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TÜBINGEN

TPC run 2 plans / issues

ALICE offline week
19.-21.11.2014

Marian, Kai, Jens

People involved

- Many people are involved in these activities
- Not individually listed on the slides

Anthony T., Chiara Z., Christian L., Federica S., Ivan V., Jai S., Jan W., Jens W., Mahmut Ö., Marco M., Marian. I., Martin L., Mesut A., Mikolaj K., Patrick R., Peter C., Peter M., Stefan H., Steffen W., Theo B., Torsten D.

Outline

- General remarks
- Online calibration
- QA
- Ion tail + cross talk
- Lowering of Zero Suppression threshold
- dE/dx calibration
- RCU 2
- Space charge distortions

General remarks

- For many topics the key lies in automation
- → More manpower ALICE wide should be put into this

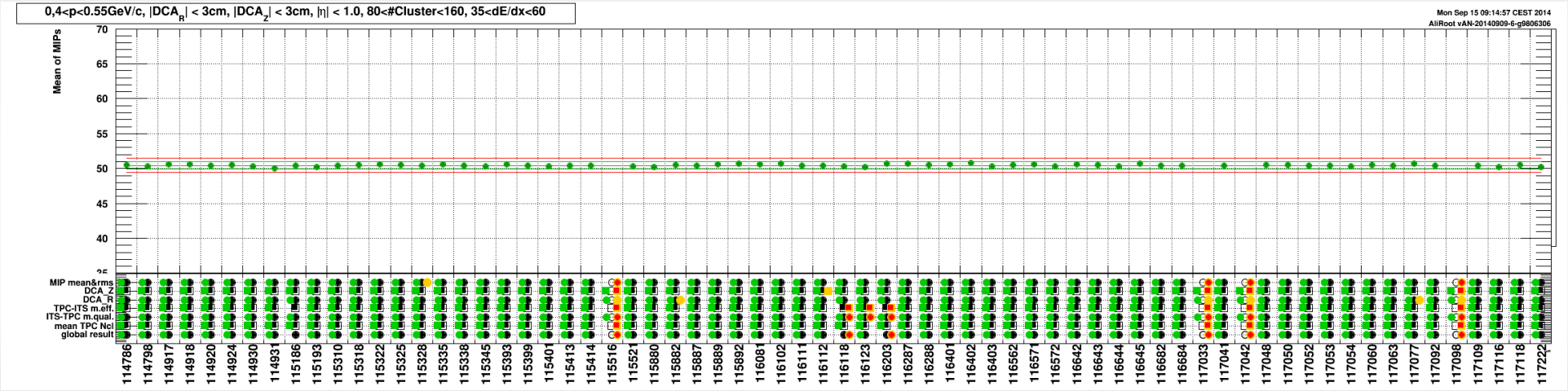
Online calibration

- Work ongoing to push CPass0 to the HLT
  - See presentations by Steffen and Ivan (Wednesday, 19 November 2014)
- Ambitious goal: CPass1 (+ implementation of calibration feedback loop)

QA

Current status

- Tools developed for TPC are generic (trending)
  - Most functionality is in TStatToolkit (automatic, robust decisions)
  - → Global QA tool, automatic descision → preparation for online QA decisions ?!?
  - If same functionality would be used by all detectors simple cross-correlations will be possible, easier to spot problems by experts
- Currently jobs are running at GSI, synced to CERN web space
- Work ongoing to run QA at CERN



QA
Plans

- In addition to run-wise information, period average and MC production averages are foreseen
  - Extremely important to spot possible problems from changed AliRoot versions
- Allow for simple correlations with other sources, logbook, production, rct, OCDB, …
  - Trending trees creation not yet fully automatized
  - Manually created, standard output directories defined
  - 'Database manger' to connect different inputs needed
- Add hyper links on the status bar of trending plots to jump to the run wise information

