TRT Dataquality operations & Heavy Ion DQ

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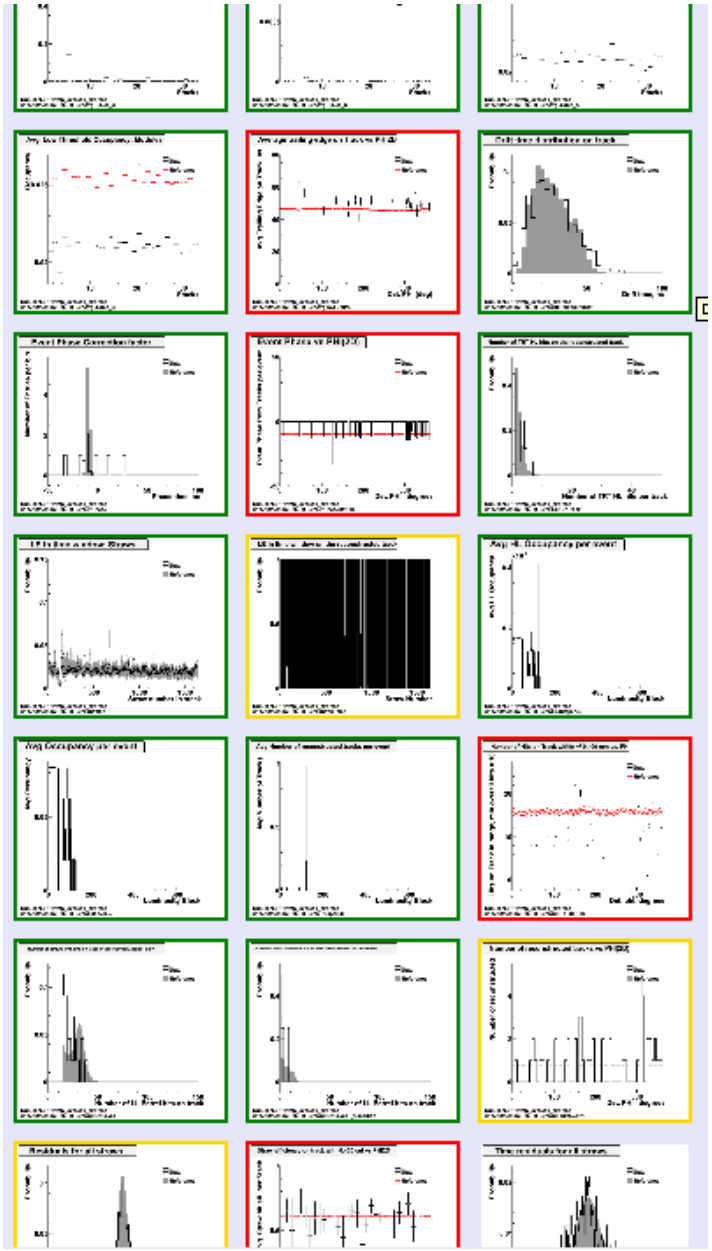
TRT Dataquality operations & Heavy Ion DQ

1. Automatic Dataquality checks
2. Dataquality online operations
3. Dataquality for Heavy Ion running
4. Summary

Some statistics [1]



For each run:

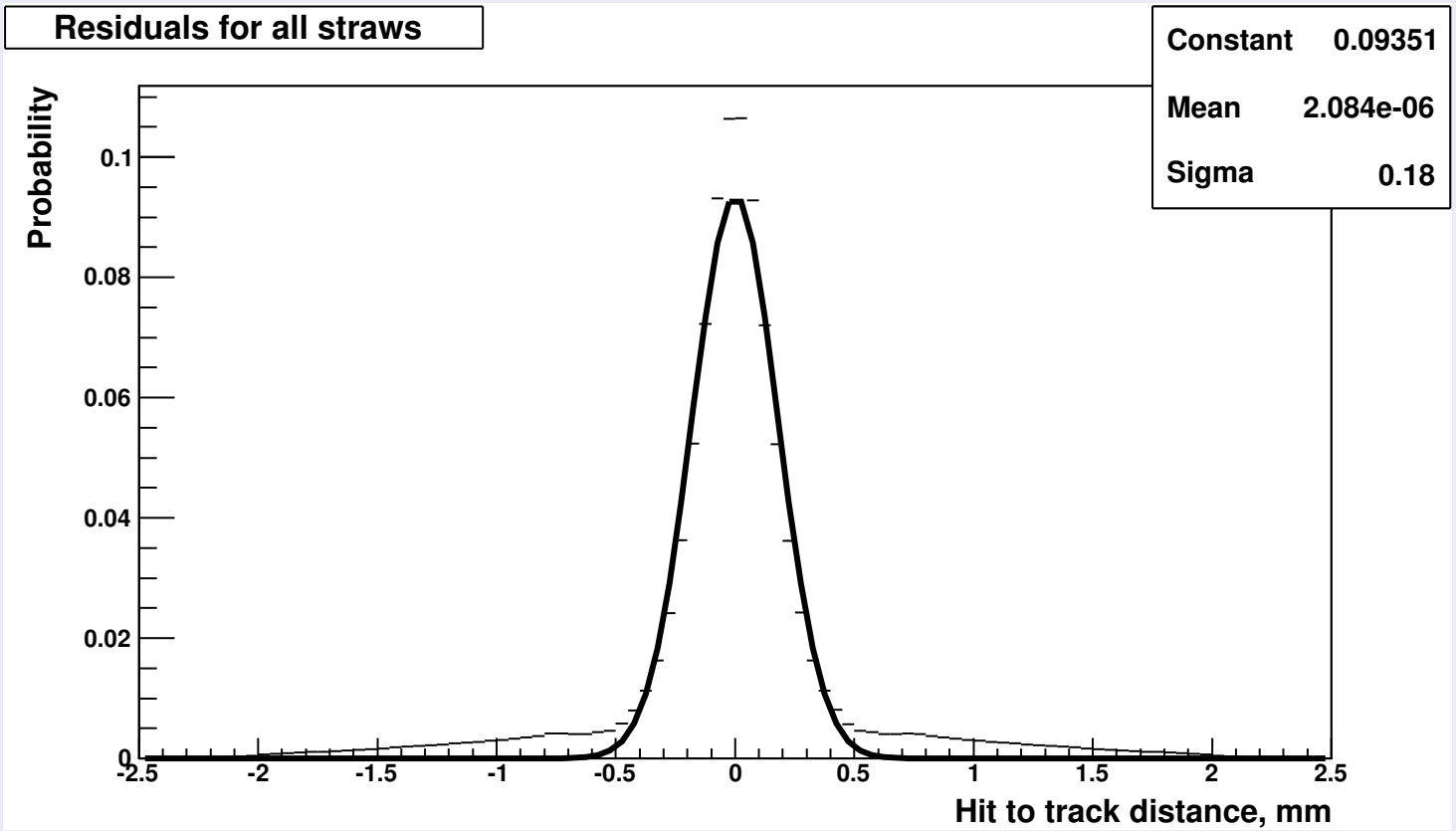
- 393 histograms checked online (73 shifter + 320 expert histograms) (+3)
- ...using 7 different algorithms (-1)
- 141 histograms checked offline (+38)
- ...using 8 different algorithms (-1)
- Same checks on- and offline as far as possible

[1] brackets denote difference to last ID week

Updates since last ID week

Iterative gaussian fit

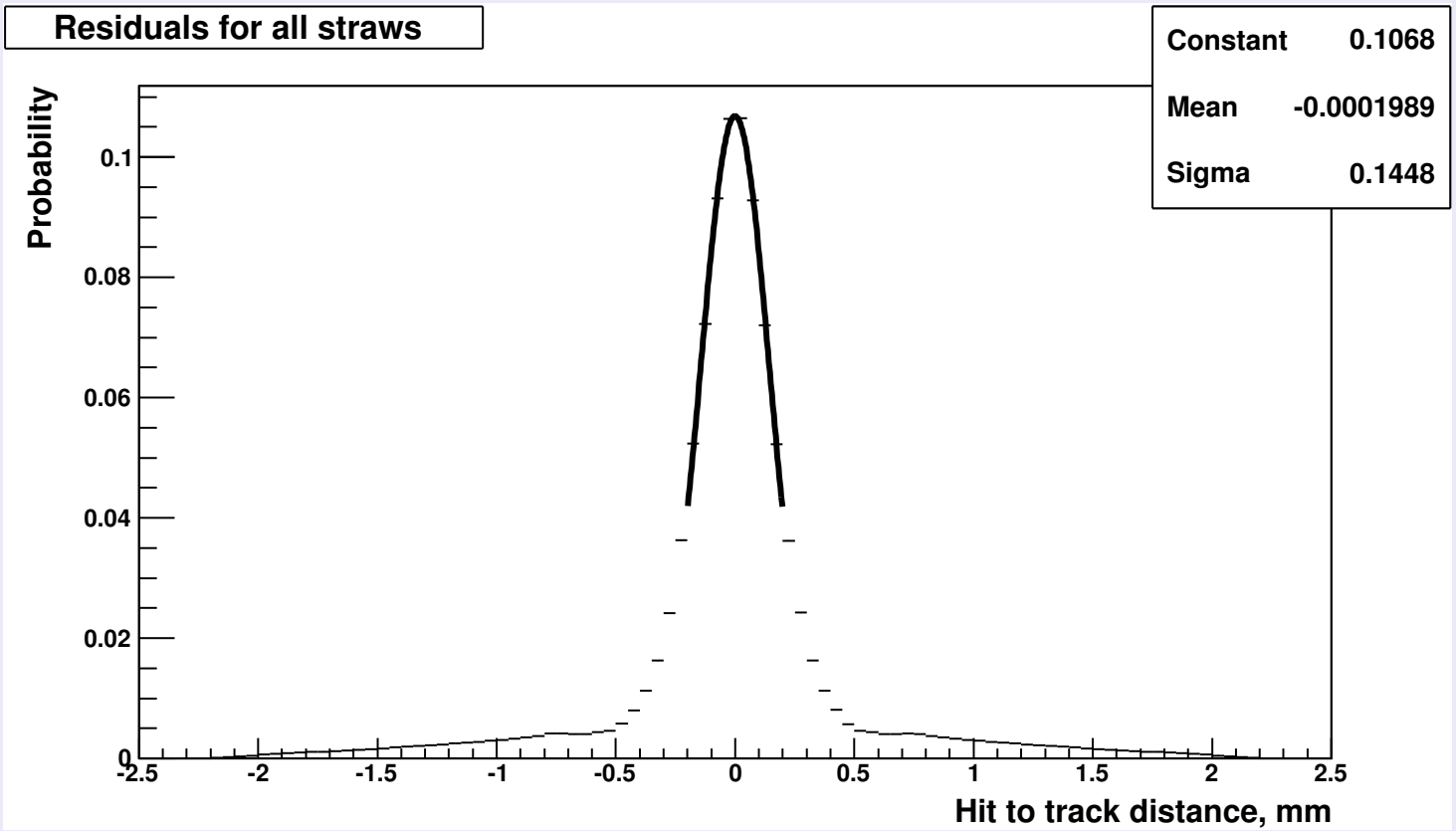
Tails deteriorate results of a simple gaussian fit



