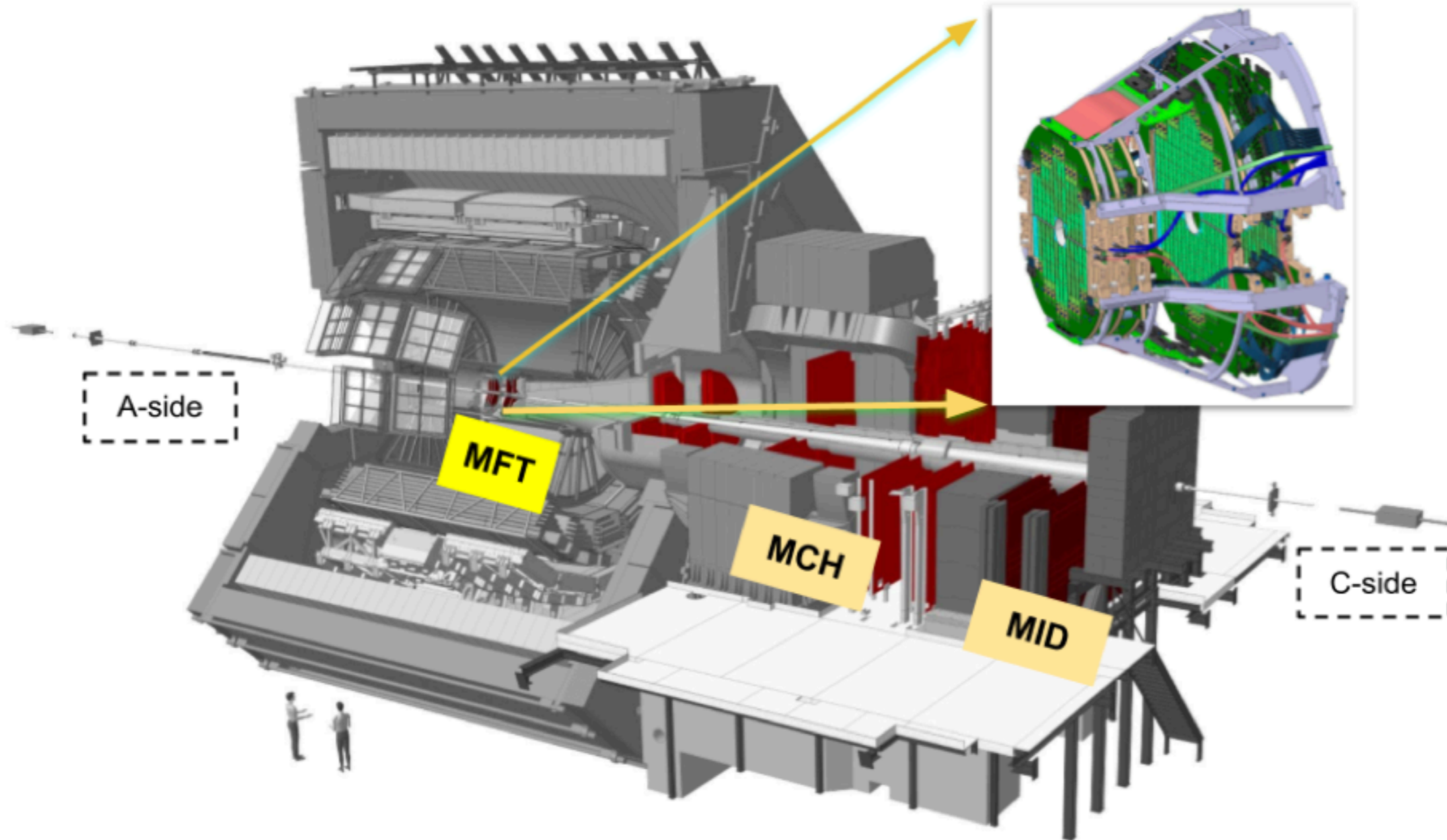




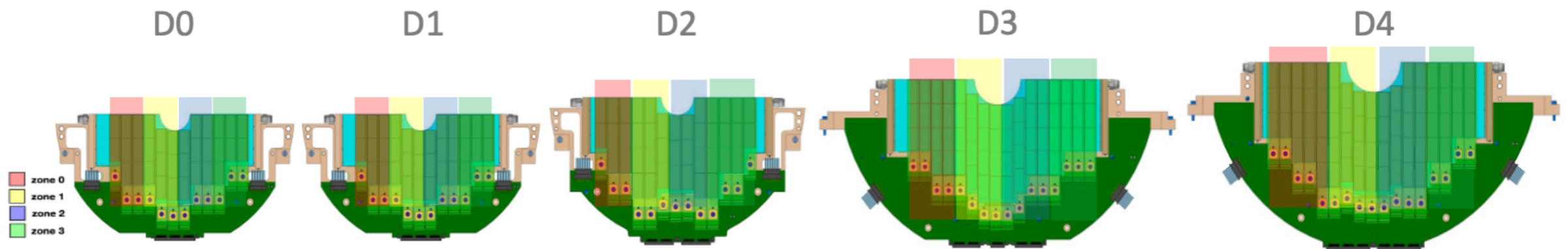
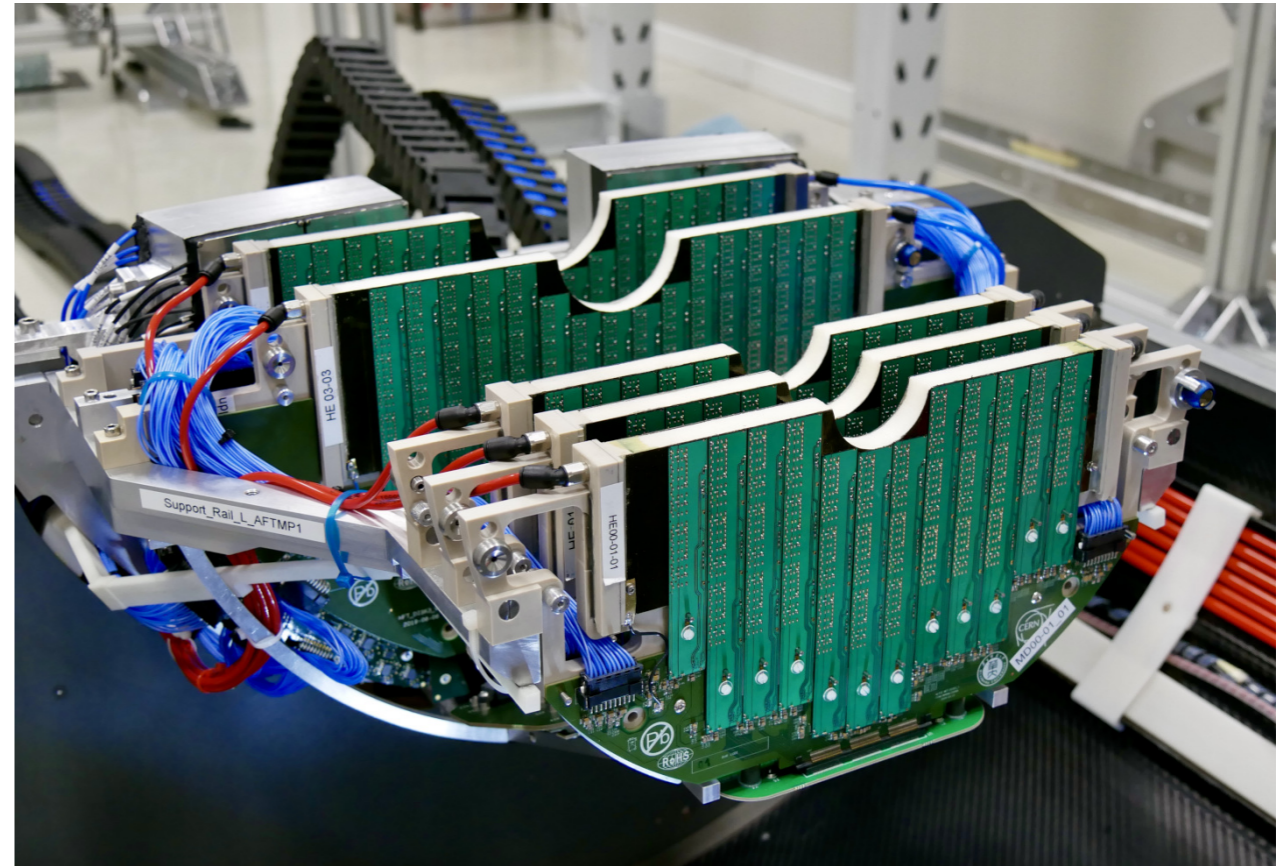
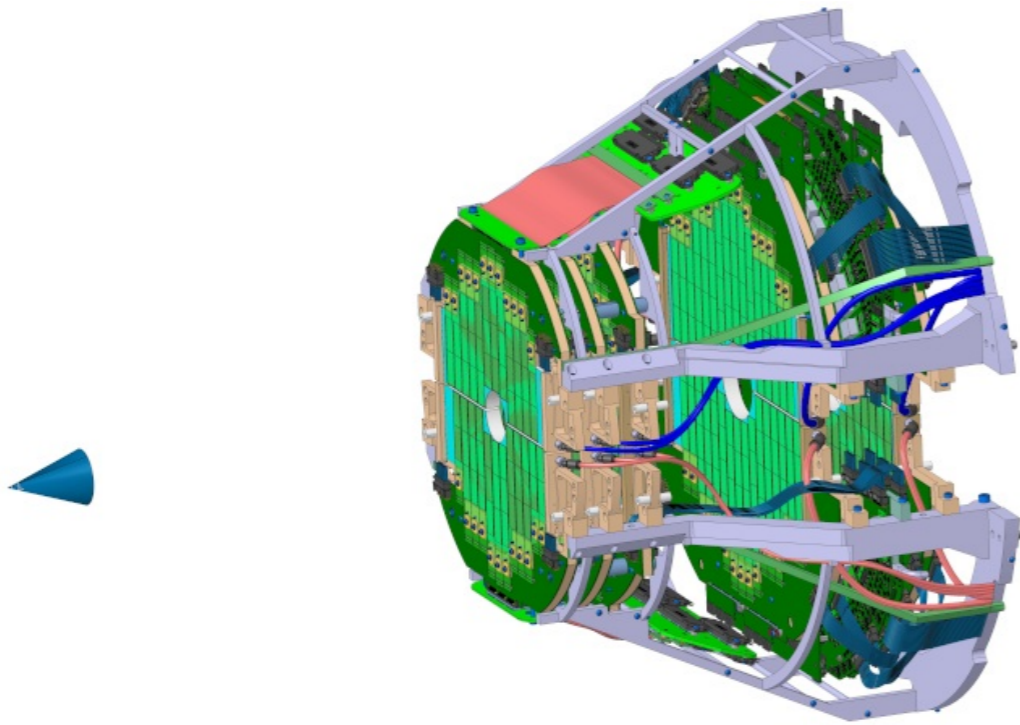
Status of the MFT

