Reconstruction

R.Shahoyan, 19/11/2014
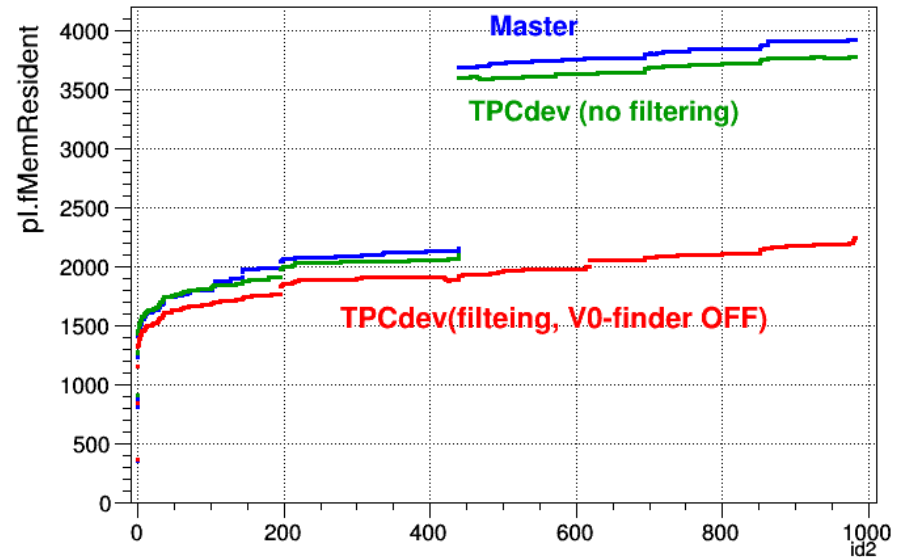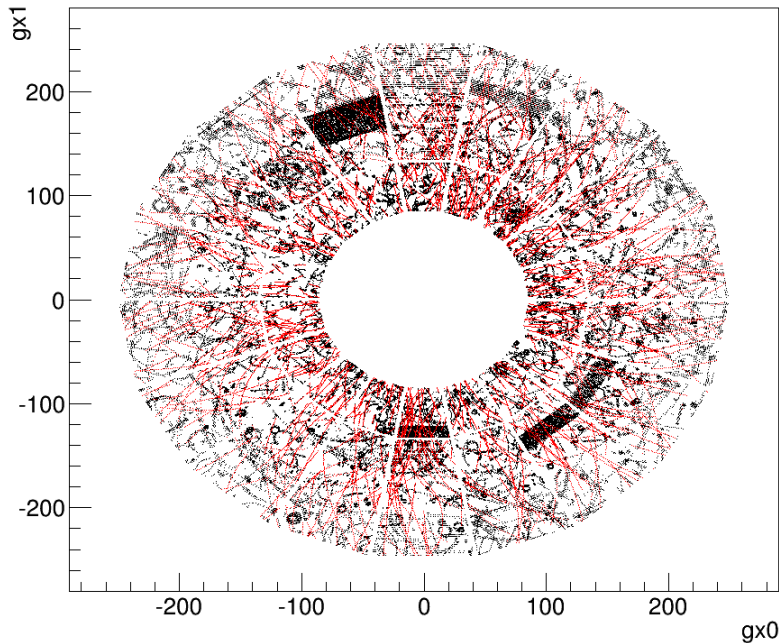
Filtering of TPC high-occupancy outliers (Jira PWG-PP-71)