Updates since last ID week

Iterative gaussian fit

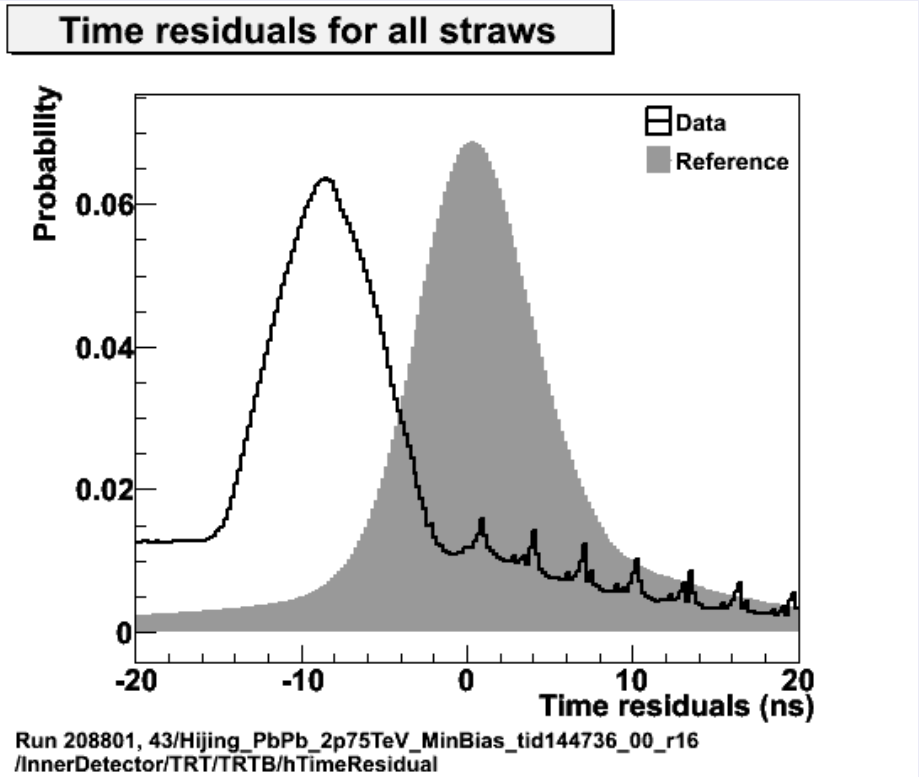
Iteratively narrowing of fit range down to $\pm 1{,}5\,\sigma$



Updates since last ID week

Iterative gaussian fit

What we can do with this

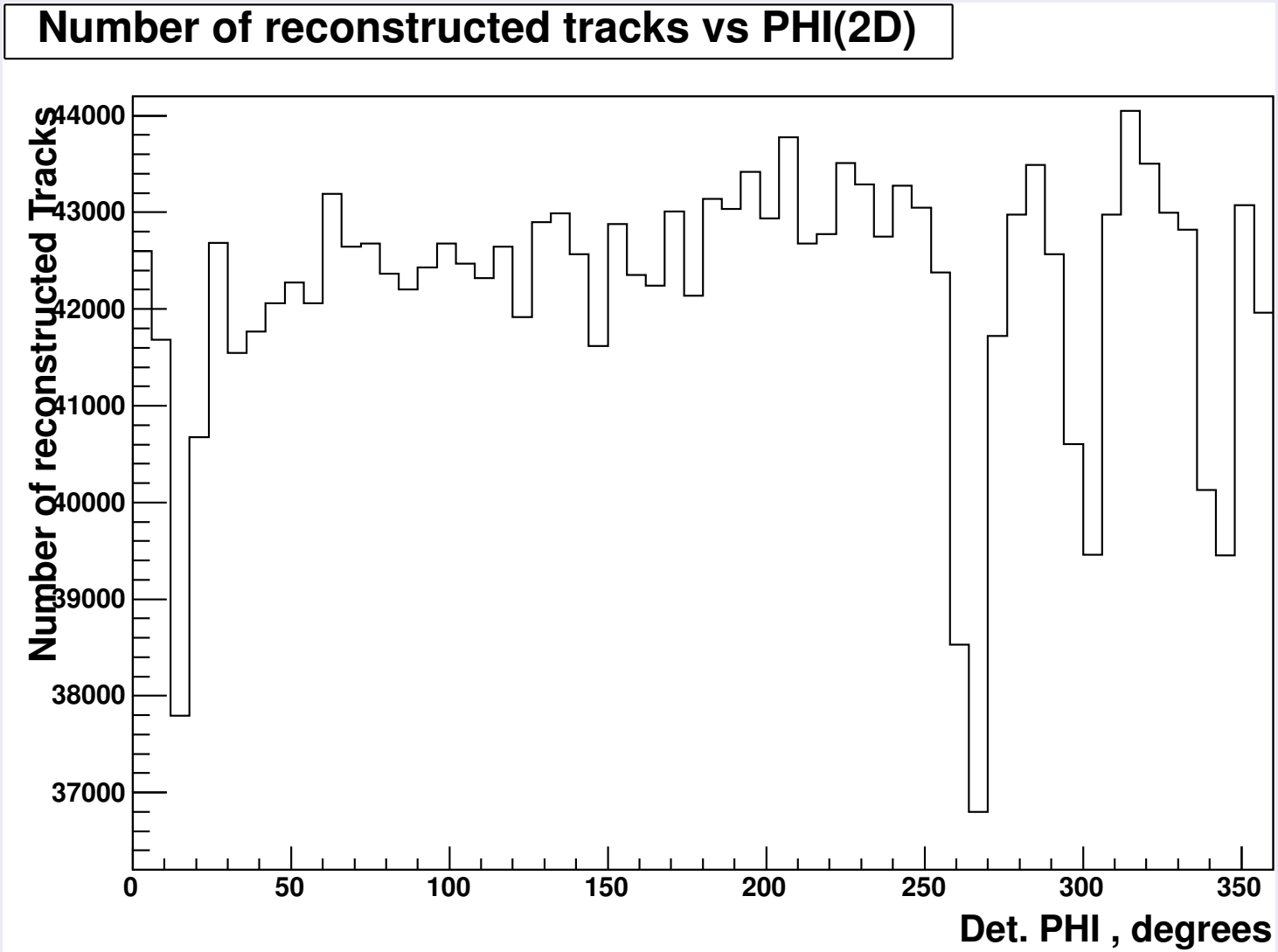


- Even distributions deviating strongly from our expectations are checked correctly
- Here: Position and width of gaussian core of largest peak found
- (Details on this histo later)

Updates since last ID week

Outlier and flatness test with known structures

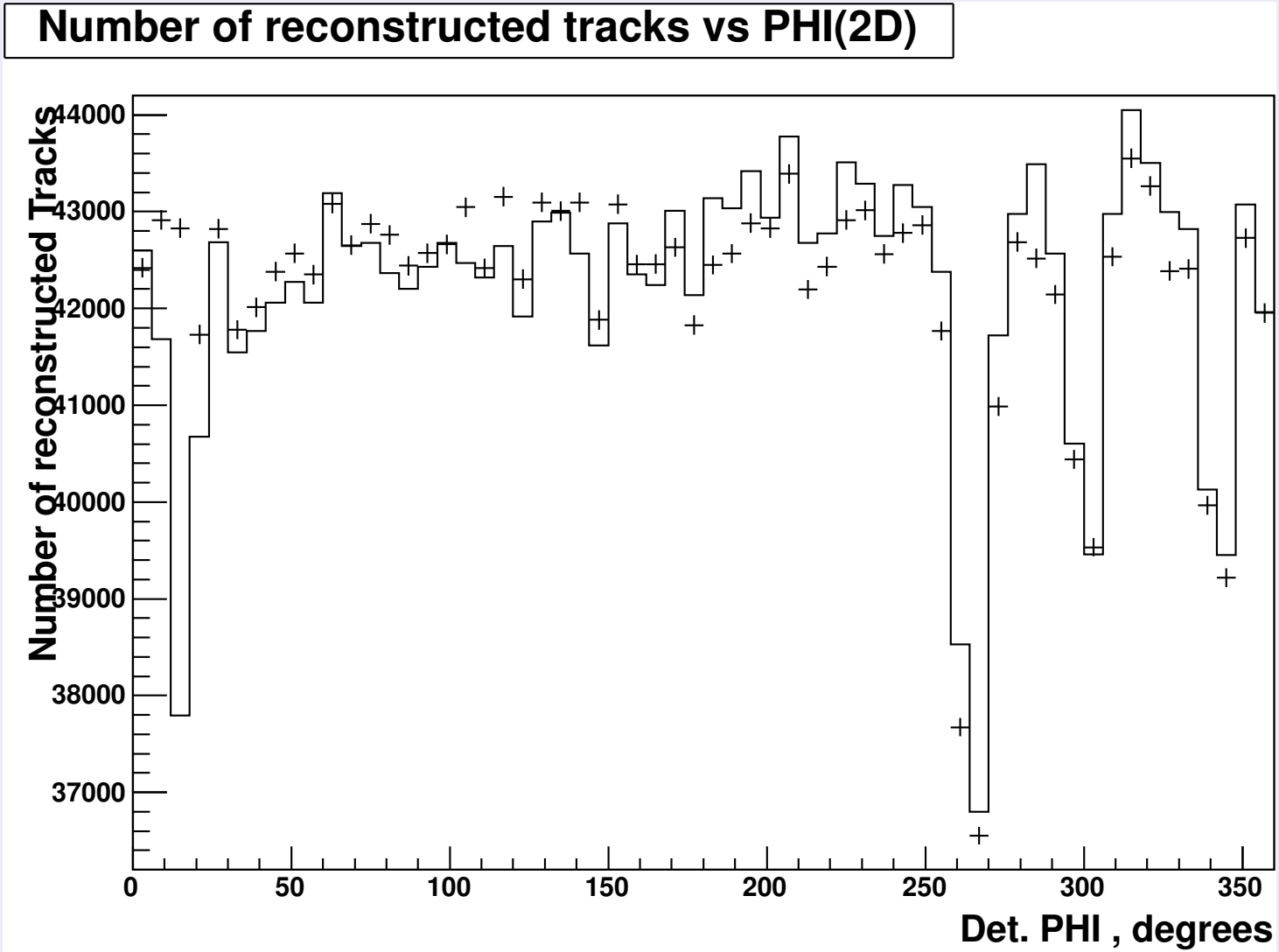
One of the dips is a new "feature"...