Sára Haidlová, 19.9.2024

Muon Forward Tracker



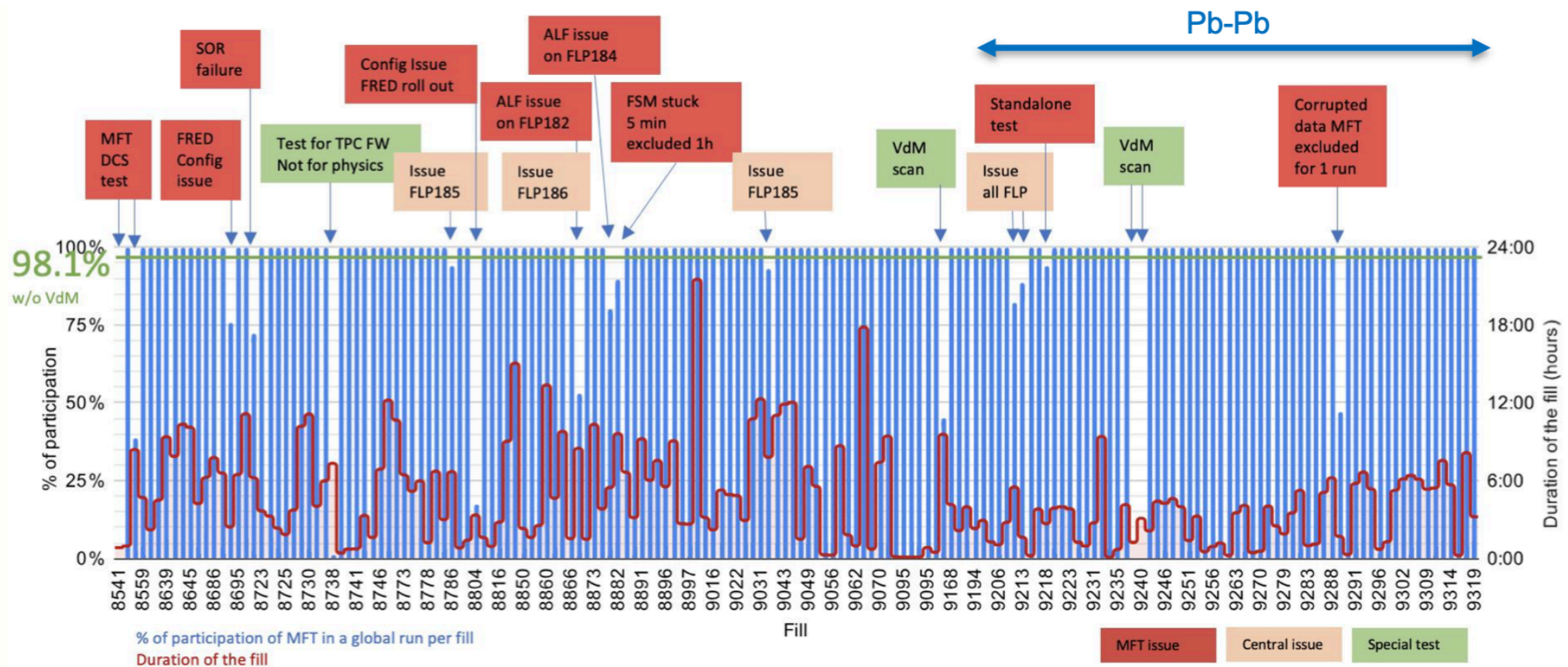
Muon Forward Tracker



MFT in 2023 PbPb



- MFT participated in 98.1% of runs (2022 - 91%), including VdM.
- participation in 99% of physics runs,
- total of 208 runs, 14 MFT EOR reasons



MFT Summer Madness

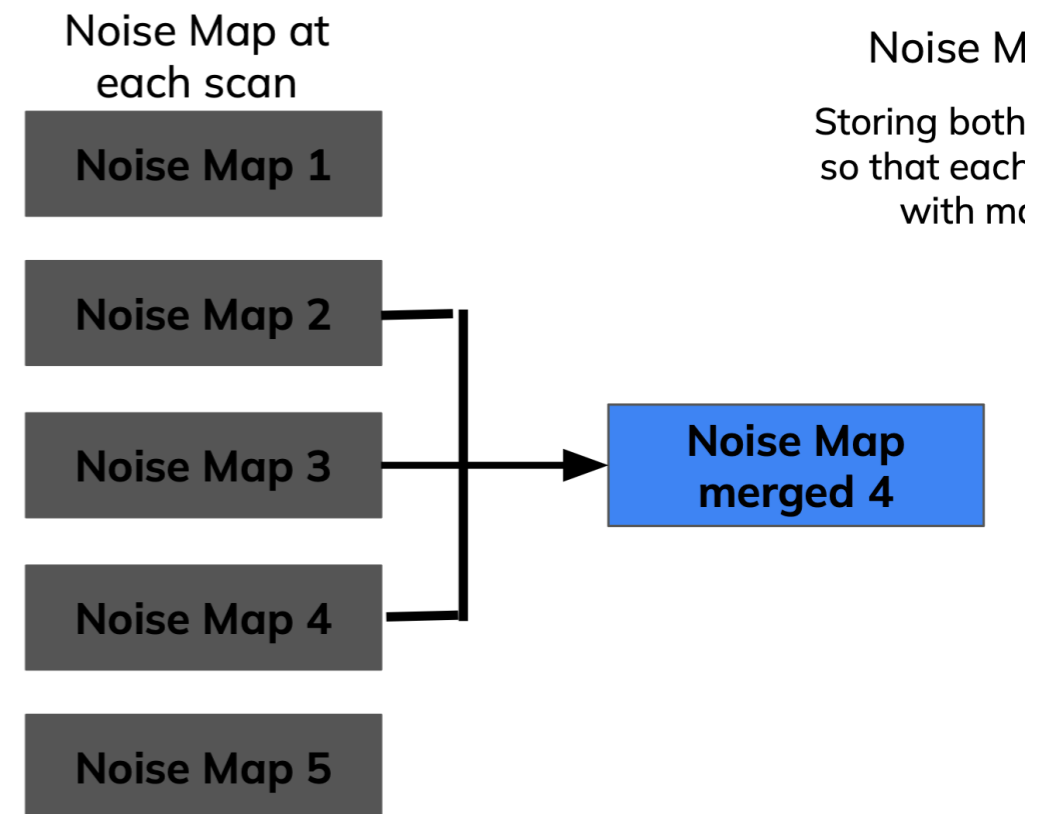


- In July MFT observed enormous amount of issues, specially noise runs.
 - Transient low voltage at RU ON, or once RU ON issues with configuration, or once all READY all the chips go in error after some minutes.
 - Low digital voltage on ALPIDEs of H1D1F0Z2 (problematic zone excluded).
 - Replacement of two CAEN modules in July for H1D1F0Z2 recovery (for PSU and RU).
 - Solved voltage issue, not configuration and SOR failures.
 - Configuration problems and SOR failures not solved -> CTP clock problem (holdover protection OFF).

