

Recent update on H0 trigger

HO Trigger Weekly Meeting

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Deutsches Elektronen-Synchrotron

July 13, 2017



Unpacker testing

> Dataset Info:

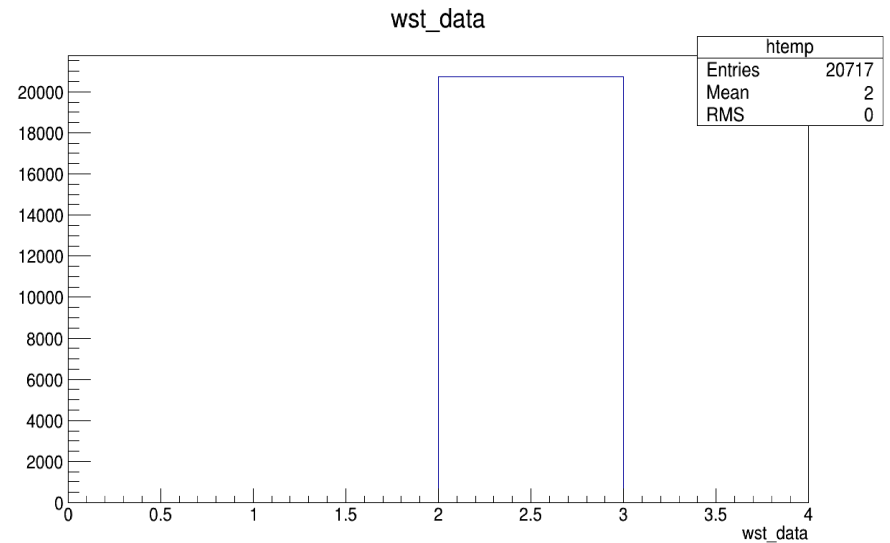
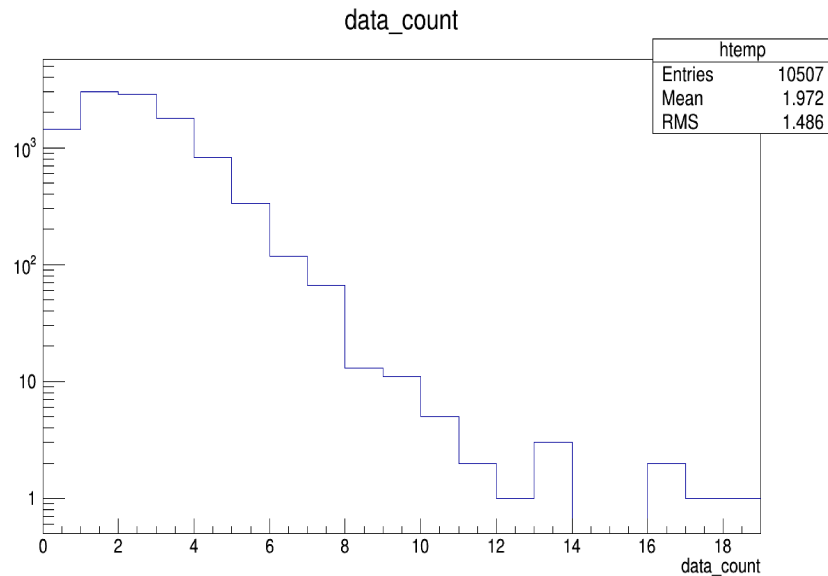
- SingleMuon Dataset
- No of Events : 10507
- Creation date: 24th June (after HO firmware update was applied)



HCal TPs distribution



HCal Tps / No Selection

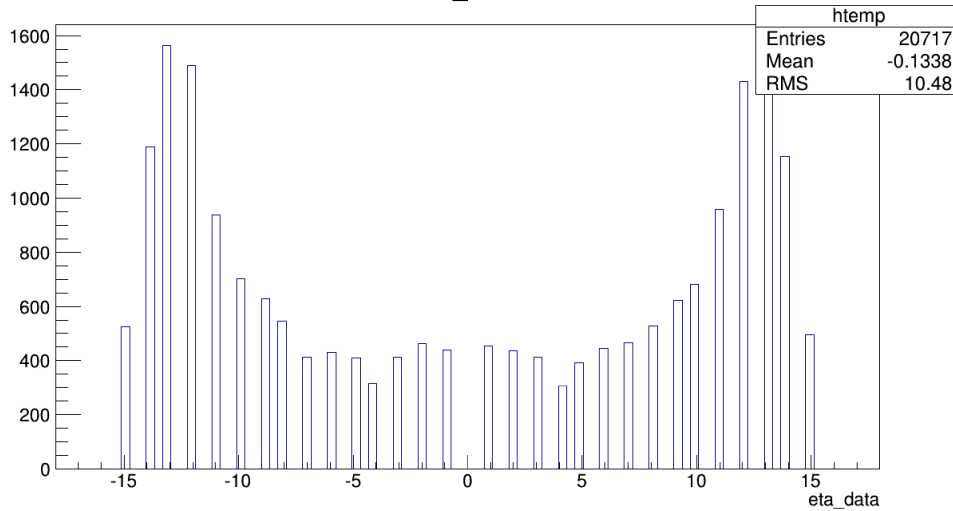


- TP distribution (data_count) looks reasonable as well as which_sample_triggered.

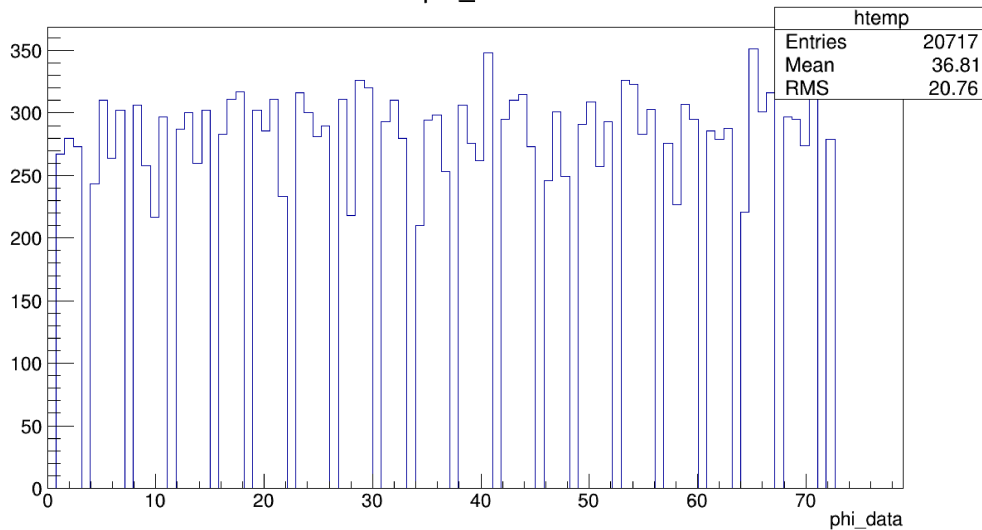


HCal Tps / No Selection

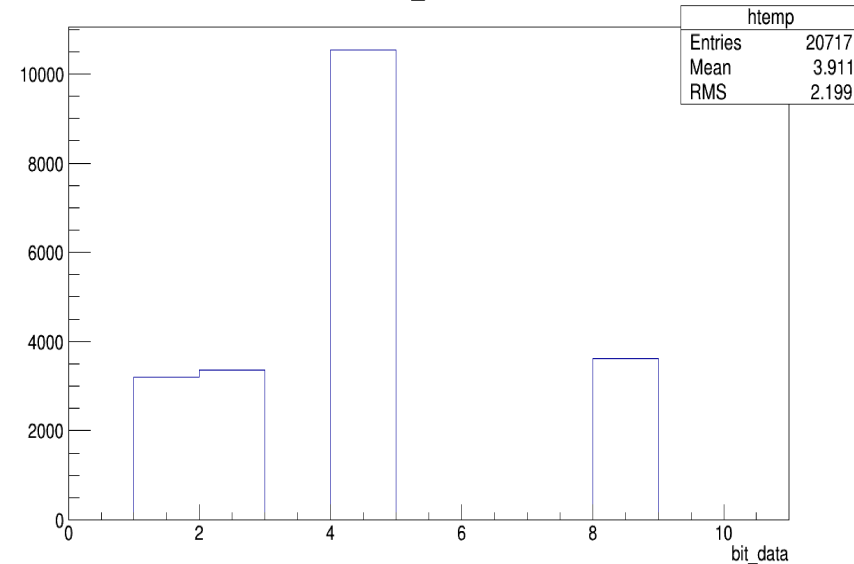
eta_data



phi_data



bit_data

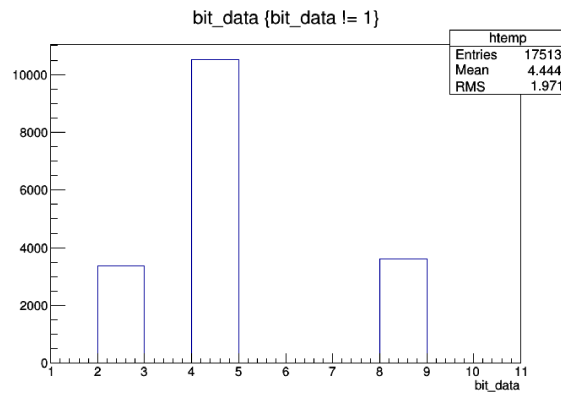


- TPs should ideally arrive at 4, still arriving partly off.

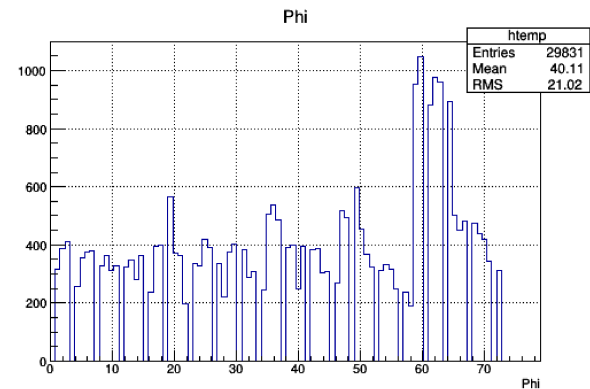
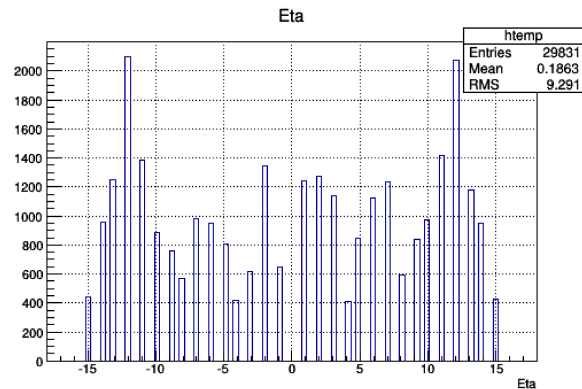
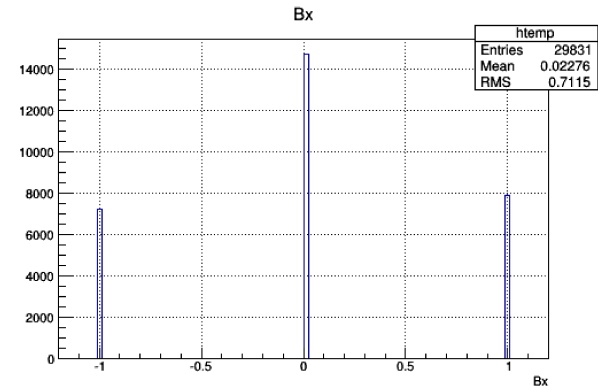
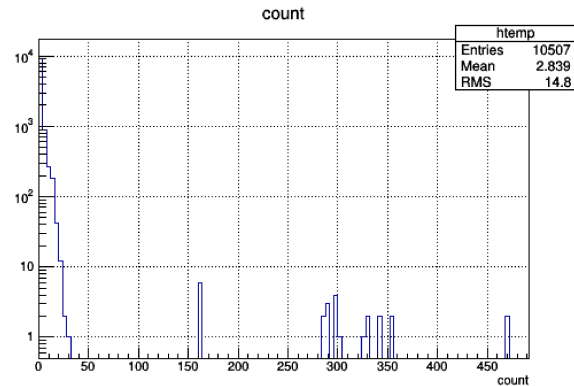