Updates since last ID week

Outlier and flatness test with known structures

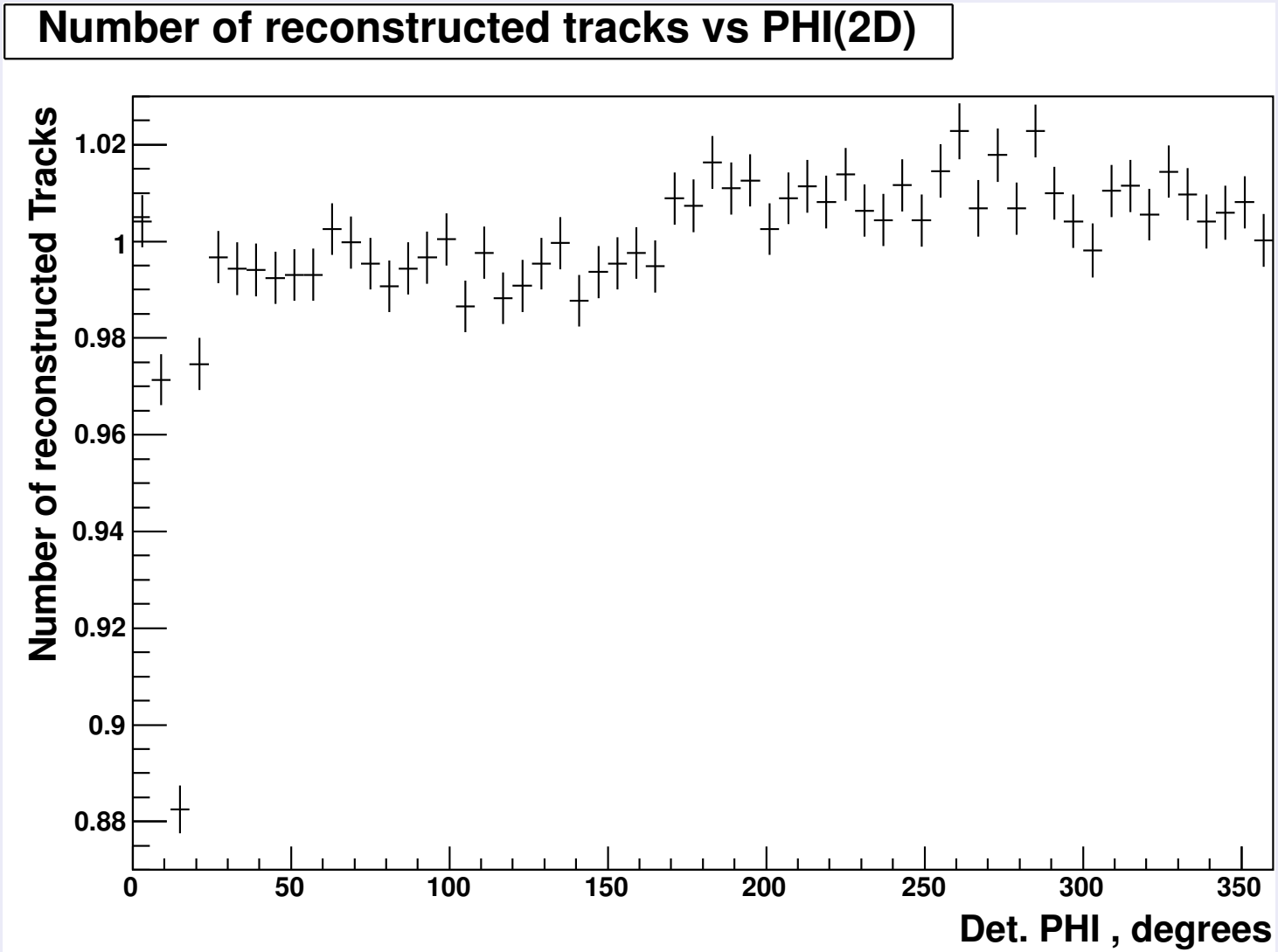
Overlay scaled reference



Updates since last ID week

Outlier and flatness test with known structures

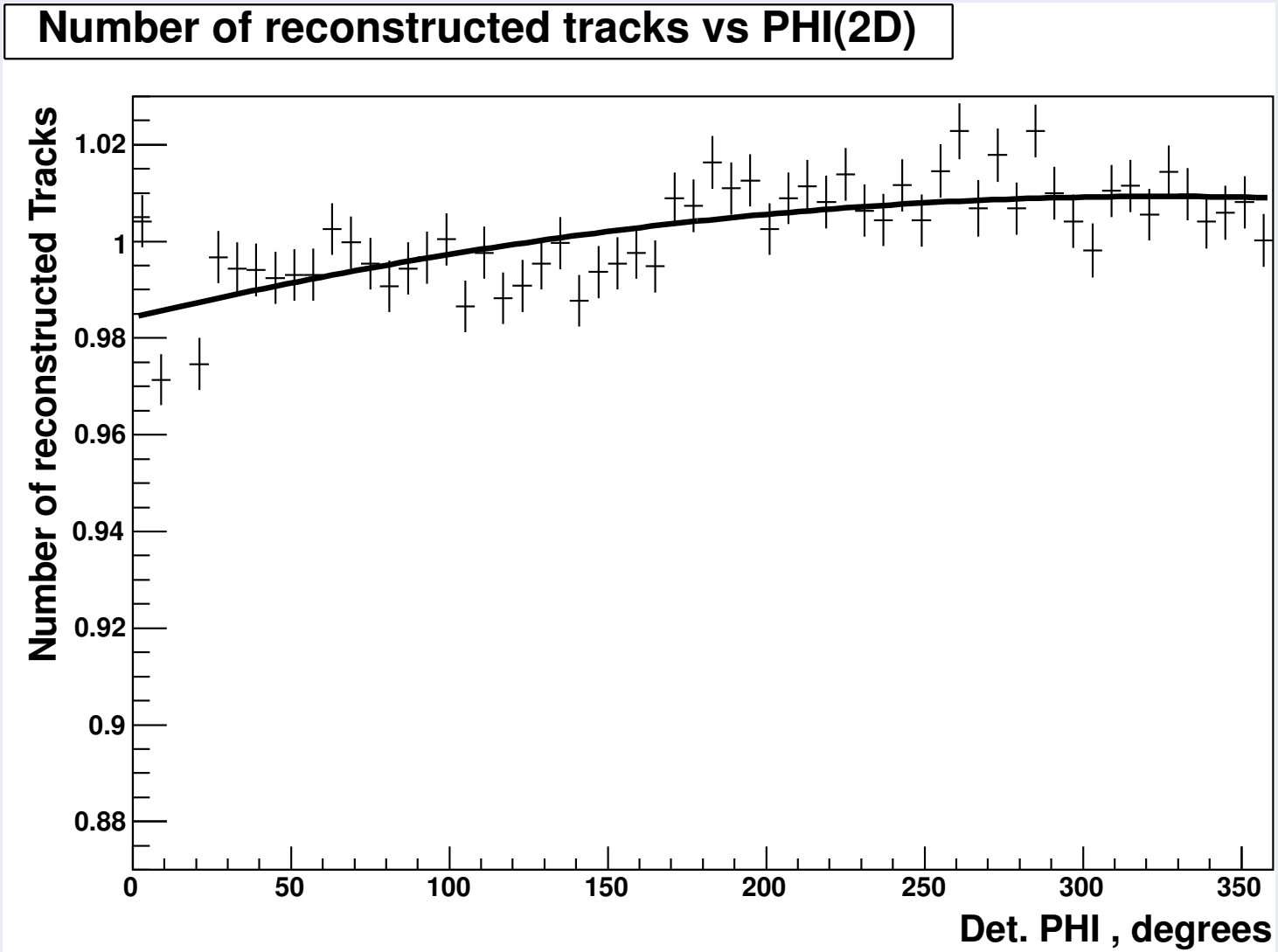
Normalize data to reference



Updates since last ID week

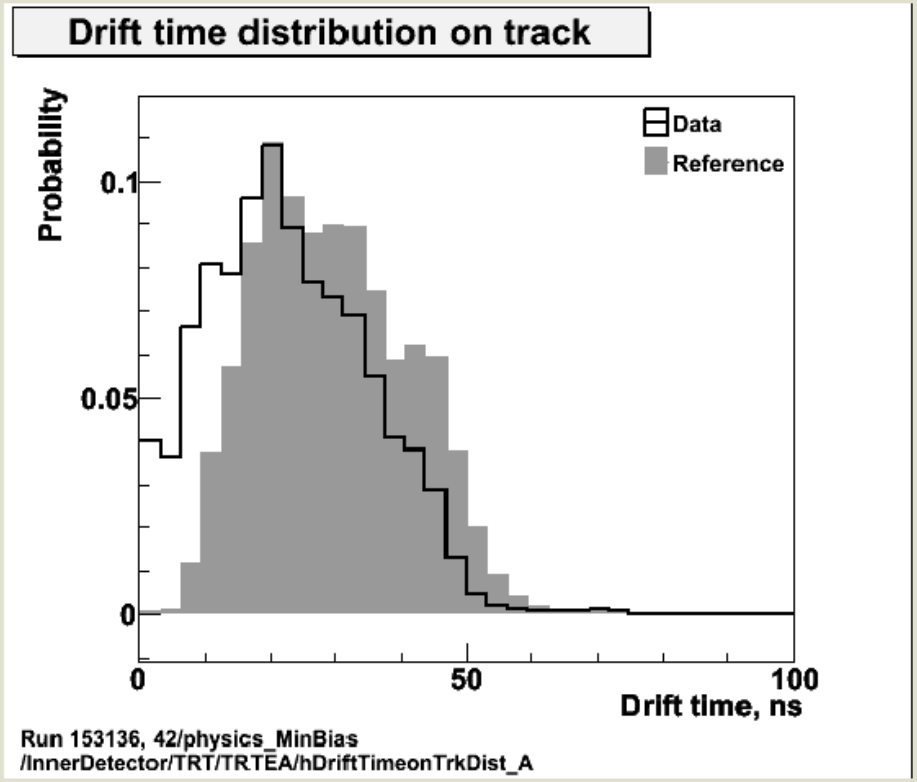
Outlier and flatness test with known structures

Spot and remove outliers and fit for flatness test



Updates since last ID week

Sideband check instead of peak finder



Location in ROOT file: TRT/Shift/EndCap/hDriftTimeonTrkDist_A

Name: hDriftTimeonTrkDist_A
Status: Yellow
Algorithm: SideBand_Relative
Num. of Entries: 20964830.0

Configuration Parameters:

Max: 60.0
Min: 8.0
MinStat: 100.0
UseOverFlow: 1.0