MFT calibrations



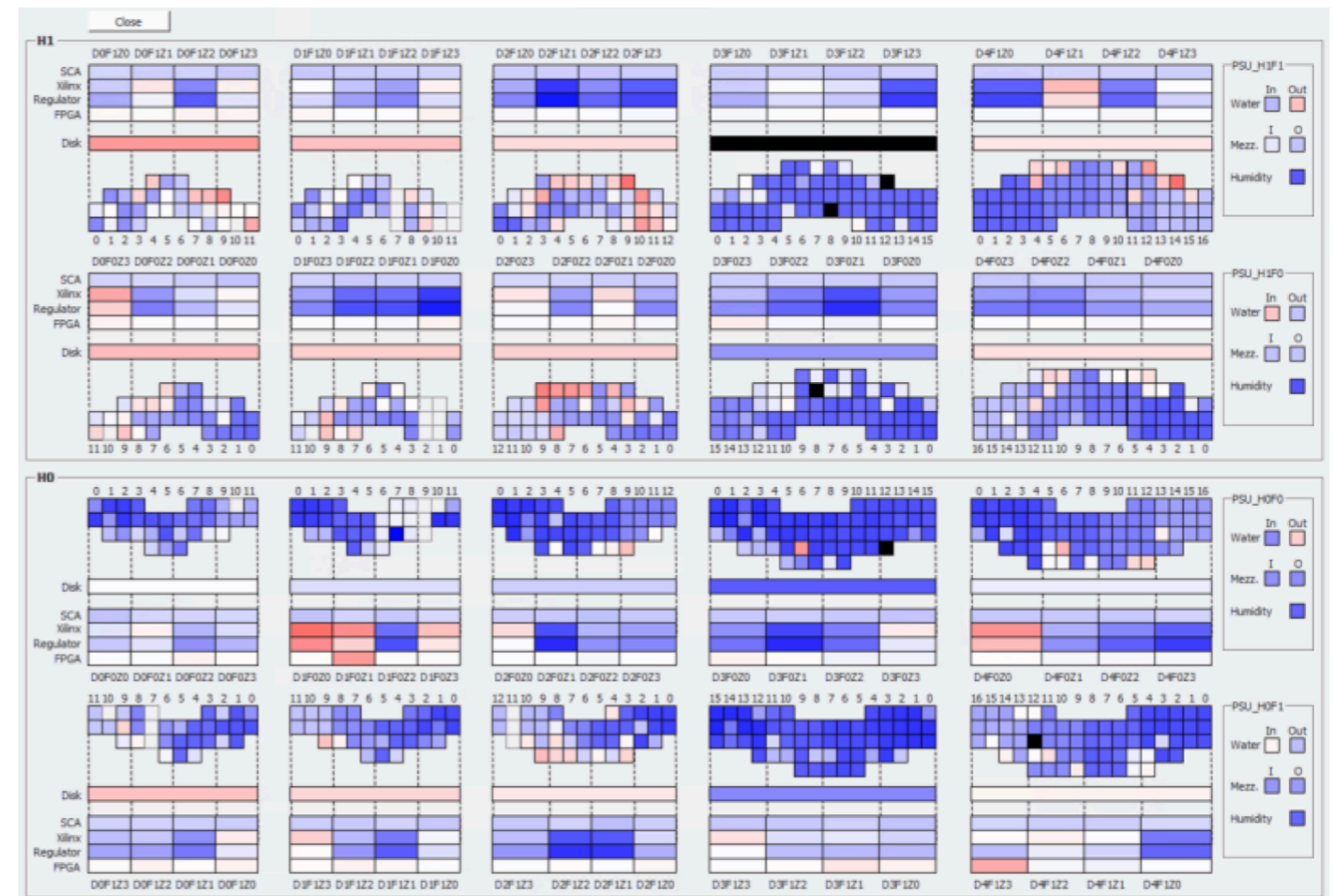
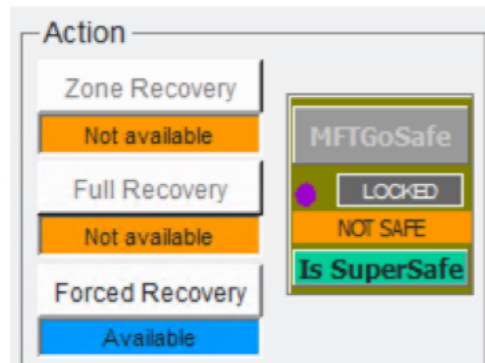
- MFT calibrations done at beam dump.
- Noise scan to identify noisy pixels at EOF to mask at readout level and again for online and offline processing.
- Implementation of merged noise maps:
 - stochastically some noisy pixels are missed and affect measured signal,
 - use merged noise maps.



MFT DCS improvements



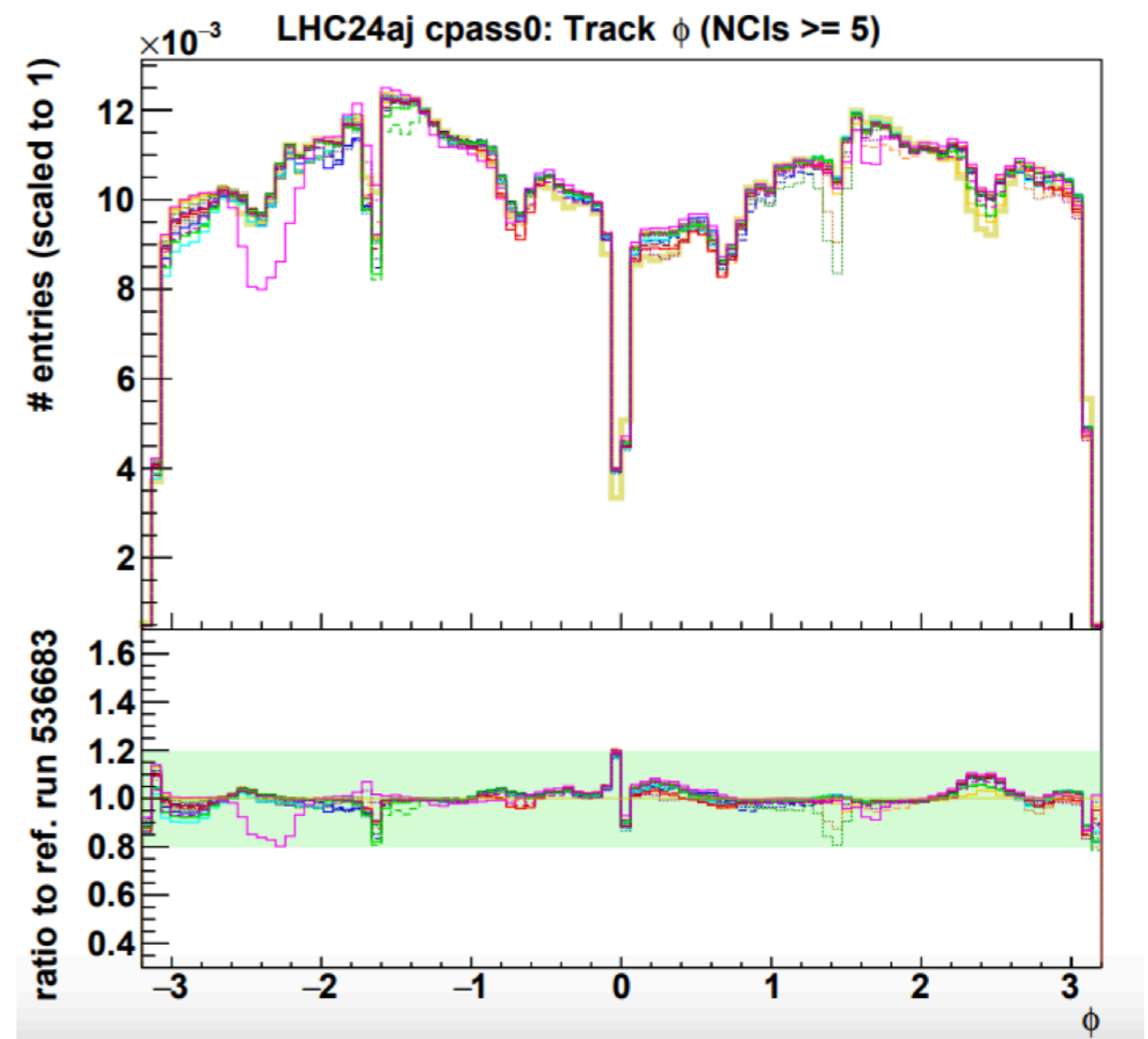
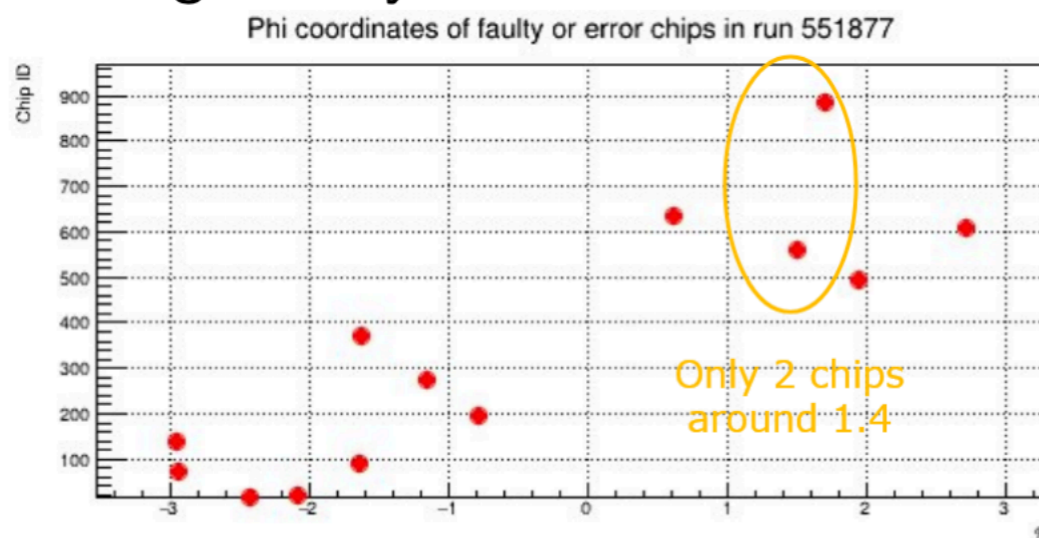
- Implementation of protection to avoid SOR execution with MFT in wrong state.
 - MFT should be brought to READY before SOR.
- New sensor recovery buttons available during run.
- Chip temperature monitoring.