TwinMUX TPs distribution

- If TwinMUX TP at given (η , ϕ) is consistent with HCal TP, Valid is set to 1 else 0
- For 'Valid' check, HCal TPs having $\text{bit_data} > 1$ is considered, as $\text{bit_data} = 1$ seem to be too off-time to arrive in three BX window of TwinMUX



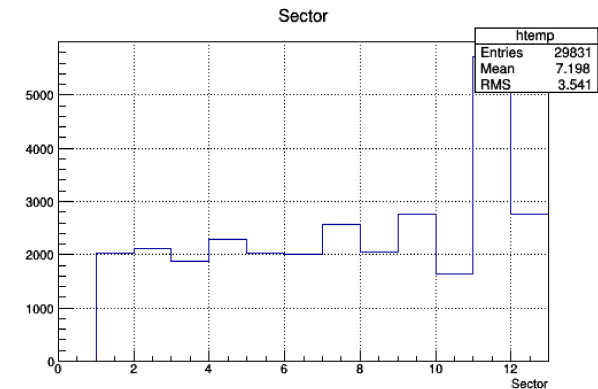
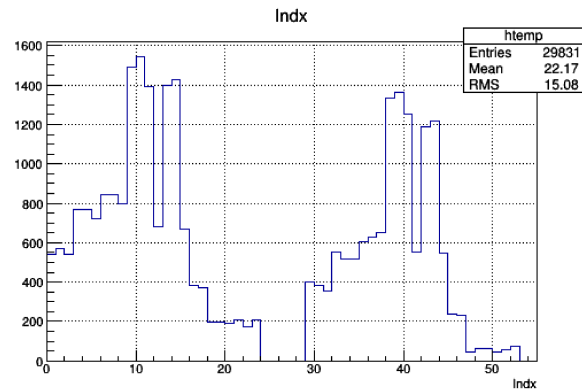
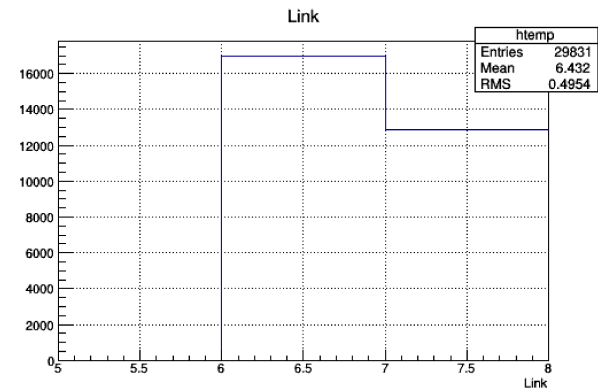
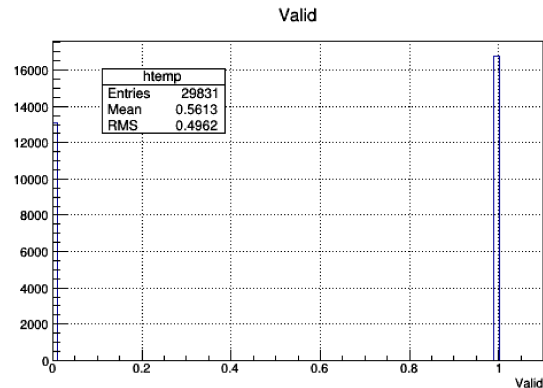
TwinMux TPs / No Selection



- $n_{TP} > 20$ is visible, not expected

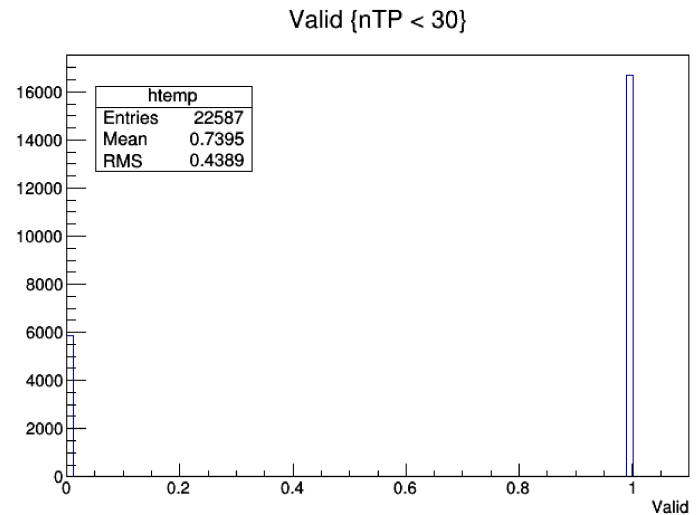
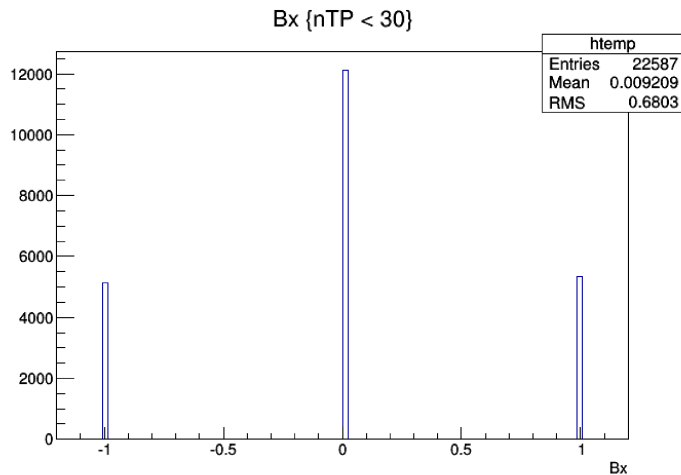
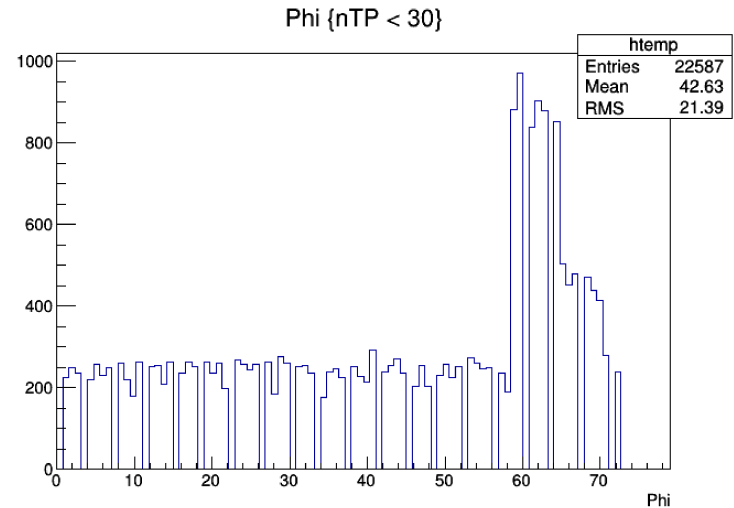
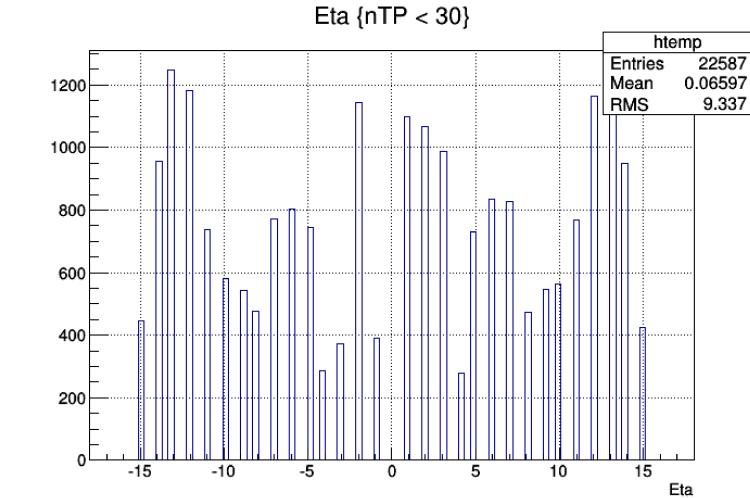


TwinMux TPs / No Selection



- TPs are consistent with HCAL TPs for 56% cases, ie. valid is high for 56%
- As these higher Tps seem to be related to something wrong in detector, lets analyze good TPs

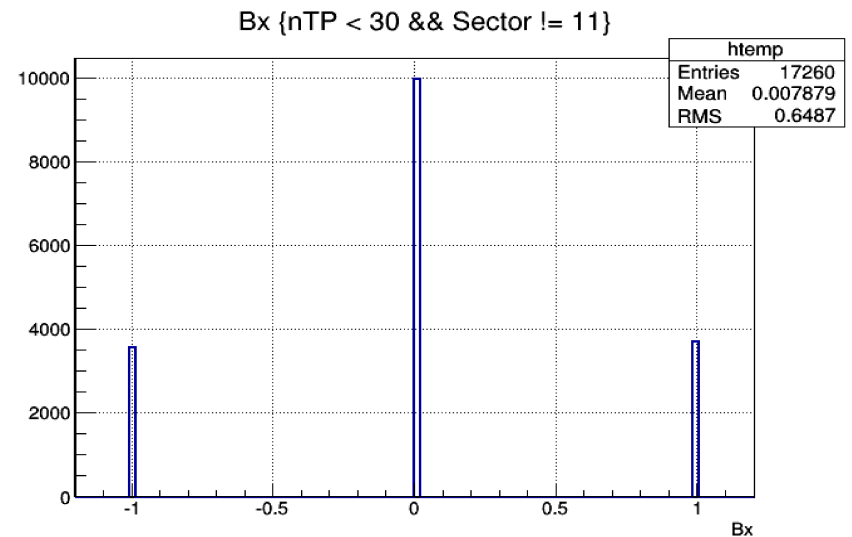
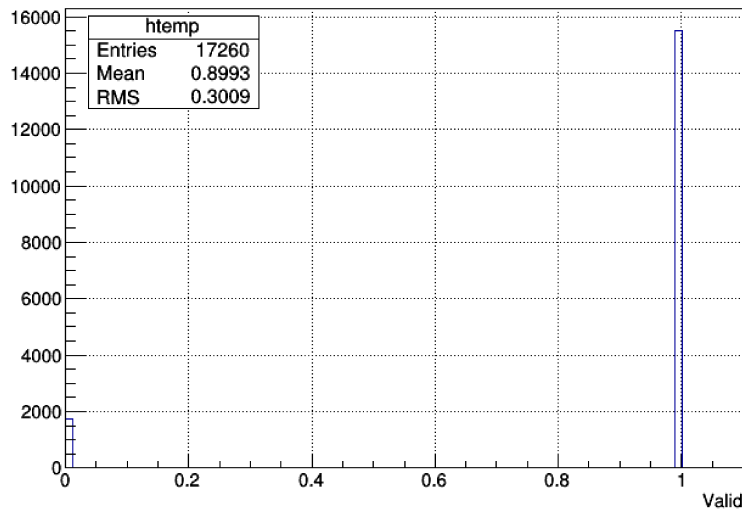
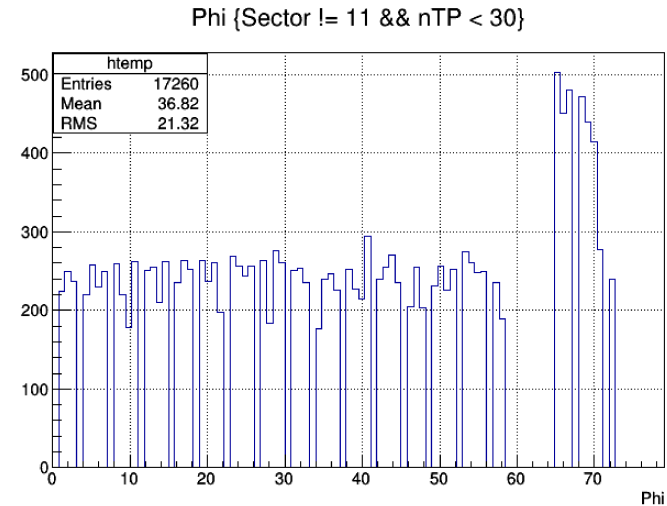
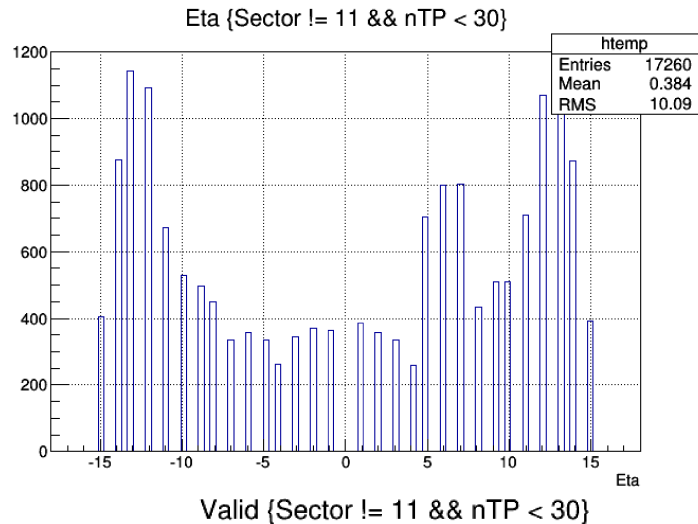
Selection: No of TP < 30



