

PWG3-Muon: Analysis Status

- ➔ From ESD to AOD:
 - ➔ inclusion of MC branch in the AOD
 - ➔ standard AOD creation for PDC09 files locally/CAF/Grid
- ➔ From AOD to Muon-AOD
 - ➔ updated analysis task
- ➔ Update on PWG3-Muon analysis wagons
- ➔ Usage of other tools: CORRFW
- ➔ Outlook and requirements



PWG3-Muon Analysis Train

➔ A PWG3-Muon analysis train has been prepared to test analysis wagons before inclusion in the official train

(adapted version of the official code

`ANALYSIS/macros/AnalysisTrainNew.C`)

`AnalysisTrainPWG3Muon.C`

(now committed in PWG3/muon with a slightly different name)

➔ This analysis train

- is compliant with the developments of the analysis framework (AddTask format for the wagons)
- allows a selection of inputs (ESD, AOD)
- allows inclusion of all the developed analysis wagons
- runs
 - Locally
 - Grid with/without AliEn Plugin
 - Proof

From ESD to Standard AOD

➔ Using `AnalysisTrainPWG3Muon.C`, the standard AODs production for **PDC09 files** relevant to the Muon community has been done (statistics not huge)

➔ AOD production is stored in alien:

`/alice/cern.ch/user/a/arnaldi/PDC_09/`

LHC09a10 (dimu, no J/ψ pol) → Completed
LHC09a11 (dimu, J/ψ pol 0.3) → Completed
LHC09a12 (dimu, J/ψ pol -0.3) → Completed
LHC09a13 (dimu, J/ψ pol 0) → Completed
LHC09a18 (MB, no J/ψ pol) → On going

➔ Some AOD files are also staged on CAF for tests of muon analysis:

`/PWG3/arnaldi/LHC09a11_aod`
`/PWG3/arnaldi/LHC09a12_aod`

Standard AODs for PDC09

➔ Size of the PDC09 files:

LHC09a10 (dimuon production):

ESD file (100 events) → 0.8MB

Kinematics → 4.6MB

Standard AOD → 0.1MB

Standard AOD+MC info → 1.4MB

➔ Standard AODs from Muon-PDC09 now include MC information stored in an additional branch

MC info in standard PDC09 AOD

➔ Reconstruction for Muon-PDC09 starts from raw data and not from digits

- ➔ therefore no labels are assigned to ESD tracks
- ➔ this would prevent the use of the standard framework for MC branch addition to the AOD (`AliAnalysisTaskMCParticleFilter.cxx`)

➔ The adopted workaround is the following:

- ➔ A new analysis task is run, as a first wagon of the ESD→AOD analysis train

PWG3/muondep/

`AliAnalysisTaskESDMCLabelAssignment.cxx`

The task computes the MC label (TrackRef based) and assigns it on fly to the ESD track