MFT Acceptance study



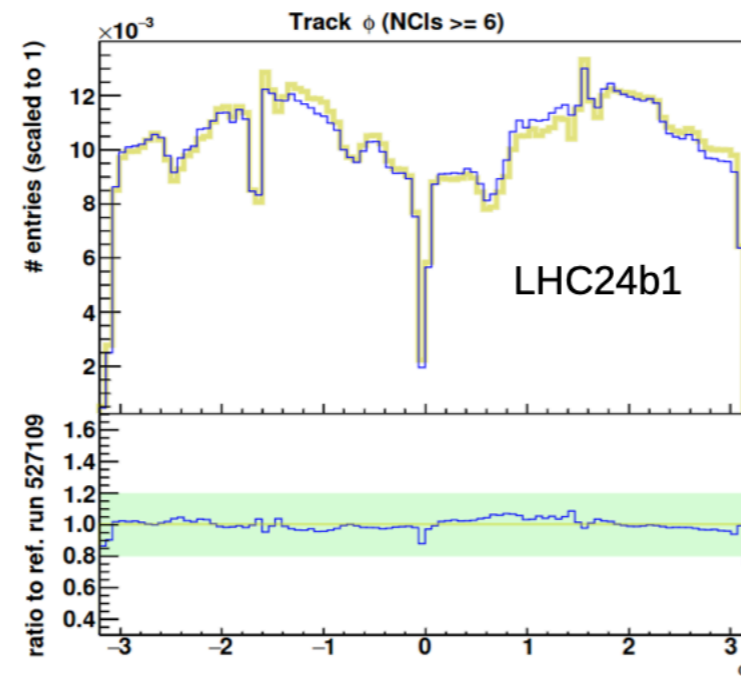
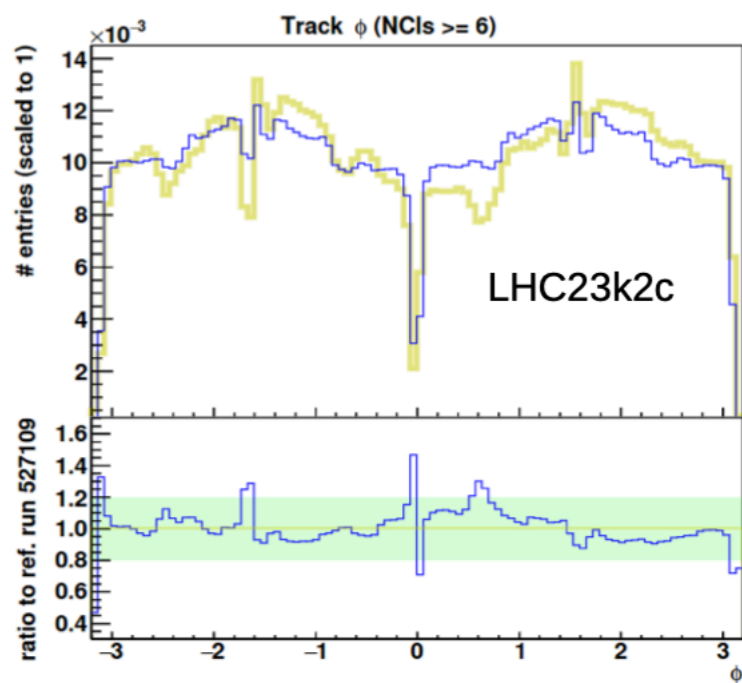
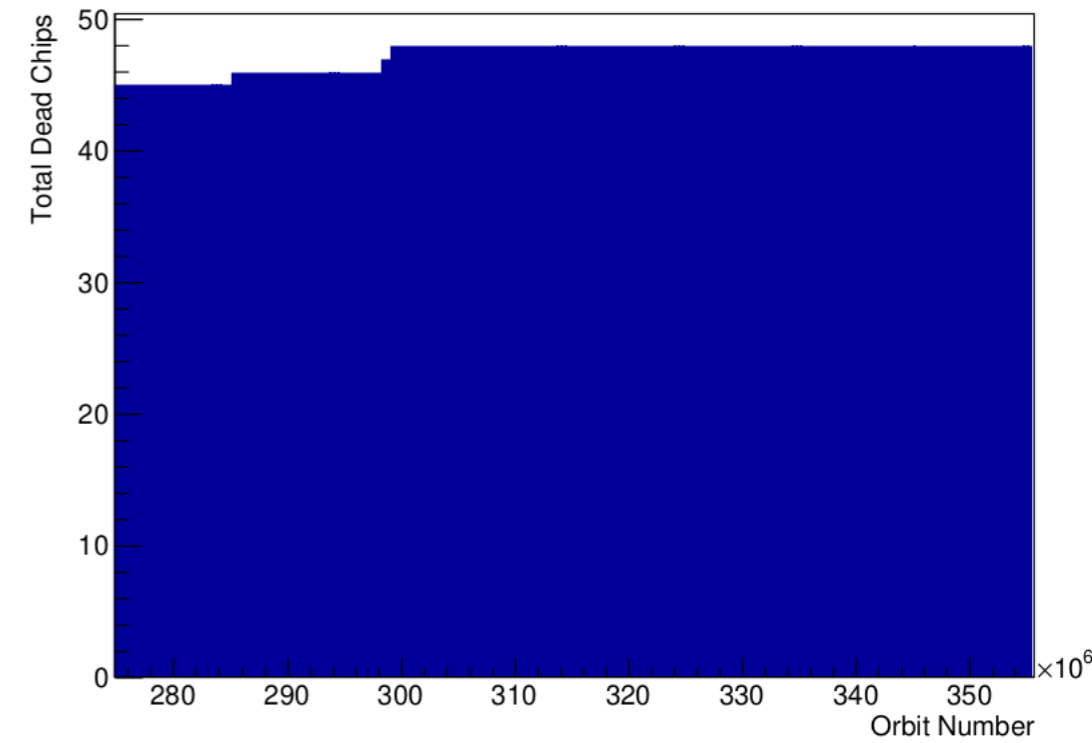
- Loss of acceptance observed in several runs.
 - Origin investigated by experts.
- New tool by Titouan.
 - Study correlation of missing chips and acceptance drops.



MFT Dead maps



- New time-dependant dead maps.
- Impact on detector acceptance.