- ❑ Rarely (~10^{-3}) TPC sees dense blob of clusters, which leads to memory consumption spike due to the large combinatorics of TPC seeds
- ❑ Updated TPC reconstruction checks cluster density before tracking starts and removes blobs from reconstruction.
- ❑ Events where intervention happened can be recognized via AliESDHeader:: GetTPCNoiseFilterCounter(UInt_t index) (3 levels: sector, time-bin and pad-row considered)
- ❑ Implications on event selection must be studied
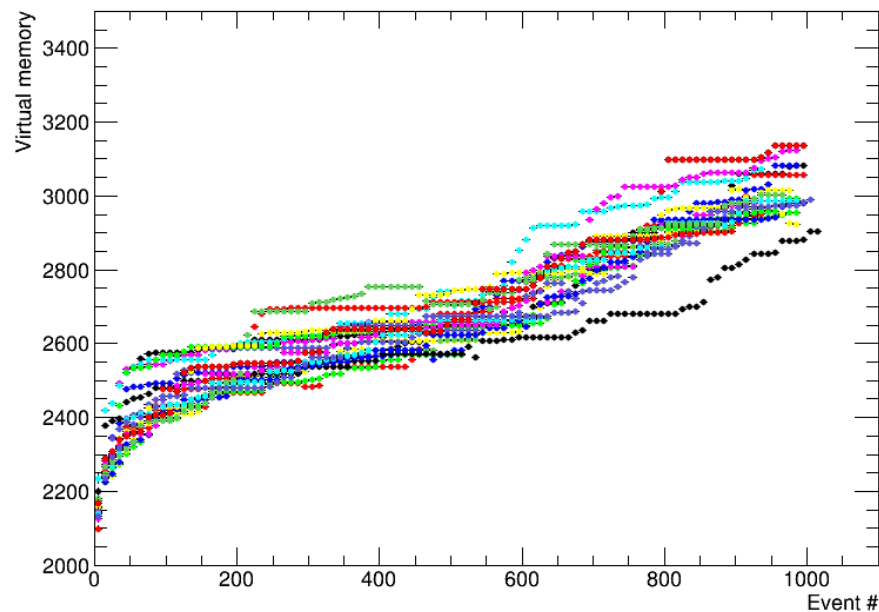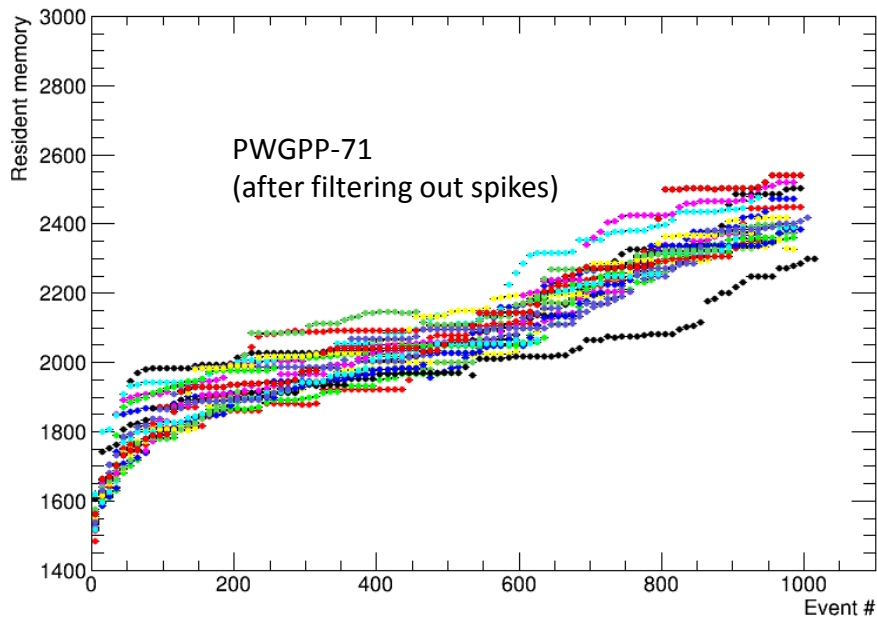- ❑ To be ported

Memory issues
(Important for lhc12, Run2)

LHC10 (low background, small IR) was reprocessed with good memory consumption (< 2/3GB Res/Virt)

Already in LHC12(g,h) the Res Mem reaches ~2.5 GeV

Main reason: autoexpantion of TClonesArrays

PWGPP-71
(after filtering out spikes)

Main consumer: 1 TClonesArray for TPC clusters (80b) per pad-row (max 2500 clustesr/padrow)
→ asymptotically will reach 1 GB in PbPb, once all arrays expanded to maximum

Ways to cope: limit number of TClonesArrays, decrease cluster size.

