Recent update on HO trigger

HO Trigger Weekly Meeting

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HELMHOLTZ ASSOCIATION

DESY

Overview

- Commissiong
- HO TP unpacker in TwinMUX
  - cosmic run
  - collision run
- HO TP in TwinMUX Emulator
- HO TP in HCAL Emulator

Commissioning

- HO Side:
  - New firmware was requested from Mr. Wu : oslbRPCv0x9d.mcs
    - installed on 8th June
  - The new oSLB firmware update solve the problem with many optical links that were not locking.
    - Now only 3 links do not lock, 2 of them due to bad oSLB, for one link reason not identified (no light on the fiber).
  - Three oSLBs received from BU, not yet tested.

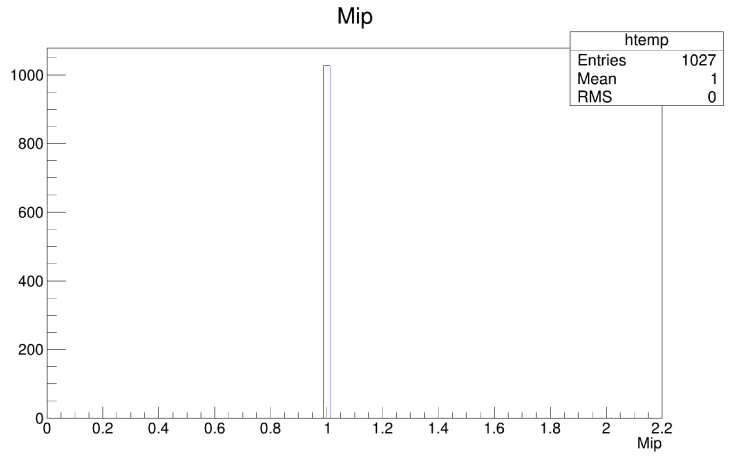
- TwinMUX side:
  - The correct HO Rx configuration is now automatically applied (i.e. change in the online software)
  - The DAQ delay seems to be good – but not yet confirmed in the collision runs

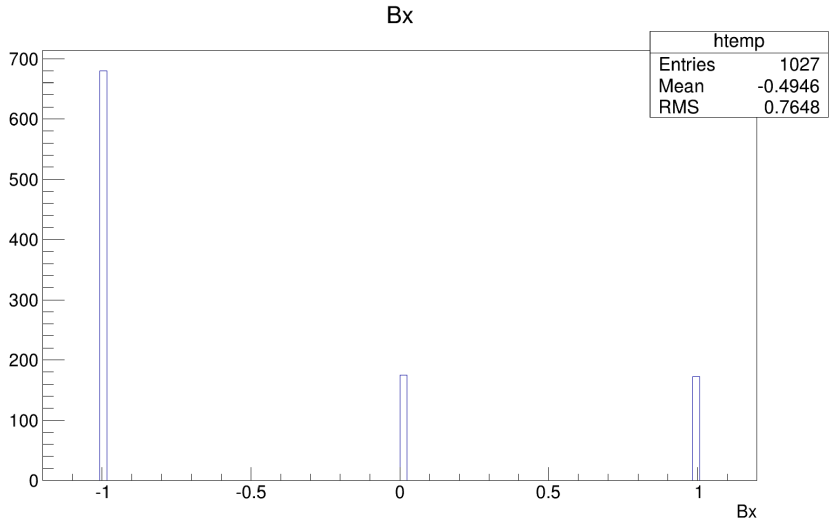
TwinMUX HO Unpacker / cosmics

- Previously I analyzed the S04/YB2, Karol suggested to look at the bottom sector for the cosmic run
  - Karol comment was that for cosmic run, bottom sector should have more TP in BX=0
- unpack following dataset :
  - Run: Run2017A (run no:295898)
  - Dataset: /cosmics
  - Unpack only YB2/S04 (top sector) & YB2/S10 (bottom sector), ie 30 channels