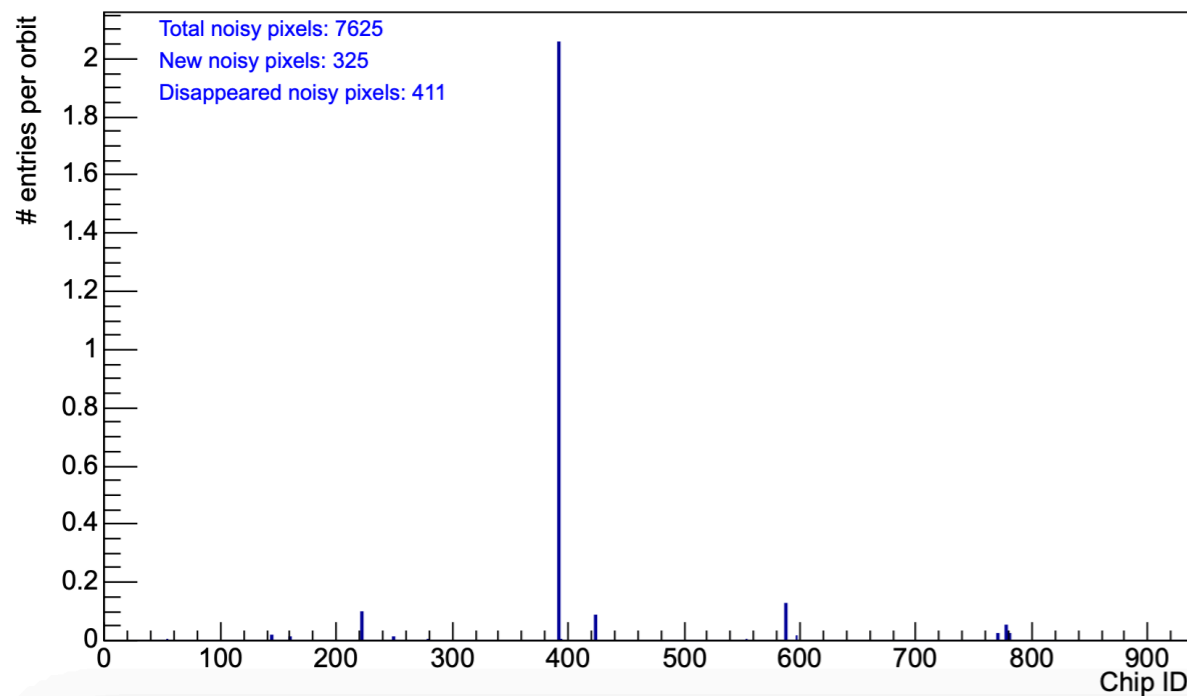
MFT QC improvements

Calibration QC checker

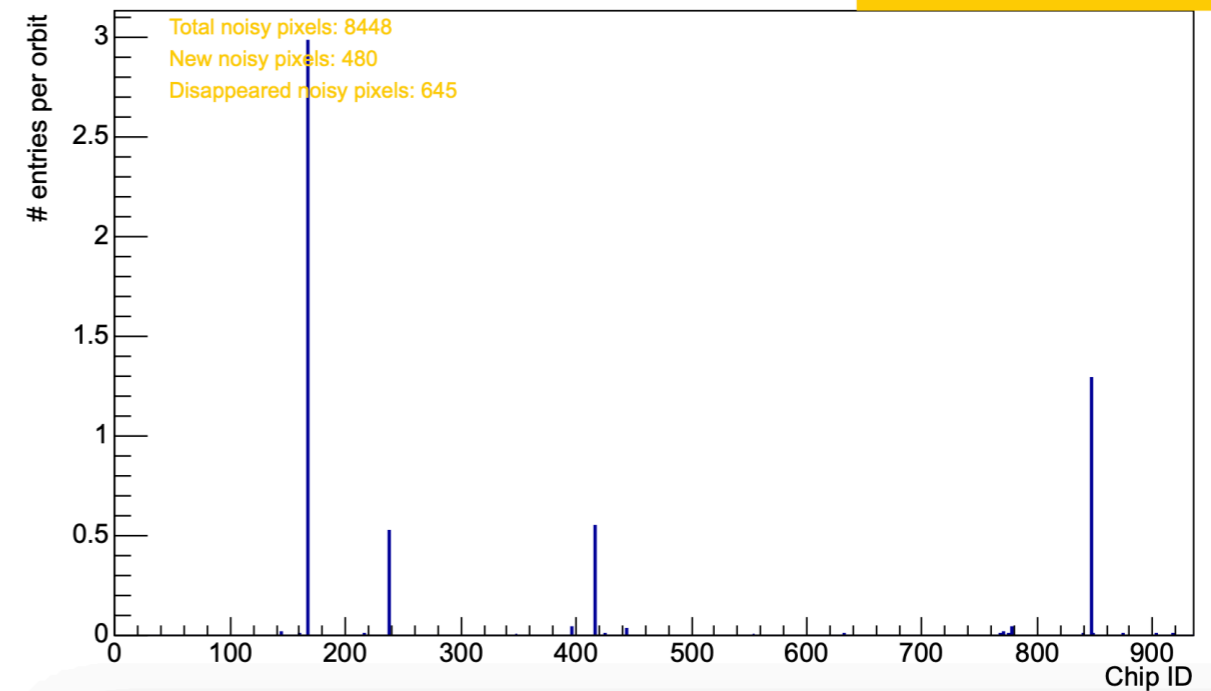


- Include number of total, new and disappeared noisy pixels.
- Recently added a quality checker. Parameters to be fine-tuned.

Digit Chip Occupancy



Digit Chip Occupancy

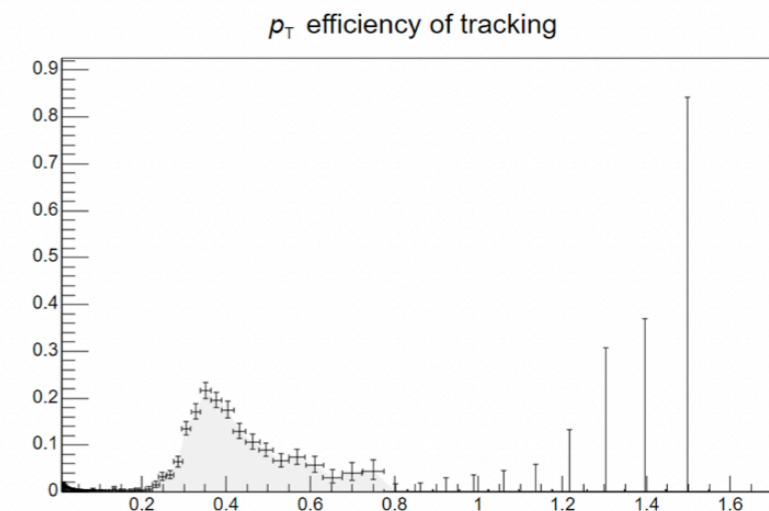
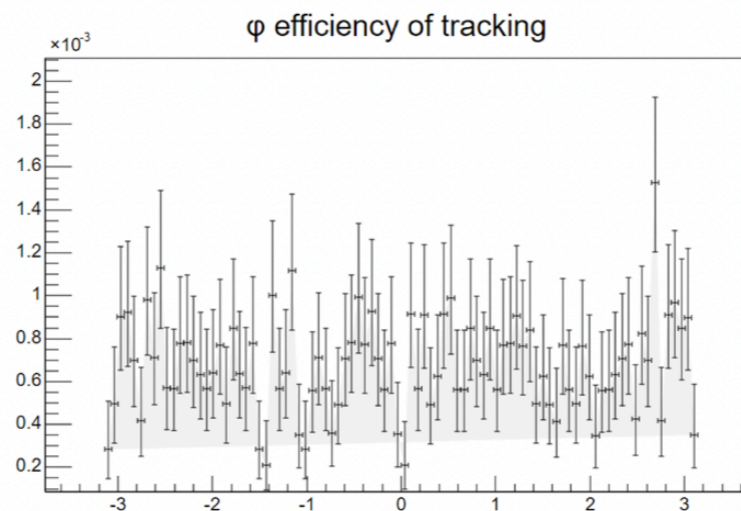
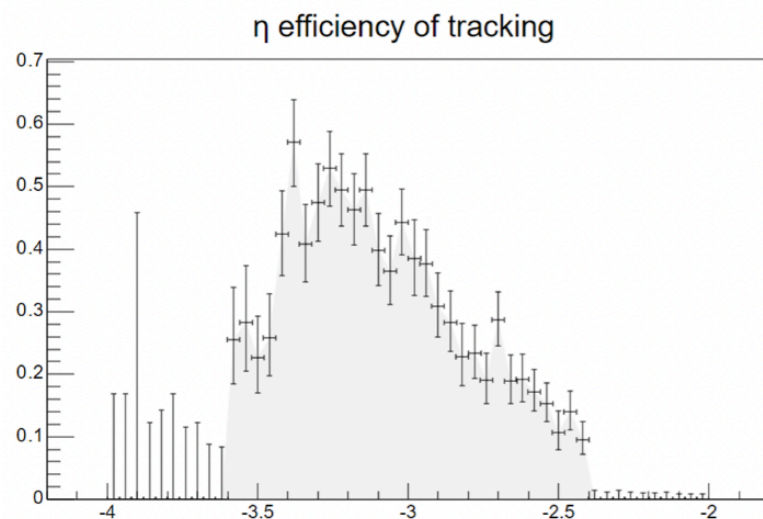