Memory issues
(Important for lhc12h, Run2)

Memory profiling is in progress

Including TRD in tracking (Jira PWG-PP-1)
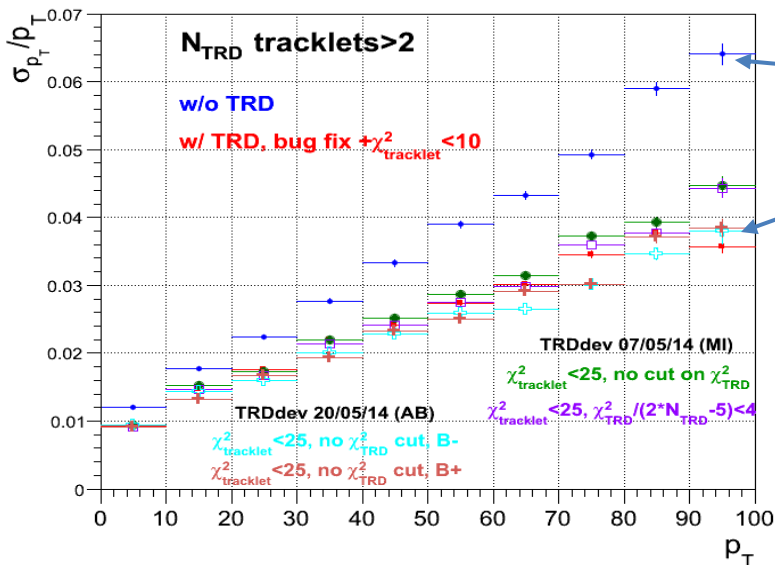
current resolution
w/o TRD

what we can achieve
with ideal alignment

Prerequisites to achieve this resolution:

Correct TRD tracklet fit :	Done
Good TRD alignment (<<1mm)	Need to be validated
Good TPC calibration* (<<1mm)	In progress

