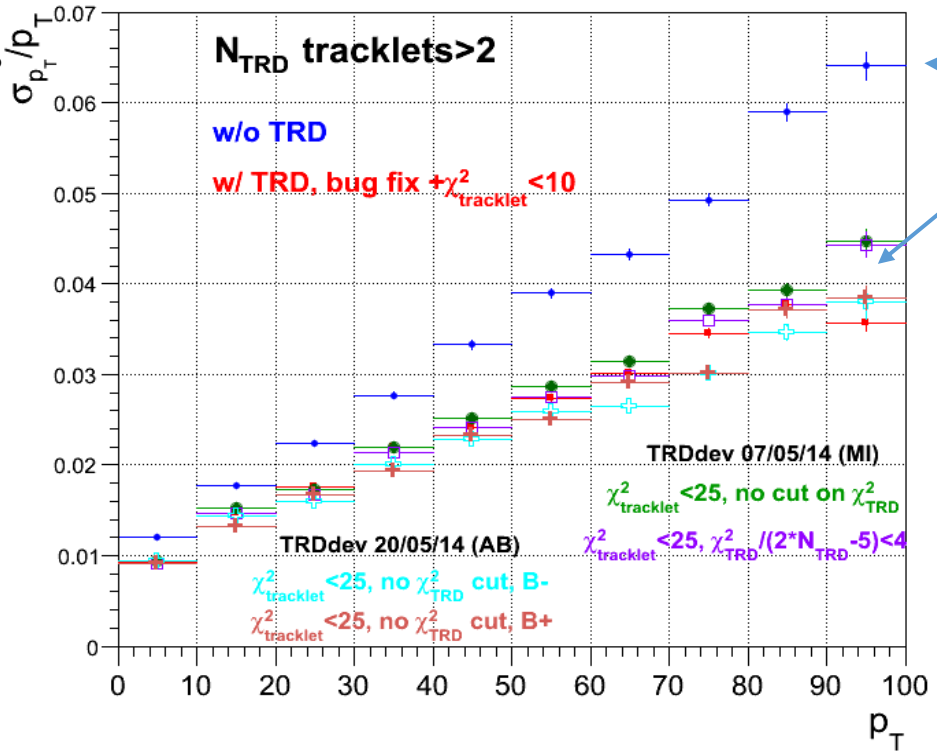
Reconstruction tasks

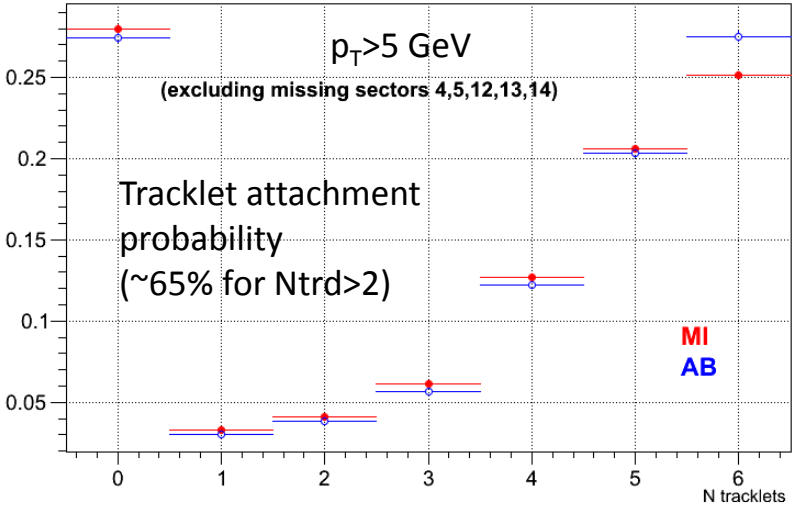
Including TRD into track fit (JIRA PWGPP-1)

- JIRA PWGPP-2: Code is in the release, need to switch setting in TPCRecoParam to enable TRD



previous status

current status



- JIRA PWGPP-8: Alignment of the TRD with current algorithm using high-pt filtered data:
  - Started with LHC13 data, but the statistics was insufficient due to the impossibility to merge the filtered data (bug in the compression, fixed).
  - Since priority is LHC11 and new TRD sectors were installed before LHC12, dedicated alignment for LHC11 is needed.
  - LHC11 reconstructed data to be filtered for alignment, then raw data with K0s for validation of pT resolution improvement.
    Time estimate (optimistic: 2 weeks)

Tasks in progress

Blockers for 2012,2013 reprocessing:

- JIRA ATO-17: TPC MC tail and crosstalk maker
- JIRA ATO-34: Crosstalk correction in TPC

Needed to prevent decrease of dE/dx (~20% in central PbPb, proportional to multiplicity)
Partially implemented.

Non-blockers (it was decided to start LHC11 reprocessing w/o them if not available)

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

In progress, was blocked by problems in data refiltering (same as for TRD alignment, now solved)

Time estimate for all these tasks: ~ 2 weeks

- JIRA ATO-18: dE/dx transfer function for dE/dx calibration. If available during reconstruction, the mass hypothesis will be improved.