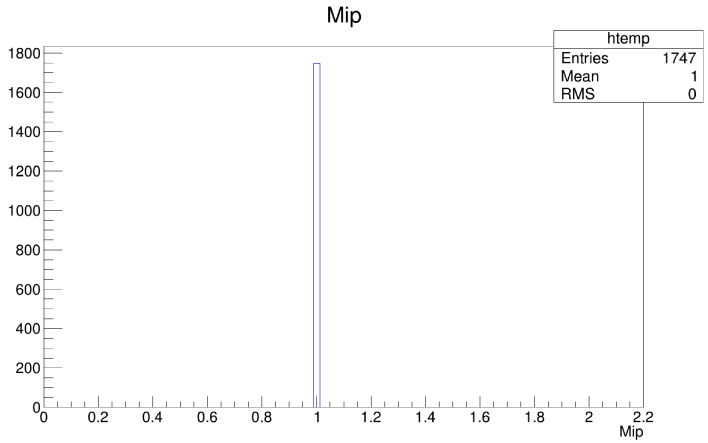
Unpacker testing / cosmic

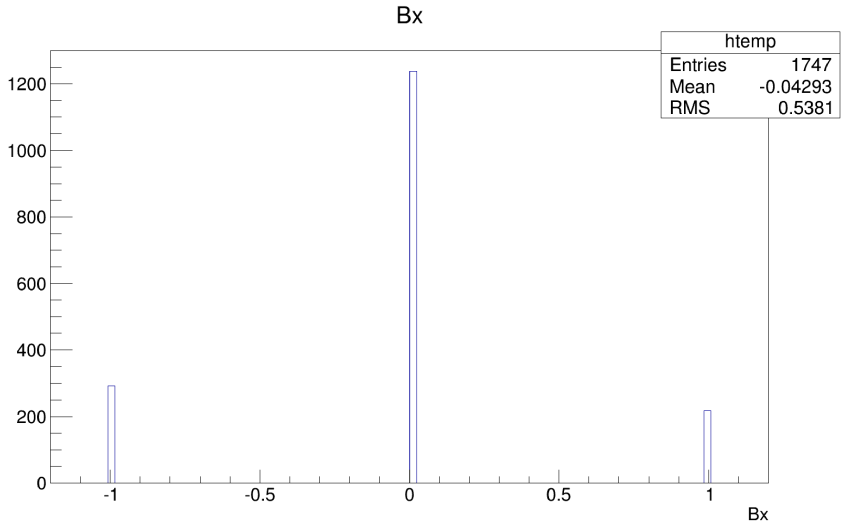
> S04





> S10





- BX distribution is same as what Karol mentioned for both top/bottom sectors.