* Currently the TPC tracks errors are artificially increased to hide residual miscalibration
This also cancels out the effect of including the TRD in the fit (even for ideally aligned/calibrated MC)
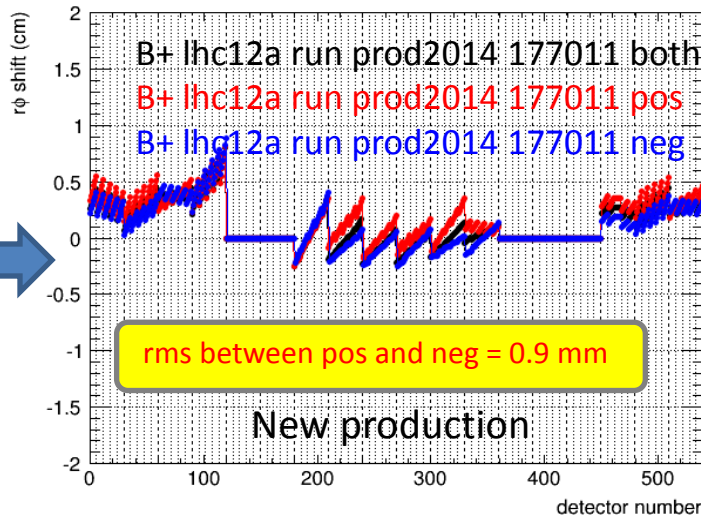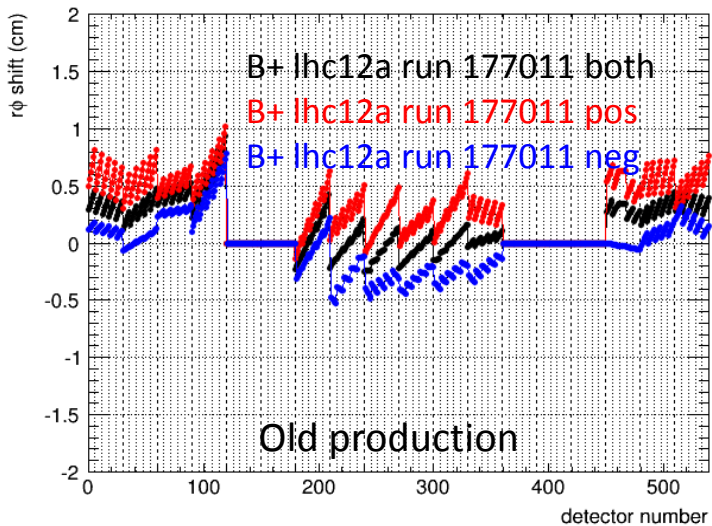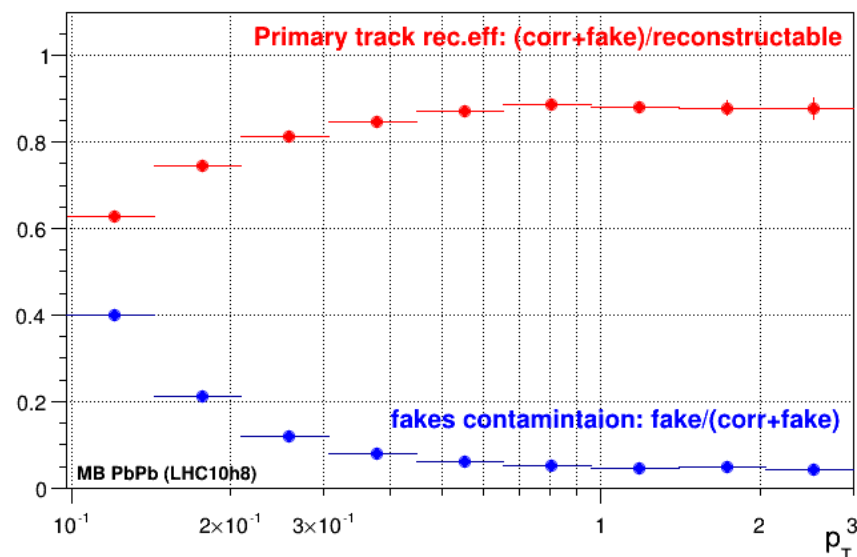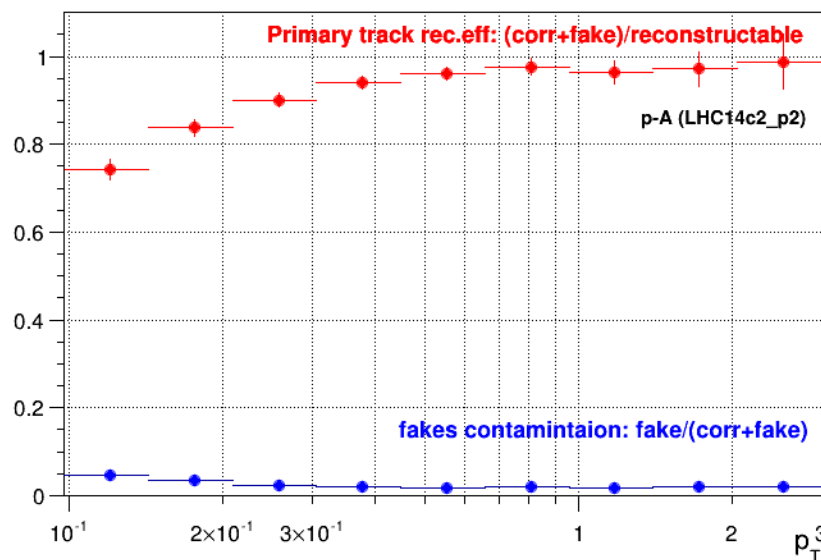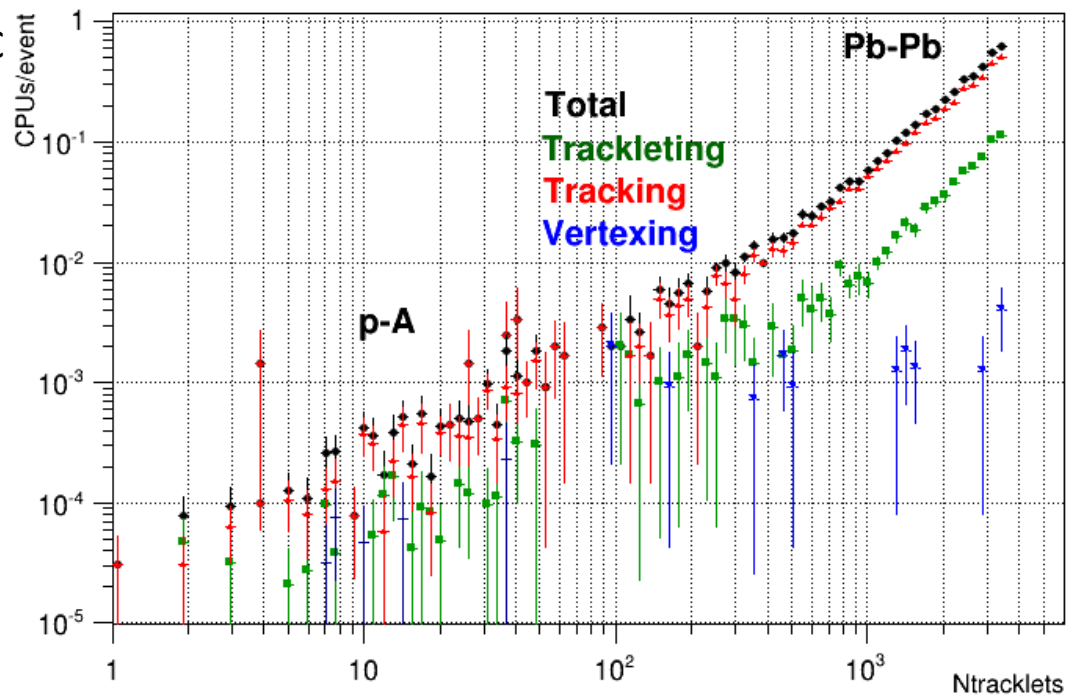