- nTP < 30 selection reduced this to 75%
- Out of this 75% events, valid is high for 74%
 - Something fishy is ongoing with Sector=11



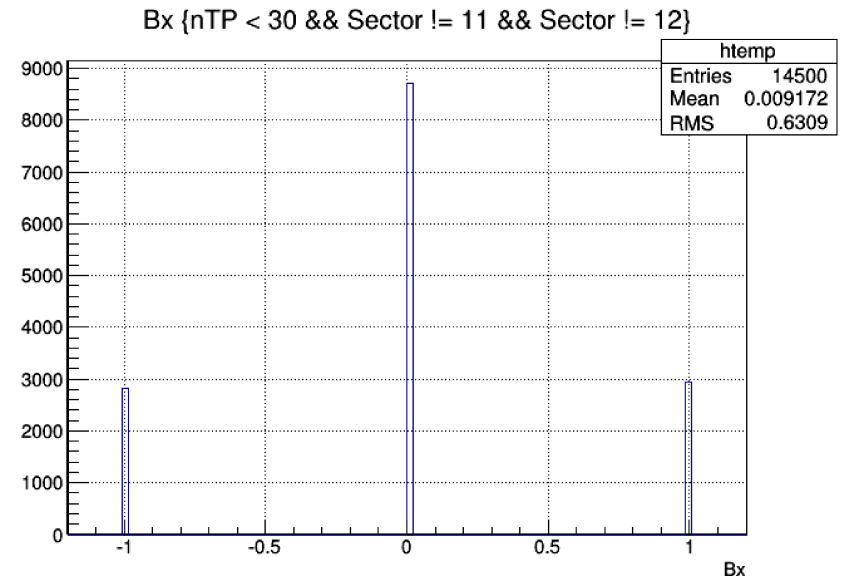
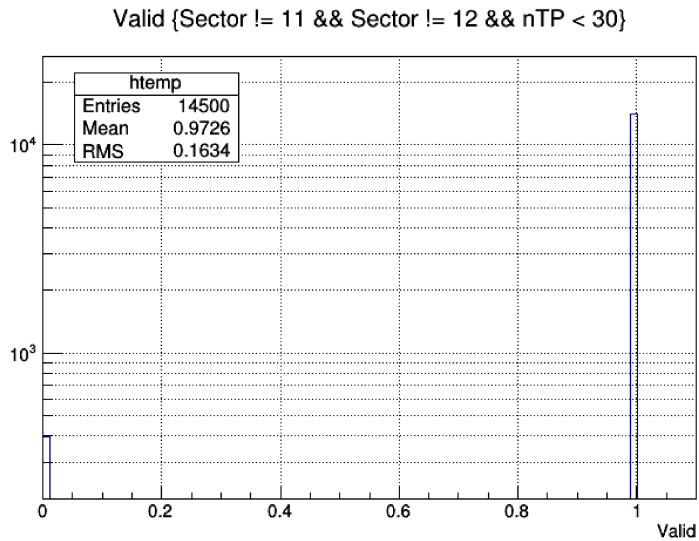
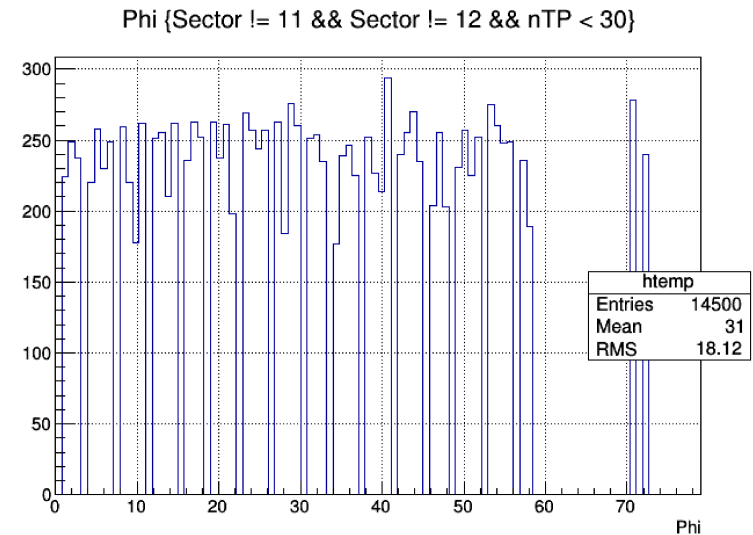
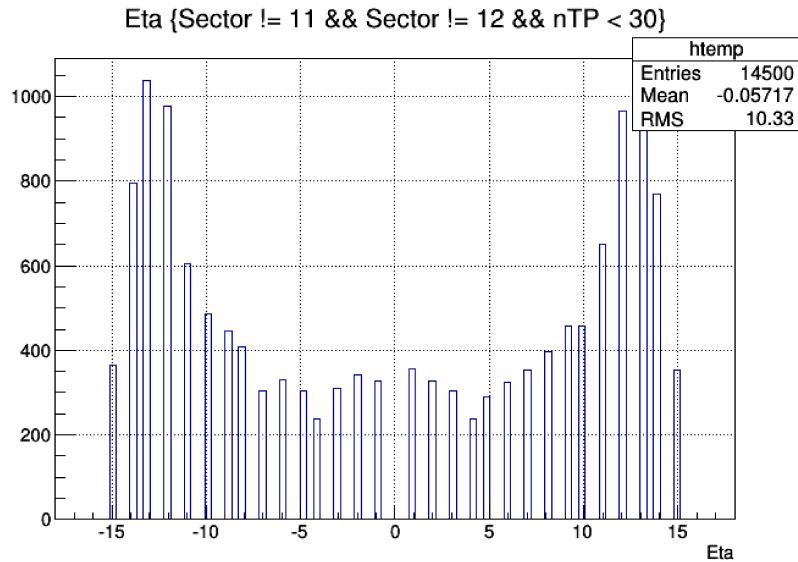
Selection : $nTP < 30$ && Sector $\neq 11$



- Above selection reduced this to 58%
- Out of this 58% events, valid is high for 90%
 - Still some unexpected activity around Sector=12

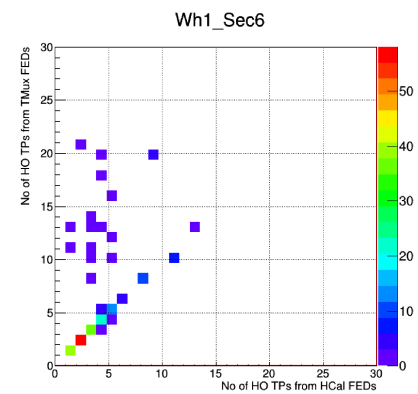
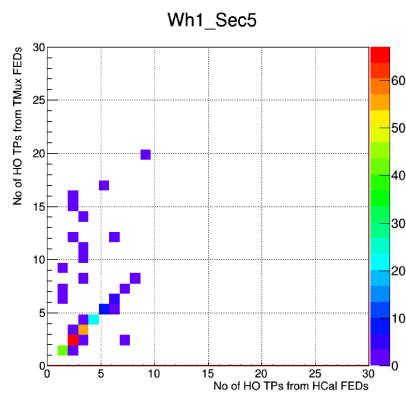
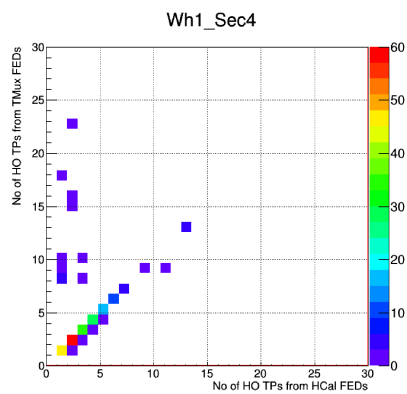
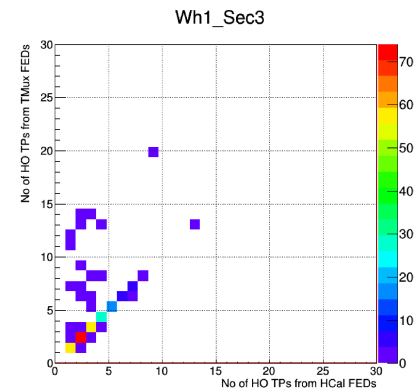
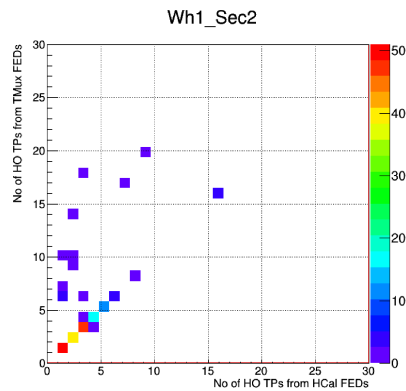
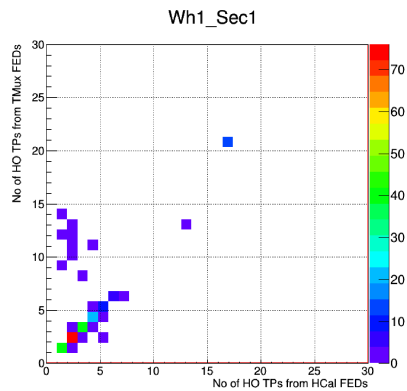