- ➔ at this point, standard framework for MC branch inclusion in AOD can be used

analysis train

PDC09 ESD
without label

ESD MC label
assignment

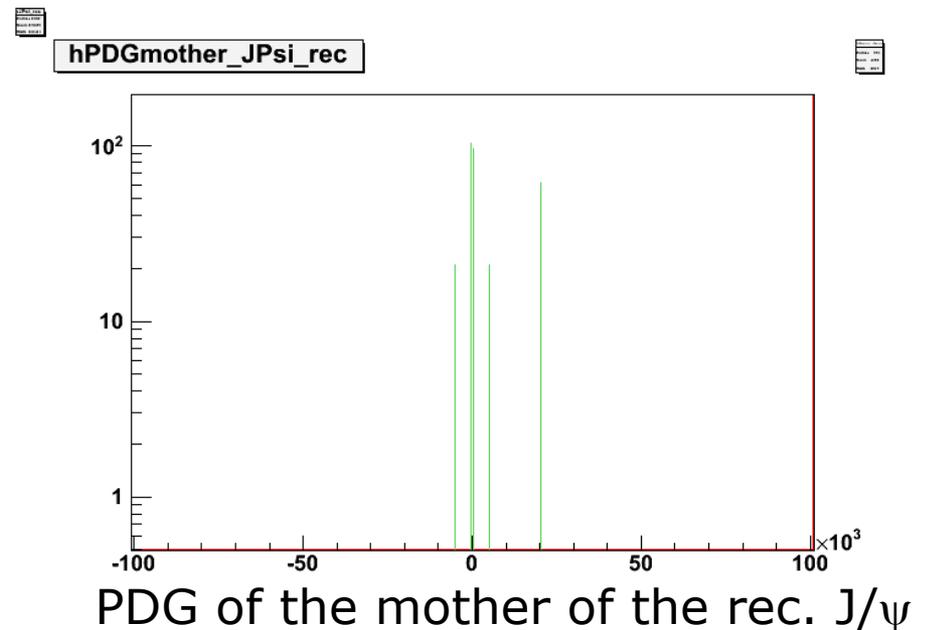
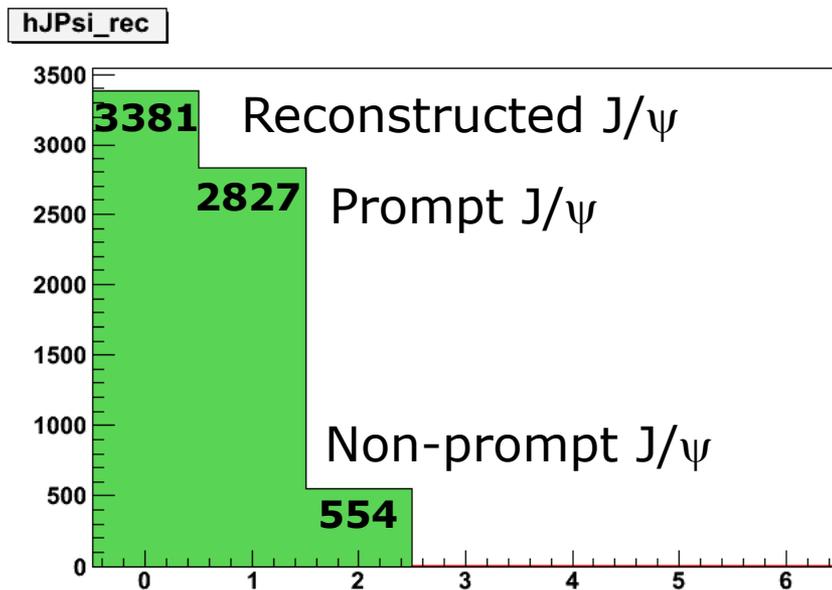
ESD filter

ESD muon filter

Standard AOD
+ MC branch

MC info in standard PDC09 AOD (2)

➔ MC information stored in the AOD has been used in the J/ψ polarization analysis, in order to disentangle prompt J/ψ from those from feed-downs

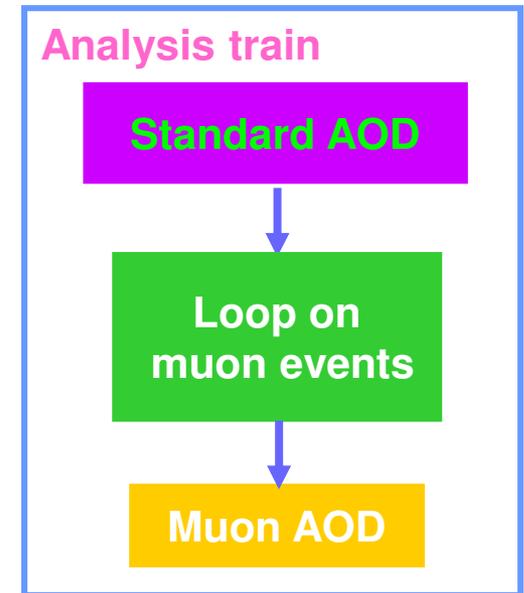


From AOD to Muon-AOD

➔ As discussed at the July Offline Meeting, we foresee the production of **Muon-AODs** containing only events where at least one muon in the Muon Spectrometer has been reconstructed

➔ During the loop on the events, events containing muons are selected and copied to the AOD

```
AddTaskMuonAODCreation.C  
AliAnalysisTaskMuonAODCreation.cxx (.h)
```