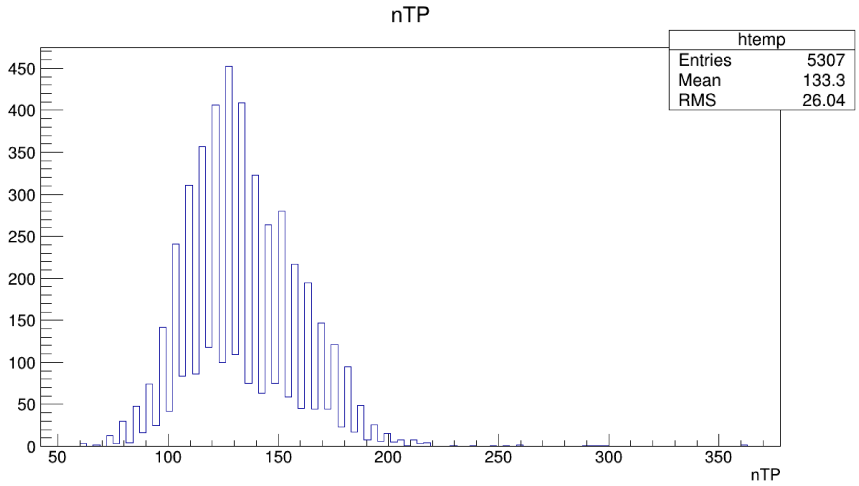
TwinMUX HO TP Unpacker / collision

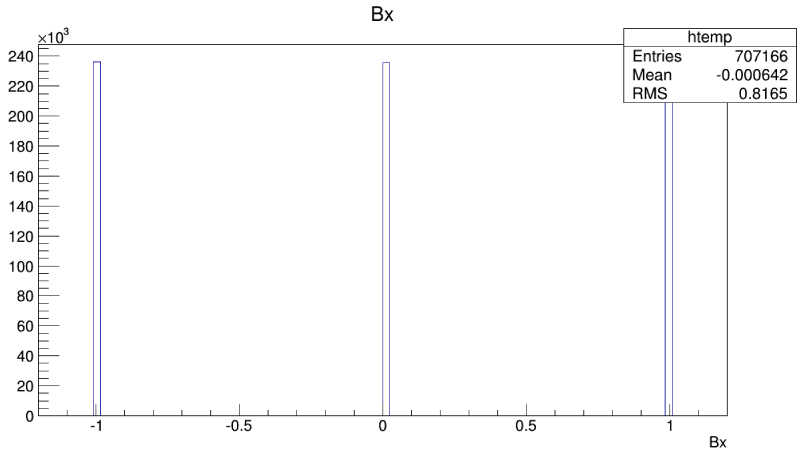
- Previously was unpacking only a given sector and wheel, extended to unpack all 2160 channels of HO
- zero suppression is also applied on the new unpacker
- Finished the Electronics emap from HCAL ieta, iphi to TwinMUX link, index for whole HO detector
- Unpacking following recent dataset:
  - Run: Run2017A (run no:296174)
  - Dataset: /SingleMuon
    - Wanted to look for SingleMuon dataset taken after Monday (12th June)
    - Found this run as most recent run with SingleMuon collection, taken on 6th June, 2017 [1]

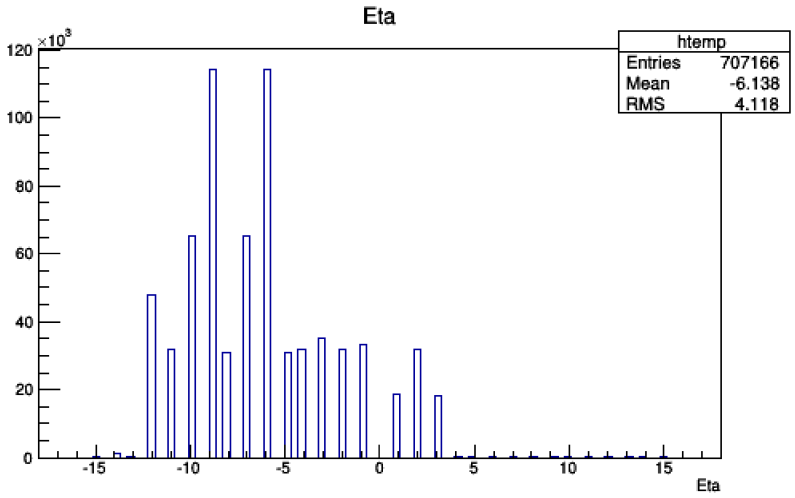
[1] https://cmswbm.cern.ch/cmsdb/servlet/RunSummary?RUN=296174&SUBMIT=Submit