Selection : Sector != (11,12) && nTP < 30

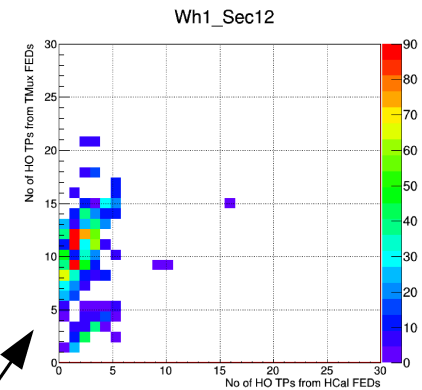
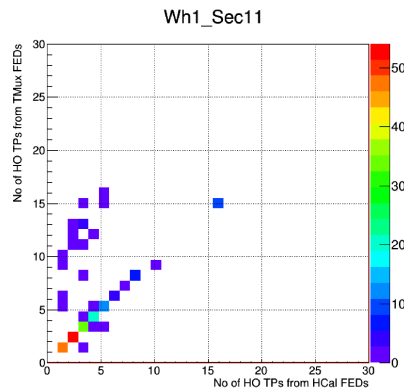
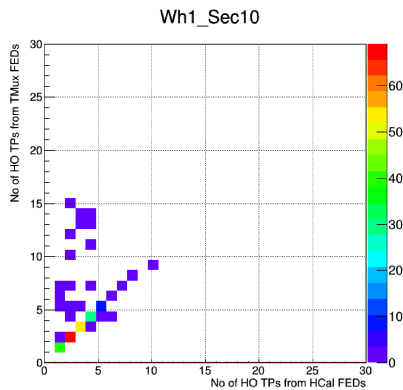
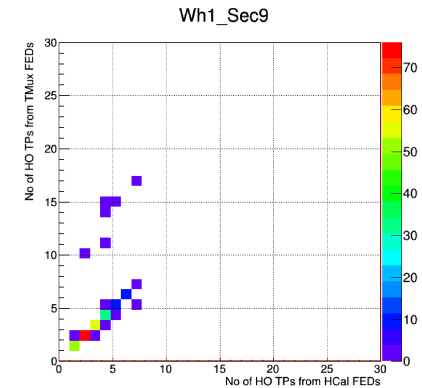
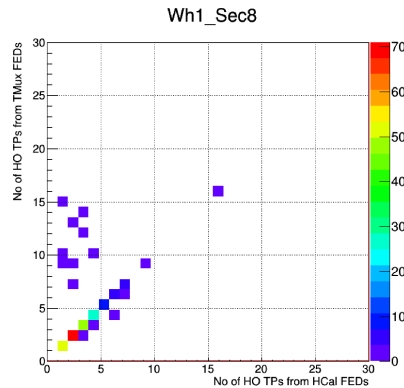
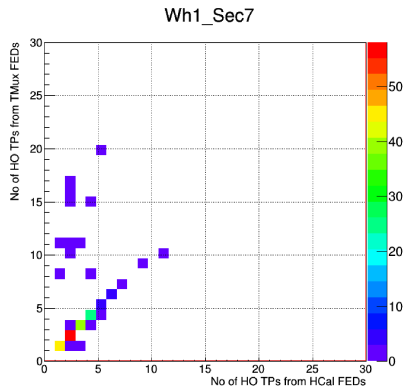


- Above selection reduced this to 48%
- Out of this 48% events, valid is high for 97%.

Wheel : 1



Wheel : 1



- Today morning, figured out that oslb fibers for S11 & S12 were loose ^[1] when this run was taken. But then it means that TwinMux is not protected against it..

^[1] <http://cmsonline.cern.ch/cms-elog/994382>

More Update

- OSLB mapping testing was successful.
 - There are four mapping implemented in oSLB for transmission of the bits.
 - Last week, Drew managed to tests the consistency of all four of the mapping.
- Yesterday had meeting with Andrea Triossi (TwinMUX Enginner) for discussing the LUT needed to implement HO in TwinMUX.
 - Good news! he got new contract with Madrid group, so he will conitnue working on TwinMUX firmware.
 - Once LUTs is provided, he will begin with matching HO with DT in a given phi.



Summary

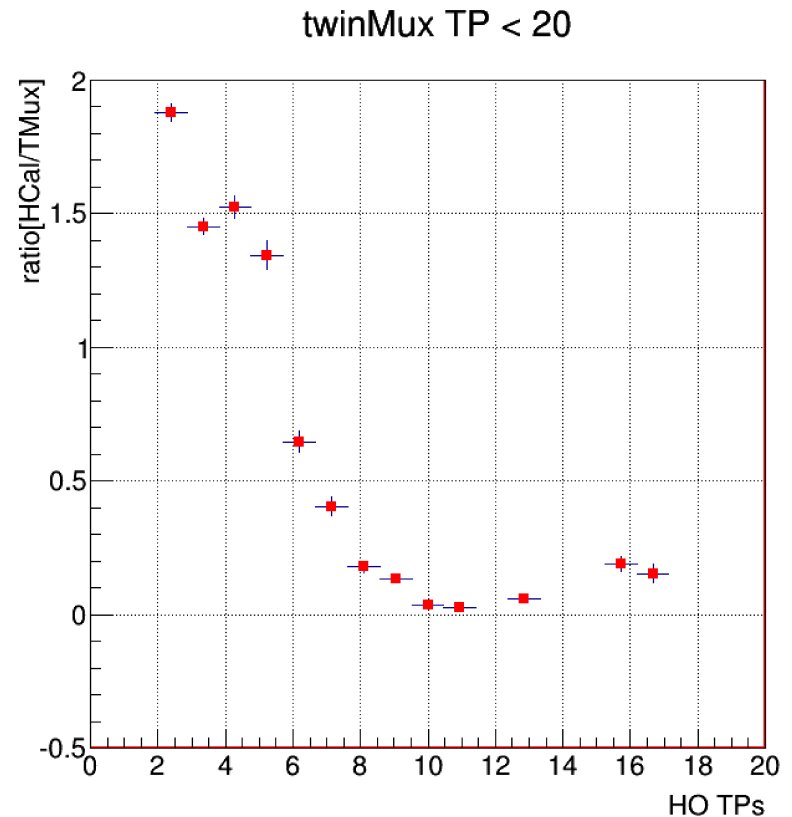
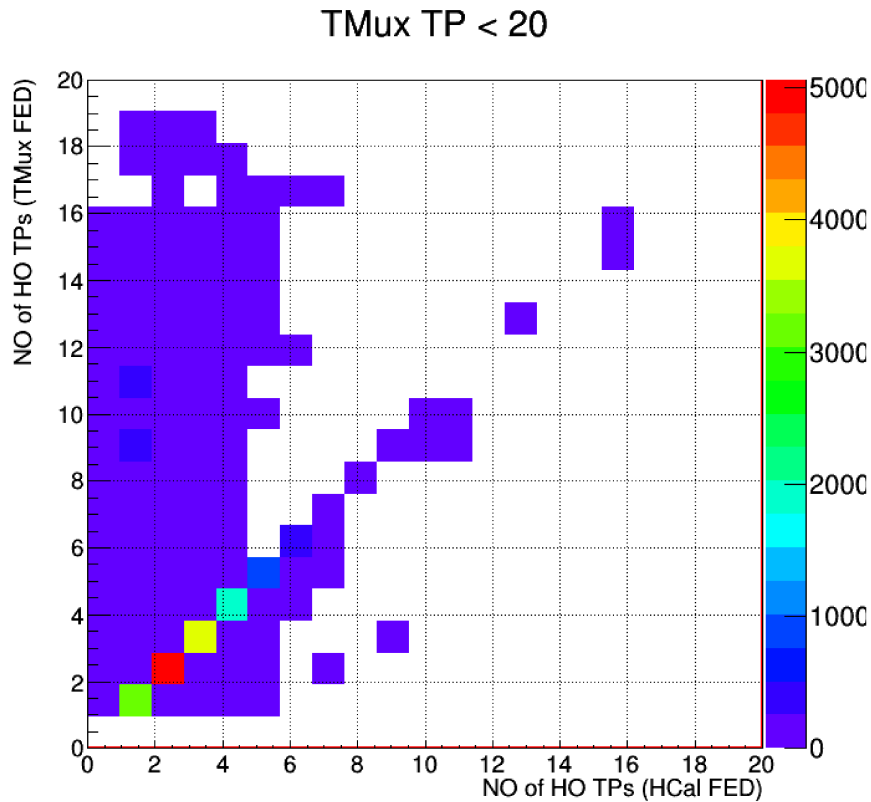
- > OSLB firmware mapping was tested successfully by Drew last week.
- > Unpacker testing is in very good shape
 - Consistency is established for 97% channels.
 - revealed some issues with the twinMUX credibility to handle the not-useful HO data. Need to think, how to fix it. Maybe Parity bit should be turned on.
- > TwinMUX Firmware
 - yesterday's discussion with Andrea was positive.
 - Need to write the LUT in the local DT coordinates, so he can begin adding HO in twinMUX.



Backup

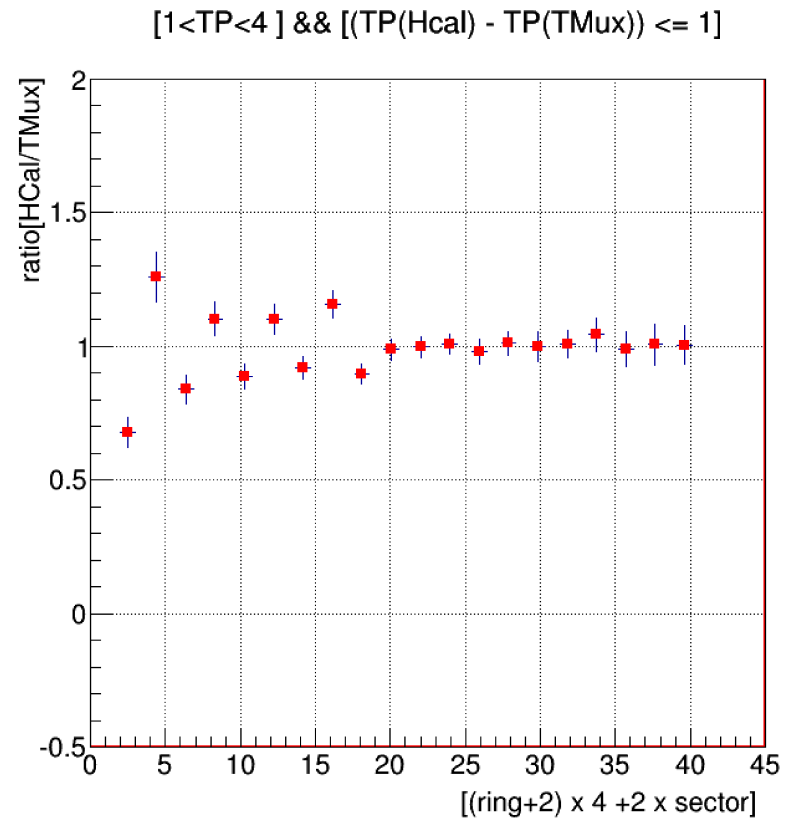
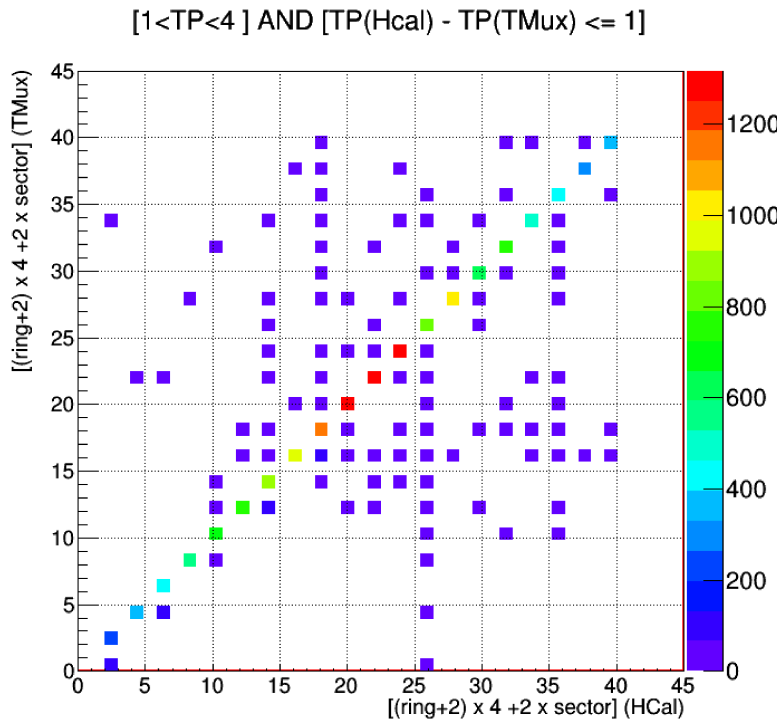