Time estimate not available, need R&D

- JIRA ALIROOT-2493: Global tracking forces some pairs of tracks to have almost the same momentum (due to the ITS cluster sharing)

Two alternative patches for shared cluster suppression are produced, reconstruction of 4 runs from LHC10h and LHC11h is pending, then to be tested by HBT group.

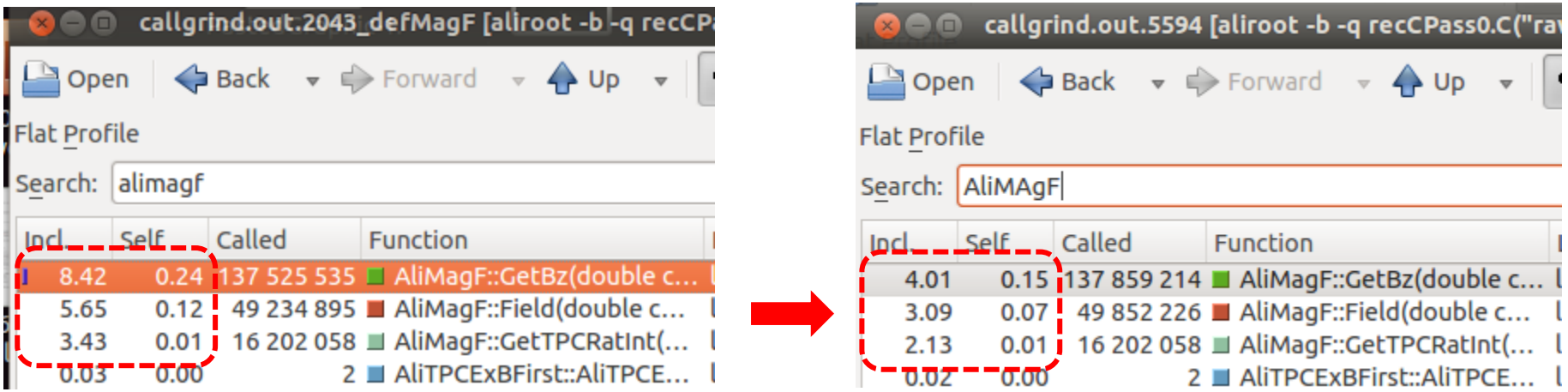
Tasks in progress

- JIRA ATO-66: Framework for global alignment using MillePede (ITS/TPC/TRD/TOF...)
  - in (very slow) progress: solved problem of track model:
    - AliExternalTrackParam (as in tracking!) with numerical calculation of derivatives (can be vectorized)
  - still need to prepare the templates for detector specific DOF/derivatives definition, handling of default geometry handling routines and steering task

- JIRA ALICEHLT-41: Fast HLT ITS standalone tracker for TPC Vdrift calibration and Luminous region determination ("backup" solution in absence of Run3 tracker prototype)
  - using HLT SPD vertex build SPD tracklets and extend to SDD(if confirmed!) and SSD
  - almost done: need some tuning/cleaning + integration to HLT
  - formats of output to be defined

Magnetic field query speed-up (JIRA PWGPP-59)

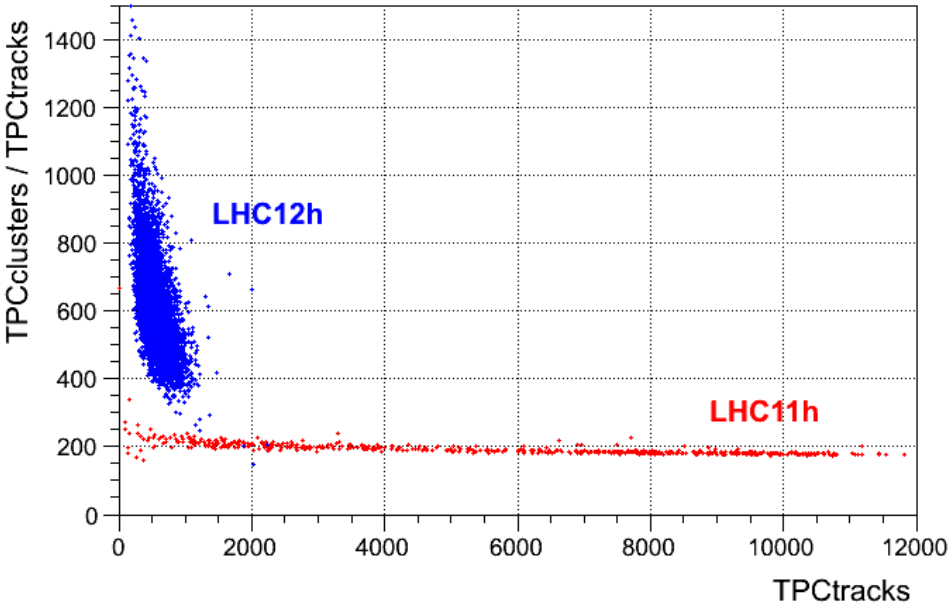
- B field and its integrals (for TPC ExB) are stored as patches of polynomial parameterizations;
  → half of CPU time is spent on the search of patch containing requested space point
- For barrel tracking ~90% of consecutive queries end up in the same patch, for Muon: ~70%
- Speed-up query by caching the last used patch → factor ~2 improvement in speed (pA LHC13b)
  (~8% overall decrease of reconstruction CPU time)

