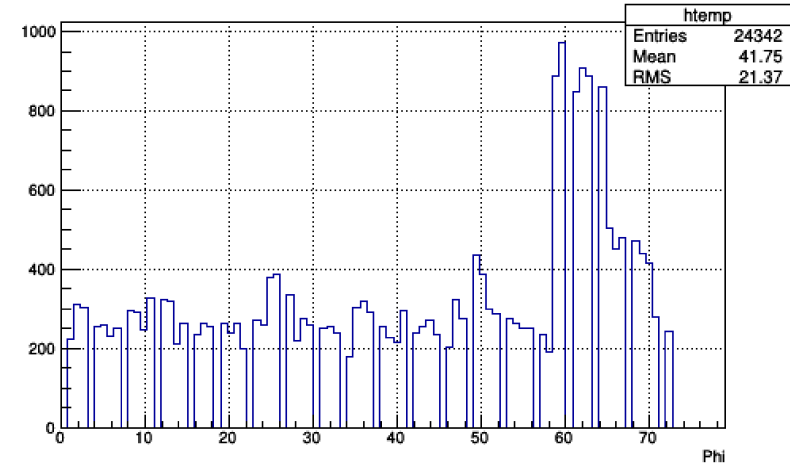
Bx



Eta



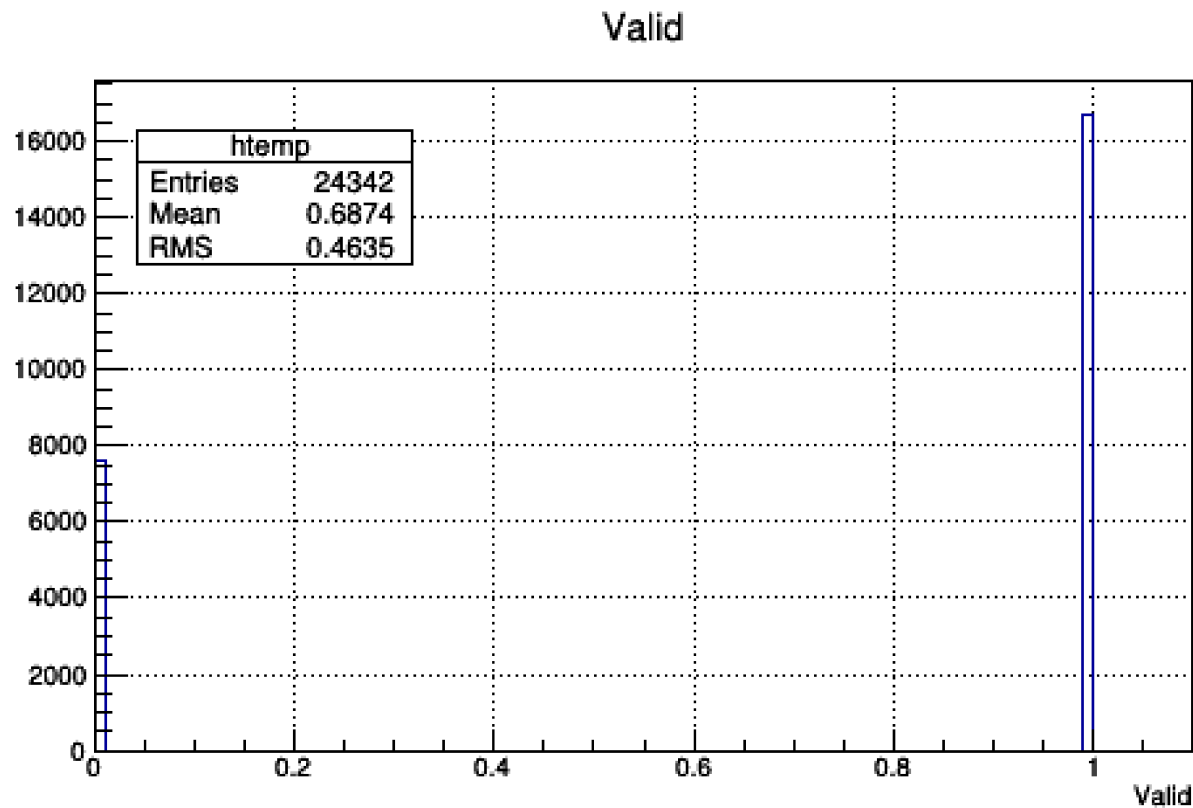
Phi



- TP drops to 18% with GoodDataMarker check
- Spurious TPs are still present, less than 1% though.
- Sector 11, 12 still seem to have the issue.