HCal TPs vs TwinMux TPs



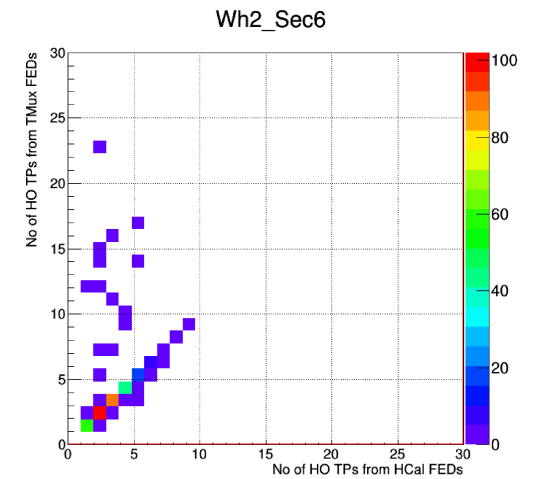
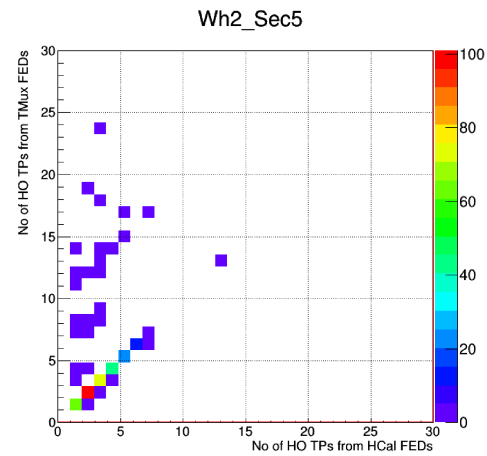
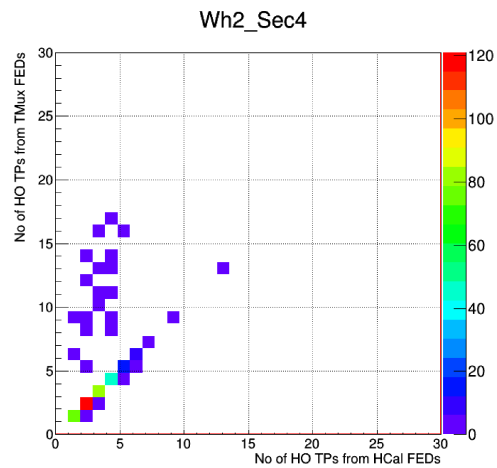
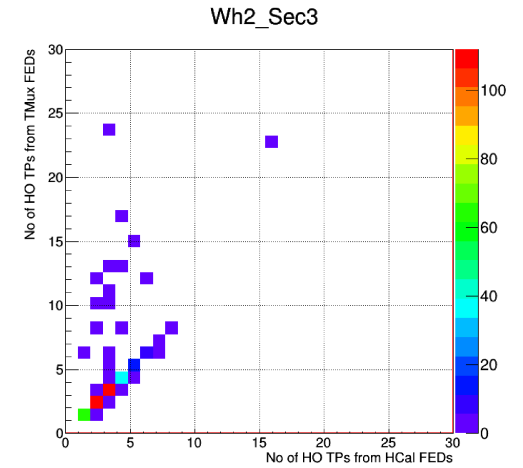
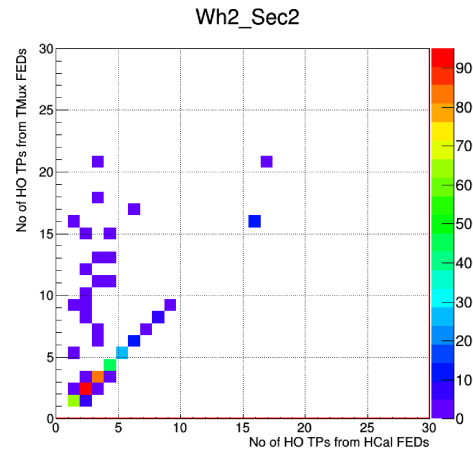
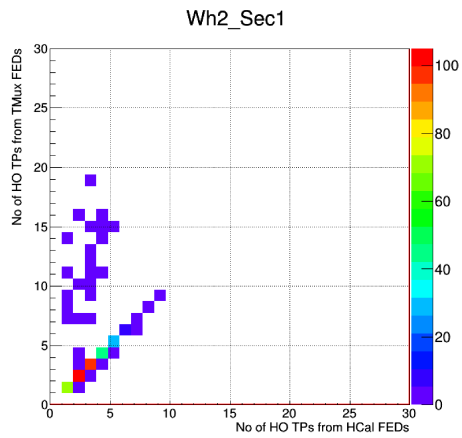
- No Selection applied
- Still, there are inconsistencies for TPs seen among HCal/TwinMux.

Geometrical Correlation

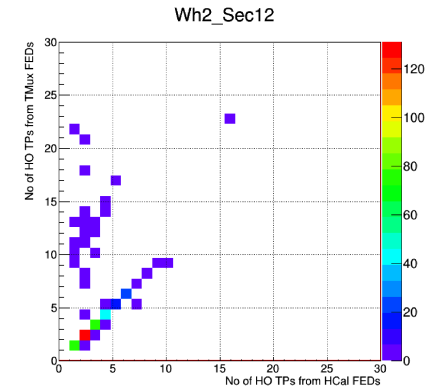
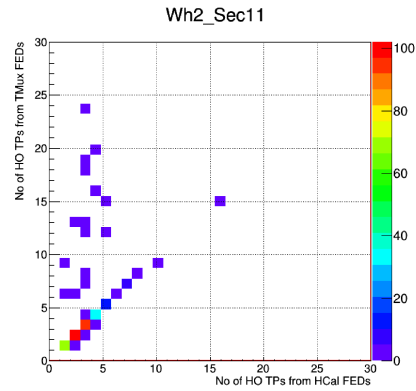
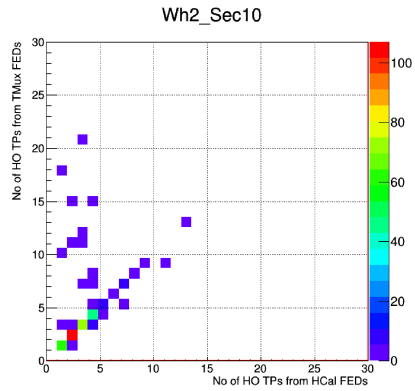
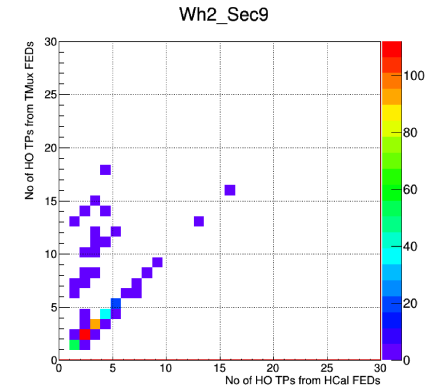
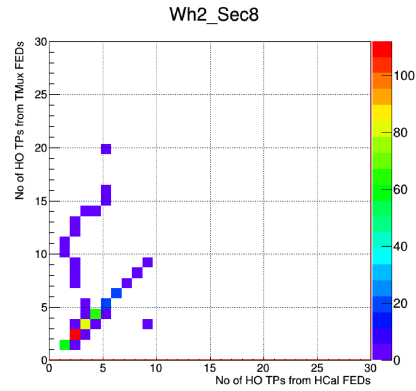
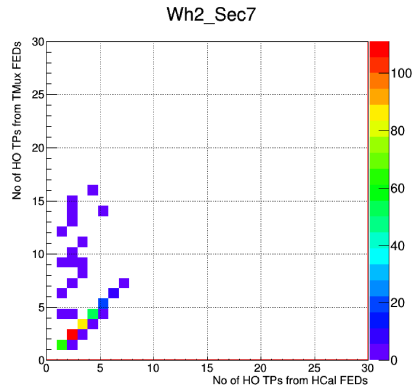


- Selection used is
 - > $1 < TP < 4$
 - > [$TP(HCal) - TP(TMux)$] ≤ 1

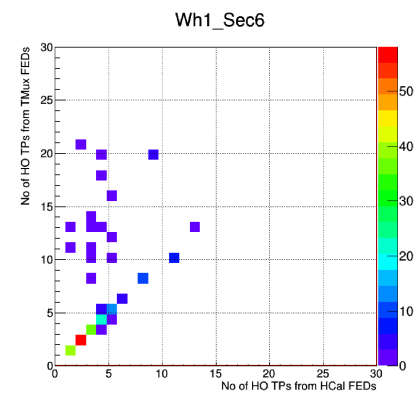
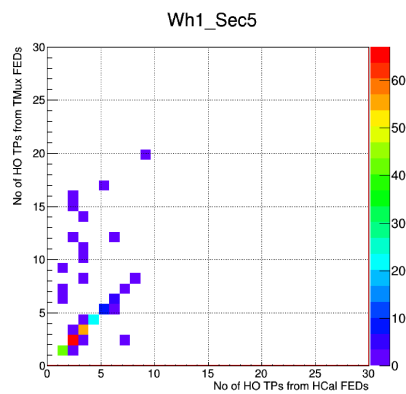
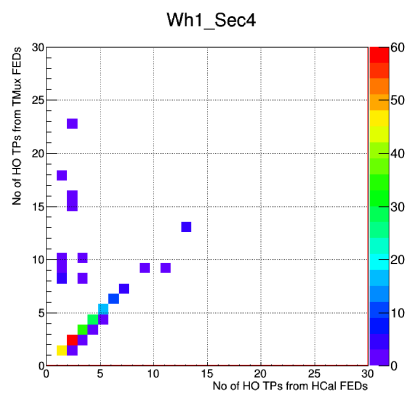
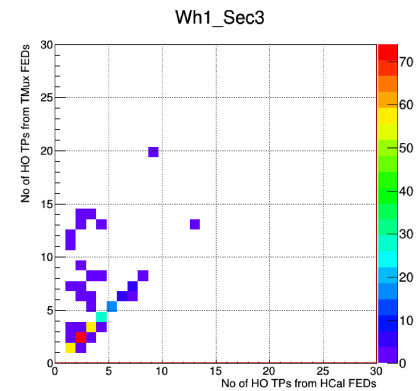
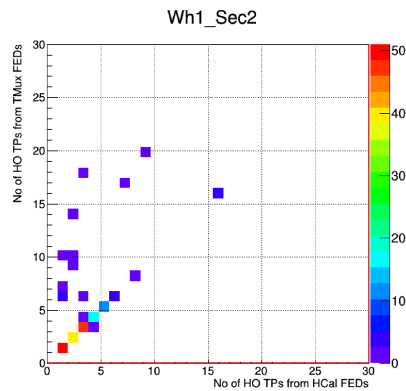
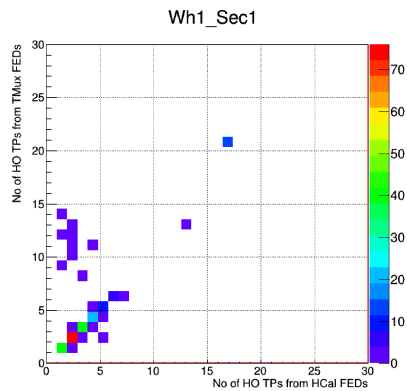
Wheel: 2



