Progress with MUON reconstruction

Outline:

- Reconstruction procedure in short
- CPU performances
- Impact of recent changes in framework

Local reconstruction

- Raw → Digits
    - format conversion
    - digit calibration (pedestals, gains)
    - fill TreeD

- Digits → Clusters
    - clustering
        - prepare clustering
        - pre-clustering (form clusters of digits)
        - clustering (cluster fitting / splitting by using MLEM)
    - fill TreeR

Muon tracking

- Clusters → Tracks
  - muon track reconstruction (using Kalman filter)
  - trigger track reconstruction
  - muon / trigger tracks matching + trigger hit map
  - compute trigger chamber efficiency (disconnectable)
  - ~~fill TreeT~~
  - fill ESD (+ extrapolate to ITS vertex)

Simulations

- 1000 p-p events:
  - p-p bench
    - Pythia minimum bias
  - + upsilon in the spectrometer acceptance

- 100 Pb-Pb events:
  - Pb-Pb bench
    - standard Hijing generator
    - impact parameter range: [8.6, 11.2] (semi-central)
  - + upsilon in the spectrometer acceptance

- platform:
  - MacBook Pro 2.4 GHz Intel core 2 duo

Local reconstruction (1)

1000 p-p   100 Pb-Pb

AliReconstruction::Run(): ·························· 266.69 / 300.97 CPU seconds

- Raw → Digits: ·································· 51.68 / 15.80 s
  - format conversion: ························ 19.98 / 4.23 s
  - digit calibration
    - create calibrator: ····················· 8.11 / 8.10 s   **once per run!**
    - calibrate: ··························· 5.39 / 1.24 s
  - fill TreeD: ····························· 4.86 / 1.17 s
  - others (loaders…): ························· 13.35 / 1.06 s

→ Improvements:
- Small optimizations… under way
  - reduce the time to create calibrator
  - dispatch the creation of the status map among events

Local reconstruction (2)

1000 p-p   100 Pb-Pb

AliReconstruction::Run(): ⋯⋯⋯⋯⋯⋯⋯ 266.69 / 300.97 CPU seconds

- Digits → Clusters: ⋯⋯⋯⋯⋯⋯⋯⋯⋯ 165.48 / 271.68 s
  - clustering:
    - prepare clustering ⋯⋯⋯⋯⋯⋯⋯ 16.17 / 4.40 s
    - pre-clustering ⋯⋯⋯⋯⋯⋯⋯⋯ 43.04 / 25.68 s
    - clustering ⋯⋯⋯⋯⋯⋯⋯⋯⋯ 65.32 / 236.94 s
  - fill TreeR: ⋯⋯⋯⋯⋯⋯⋯⋯⋯⋯ 1.44 / 0.69 s
  - others (loaders…): ⋯⋯⋯⋯⋯⋯⋯ 39.51 / 3.97 s

→ Improvements:
- Separation pre-clustering / clustering… done
- Pre-clustering:
  - optimized in the past year (pre-clustering+clustering time / 3 in p-p)
  - still some options to test…
- Clustering:
  - try to optimize the algorithm… big task!!
  - use simple fit with Mathieson function in p-p ??… To be tested
- Perform combined clustering / tracking… starting soon

Muon tracking

1000 p-p   100 Pb-Pb

AliReconstruction::Run(): ························· 266.69 / 300.97 CPU seconds

- Clusters → Tracks: ································ 23.54 / 9.20
  - muon track reconstruction: ··················· 5.48 / 5.28
  - trigger track reconstruction: ················ 0.00 / 0.01
  - tracks matching + trigger hit map: ·········· 3.76 / 2.30
  - trigger chamber efficiency: ·················· 1.66 / 0.65
  - fill ESD: ···································· 0.19 / 0.01
  - others (loaders): ··························· 12.45 / 0.95

→ Improvements:
  - Optimized in the past year… done
    - Muon track rec. time / 2 in p-p & / 16 in Pb-Pb
    - With the option MakeTrackCandidatesFast: rec. time / 50 in Pb-Pb

Impact of recent changes in framework

- MUONTracks (TreeT) no longer saved on disk:

  - lost track parameters at each chamber
  - lost informations about clusters attached to the track

- How will we recover important informations?

  - extrapolation from track parameters at first chamber stored in the ESD
  - add an array of clusters' ID into the ESD (~ 10 UInt_t in average)
    - need modifications in the definition of clusters… done
    - need modifications in the implementation of the tracking…

Summary

- Improvements in the recontruction time are mainly foreseen around the clustering (combined clustering / tracking)

- Note: we also optimized the size on disk (digits / 3 & clusters / 4)

- Need to add an array of clusters' ID into the ESD to recover the informations lost with the suppression of the TreeT