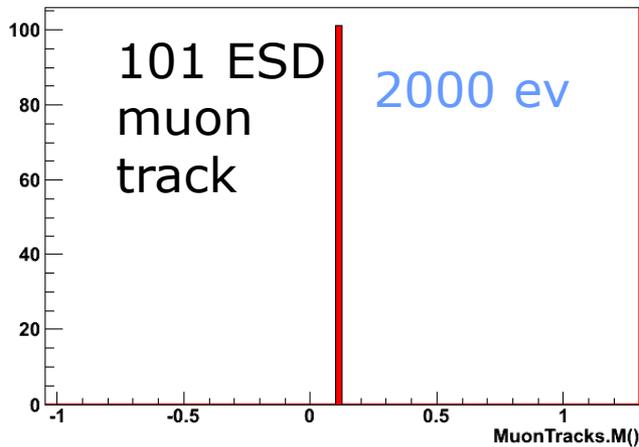


```
if (nMuon>0) outputHandler->SetFillAOD(kTRUE)  
else outputHandler->SetFillAOD(kFALSE)
```

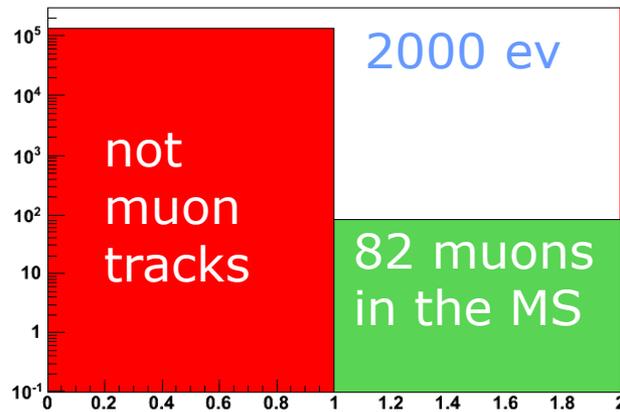
Muon-AOD

➔ The MuonAOD production has been tested on LHC09b2 (PYTHIA jet production in pp @5.5 TeV)

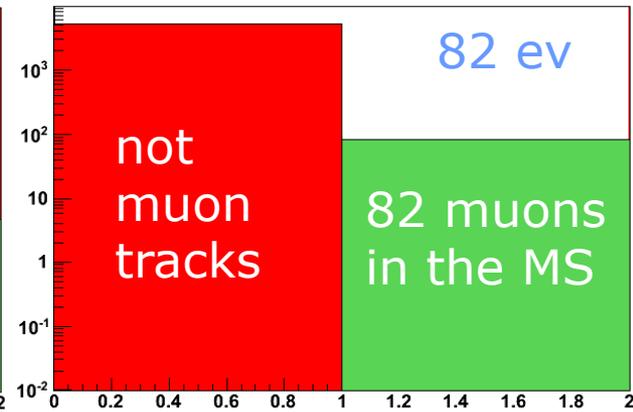
ESD :



Standard AOD:



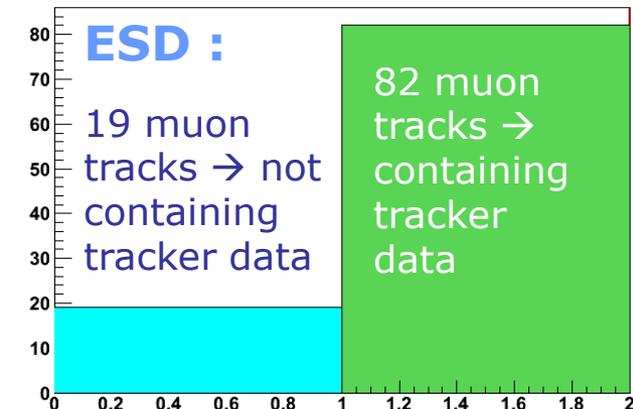
Muon AOD:



19 ESD muon tracks are not stored because they did not containing tracker data

Not muon tracks are stored only if they belong to events containing muons

ESD :



Size of Muon-AOD

➔ Size (based on the LHC09b2 production):

1 ESD (200 ev) = 20 MB



10 ESD (2000 ev) = 200 MB



1 Standard AOD (2000 ev) = 37 MB



1 Muon AOD (~80 ev) = 1.4 MB

} factor ~5

} factor ~25

➔ Muon-AOD size will be much smaller than the one of the standard AOD

➔ Size of Muon-AODs with respect to Standard AOD strongly depends on data sample

PWG3-Muon analysis wagons

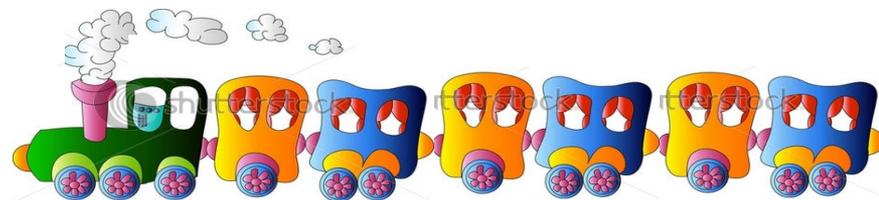
➔ When high energy data will be available, the first analysis that will be performed within the PWG3-Muon will be:

- ➔ Quarkonia cross section/differential distributions
- ➔ B measurements from single muons

➔ Prototypes of the analysis tasks are ready

➔ The PWG3-muon train is becoming longer...
Several wagons are now included:

- Muon AOD creation
- Single muon distributions
- Dimuon distributions
- J/ψ differential distributions analysis
- B measurements from single muons

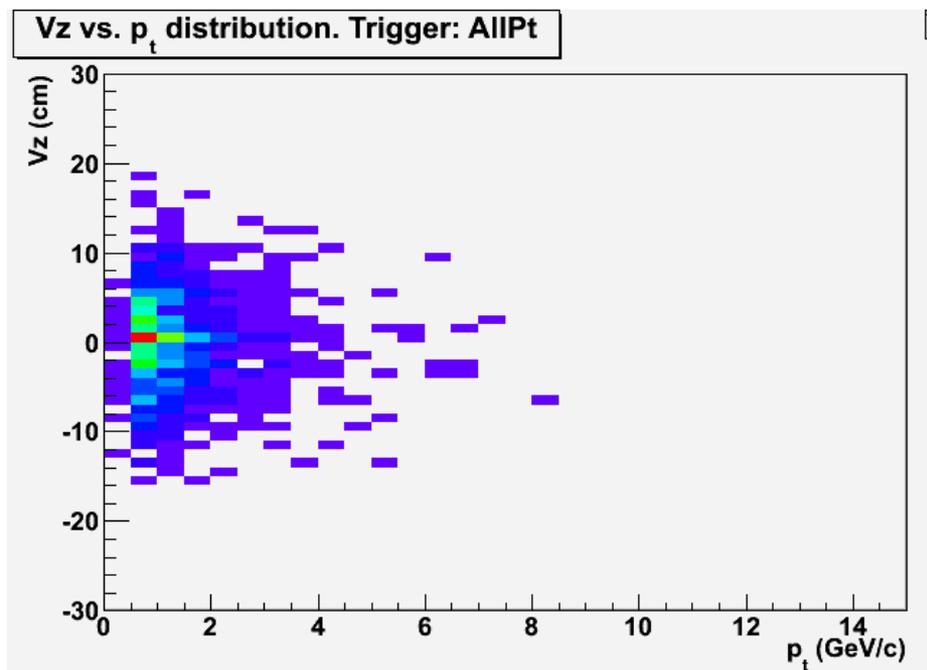


Single Muon Analysis

➔ The task computes [single muon kinematical spectra](#).
It will be used to study low p_T single muons

➔ Task included in the train using: [AddTaskSingleMu.C](#)
[PWG3/muon/AliAnalysisTaskSingleMu.C](#)