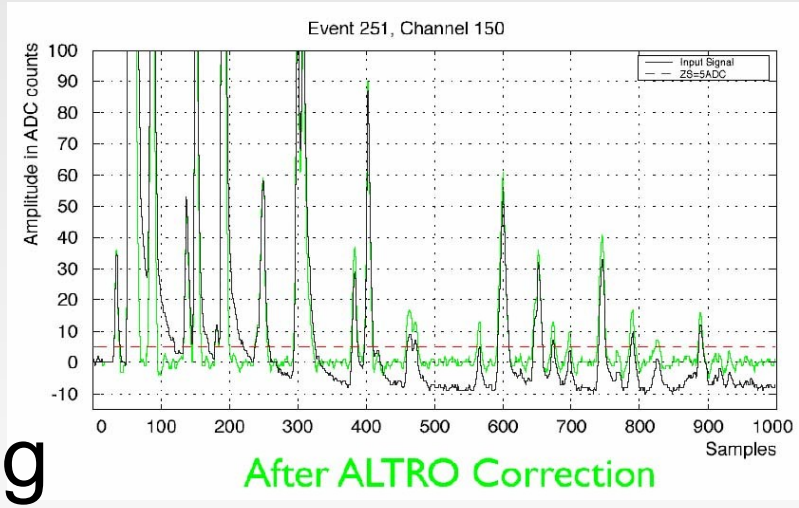
QA

Proposal – automatic benchmarking

- e.g. run ppbench, PbPbbench, reconstruction on specific input automatically for each (production) tag
- Memory and CPU trending (per detector or module)
- Calibration parameter trending
- ...
- Would make it easy to spot problems in the code right away without tedious running of jobs
- See Dario's presentation (19.11.14)
  - Check usability for detectors (e.g. run for devel branche tags, accessibility, ...)

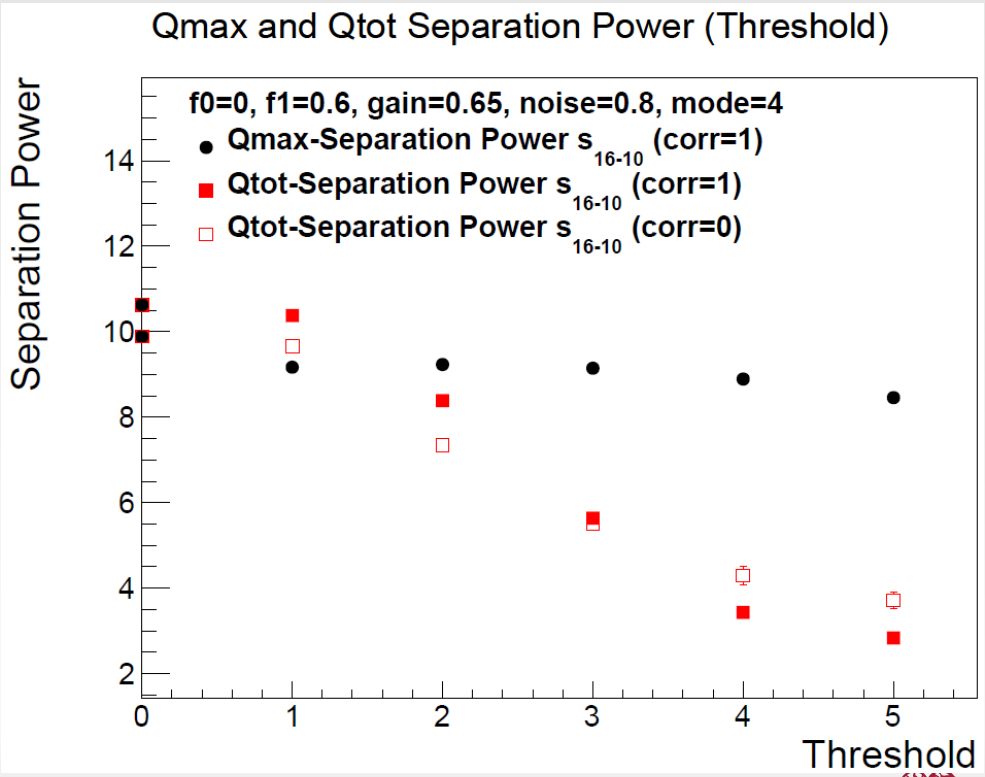
Ion tail + cross-talk

- Ion tail + cross-talk impact the dE/dx
  - Clusters fall below threshold → are lost
  - Mainly for large occupancy
- Correction was implemented on software side
  - Works on already zero suppressed data → lost signal cannot be fully recovered
- Make the 'moving average filter' in the electronics working
  - → Improvement of TPC signal in Pb-Pb