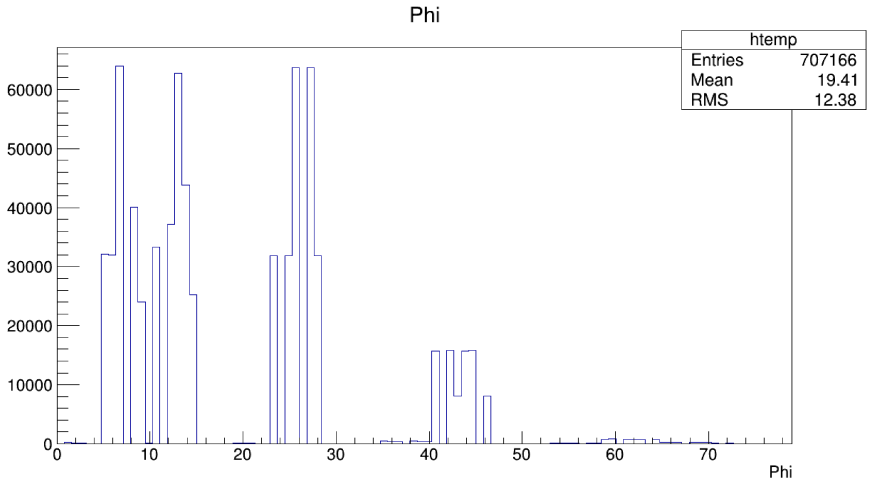
DESY

Unpacker testing / collision



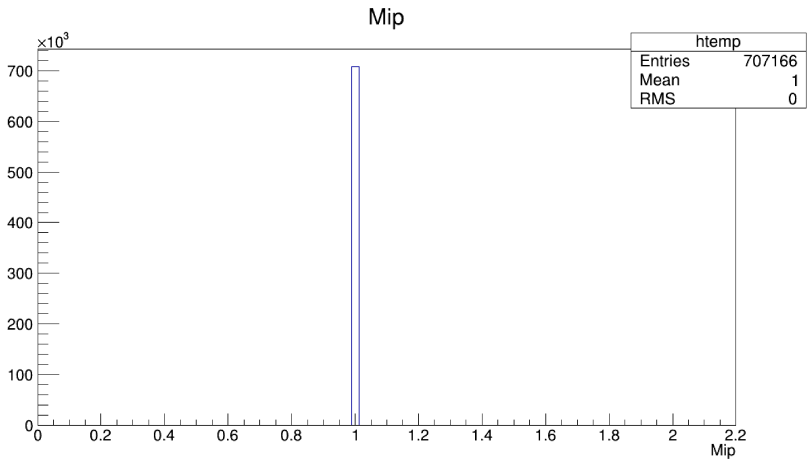


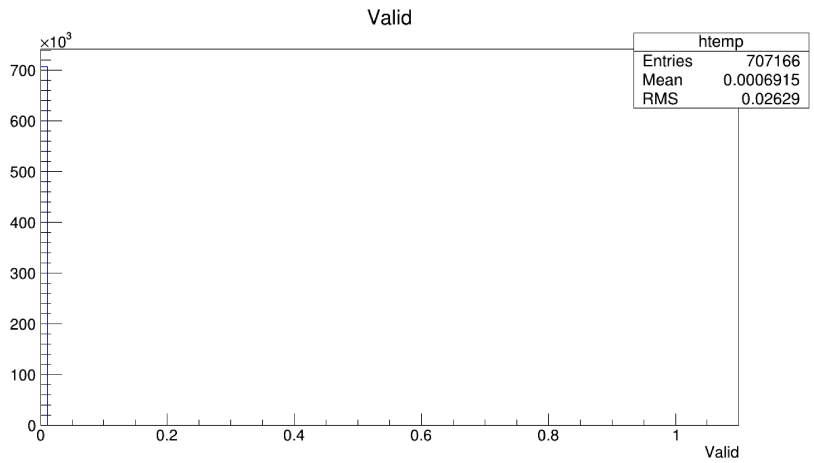




- BX: distribution is equally distributed in three values

Unpacker Testing / collision





- Analyzing more into the distribution of valid parameter

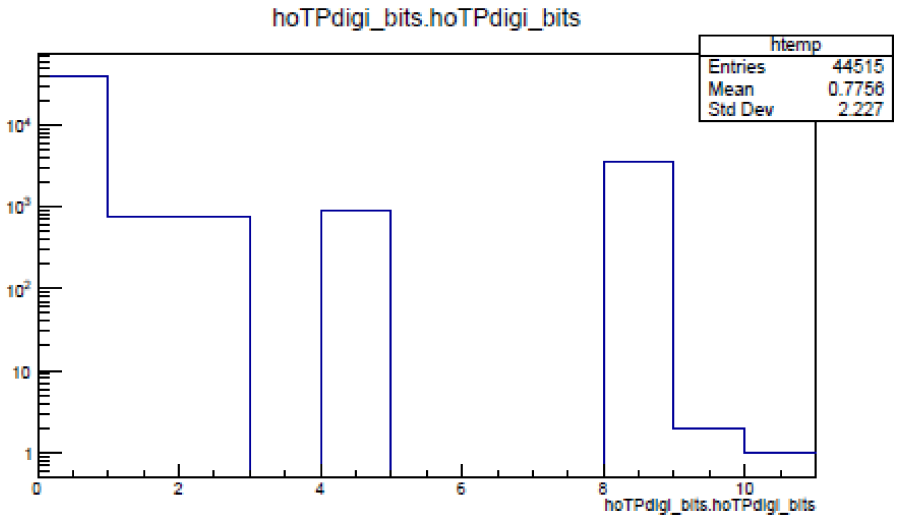
HO TP in TwinMUX Emulator

- Soham has partially implemented HO in TwinMUX emulator, preliminary studies looks promising
- He recently gave talks in L1 Trigger and HCAL Ops meeting
  - were received positively
  - also got suggestions from L1 trigger meeting to plot more distribution