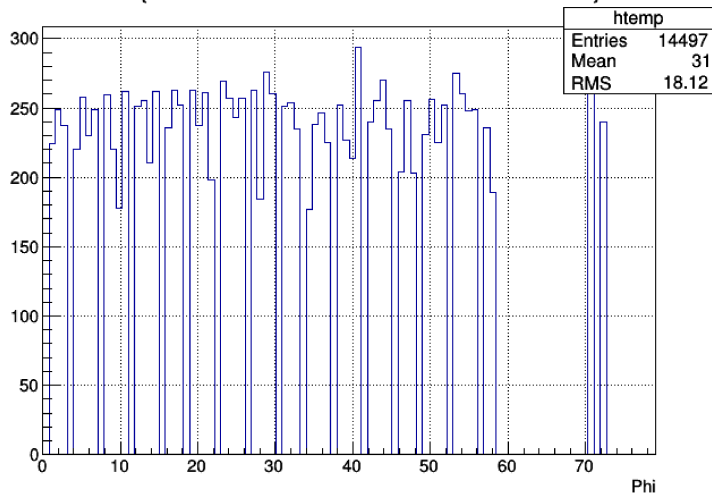
No Selection



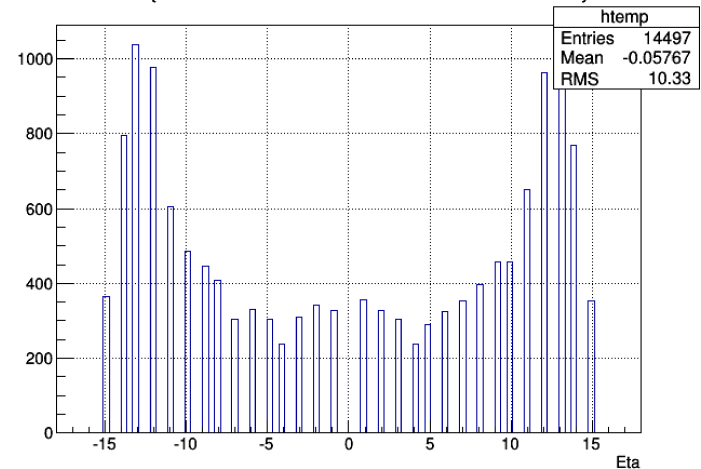
- Valid is high for 68%

Selection : Sector != (11,12) && nTP < 30

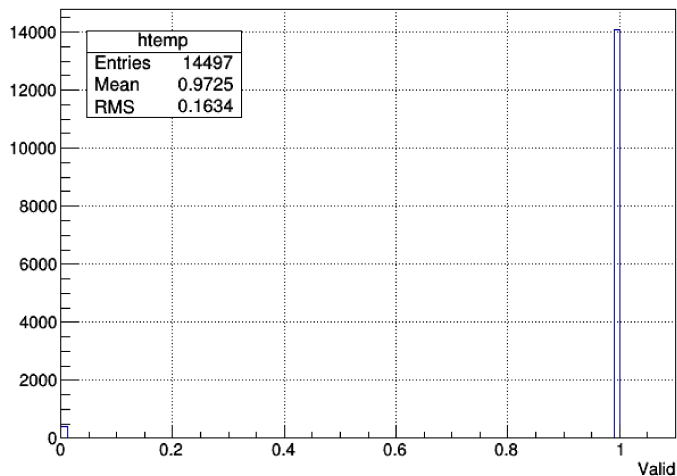
Phi {Sector != 11 && Sector != 12 && nTP < 30}



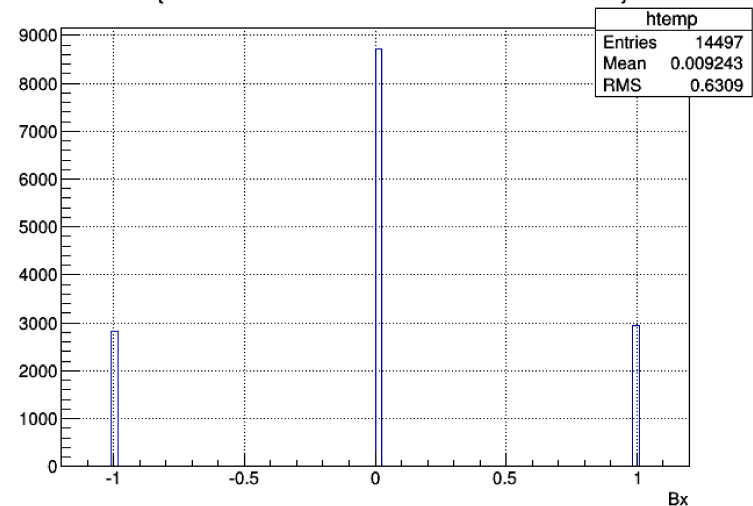
Eta {Sector != 11 && Sector != 12 && nTP < 30}