MFT QC improvements

New MC Track Task



- Dedicated MC track task for MFT, including calculation of efficiencies, fake-track rate and resolution.
 - Before we had only plots present in digit, cluster and track tasks.
- Code developed using locally produced Starlight UPC data.
- p_T bins not homogeneous

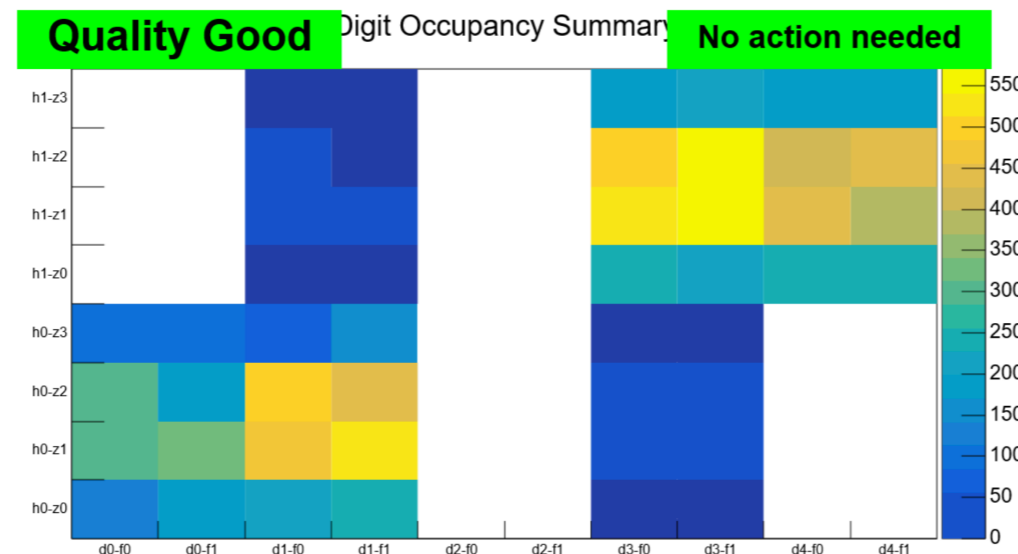
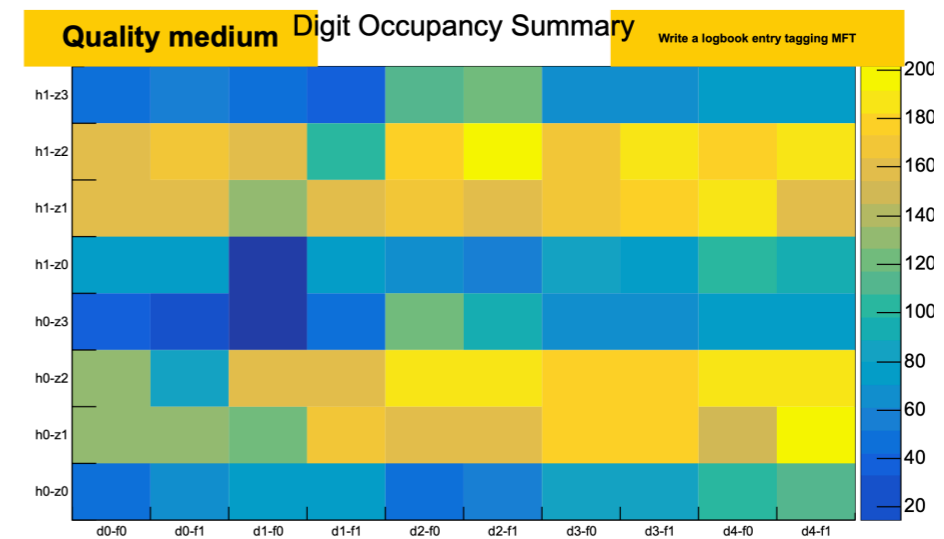
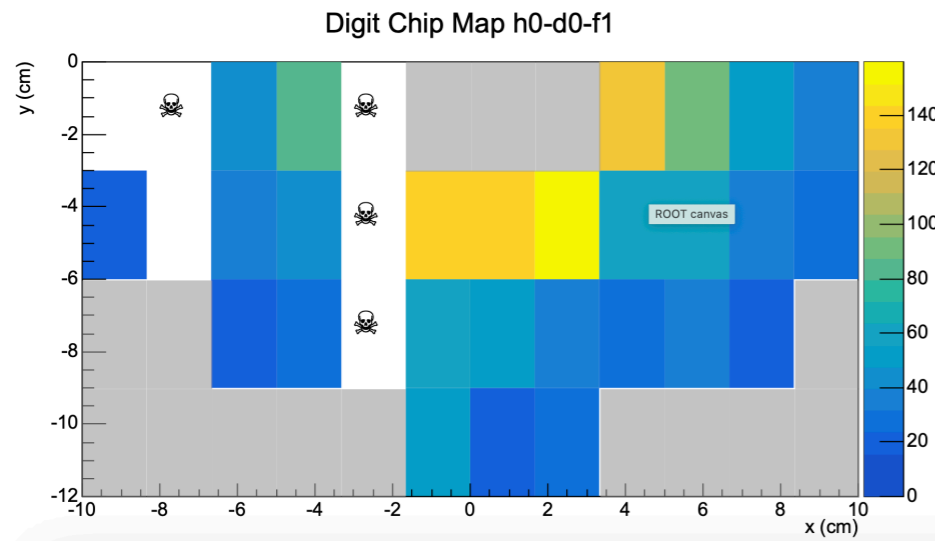


MFT QC improvements

Ladder checker and empty FLP



- Replacement of present zone checker.
- To be improved.
- Presents need for a new tool -> YETS.