2012 TRD alignment

Still systematic
difference between
B+ and B-

New TPC calibration constrained by TRD/TOF is in preparation

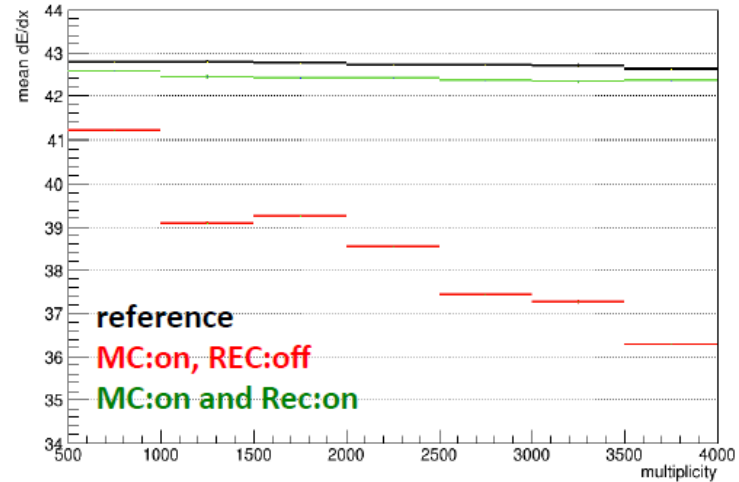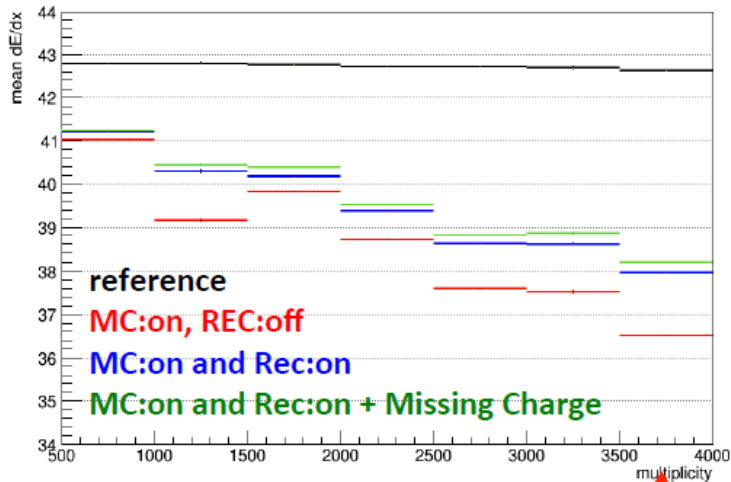# New ITS standalone ported to HLT for primary track reconstruction

- Needed for LR online determination and TPC drift-speed calibration.

- Reconstruction with all 6 layers active, allowing to skip one SDD or SSD layer (profiting from new SDD clusterizer on HLT)

- CPU-time benchmark on single core of i7-2600 CPU @ 3.40GHz

  - ~2 kHz reconstruction rate in pA (DPMJet)

  - ~18 Hz for MB Pb-Pb (Hijing) ~40 Hz skipping 15% most central PbPb

  - Can be speed-up by another factor 2-4 on the expense of some inefficiency

- Eventually can be substituted by the prototype of ITS SA tracker for Run3

ATO-17 TPC: MC tail maker, ATO-34 Crosstalk correction in TPC
(https://indico.cern.ch/event/333694)