Valid {Sector != 11 && Sector != 12 && nTP < 30}



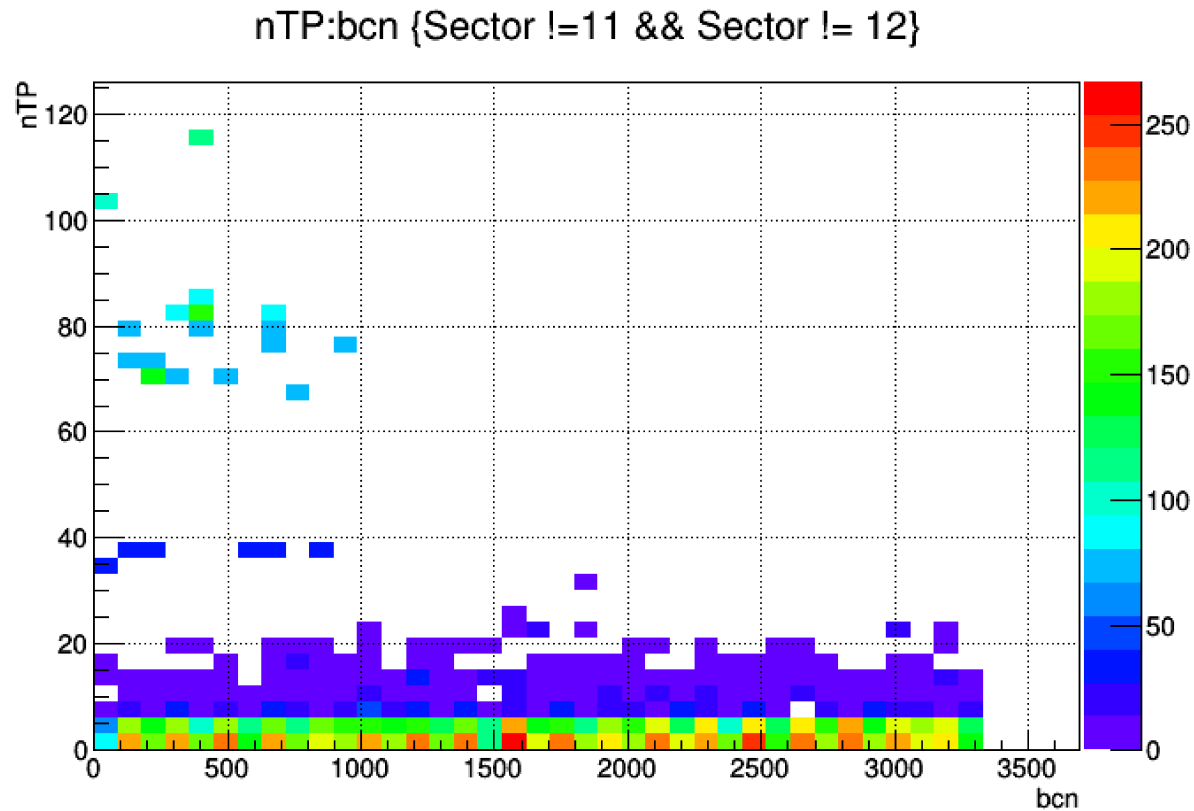
Bx {Sector != 11 && Sector != 12 && nTP < 30}



- Valid is high for ~98%
- Entries (14497) are same as without using this GoodMarker Flag (14500), means it remove the spurious events, but not effectively.



NTP vs bcn



- These spurious events still exist and are correlated with bcn

Summary

- > HO unpacker in TwinMUX is well tested with 2017B dataset.
 - Validity of the Emap is confirmed with the unpacker testing, 98% matched.
- > Now, commissioning of the links are ongoing with unpacker testing. Recently, spotted few cases of spurious HO Tps.
 - Suggestion was to use the GoodDataMarker from TwinMUX payload
- > Tested with GoodDataMarker flag on.
 - helped but not completely resolved the issues.
- > Ashraf and I met with Dick Kellogg. Ashraf is participating with Dick in performing tests at P5.