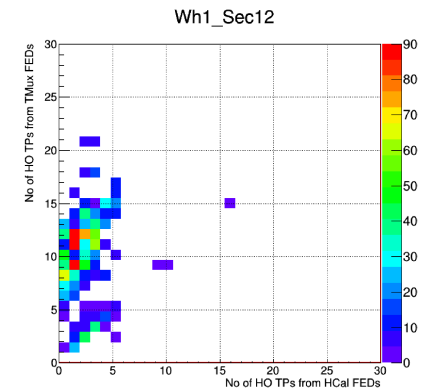
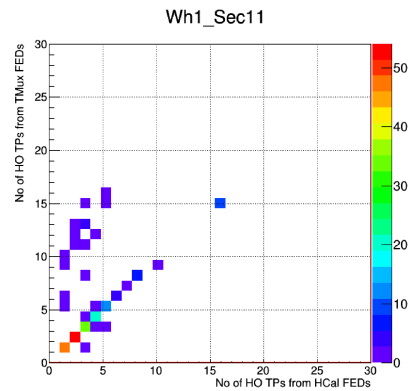
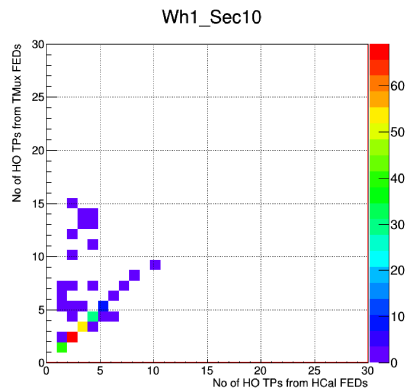
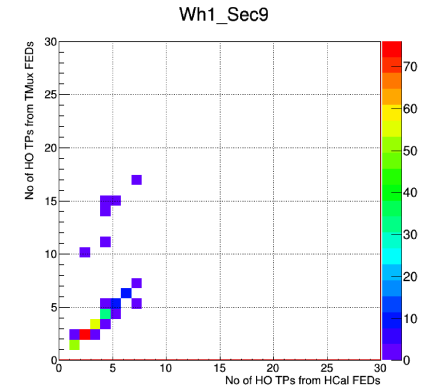
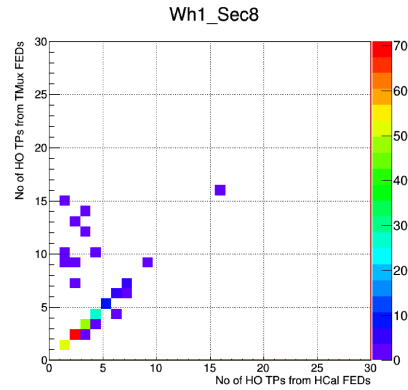
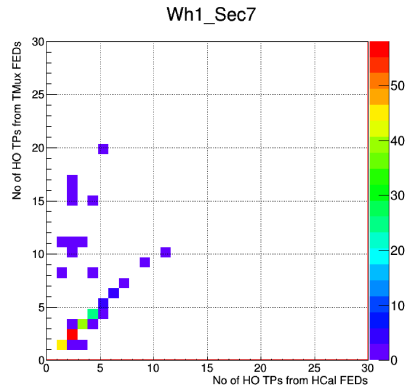
Wheel : 2



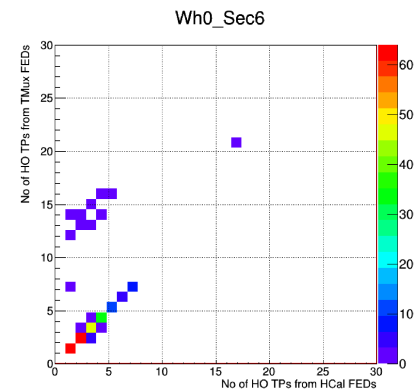
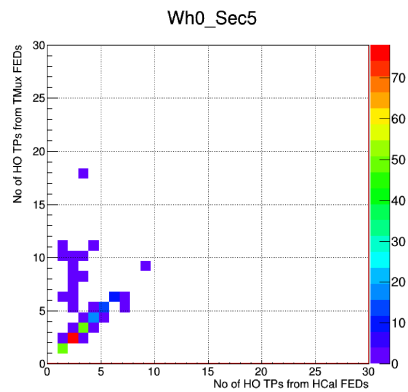
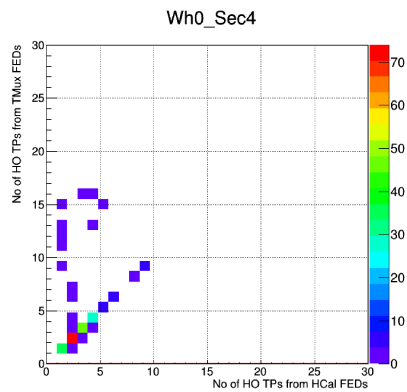
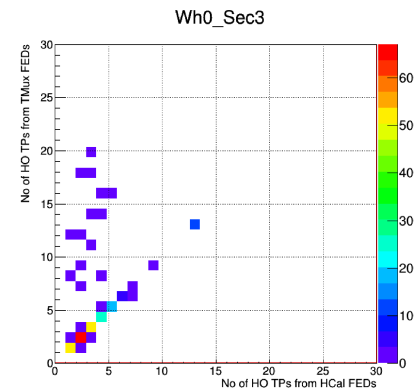
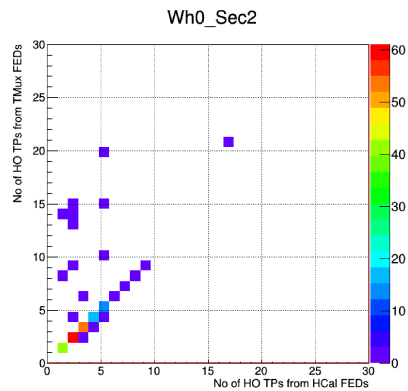
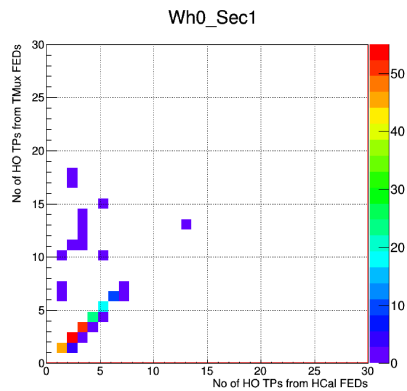
Wheel : 1



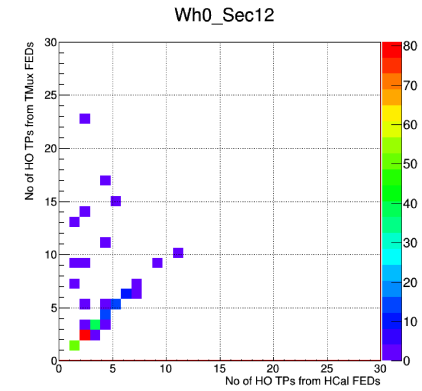
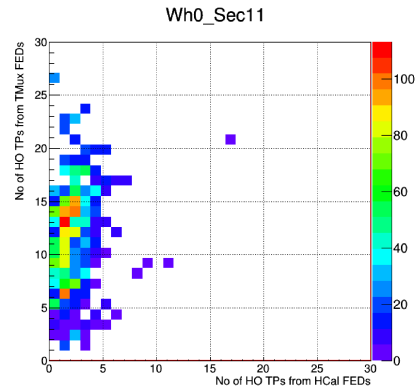
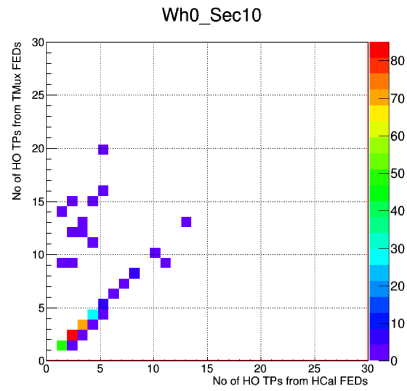
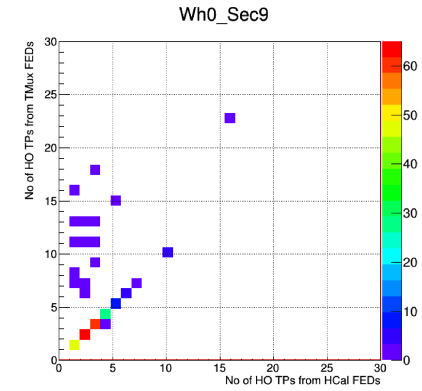
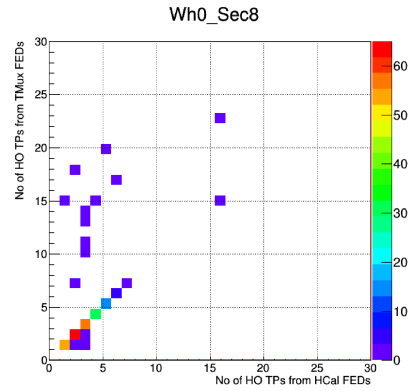
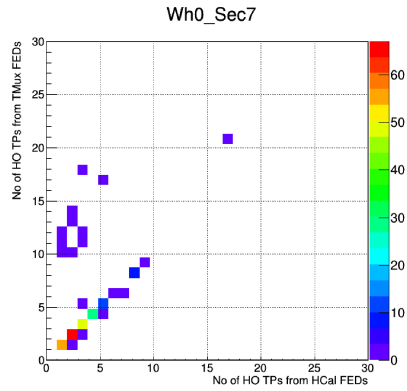
Wheel : 1



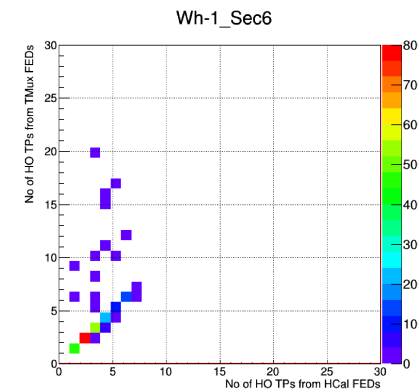
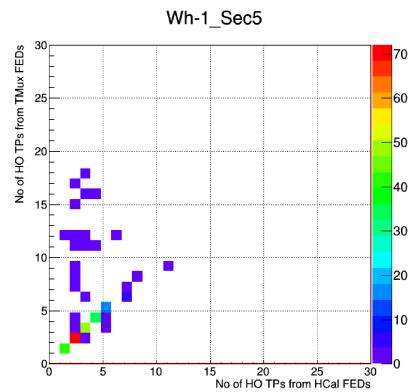
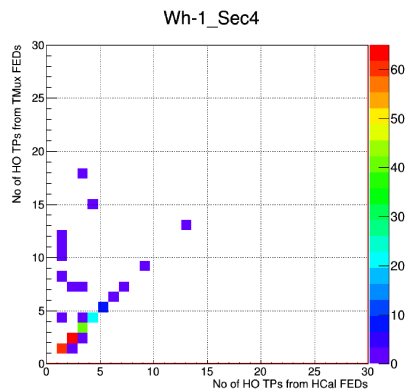
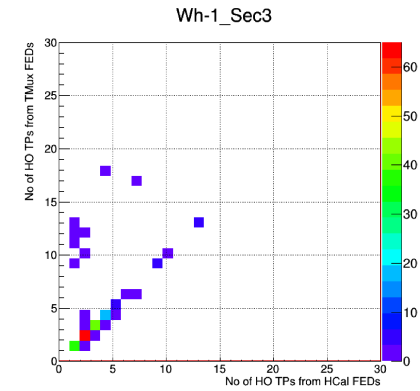
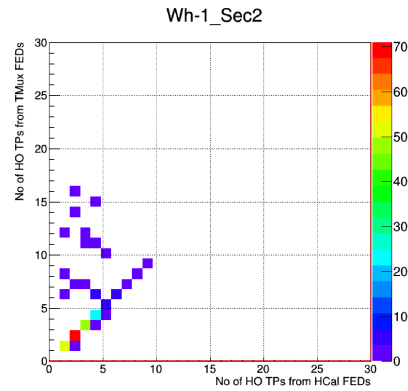
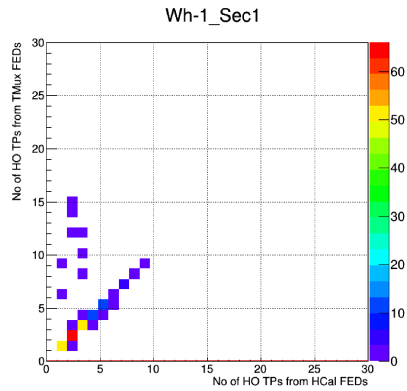
Wheel :0