To be updated

X-TALK

ION-TAIL

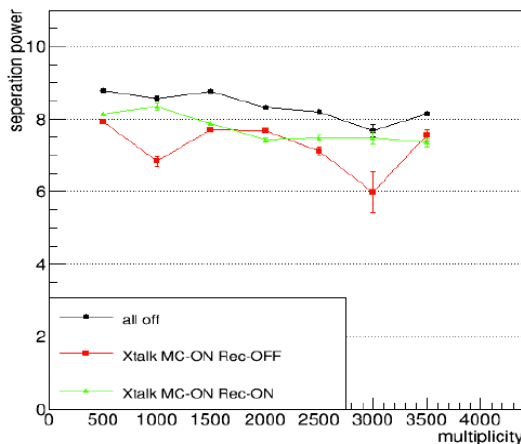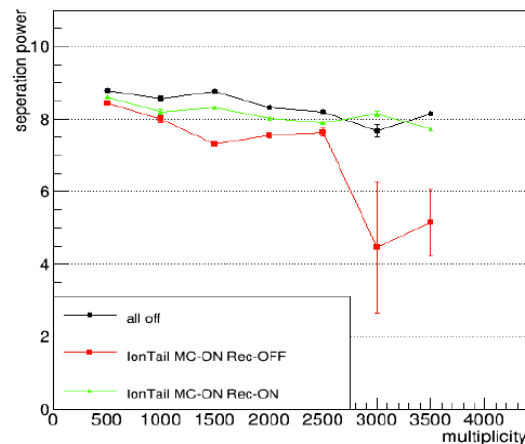
p → [0.3,0.8] GeV/c

**Central PbPb event
With track multiplicity of 15000**

Currently is fudge-factor needed to account for the missing charge effect in x-talk, attempting to avoid this (news expected by next week)
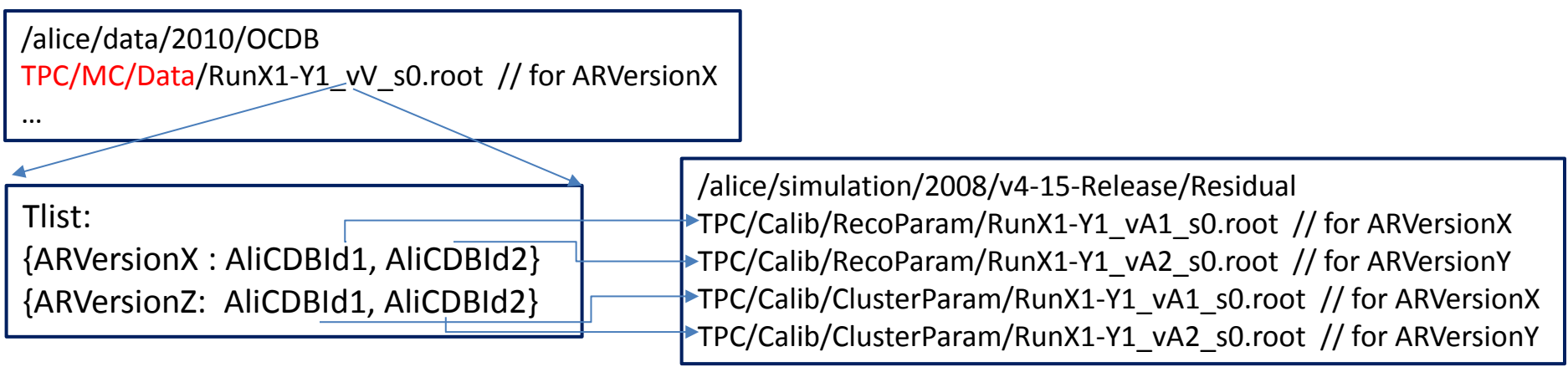
Splitting MC configuration to separate components (Jira ALIROOT-5670)

❑ Many requests to separate the Config.C to

  ● Detector configuration   ● Generator configuration   ● OCDB configuration

❑ The implementation of splitting (set of files for per period, macros "factory" etc.) is under discussion

❑ Proposal for particular topic of consistency between simulation and reconstruction OCDB setup

- Special (e.g. not in "raw" OCDB used for data reconstruction) objects are necessary for MC

- In general depend on AliRoot version and period

                      ↓

- To avoid inconsistencies each detector will validate special objects for given period/AliRoot

- Special objects will be stored on alien (e.g. /alice/simulation/2008/v4-15-Release/…)

- Its path & version will be stored in the new meta-data object in the raw:// directory of detector, together with versions of AliRoot for which it is valid

- Before running AliSimulation and AliReconstruction, query and set specific paths for all TPC/MC/* content corresponding to used AR version