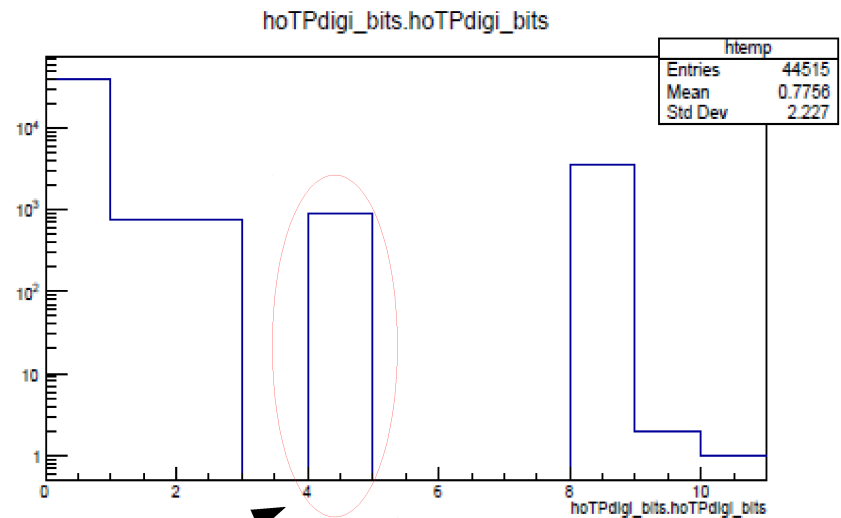
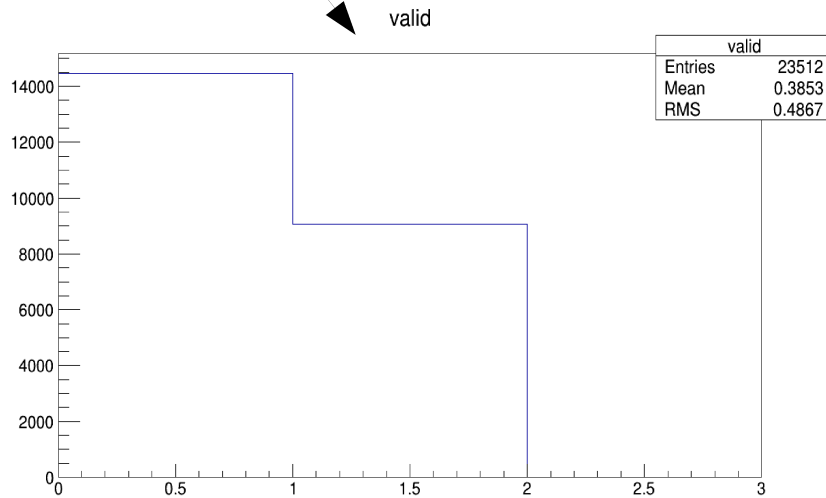


Backup



Unpacker testing / Reminder

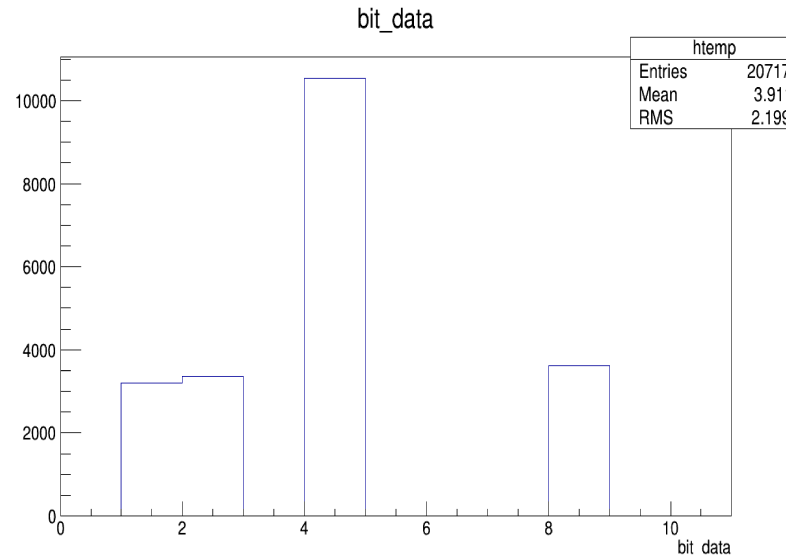
- Unpacker was giving reasonably satisfactory results for collision dataset, electronics map was still remained to be verified.
 - Valid boolean is set to high, when the TwinMUX Tps (eta,phi) are verified by HCAL FEDs.
 - During June, only 40% matching is found.



- HO TP had timing issues (should peak at 4)

Recent Update

> HO HTR Firmware was updated in middle of June to fix the timing issue.