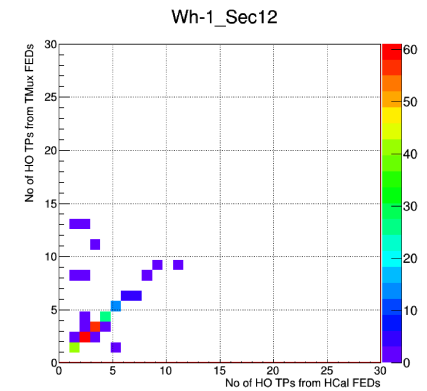
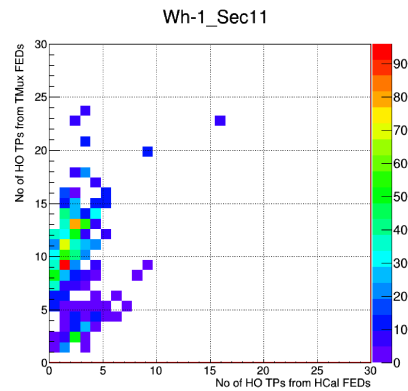
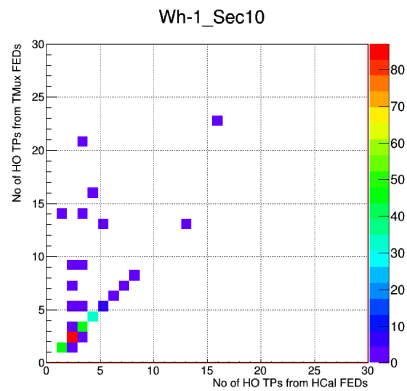
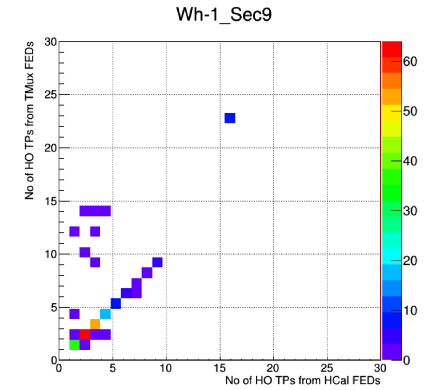
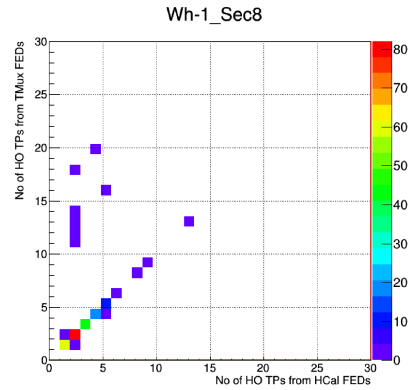
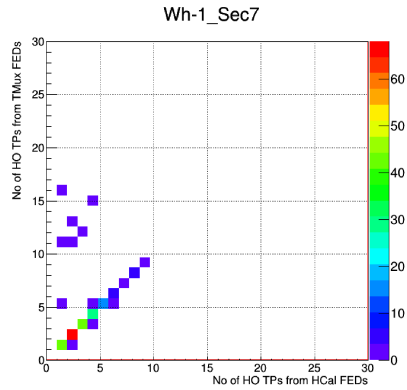
Wheel : 0



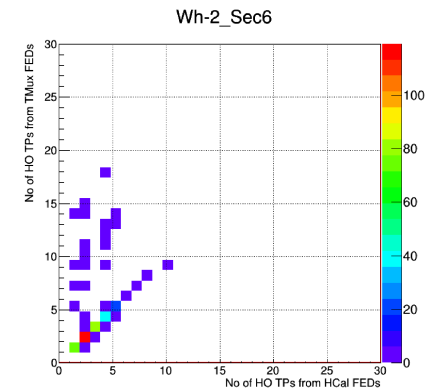
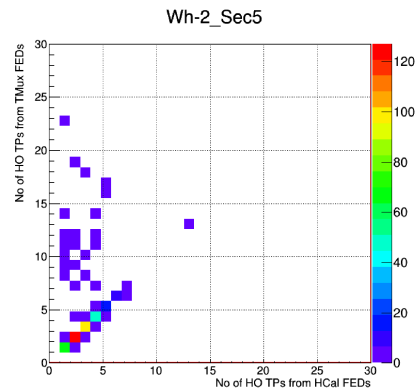
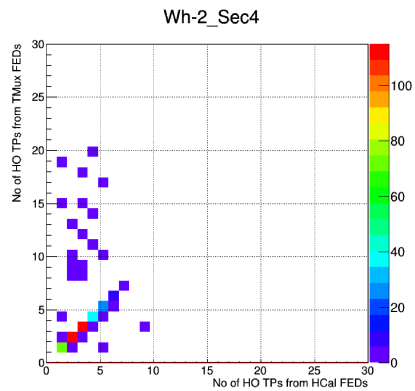
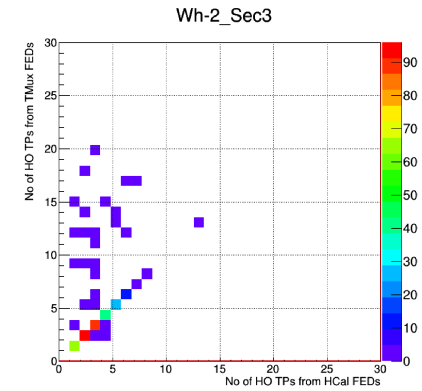
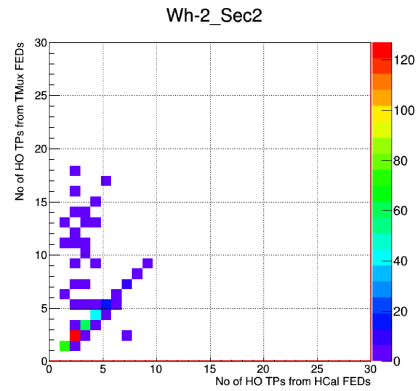
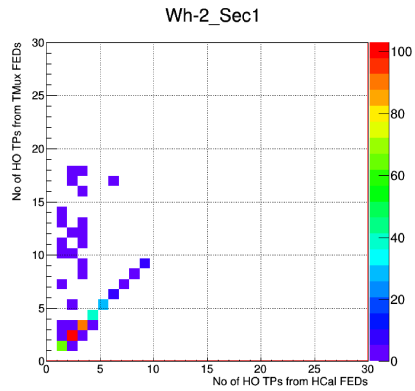
Wheel : -1



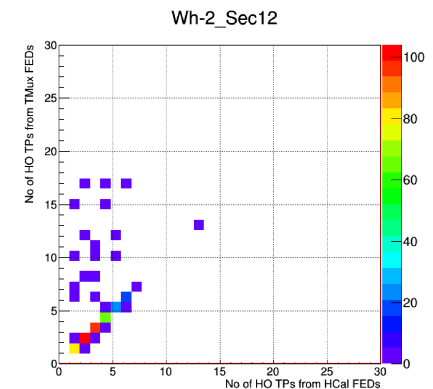
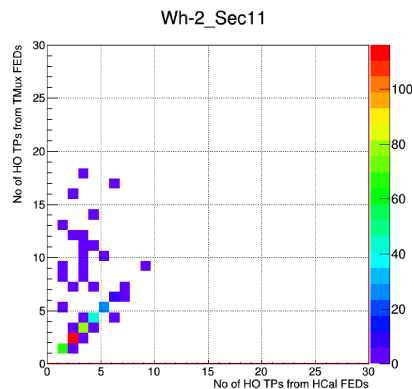
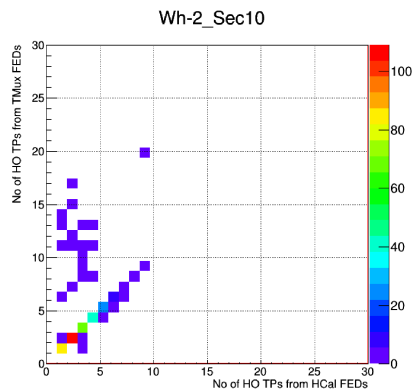
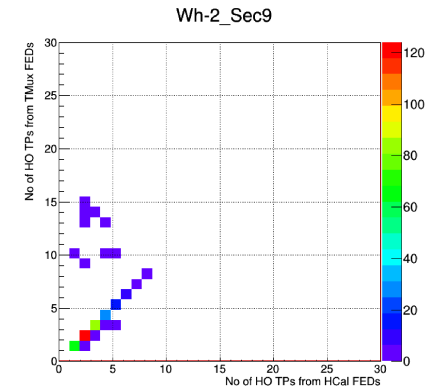
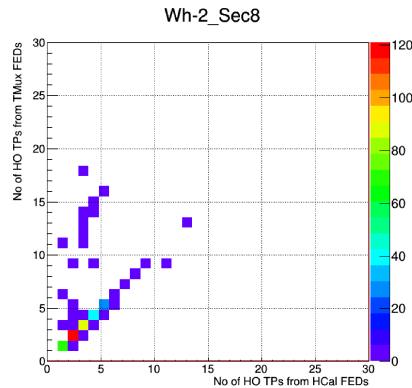
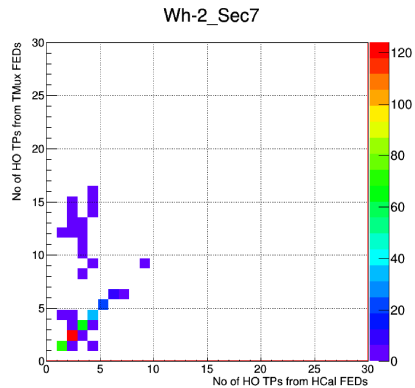
Wheel : -1



Wheel : -2



Wheel : -2



- Today morning, figured out that oslb fibers for S11 & S12 were loose ^[1] when this run was taken. But then it means that TwinMux is not protected against it..