- Possibility to SetSpecificStorate(path,storage, V, S) implemented (to use overridden object versions)

```
/alice/data/2010/OCDB
TPC/MC/Data/RunX1-Y1_vV_s0.root  // for ARVersionX
…
```

```
Tlist:
{ARVersionX : AliCDBId1, AliCDBId2}
{ARVersionZ:  AliCDBId1, AliCDBId2}
```

```
/alice/simulation/2008/v4-15-Release/Residual
TPC/Calib/RecoParam/RunX1-Y1_vA1_s0.root  // for ARVersionX
TPC/Calib/RecoParam/RunX1-Y1_vA2_s0.root  // for ARVersionY
TPC/Calib/ClusterParam/RunX1-Y1_vA1_s0.root  // for ARVersionX
TPC/Calib/ClusterParam/RunX1-Y1_vA2_s0.root  // for ARVersionY
```

Other reconstruction tasks (Run2 + Run1 reprocessing) still pending
(very small progress since last OW)

❑ TPC related (collected under JIRA ATO-19):

- PWGPP-55: Improving TPC/ITS matching efficiency and its systematic error (seeding TPC by standalone ITS tracks)
- PWGPP-56: Improving double track resolution

❑ ITS related:

- ALIROOT-2493 Global tracking forces some pairs of tracks to have almost the same momentum: test production (PbPb) with 2 alternative patches is still pending.

❑ Global alignment framework (PWGPP-73):
Alignment track model is implemented, further development is slowed by other priorities

→ Need to be finished before Run2 since the alignment should be redone.
Cosmics trigger request Jira PWGPP-66
(~16 days per B polarity with C0OB3-like triggers with CENT readout)

❑ Multi-vertexer update: optimize algorithm, change fitter
current version tuned on 2011 pp data → need to be adapted for high pile-up rate

BACKUP

New ITS standalone tracker for HLT primary track reconstruction (RS)

- ❑ Requested for new "online" calibration framework:
  - TPC v-drift calibration (via matching of SA TPC and ITS tracks)
  - MeanVertex: VertexTracks online reconstruction (and LR reporting to LHC)
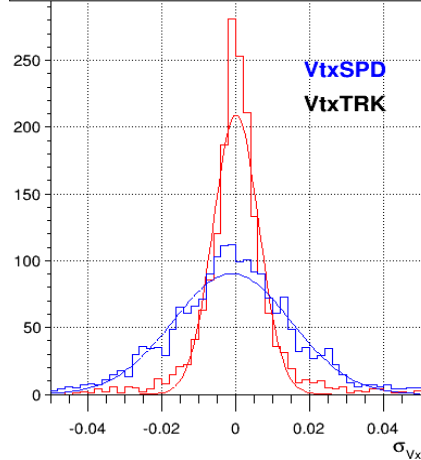
- ❑ Requirements:
  - High tracking efficiency, low pT coverage, secondaries are not so relevant
  - <u>CPU speed is absolute priority</u>
  - Should work also in case SDD clusters are not available (but we plan to have them)

- ❑ Method:
  - Start from (HLT) SPD vertex
  - Build SPD tracklets: same algorithm as offline trackleter but optimized for speed and skipping the check for overlapping sensors
  - Create tracks from SPDvertex and tracklet, extrapolate outwards and update with best matching clusters at each layer (predefined number of active layers is allowed to skip the update)
  - Store the tracks kinematics at R~50cm for matching to TPC
  - Refit inward to SPD vertex,
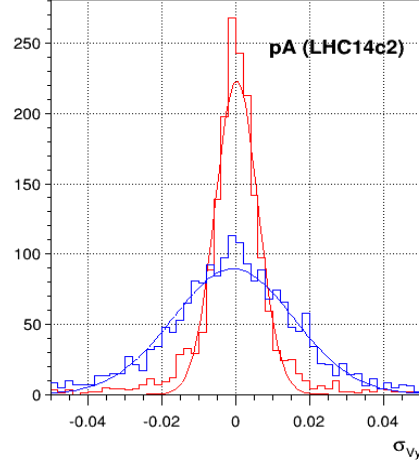 - Fast fit of VertexTracks

- ❑ Tested in offline mode, HLT wrapper with tentative IO is committed to HLT/ITS/trackingSAP (to be finalized at HLT hands-on session with help of HLT experts)