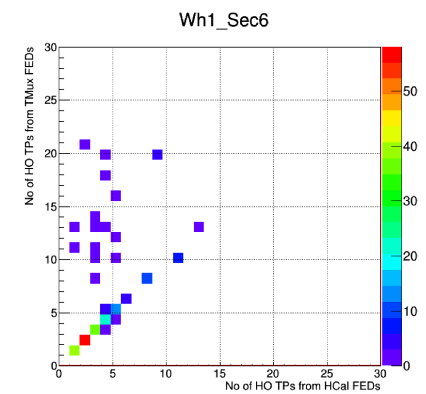
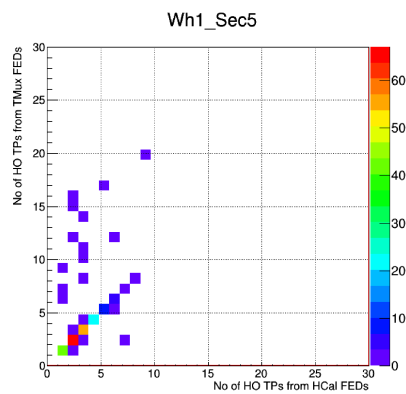
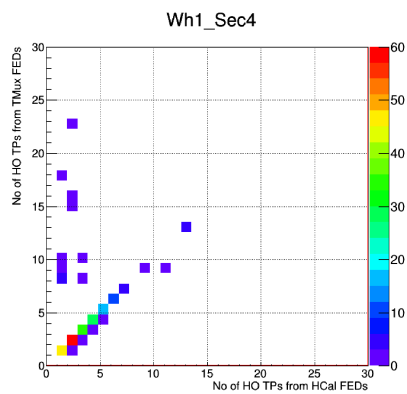
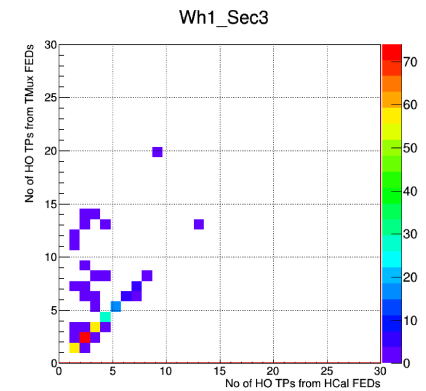
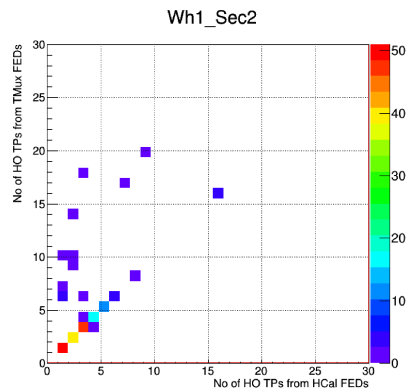
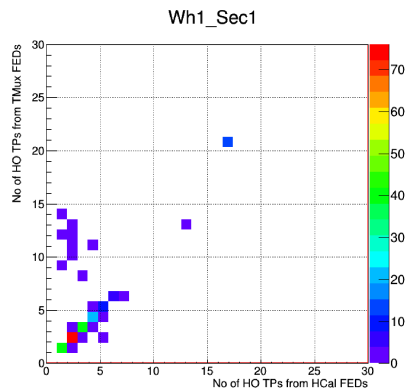


> Performed unpacker testing with latest dataset:

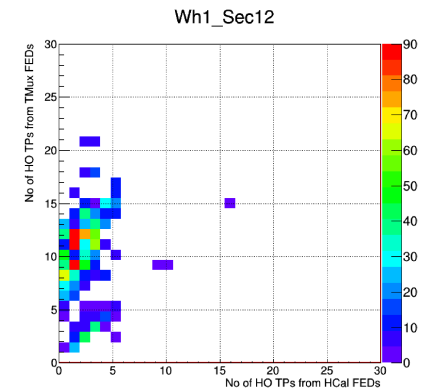
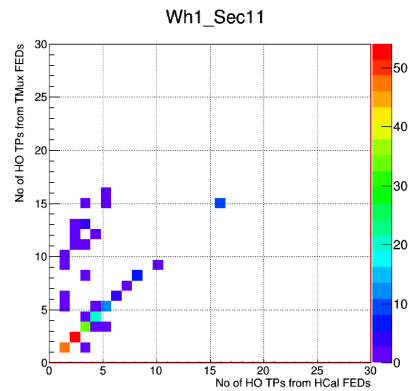
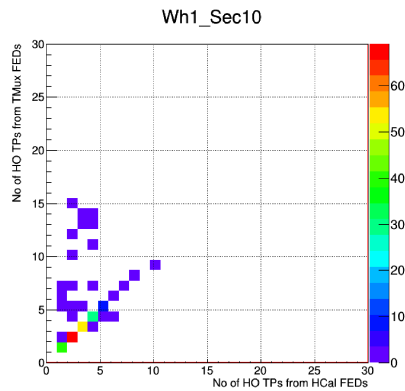
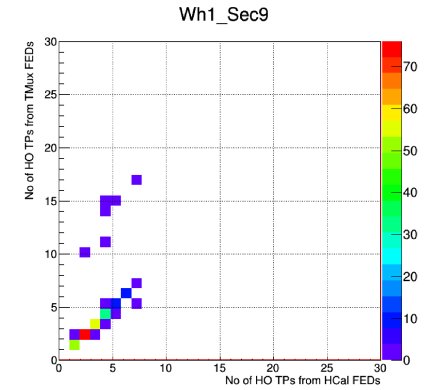
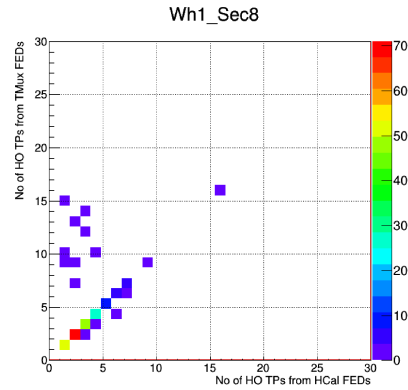
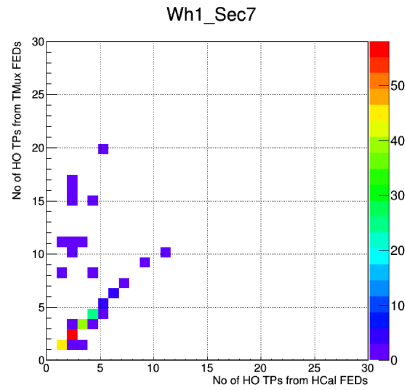
- SingleMuon/Run2017B Dataset
- No of Events : 10507
- Creation date: 24th June (after HO firmware update was applied)