Lowering of the ZS

- The zero suppression threshold (ZS) impacts the dE/dx resolutions → lost charge information
- Lowering the ZS improves the separation power
- Increase of data volume to be studied
- Noise removal in the HLT possible?

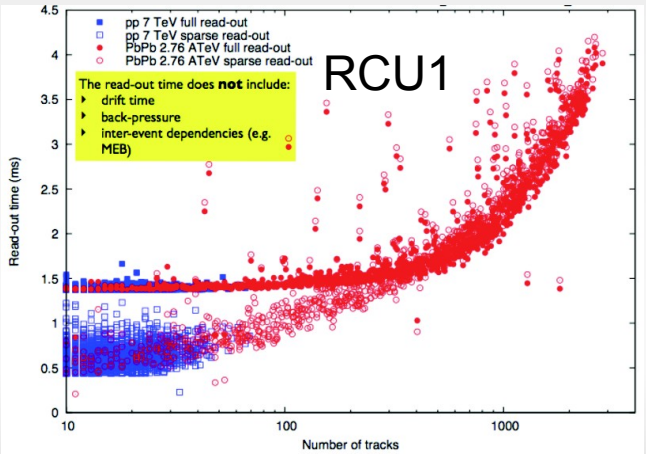


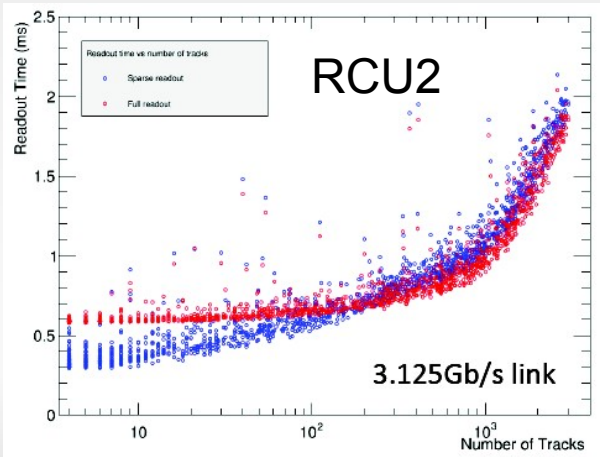
dE/dx calibration

- For better control of the 'measured dE/dx' the use of a transfer function 'H' is foreseen
  - $dE/dx_{meas} = H(1/Q, \varphi, \eta, ZS, ...) * dE/dx_{real}(\beta\gamma)$
  - The 'real dE/dx' is very stable (constant parameters)
  - H has fewer dependencies → can be fitted reliably with small statistics (CPass1)
  - Considered update interval is per fill

RCU 2

- To increase the data throughput (readout rate)
- Automatic 'junk detection' (huge events)
- DAQ structure will stay the same → no impact on readout
- Hardware test with prototypes are ongoing