➔ Input: ESD
Output: Histograms file

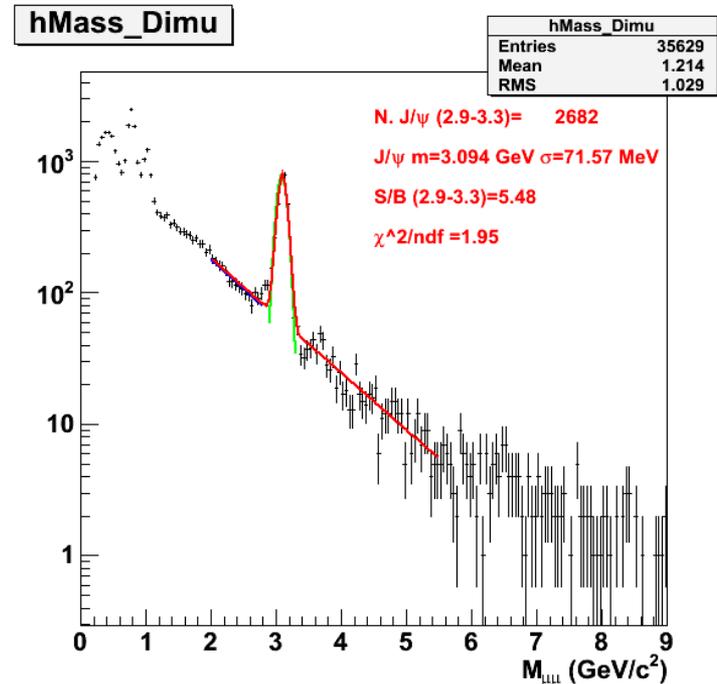
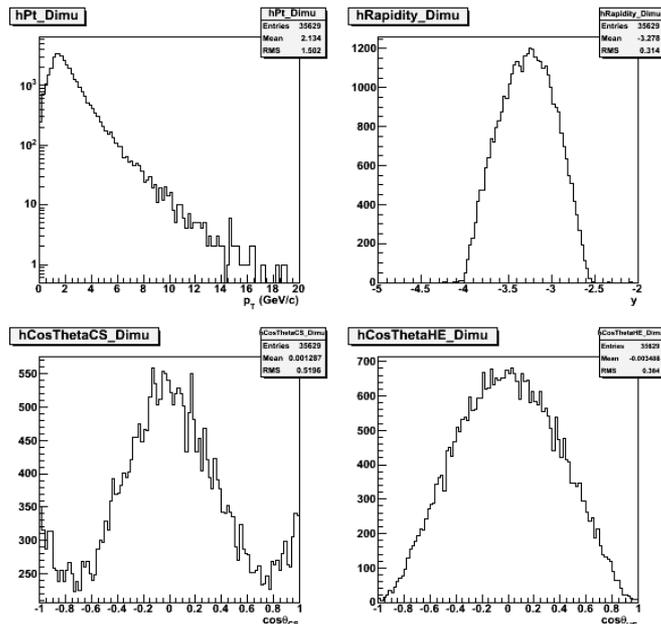


Muon/Dimuon distributions

➔ The task computes dimuon kinematical distributions and performs preliminary invariant mass fits

➔ Task included in the train using: `AddTaskMuonDistributions.C`
`PWG3/muon/AliAnalysisTaskMuonDistributions.C`

➔ Input: ESD or AOD
Output: Histograms file



J/ψ differential distributions

➔ A possible approach for the study of J/ψ differential distributions has been implemented in

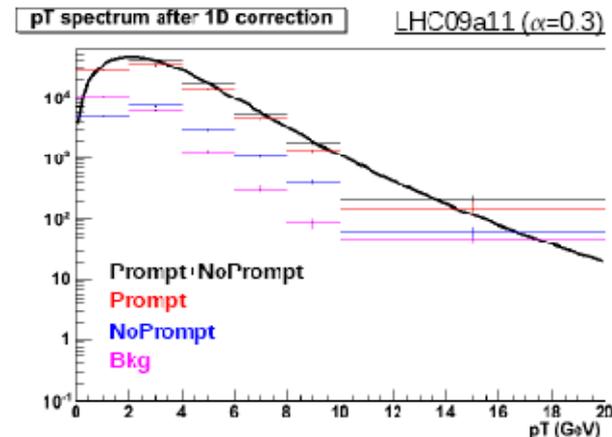
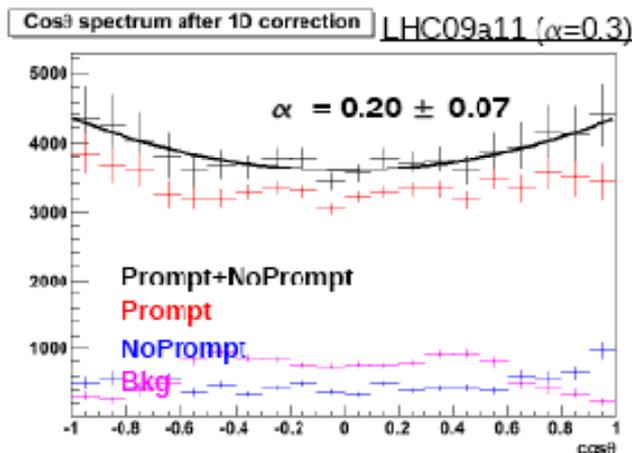
AddTaskDiMuonCFPolar.C

AliAnalysisTaskMuonCFPolar.C

➔ Input: ESD (update to AOD is on-going)

➔ Output: Histograms file, CORRFW containers containing J/ψ kinematical variables

➔ This task has been used on CAF to perform preliminary study of J/ψ kinematical distributions



Other wagons

- ➔ Analysis tasks for muon tracking and trigger chambers efficiencies
 - ➔ Need ESD files as input and produce histos as output
 - ➔ good candidate to be added to the train
 - ➔ can this task run in the ESD → AOD train?
 - ➔ these tasks need geometry.root and other infos from OCDB (magnetic field, mapping, recoParam) and MUON libraries.