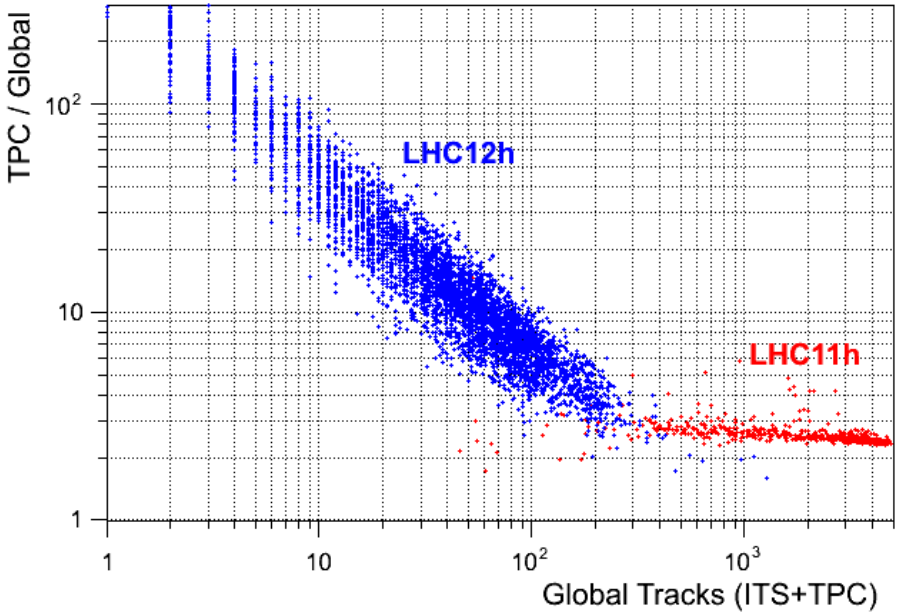


- Further speed-up is possible only on expense of precision drop or significant increase in memory;
  Can be considered if B-field query becomes a bottleneck

Memory, data size problems

- Run2: 25 ns spacing beams with, μ≤1% → ~40 pile-up events in TPC (w/o PF protection)
  - only ~5% of TPC cluster data is useful (for MB trigger)
  - waste of disk for storage/memory & CPU in reconstruction

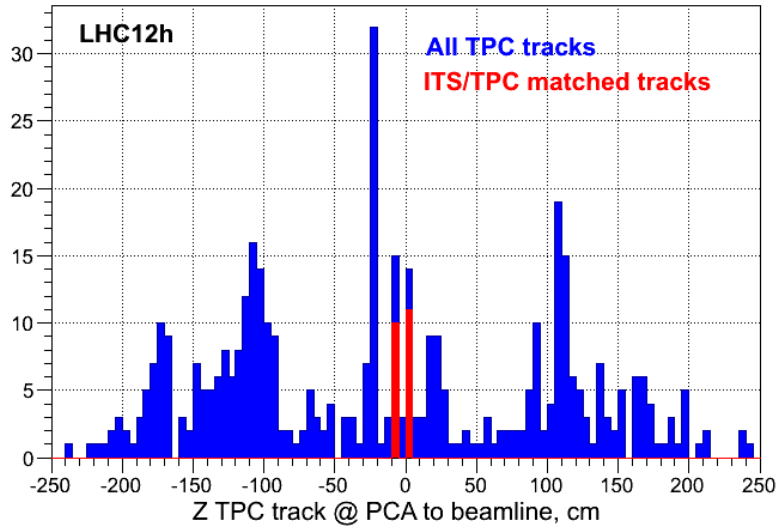




Memory, data size problems

- Could be improved by better usage of HLT reconstruction
  - If we manage to get HLT TPC tracking efficiency equivalent to offline efficiency:
    (both for track-finding efficiency and cluster-to-track attachment efficiency/purity)
    - store only clusters used by validated tracks → factor 3-4 reduction in data size
    - additionally reject the clusters of tracks beyond some distance from IP (a la "CleanESD")
      → extra factor ~2 (selection criteria need to be tuned, may decrease efficiency for conversion/decays at large radii. Tolerable?)
    - Perform only offline refitting of HLT seeds (w/o track-finding): gain ~30% in CPU ? ***
  - If offline tracking performance is not reachable in HLT:
    - still may reject clusters of track not passing "CleanESD"
    - in offline reconstruction perform seeding with HLT tracks then afterburner with offline seeding: gain ~20% in CPU ? ***

*** **Need assessment of HLT TPC tracking quality!**



Memory problems

- Problems with memory jumps due to anomalous number of seeds
  - TPCseed is an object of >8kB size
    Can it be reduced?
  - In some pp events > 200K seeds are created (instead of ~10K in average) leading to 1.5 GB jump in memory