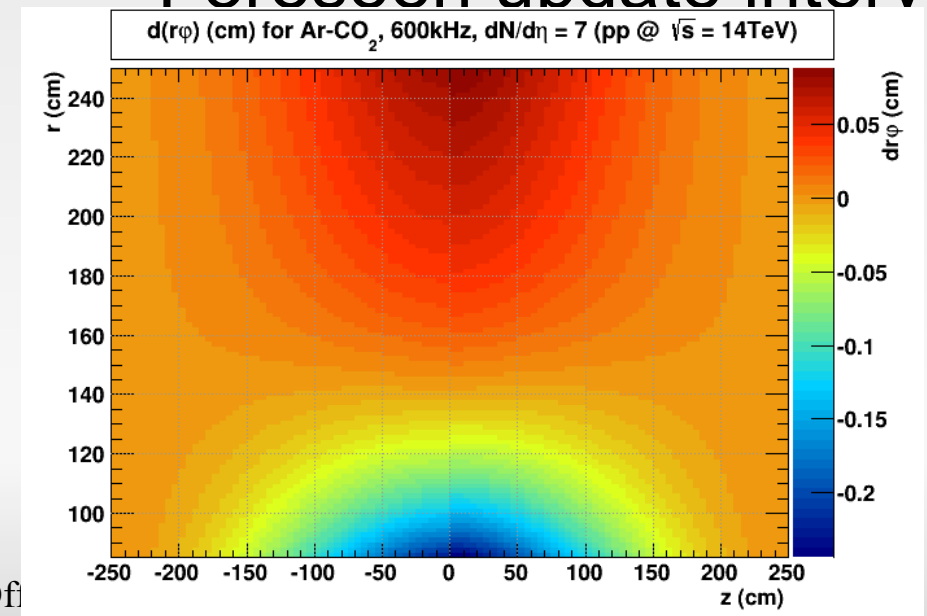


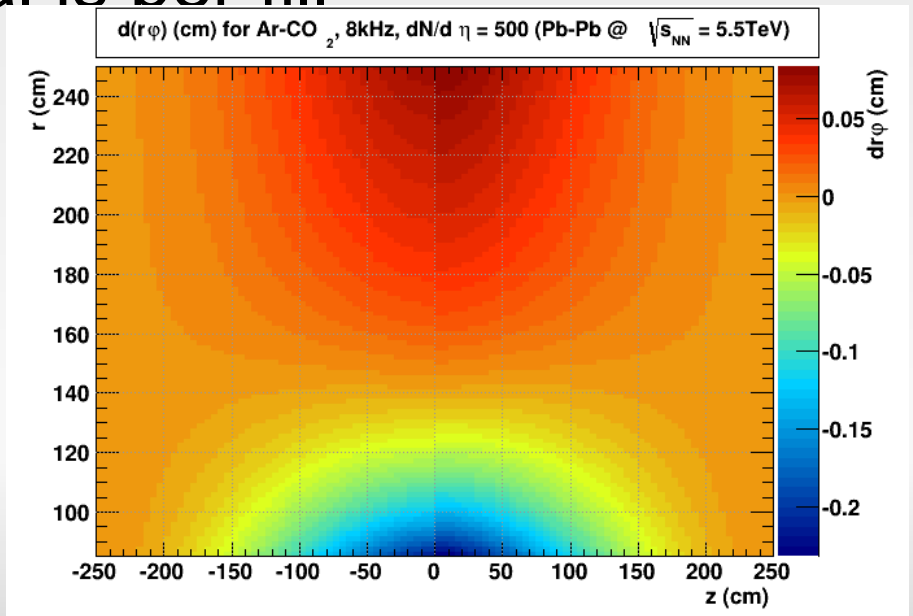


Space-charge distortions

Relevance in Run2

- No ion back flow as with GEM in run 3, but
  - Usage of Ar based mixture leads to 5x larger distortions (2x higher ionisation, 2.5x slower ion drift)
  - Larger dN/dη than in run 1 (pp ~7, Pb-Pb_{MB} ~500)
  - High interaction rate, up to 600kHz pp and 8kHz Pb-Pb
  - Foreseen update interval is per fill





Space-charge distortions

Summary

- Visible distortions in Run 2
  - Similar for pp@600kHz and Pb–Pb@8kHz
  - Up to ~5mm in *r* and ~2.5mm in *rφ*
  - → Needs correction – compare to intrinsic tracking precision of ~200µm (at the inner wall of the TPC)
- Distortions on the order of the IROC pad size ($4 \times 7.5\,mm^2$)
  - Might require update of tracking procedure: propagation to real cluster position (after correction) not pad-row center

Summary

- Emphasis should be put on automation
- Porting of CPass0/(CPass1) to HLT will speed up reconstruction procedure
- Ion tail correction hopefully done in hardware
- Check possibility of lower zero suppression threshold
- RCU 2 will allow for higher readout speed