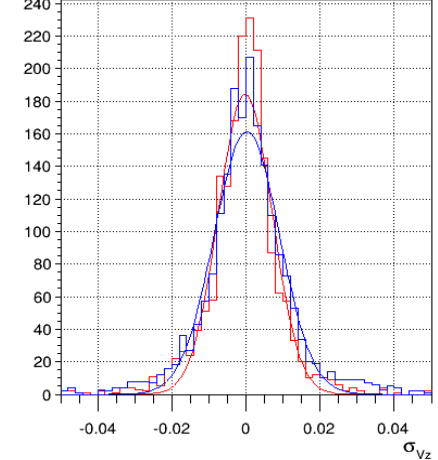# New ITS standalone tracker for HLT primary track reconstruction

❑ Vertexing resolution to be improved by introducing bi-squared weighting (like in MultiVertexer)
❑ Consider using new fitter for offline vertexTracks fit (much simpler/faster)

The graph shows rϕ shift (cm) vs detector number with annotations:
- B+ lhc12a run 177011 prod 2014
- B- lhc12g run 188362 prod 2014
- still poor consistency between B+ and B- (rms 2 mm)
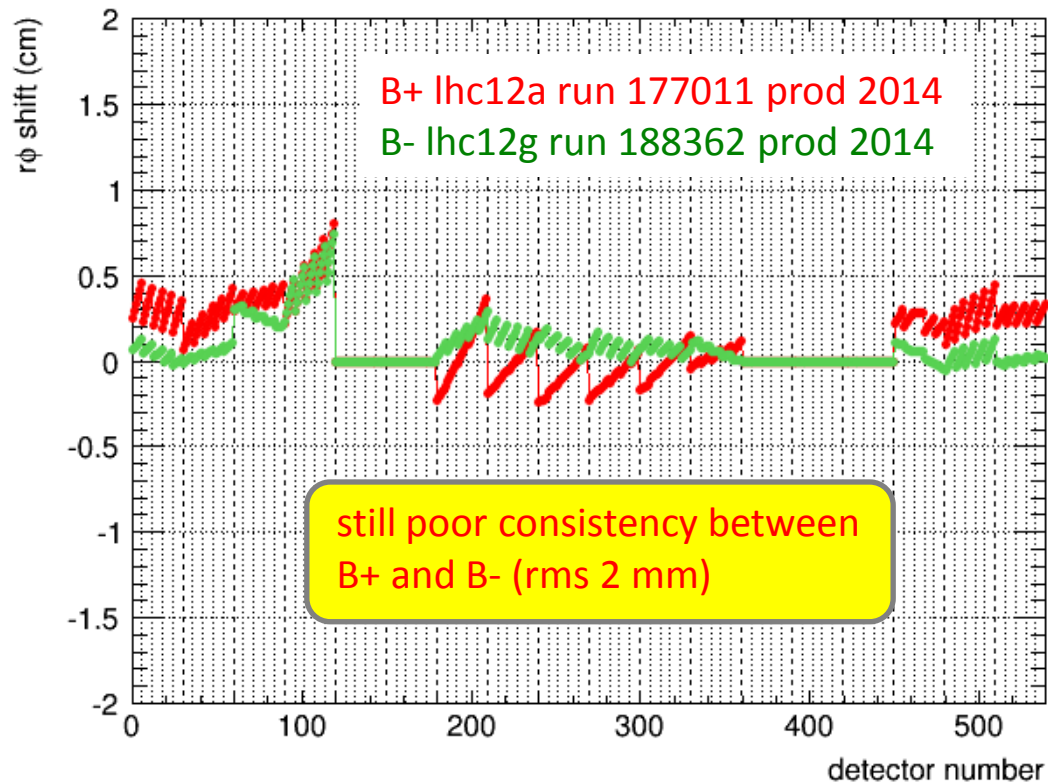
❑ Inconsistency might be related to residual TPC miscalibration (different steps are seen in residuals of A and C TPC tracks wrt the same TRD stack at η=0).

❑ Final alignment produced by averaging corrections of B+ and B-

❑ In order to profit from improved TRD alignment and tracklet fit one should improve the residual TPC calibration

→ Use TRD to constrain the TPC calibration (as it is done with ITS at inner side)

  ▪ The filling of necessary residuals in TPC calibration is implemented,

  ▪ Using these data for calibration still to be implemented (Marian)

❑ Then will need another cpass/ppass over these runs to validate alignment