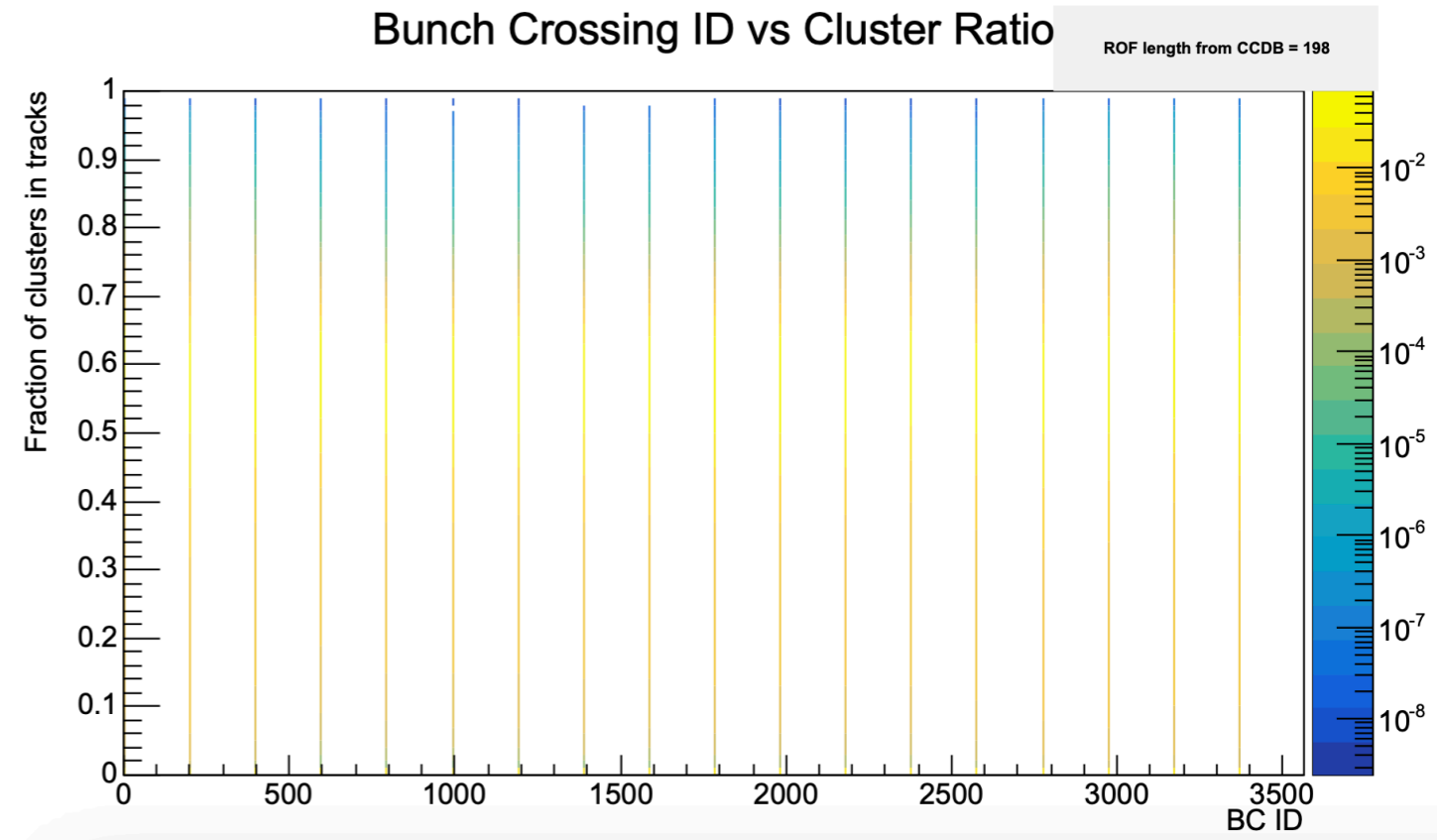
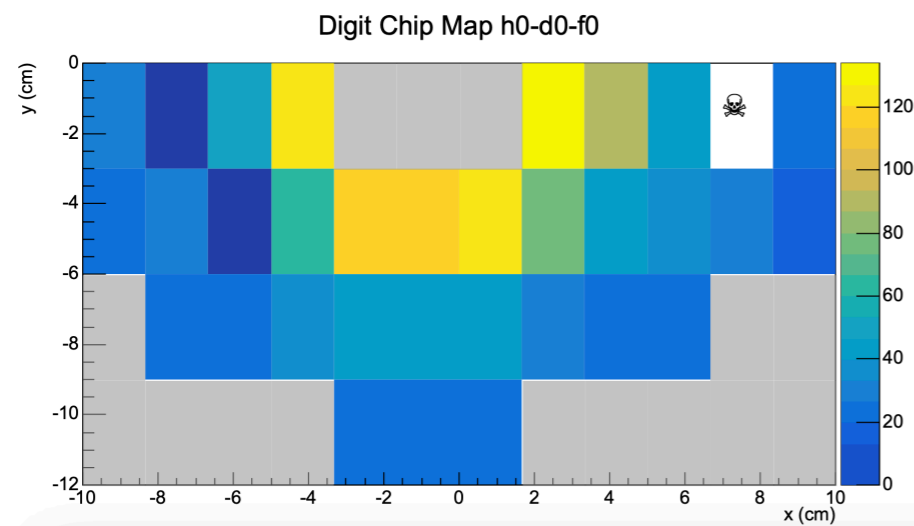


MFT QC improvements

Outside acceptance, ROF length check



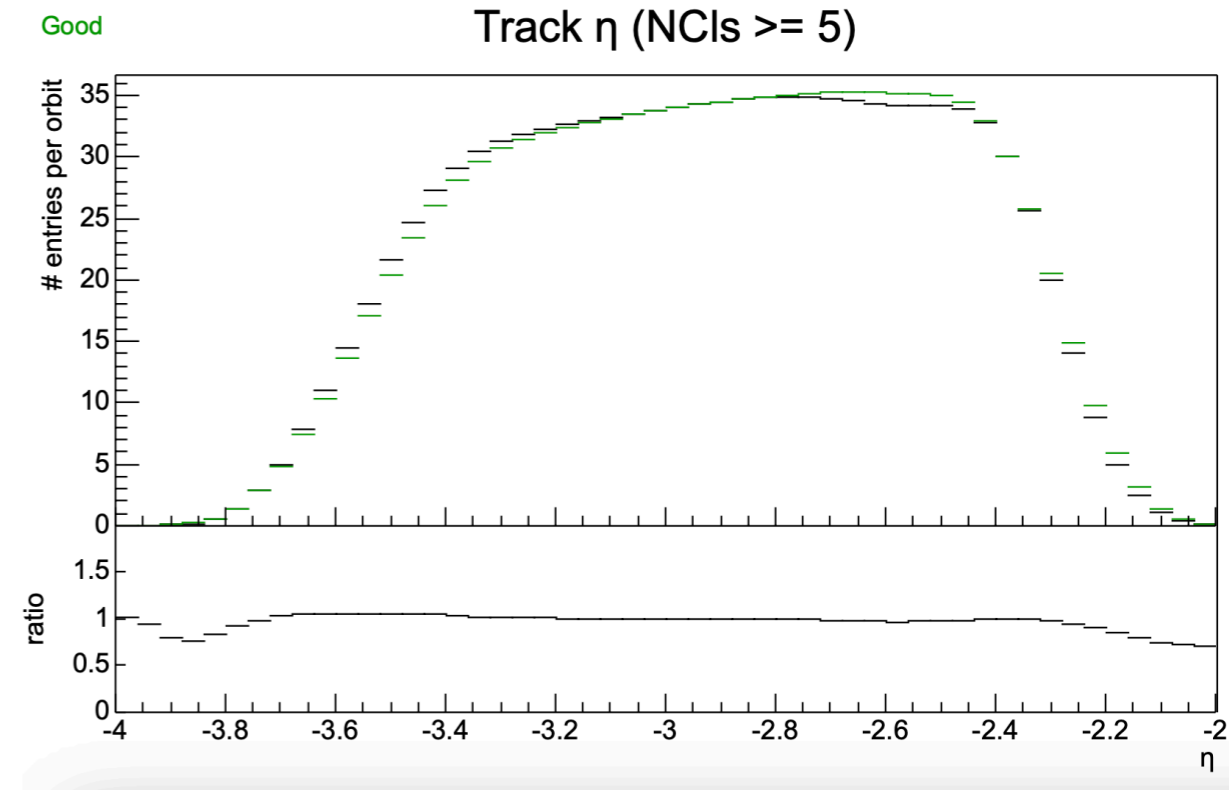
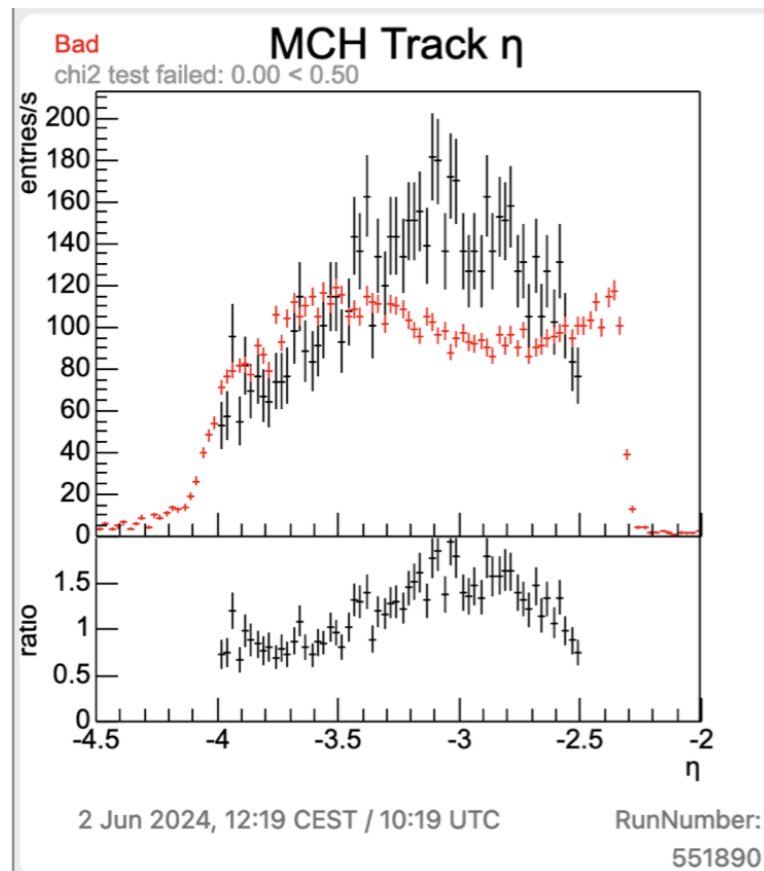
- Check of correct ALPIDE configuration from CCDB.
- Easier interpretation



MFT QC improvements

Reference comparison

- Now in online.
- Comparison of measured distribution with a reference run.



MFT QC improvements

Reference comparison



- Now in online.
 - Comparison of measured distribution with a reference run.
 - MFT coordination requested new comparator for bin by bin comparison.
 - Under development, to be solved ASAP.
- Generic Check to compare and assess
 - Configuration only
 - *referenceRun*
 - *comparatorName* – how to compare
 - *threshold* – discriminator, depends on the comparator
 - Comparators
 - *ObjectComparatorDeviation*
 - *ObjectComparatorChi2*
 - *ObjectComparatorKolmogorov*
 - The plot is beautified by the addition of a TPaveText containing the quality and the reason for the quality.