Inclusion in the official train

➔ PWG3-Muon wagons are ready to be included in the official train

➔ Requirements:

We would like to test Muon-AOD production and run the available analysis wagons on the standard AODs from

- Single Muon/Dimuon/Muon Cocktail pp Minimum Bias PDC09
- Other PDC09

➔ Standard AODs have already been produced for some for Muon PDC09 productions inside PWG3-Muon, but it may be useful to complete the production and to test the chain from the beginning.

CORRFW

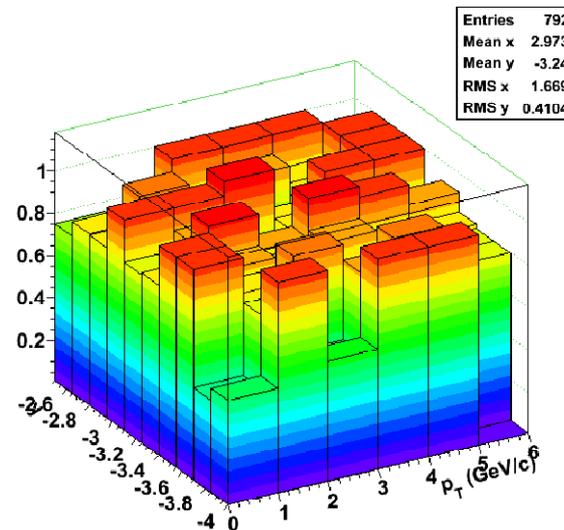
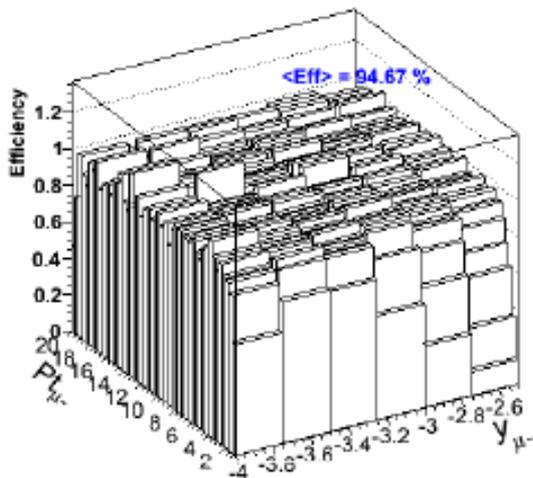
➔ To compute acceptances and efficiencies and to correct the reconstructed data
➔ the correction framework (CORRFW)

➔ The CORRFW has been adapted to muon/dimuon studies

- ➔ CORRFW for single muon analysis
- ➔ CORRFW for dimuon analysis
- ➔ CORRFW for continuum analysis

➔ Optimization of the number of variables needed for the different analysis is ongoing

Single μ
efficiency



J/ψ
efficiency

A user feedback on CAF and GRID usage

- ➔ Difficulties in the use of the Grid for both AOD production of Muon PDC09 data and subsequent analysis
 - Long waiting times for several subjobs
 - Various resubmit of the subjobs in the same masterjob were necessary to complete the job

- ➔ CAF used rather extensively for analysis and debugging of the code
 - Staging times reasonable
 - Very fast analysis

- ➔ Debugging on CAF is often not enough to ensure a correct behaviour on the Grid
 - It would be very helpful to debug directly on the Grid...

Conclusions

- ➔ PWG3-Muon analysis train has been updated and tested
 - ➔ can be run locally, on Proof and on the GRID with/without the Alien plugin
 - ➔ allows the inclusion of several analysis wagons (ESD/AOD inputs)
 - ➔ allows the inclusion of the MC branch
 - ➔ tested with PDC09 production
- ➔ Code for [AOD](#) → [Muon AOD](#) has been tested on Grid. We would like to have centrally produced Muon AOD soon
- ➔ PWG3-Muon wagons are ready to join the official train