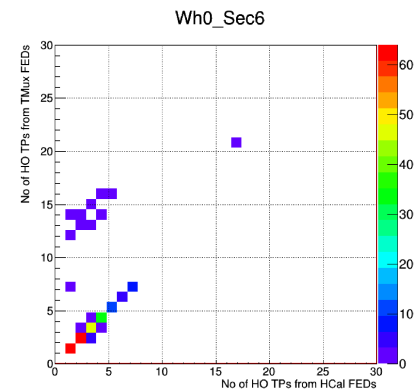
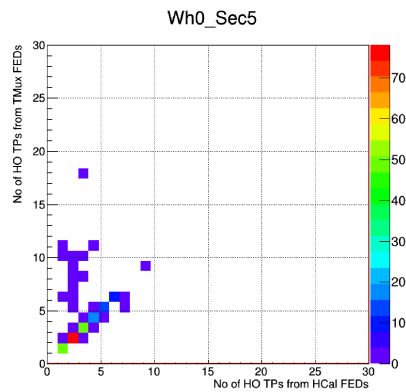
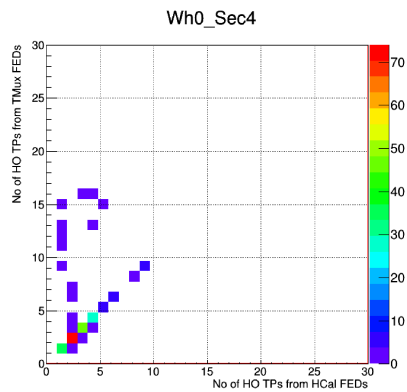
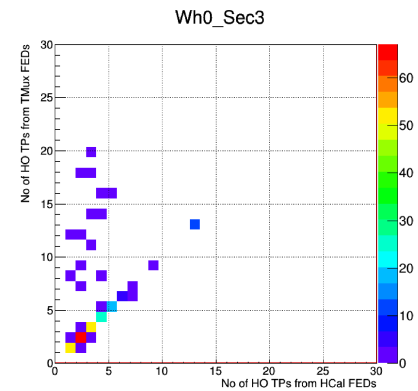
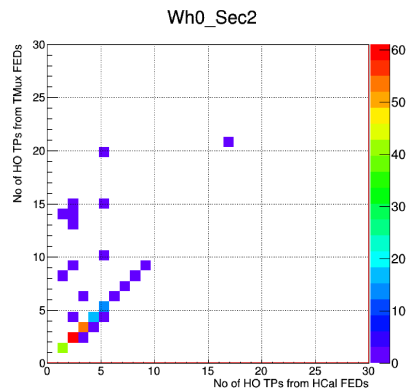
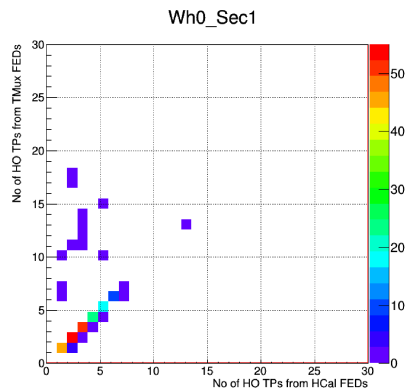
Wheel : 1