UseUnderFlow: 1.0

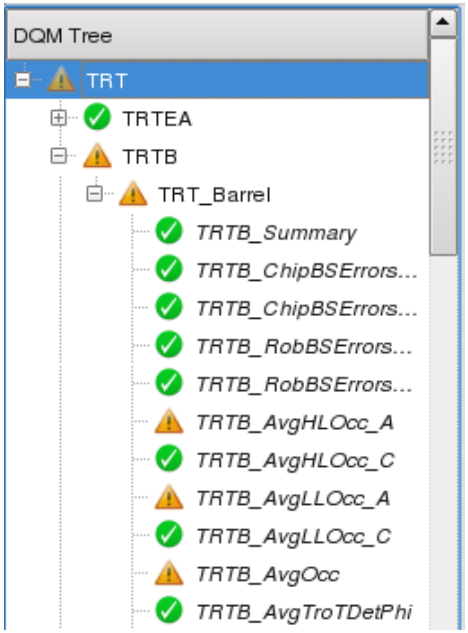
Threshold
XXXXXXX| XXXXXXX| XXXXXXX
0.05 0.1

Results:

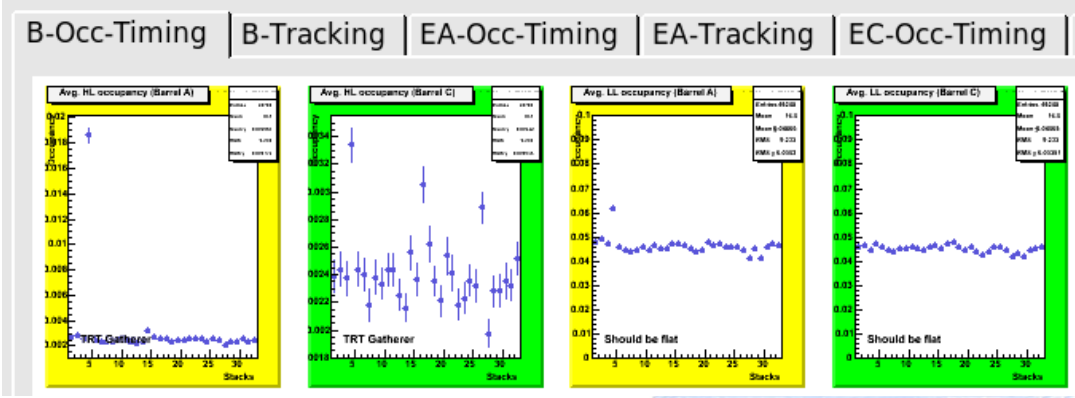
SideBands: 0.07953

- Used to check for peak position
  $\Rightarrow$ Same in (good) reference and (suspicious) data
- Now check for percentage of entries outside borders
- Used for drift time and trailing edge distributions

Dataquality online operations

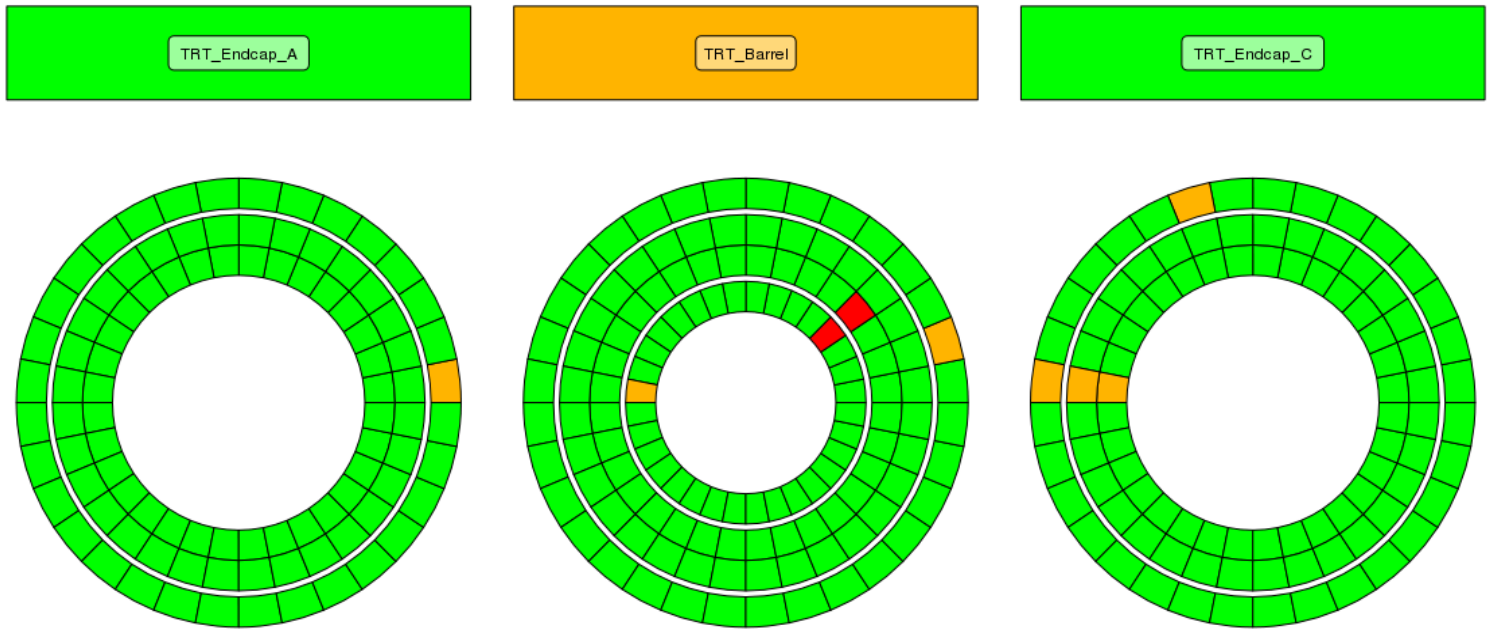


- Major updates since last ID week
- Monitoring code on rel. 16 level (see Taikis talk)
- DQ configurations equalized to offline checks $\Rightarrow$ Configurations basically rewritten
- Adaption to special online conditions $\Longrightarrow$ Should be done by now
- Modified summary tool to exclude results older than 10 minutes