  - Costas was not present in meeting, still we raised the request of extending the BMTF to implement the new DT-HO super-primittive. Alex was positive.
- Issues discovered
  - HO TP from HCAL FED has offset in timing in 2016 dataset, notified the HCAL
  - suggestion was to look at the 2017 dataset and then take necessary action
  - possible solution would be to fix the HTR firmware
- Once the HO TPs unpacker is ready, he will switch to HO TP from TwinMUX
- Thanks for his good job, he is traveling today back to India.

DESY

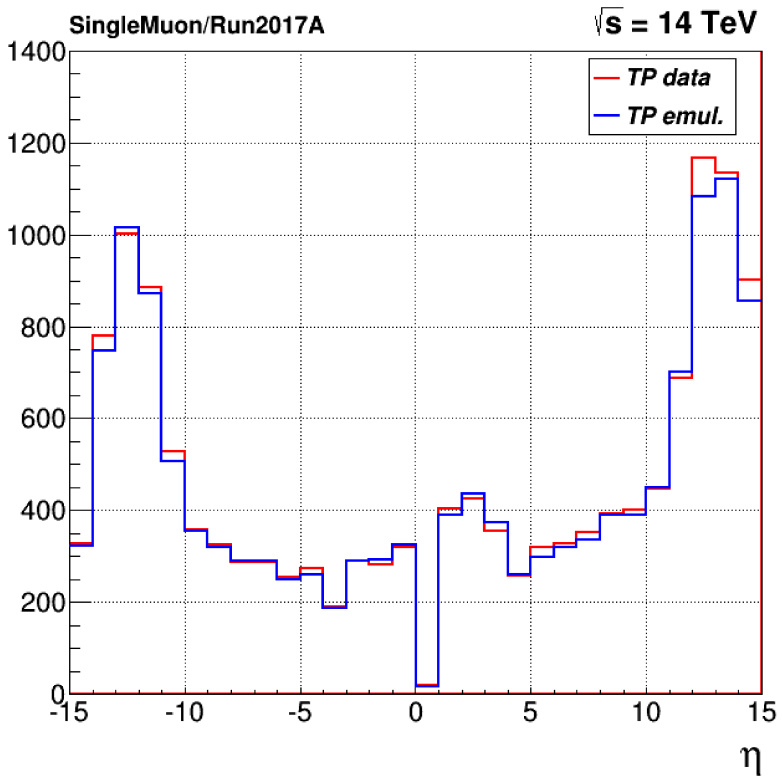
HO TP in HCAL Emulator

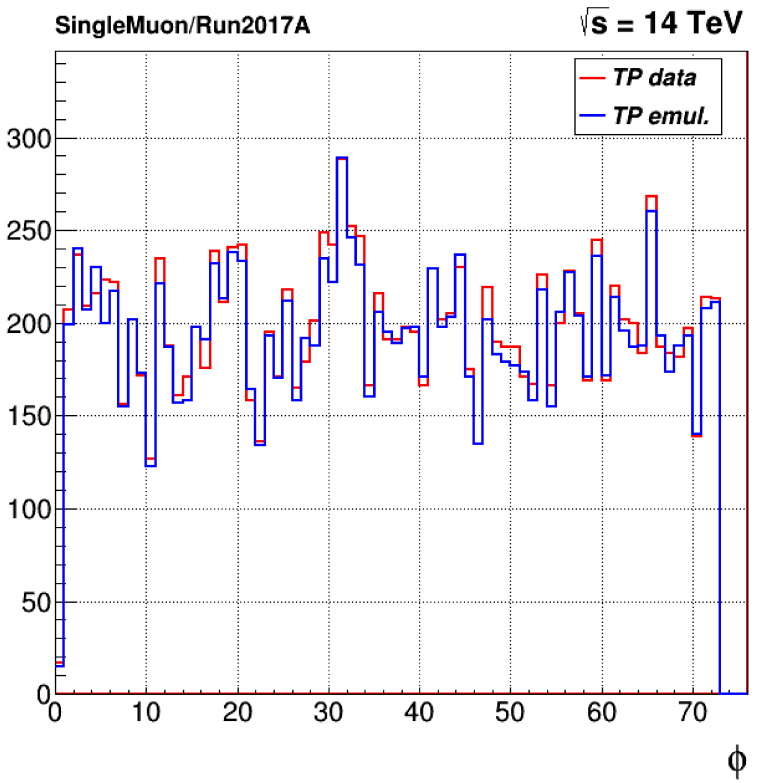
- During Soham studies, we found that HO Tps from HCAL FEDs has offset in timing for 2016 dataset.