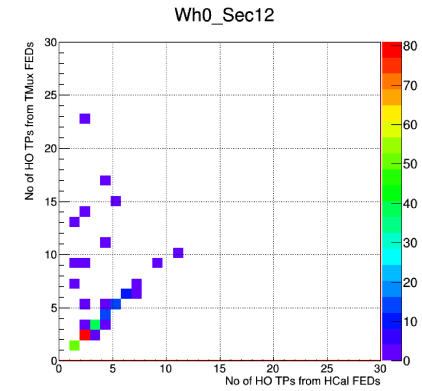
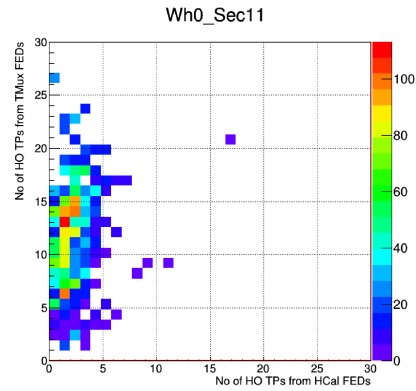
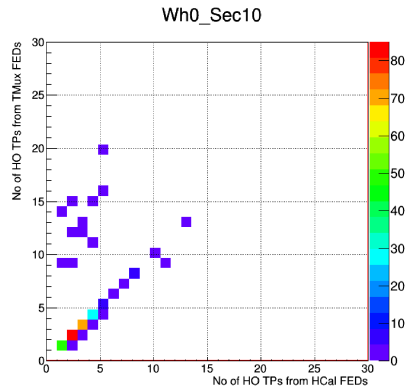
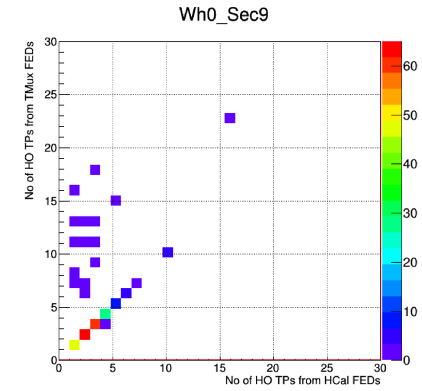
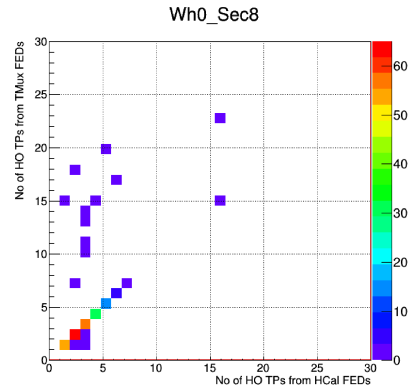
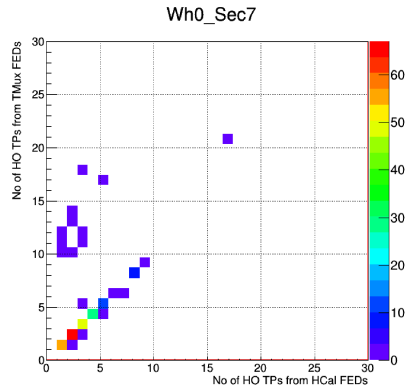
Wheel : 1



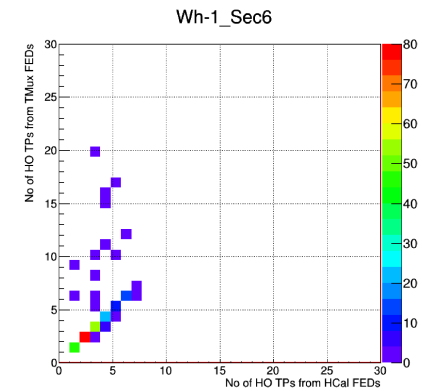
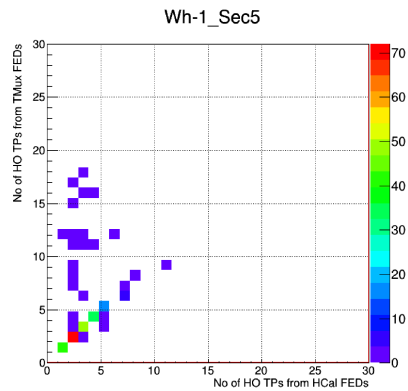
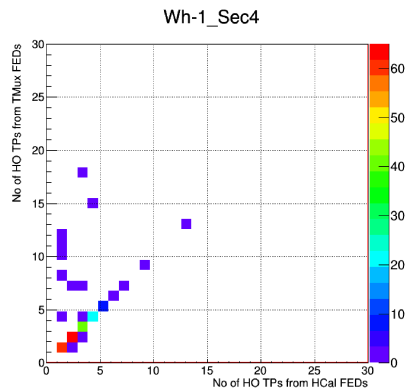
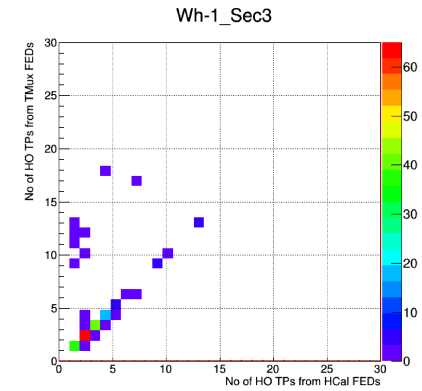
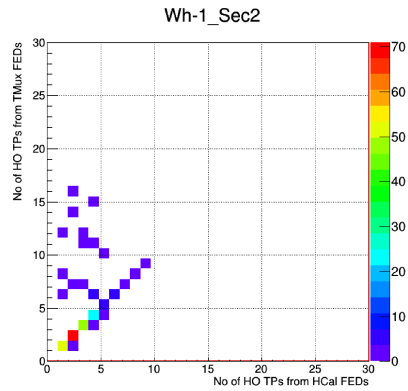
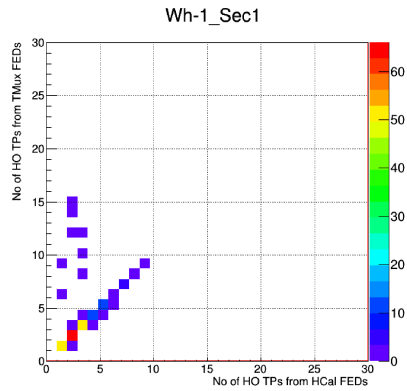
Wheel :0