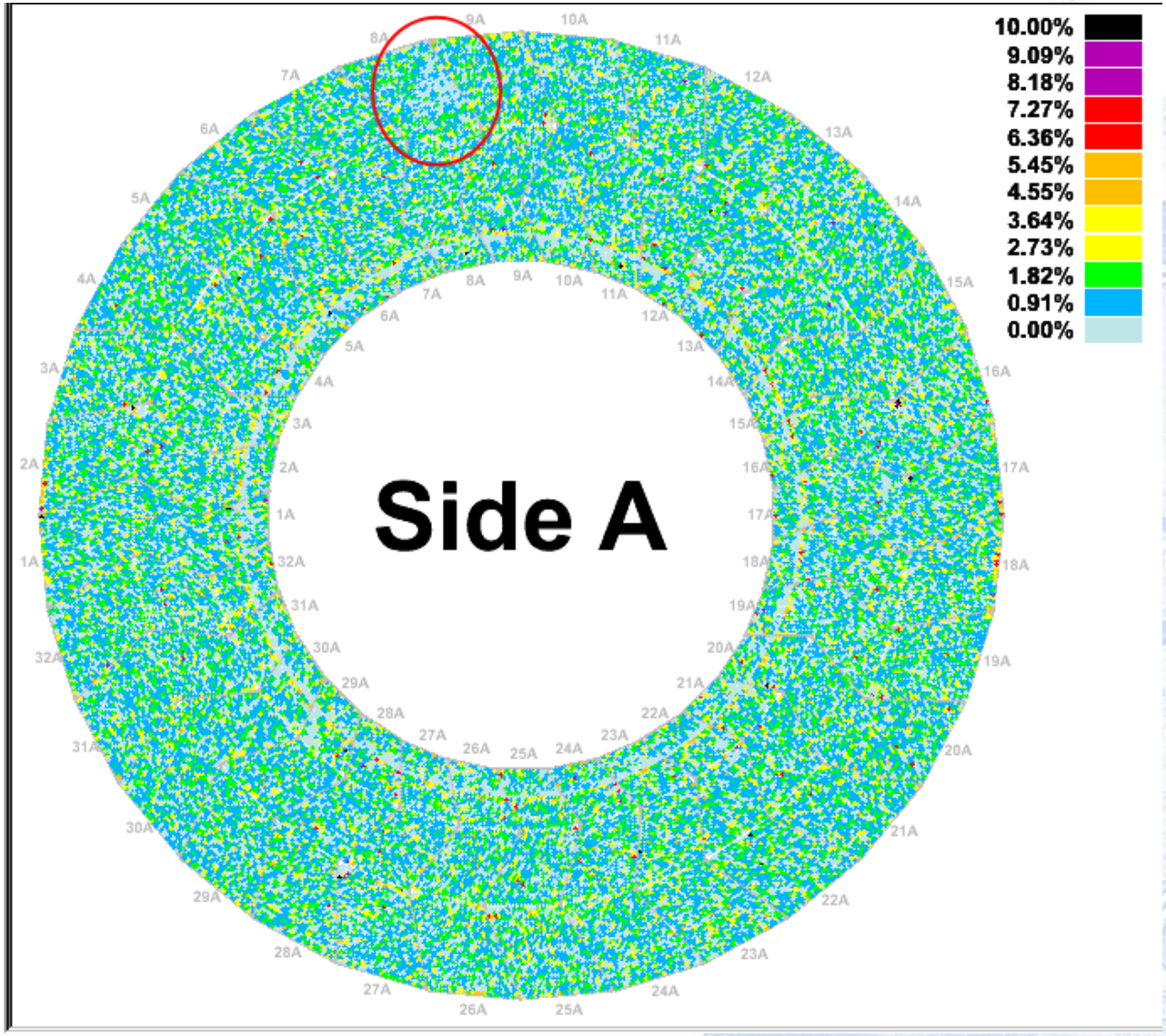
Noise monitoring

- Monitoring of detector occupancy on dedicatedly selected noise events (see Adrian's talk)
- Monitoring on chip and straw level
- Outlier and flatness test based on references
- Could in principle be very sensitive
- Thresholds are set to very loose values at the moment
- DQMD layout reworked to reflect changes



Noise monitoring

What one **could** do. . .



Noise monitoring

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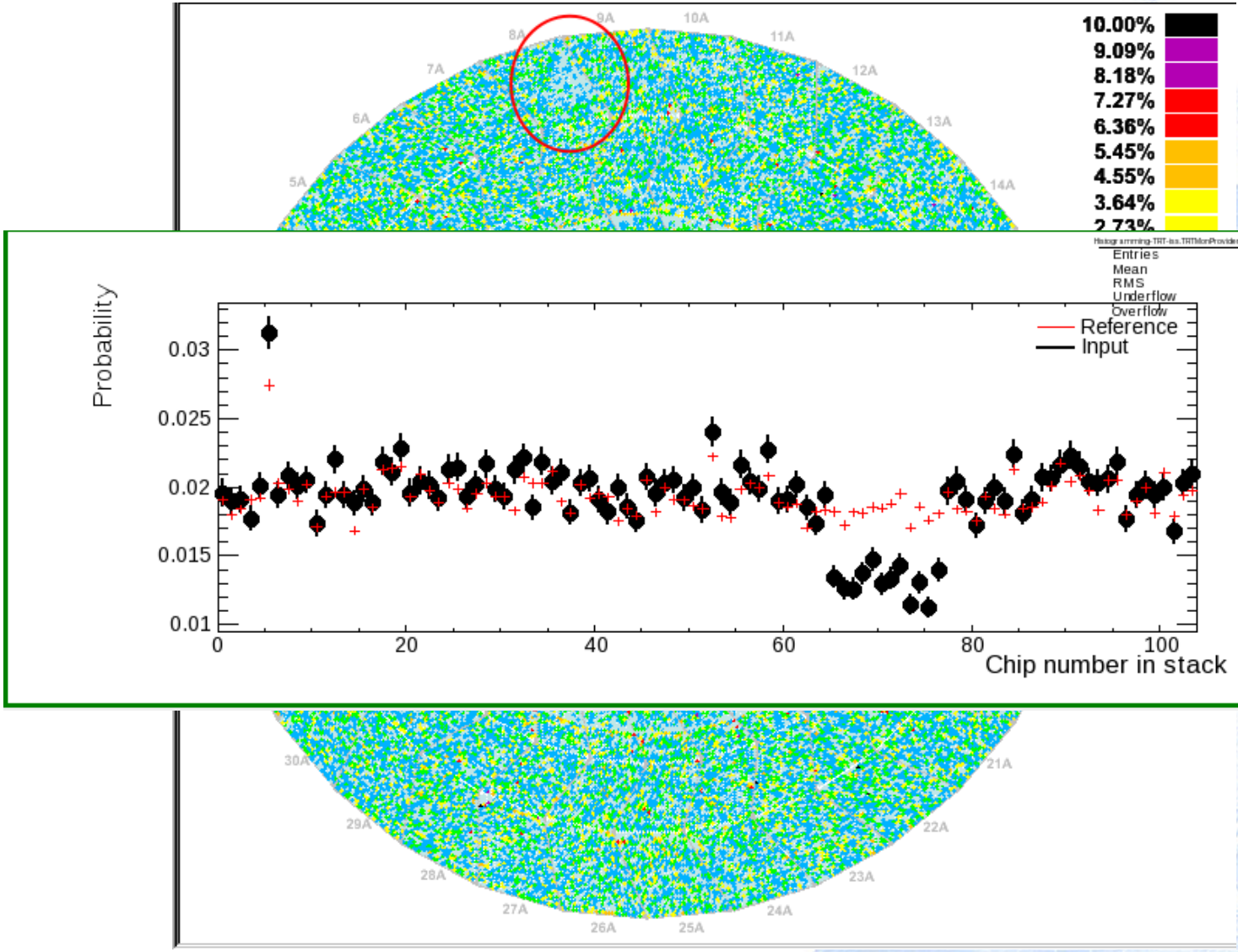
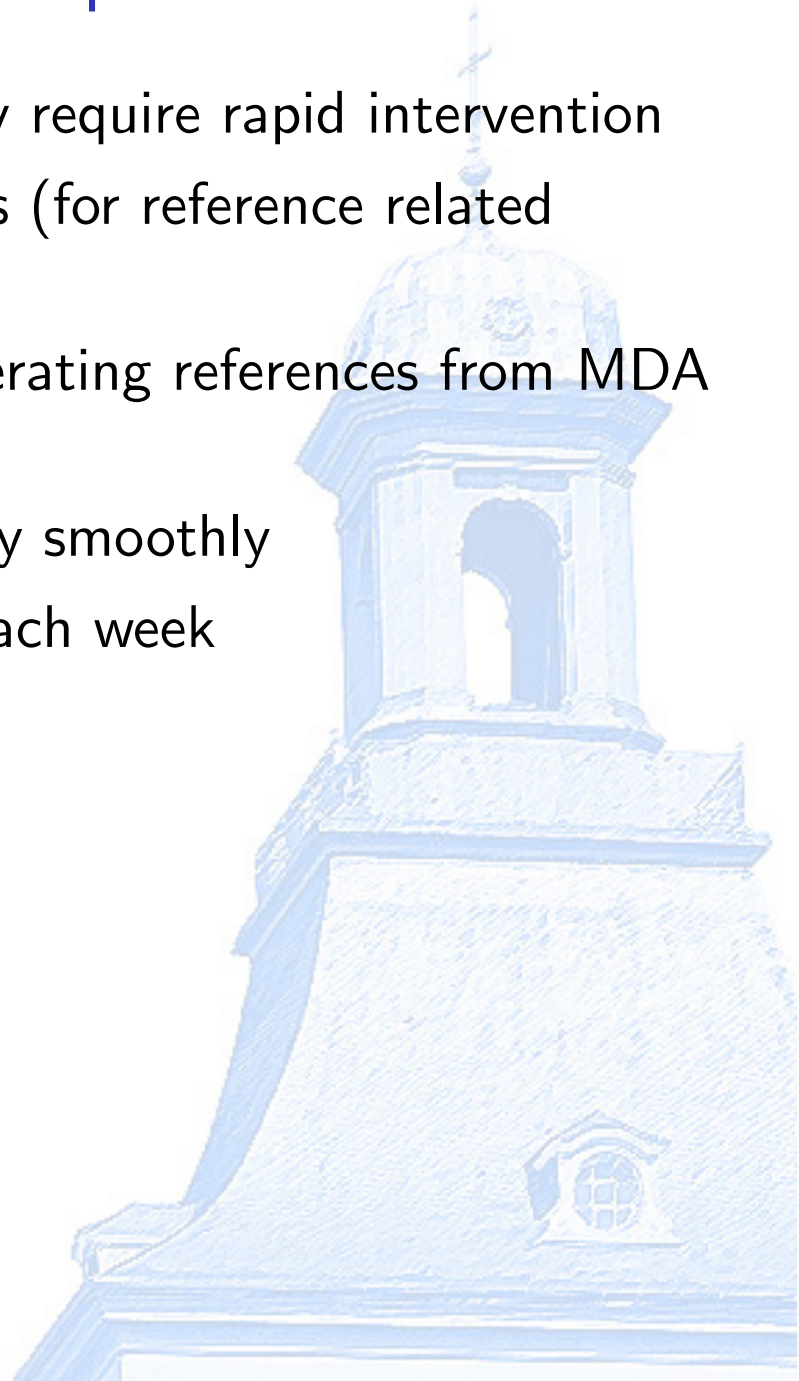


General online operation

- Rapid changes in luminosity require rapid intervention
- Mainly to update references (for reference related checks)
- "One click" scripts for generating references from MDA files
- Shifter operation runs pretty smoothly
- We get a handful of calls each week



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But:

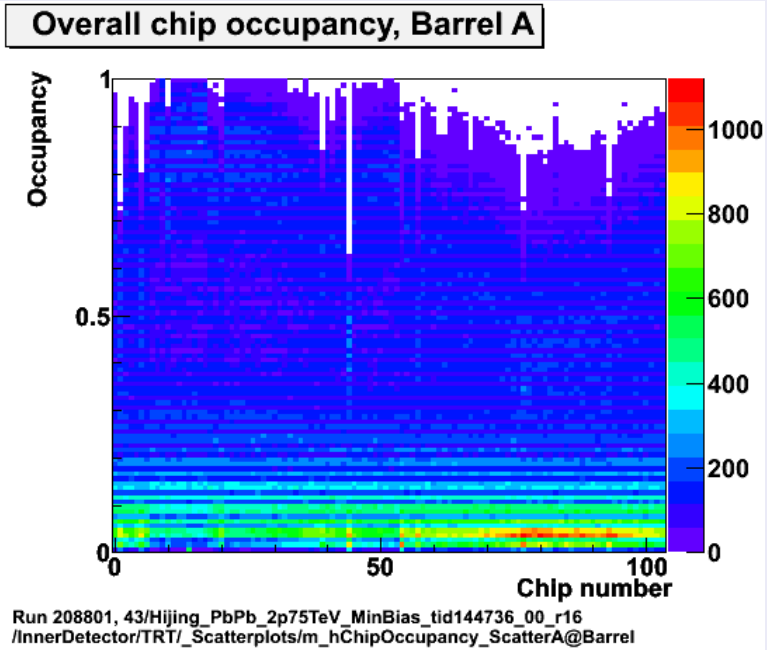
- More or less always the same questions
- ...which could be answered by reading the whiteboard and/or documentation
- No calls for real problems. Of those we here three days afterwards from (e.g.) Jim (Example: Glitch in beam monitoring)

Dataquality for Heavy Ion running

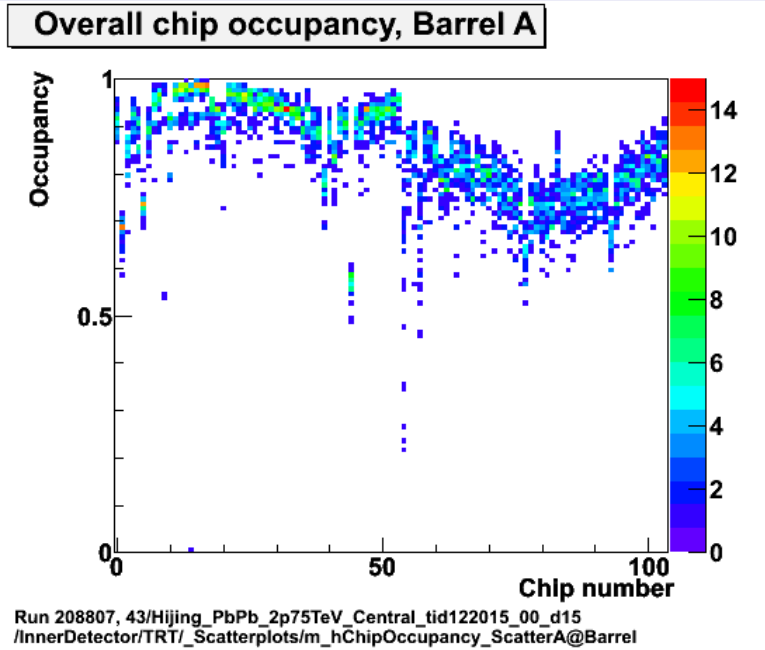
- Request from central DQ group to prepare for Heavy Ion running
- One MC test file provided, two more with varying occupancy generated
- Monitoring code adapted (mainly larger ranges)
- Things don't seem to be too bad, some open questions to be addressed with data
- Heavy Ion offline monitoring configuration prepared and committed last weekend
- Online configuration will be changed once we see first data
- TRT requested a Heavy Ion test running which was welcomed by the central DP group
- Some highlights from the testing:

Dataquality for Heavy Ion running

MinBias event mix



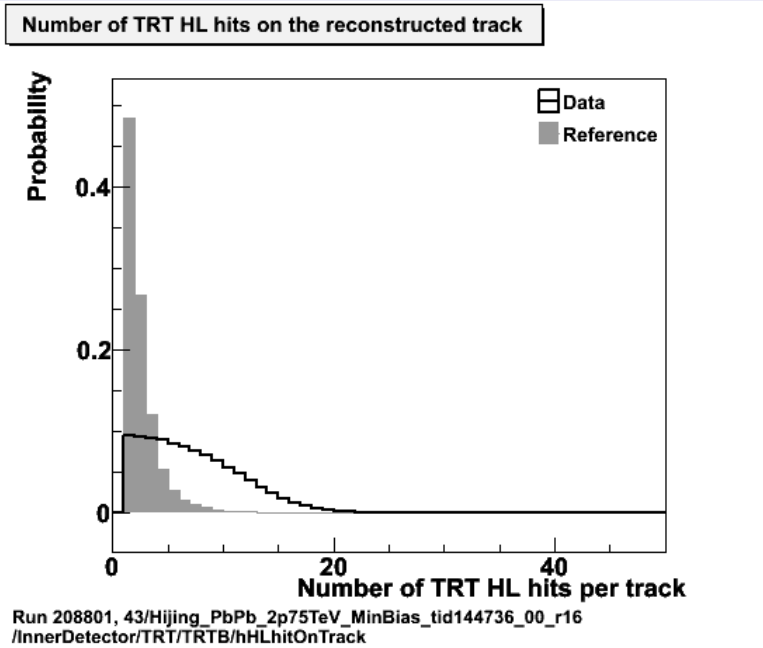
Central collisions



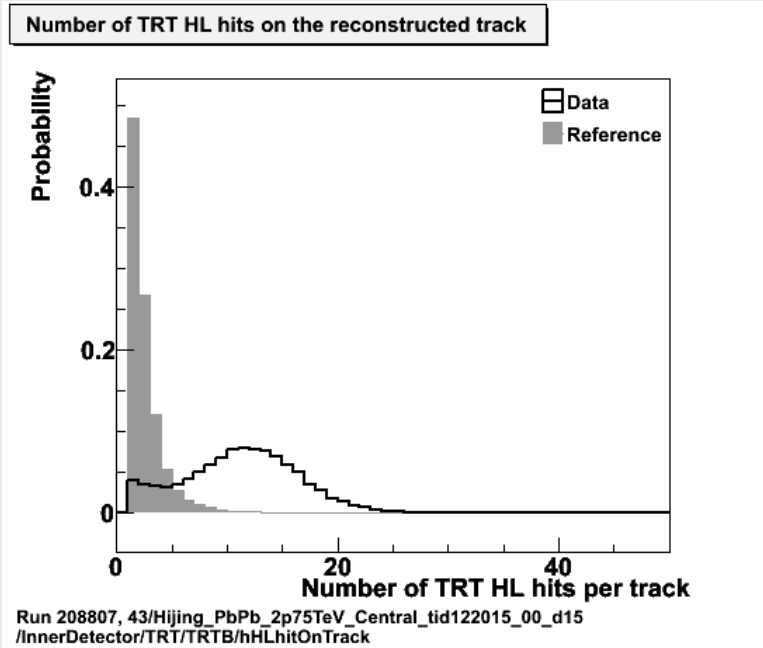
- Close to 100% for central collisions
- In MinBias mix "mostly harmless"

Dataquality for Heavy Ion running

MinBias event mix



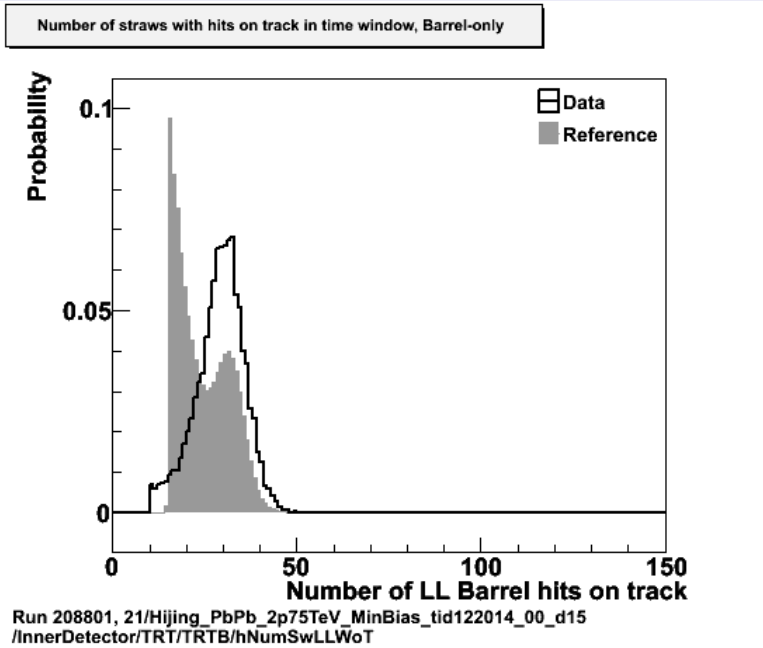
Central collisions



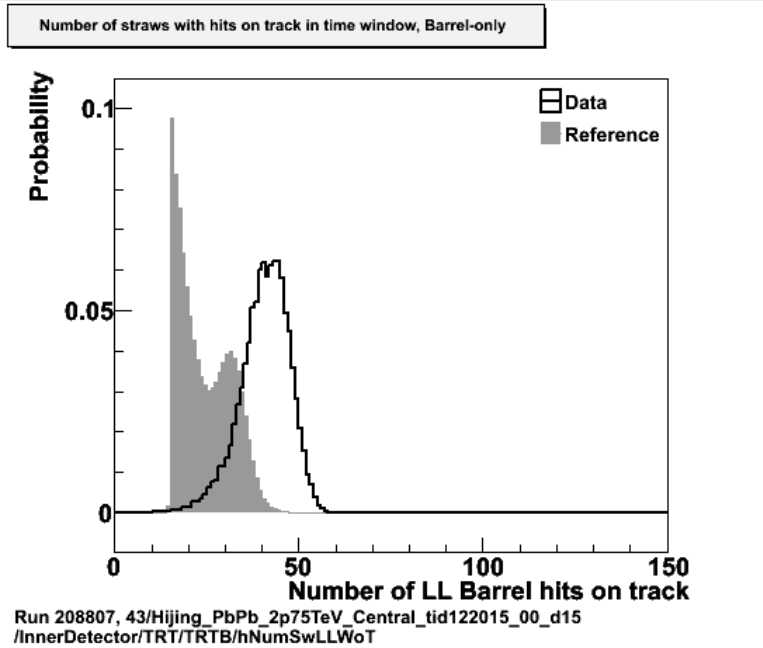
- High fraction of HL hits due to ion fragments
- PID tool in current config probably useless