- It was important to see how the timing look like in recent 2017 datasets
- Setup the HO TP emulator code in CMSSW_920
- Analyzed following recent dataset:
  - Run: Run2017A (run no:296174)
  - Dataset: /SingleMuon
    - Same dataset as used for unpacker testing

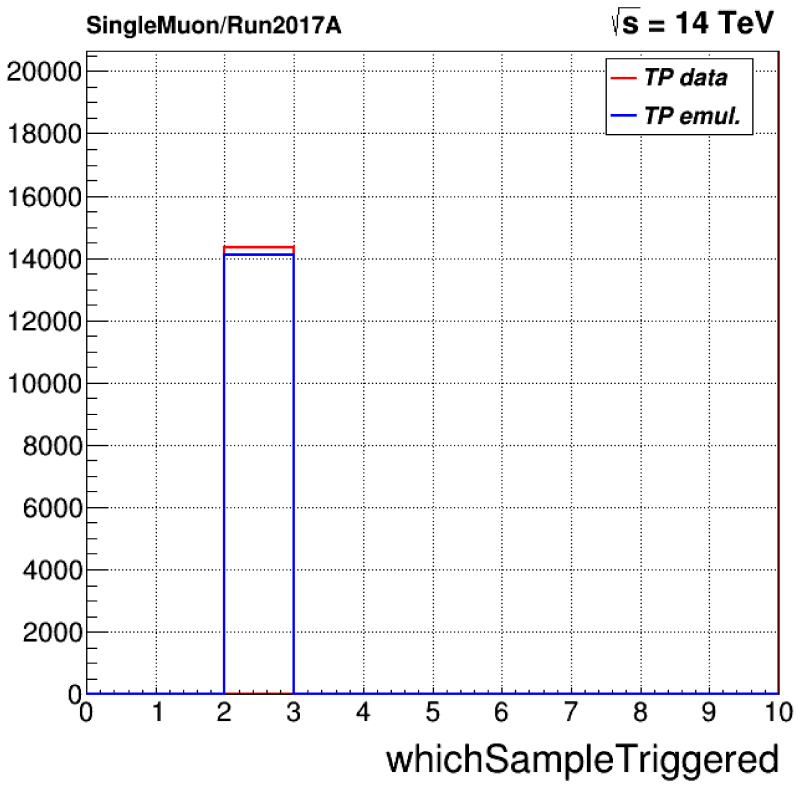
Emulator Testing

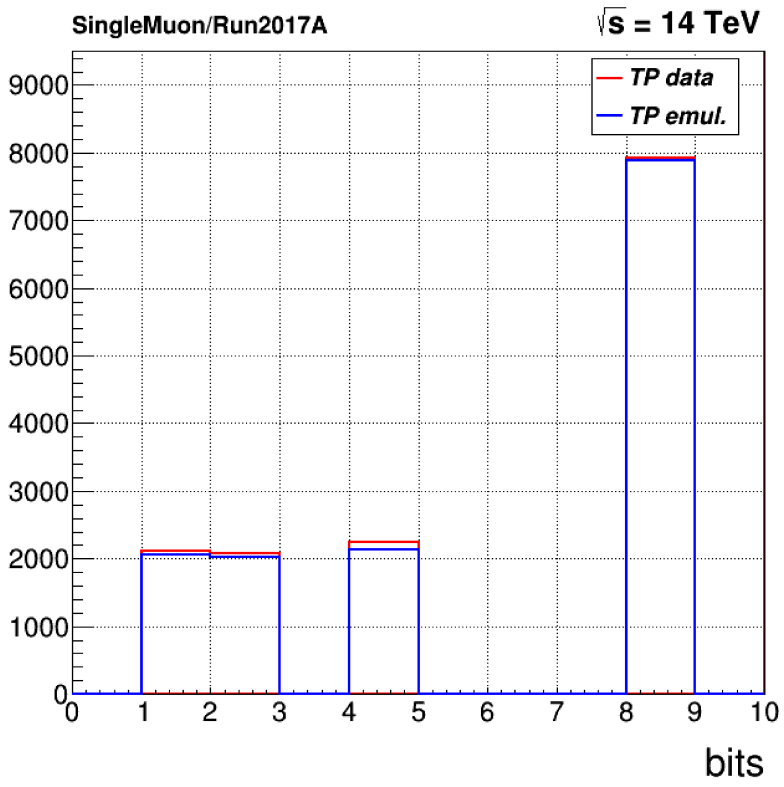




- Small discrepancy of order of 2.5% is visible in emulator and in data

Emulator Testing





- HO TPs are delayed, suppose to peak at 4

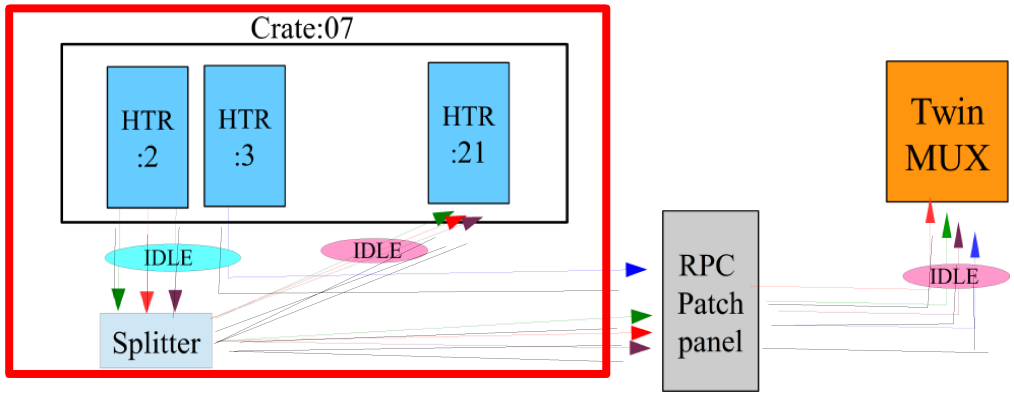
Summary

- Soham has partially implemented HO in TwinMUX emulator, preliminary studies looks promising
  - He will switch to HO To from TwinMUX, once they are ready.
- HO TP unpacker in TwinMUX is testes with both cosmics and collision dataset
  - Extended to all 2160 channels of HO
  - Electronics emap is also ready for whole HO detector
- Tested the HO TP in HCAL emulator using recent collision run
  - Data-emulator comparison difference is of the order of 2.5%

Backup

Commisiong

- Recent Update:
  - Followed from modified htr.cc with debugging feature by Drew, we did tests with the splitted signals on HCAL side on May 5 [1]
    - Summary: Everything looks OK and oSLB datra was perfectly synchronized over the 3 fibers from oSLB in slot:2



  - Conveyed to Karol to report his finding from TwinMUX side
    - Yesterday, he replied that 80% links are locked right and reported few issues

> Sorry for responding so lately, but I was busy last days with the CPPF commissioning.
>
> I just checked the HO RX in the TWinMux, when both the TwinmUx and HCAL where in global. It looks much better now:
> - About 80% of links lock and align with very similar alignment delay (3-4BX, for the BCN0 delay of 3478BX). The links lock by themselves after I reset the receiver, so I guess you send commas(idles) periodically? How frequent it is (I could not catch the commas with the spy memories, so I guess not very frequent)?
> - On many above links I can see a repeating pattern of data:

[1] http://cmsonline.cern.ch/cms-elog/980139

DESY