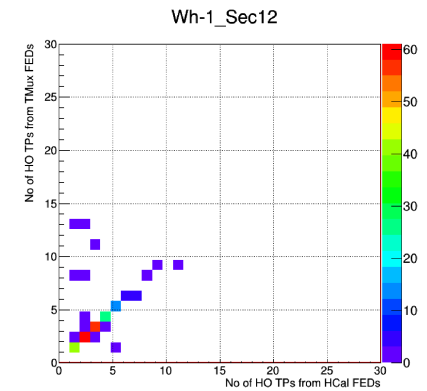
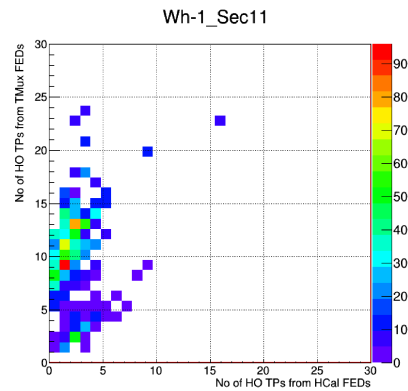
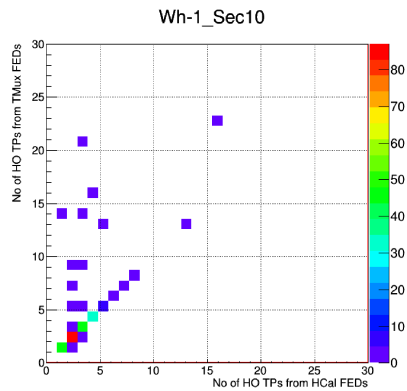
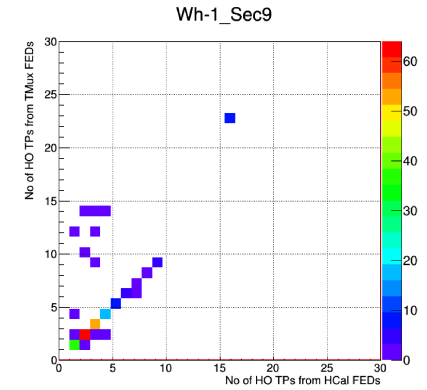
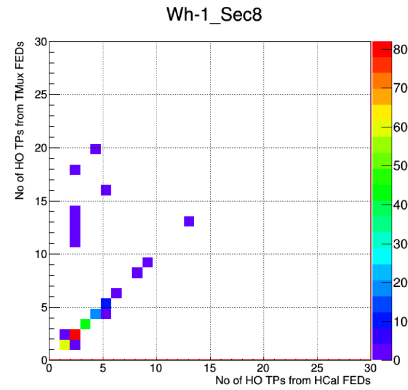
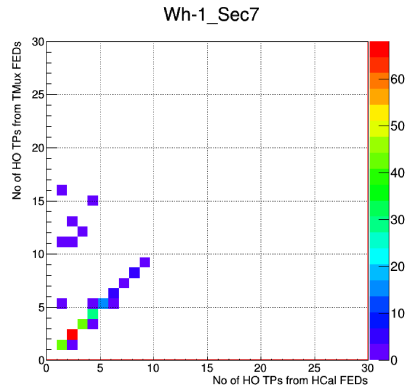
Wheel : 0



Wheel : -1



Wheel : -1



HO Electronics Emap

- > Prepared the Electronics Emap from TwinMUX link, index to HCal local coordinates ($i\eta, i\phi$) for whole HO detector
 - Using this as local txt file for unpacker testing
 - > Working on validity of HO TPs in TwinMux with TPs from HCal FEDs
 - > Conversion to coordinates required by TwinMux
 - Will request to add this Emap in database of L1 trigger.
- > Additional remarks:
 - New HO TP class (HOTPDigiTwinMux) is in CMSSW^[1]
HOTPDigiTwinMux(int ieta, int iphi, int bx, int mip, int validbit, int wheel, int sector, int index, int link)
 - New Electronics class for this EMap need to be written

^[1] <http://cmslxr.fnal.gov/source/DataFormats/L1Trigger/interface/HOTPDigiTwinMux.h>