Dataquality for Heavy Ion running

MinBias peripheral collisions



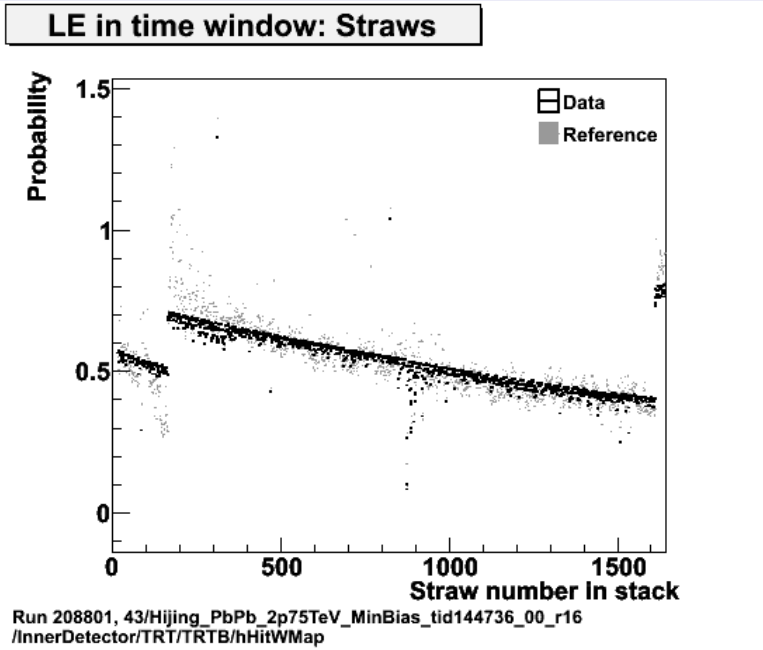
Central collisions



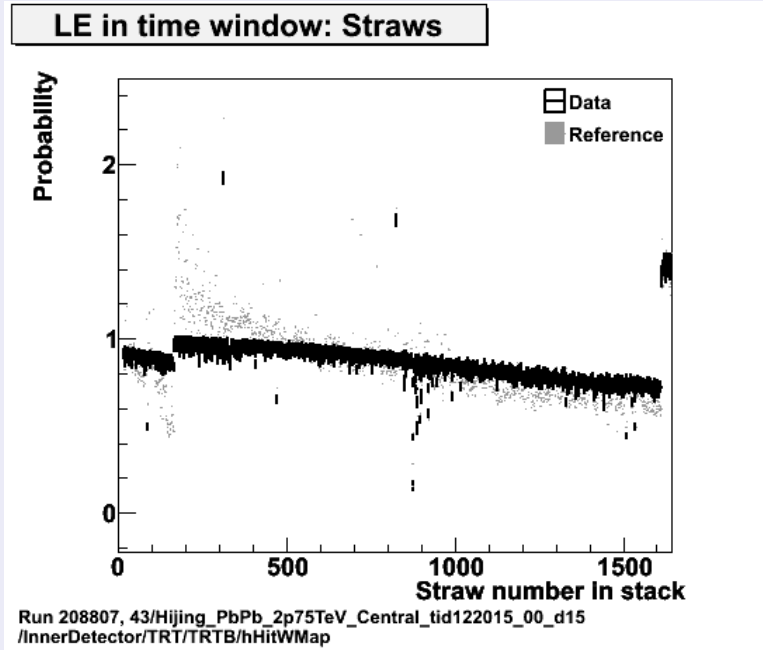
- Higher number of hits on tracks than in pp running and missing "low hit" tail
- Due to cut on silicon hits (see Taiki's talk) and fake hits on tracks

Dataquality for Heavy Ion running

MinBias event mix



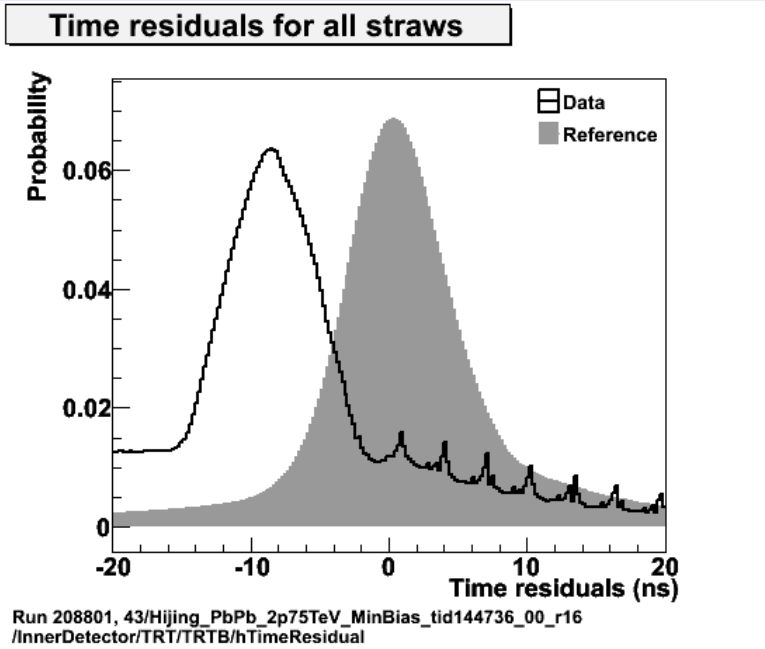
Central collisions



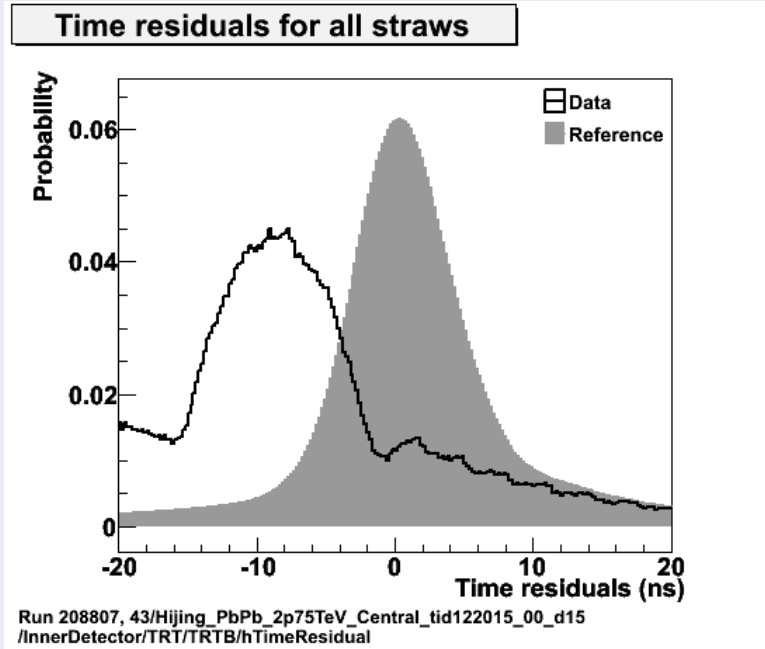
- Showing values greater than 1
- Not really clear how this can happen, under investigation

Dataquality for Heavy Ion running

MinBias event mix



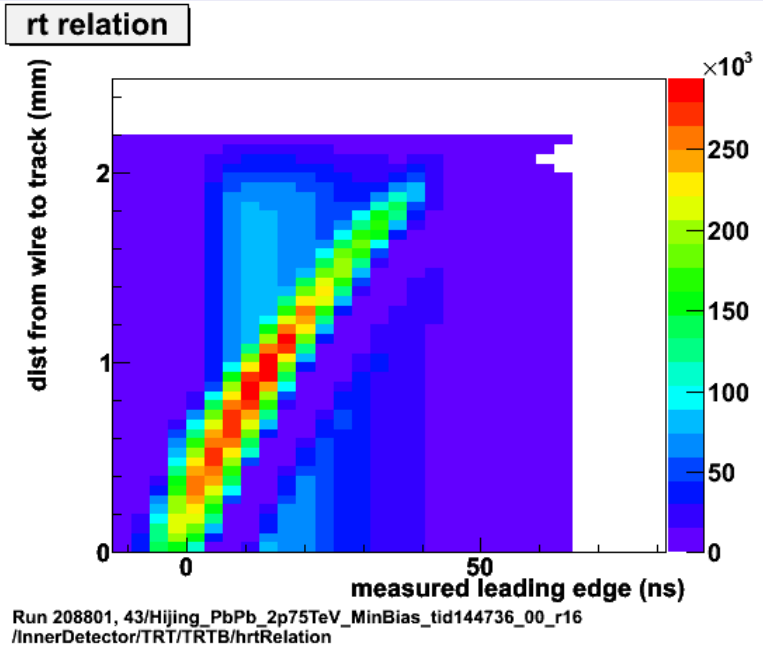
Central collisions



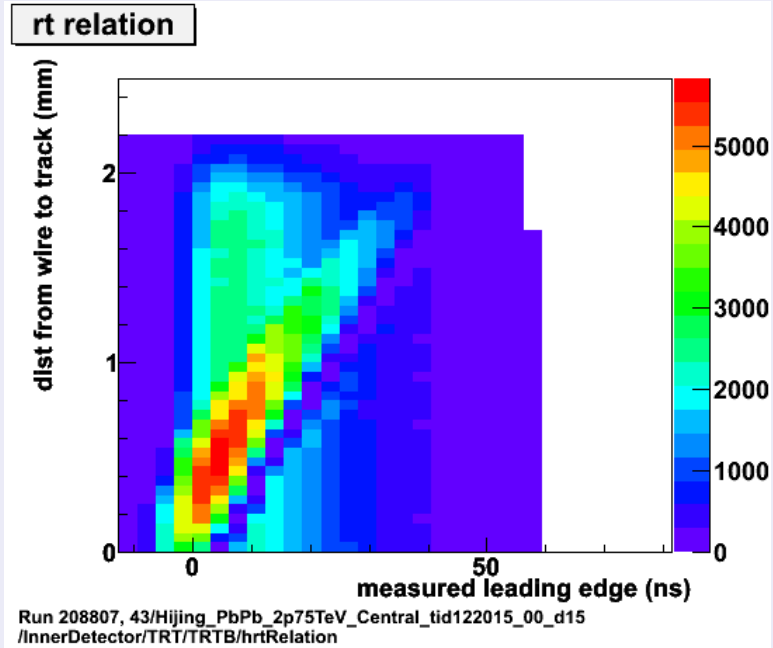
- The only really difficult finding
- Absolute displacement is a matter of constants
- BUT: Structure in ”right handed“ tail
- Depends of reconstruction used

Dataquality for Heavy Ion running

MinBias event mix



Central collisions



- Shows problems maybe due to problems in timing
- Have to wait for real (calibrated) data

Summary and Outlook

Summary

- TRT Dataquality is in excellent shape
- Most past challenges have been met
- We are well prepared for the next weeks (and the next year) of running
- Heavy Ion running seems to be manageable, all precautions taken
- Final tuning will be done by the DQ team in time

Outlook

- Many changes in Rel 16 will have to be included in DQ
- Reprocessing: Probably hundreds of runs to flag
- How do we want to use the noise monitoring?