MFT aQC improvements

Moving windows



- By default, tasks in QC never reset.
- Moving windows allow us to pinpoint when something happened thanks to reset every X cycles.
- This is good for aQC as it allows to monitor plots throughout the run and not only cumulated results -> possibility of time-dependent quality flags.

MFT QC improvements

Running Condition Table in BK (for YETS)



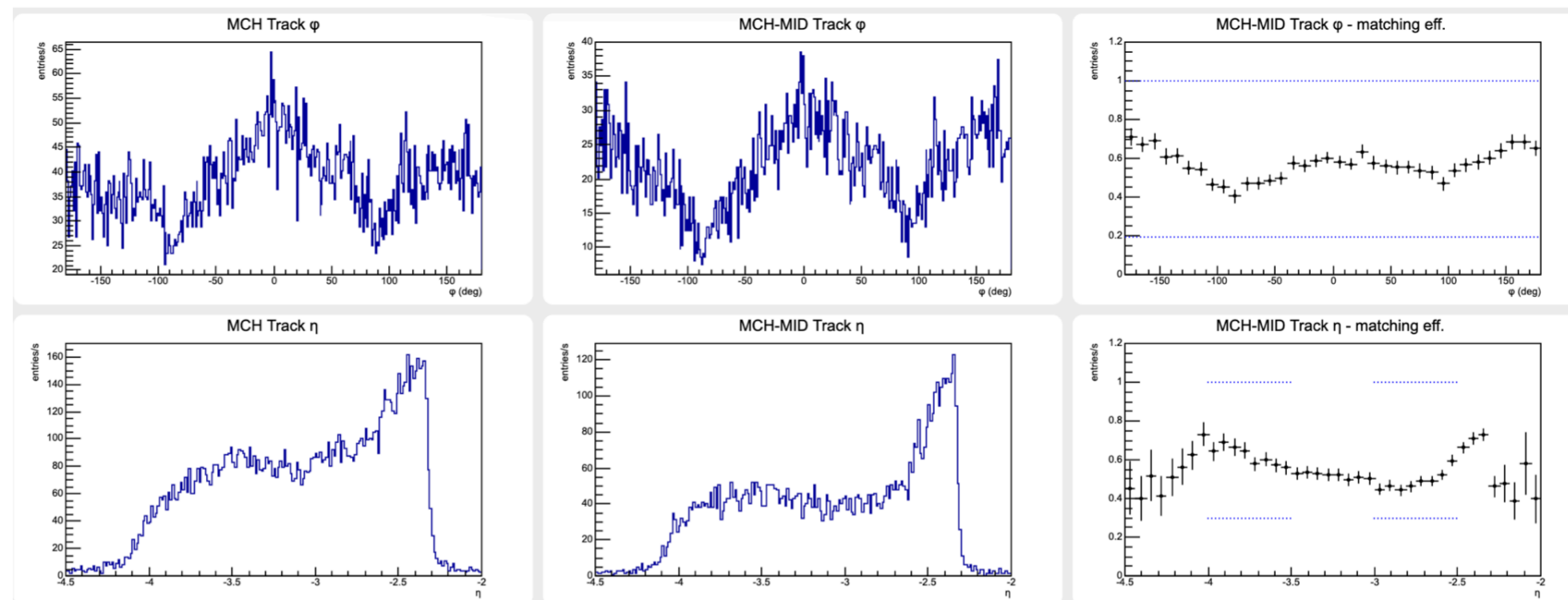
- Replacement of locally used google spreadsheets for MFT.
- Ability to set time-dependent quality flags.
- Quality set for various data passes can differ.
- Possibility to move sync quality to BK.

Id ▼	Name	Method	Bad
1	Unknown Quality	UnknownQuality	Yes
3	No Detector Data	NoDetectorData	Yes
4	Limited Acceptance MC Not Reproducible	LimitedAcceptanceMCNotReproducible	Yes
5	Limited Acceptance MC Reproducible	LimitedAcceptanceMCReproducible	Yes
6	Bad PID	BadPID	Yes
7	Bad Tracking	BadTracking	Yes
8	Bad Hadron PID	BadHadronPID	Yes
9	Good	Good	No
10	Invalid	Invalid	Yes
11	Bad Electron PID	BadElectronPID	Yes
12	Bad EM Calorimetry	BadEMCalorimetry	Yes
13	Bad Photon Calorimetry	BadPhotonCalorimetry	Yes
14	Unknown	Unknown	Yes

Global MUON QC



- Provide standard set of plots for different matching combinations:
 - MFT-MCH
 - MCH-MID
 - MFT+MCH+MID.
- Kinematic plots and correlations, matching efficiency.



MFT Physics

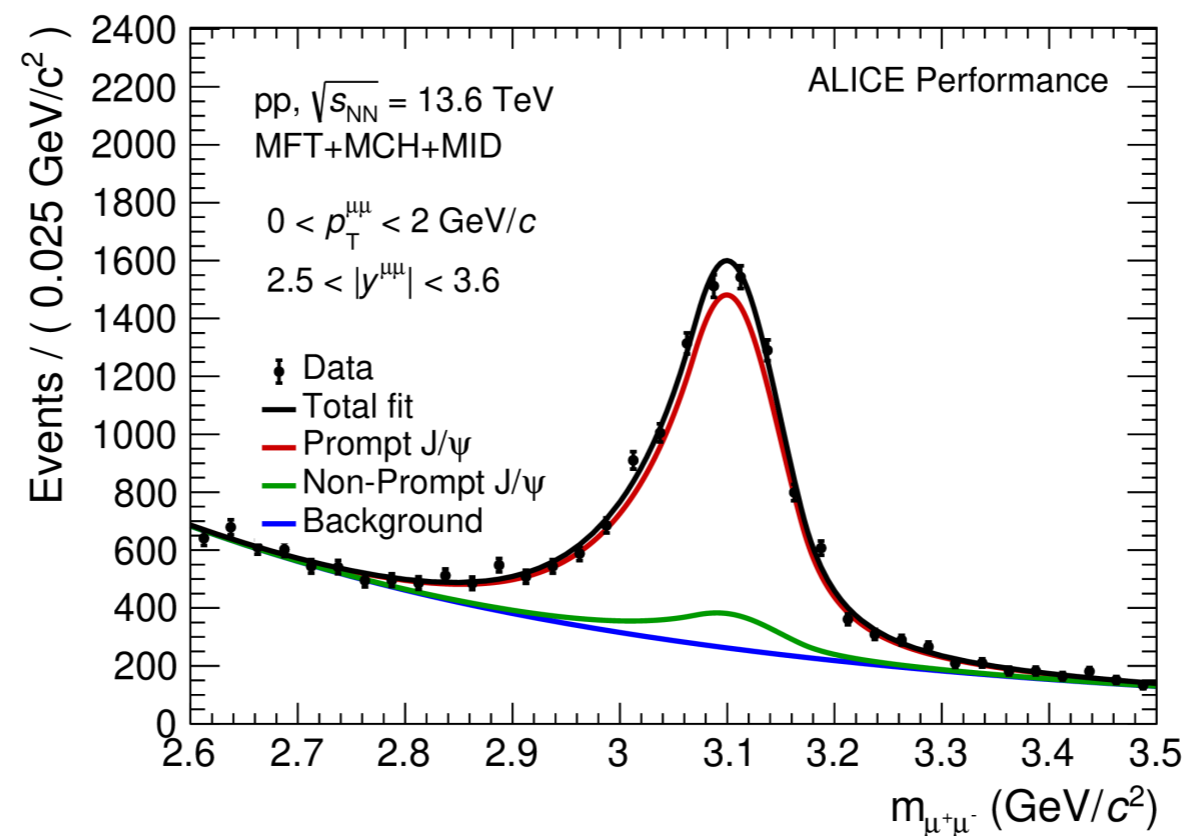


- Analysis possible with MFT standalone tracks.
- Advancements in MFT-MCH matching.
 - Standard χ^2 method makes it hard to remove background and it can discriminate signal -> implementation of ML ongoing (for Pb-Pb).
 - Different matching strategies implemented with results improving pass by pass.
- MFT geometry updated.

MFT Physics



- MFT physics manpower increased (PAG contacts).
- First performance results.
- J/ψ measured can be measured down to zero p_T .



ALI-PERF-571253

Summary



- MFT is ready and running well.
- Large amount of updates to all detector systems done, large amount still coming.
 - Preparation for smooth Pb-Pb and O-O periods.
 - Also to make out lives a bit easier.
- MFT is improving not only in data taking, but also in physics performance.



Thank you!