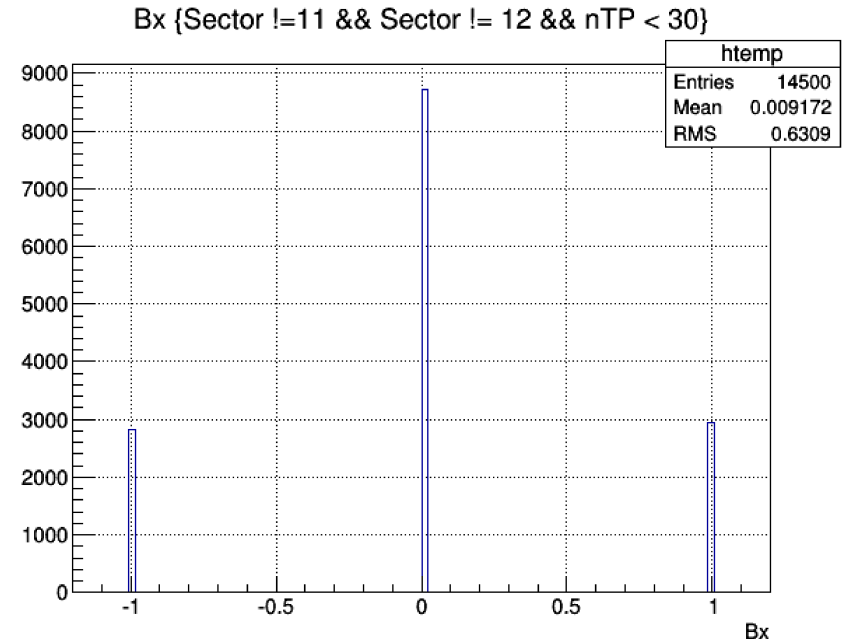
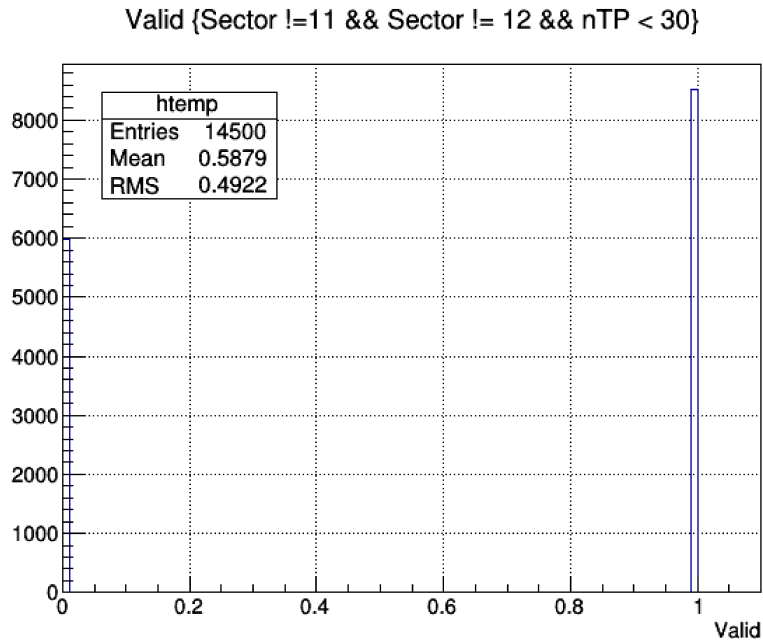
^[1] <http://cmsonline.cern.ch/cms-elog/994382>



TwinMUX TPs distribution

- TO Check how much the Tps at SOI (data_bit =4) arrive at TwinMUX

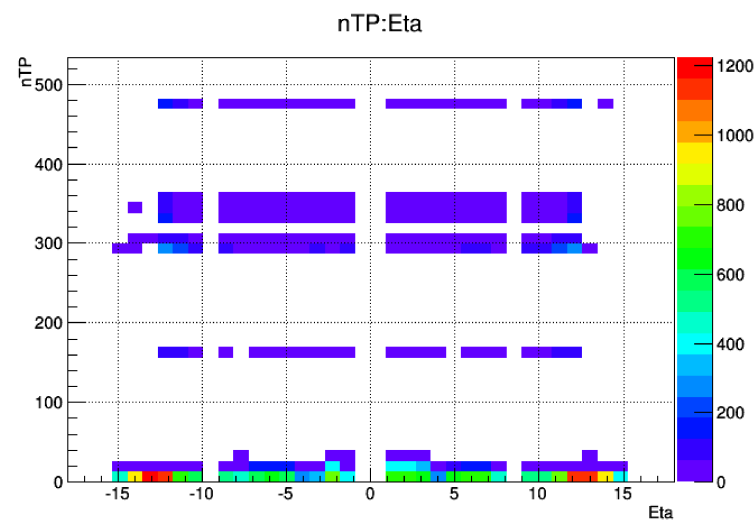
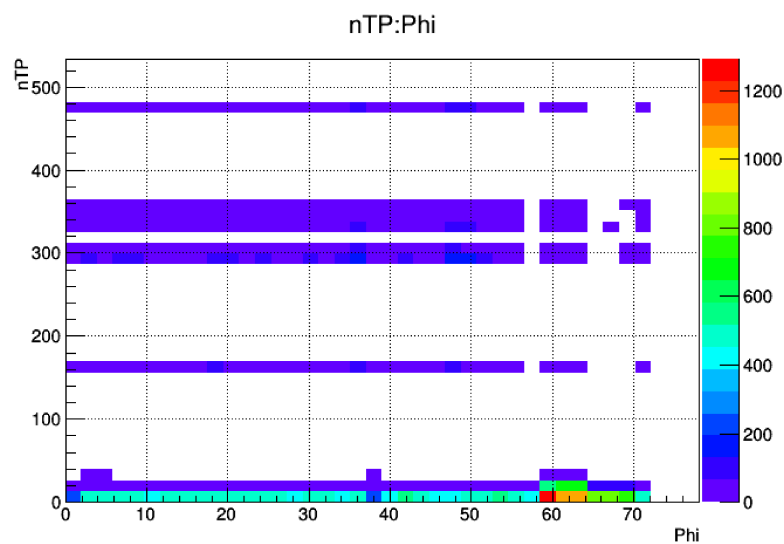
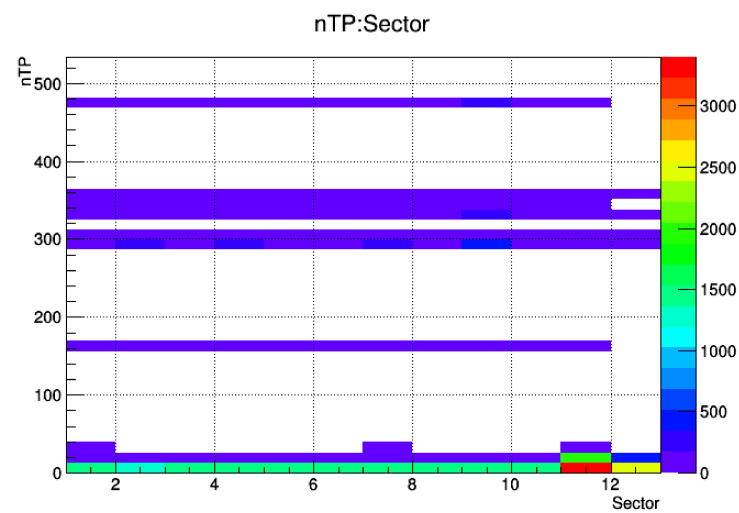
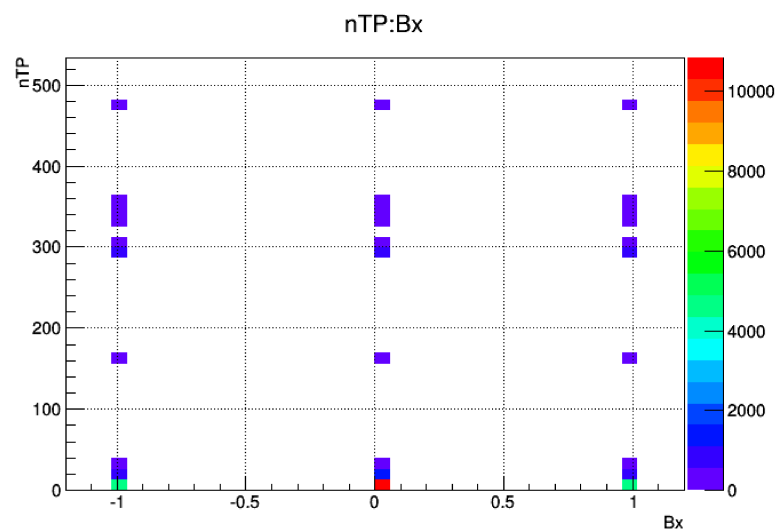
Selection : Sec != (11,12) && nTP < 30



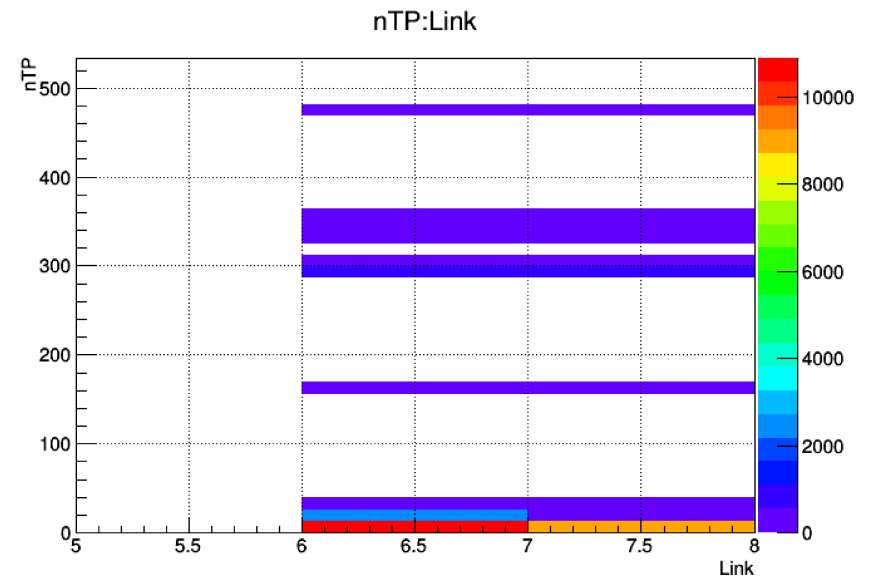
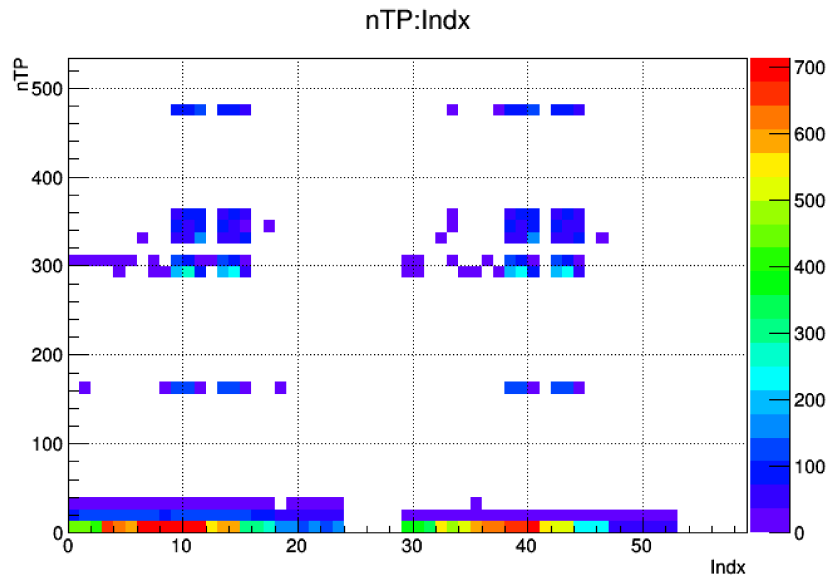
- HCal Tps at SOI are ~60%



2D plot, No Selection



2D plot, No Selection



- Higher inconsistent TPs are not showing mild correlation w.r.t Index variable, seem to be uniformly distributed for other variables.