Keep the data coming!

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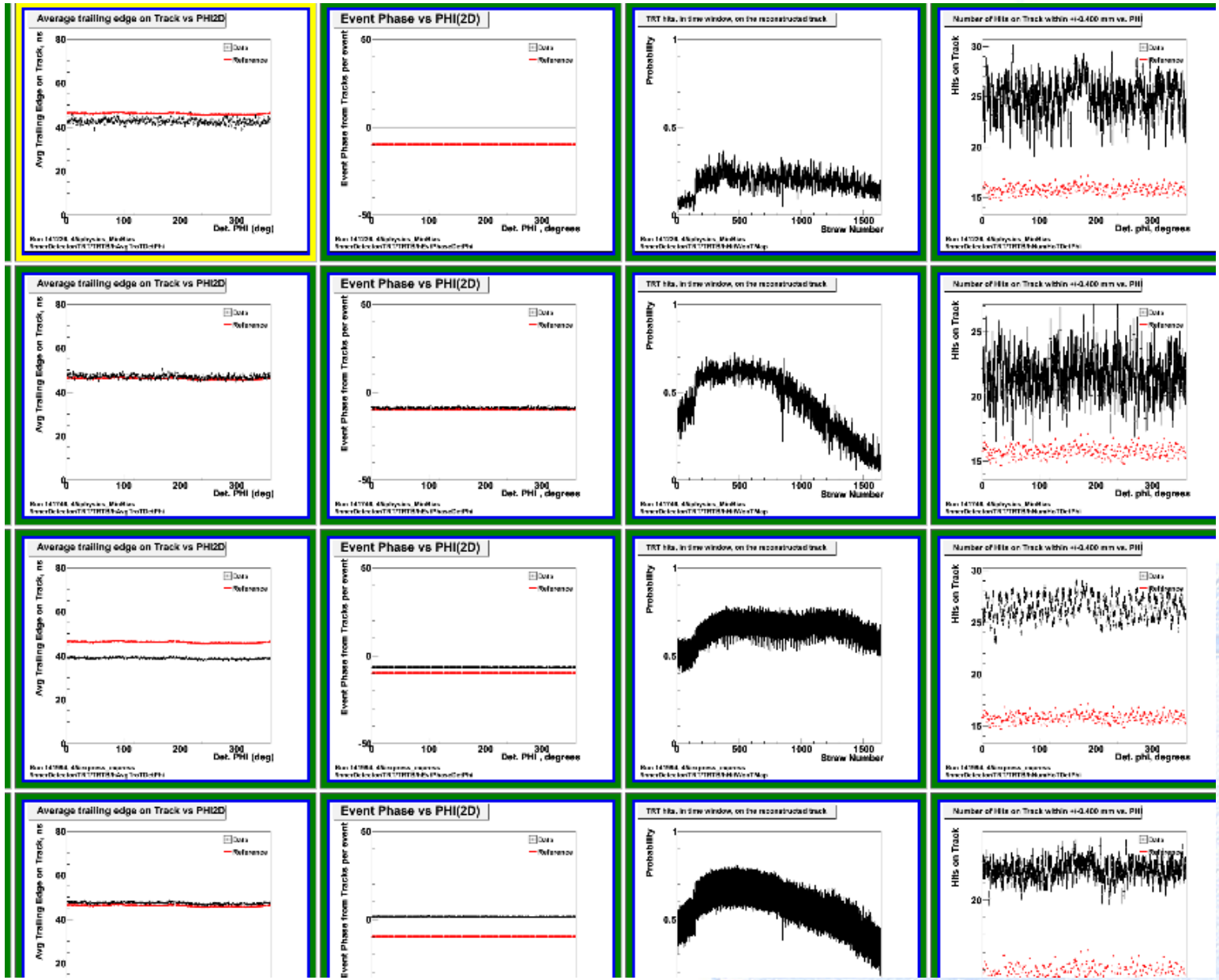
Automatic checks

Online DQ operation

Heavy Ion running

Summary

Thanks for your attention



Questions?

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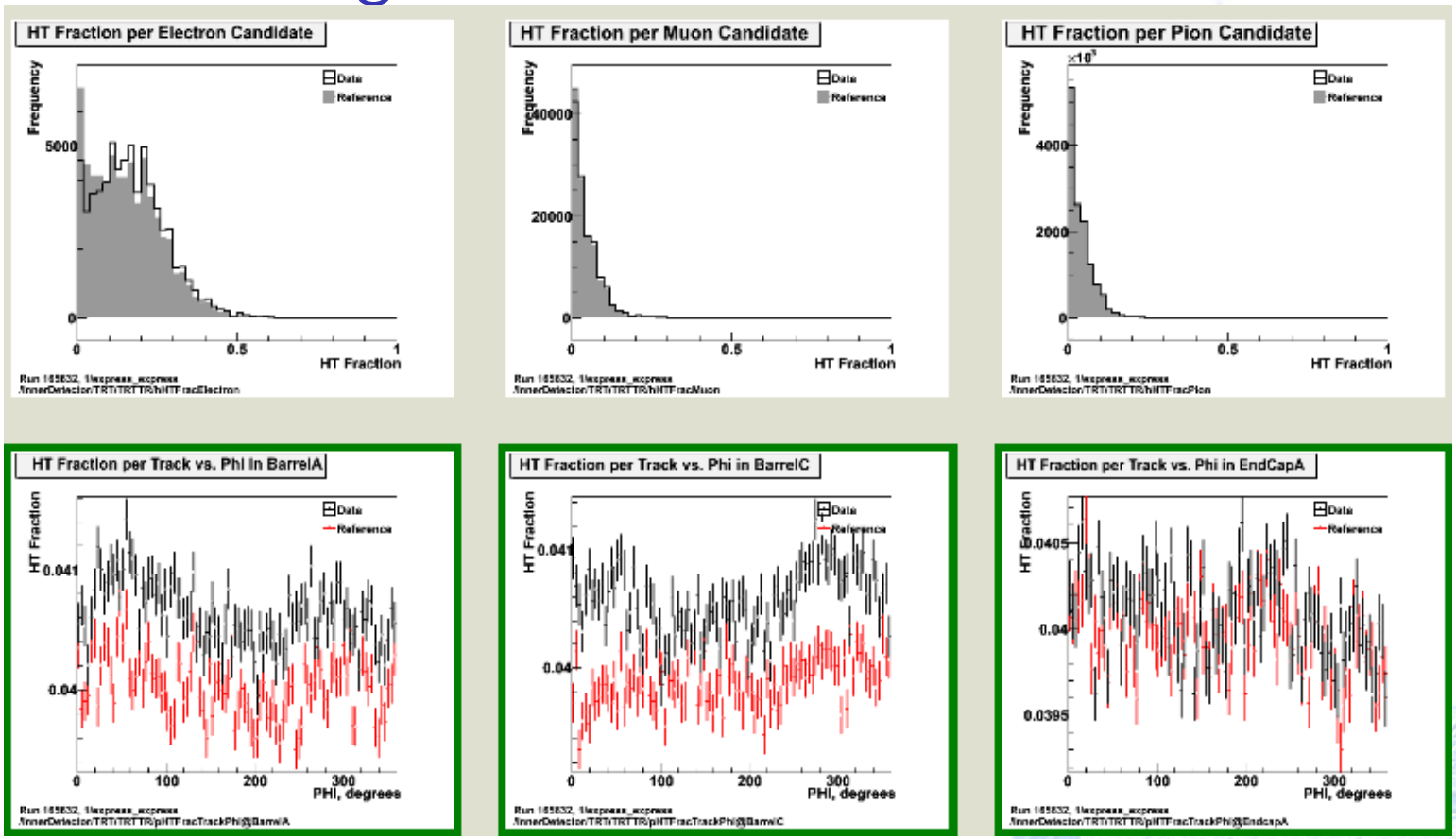
Backup

Monitoring of Transition Radiation and PID



- (Offline) Monitoring for Transition Radiation performance of TRT in place with dedicated DQ flag
- So far: always green unless we are aware of any problems outside DQ
- Might be useful to draw expert's attentions to possible problems

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The stop transition crisis

A chronological approach

Oct 7th, morning Central DAQ expert observes that TRT was slow in "SFOSTOP". Requests assistance. TRT DAQ Experts identify the Monitoring as being the problem child.

Oct 7th, evening By now it's clear that the real problem is the TRT expert gatherer

Oct 8th, morning It becomes clear that the main problem is a spread of time consuming operations over different transitions by SCT and TRT. Suggestions to reduce the number of histograms are postponed.

Oct 8th, noon Serguei Kolos identifies a problem with the handling of timeouts as the source of the problem. He asks Sami to take care of this.