



Update on the MUON Offline Status

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For Dimuon Project

ALICE Offline Week, CERN,

5 - 9 July 2010

Outline

- Detector news
 - Tracking detector
 - Trigger detector
 - Alignment
- Recent updates in the MUON code
 - Pileup
 - Reconstruction
 - Trigger chamber efficiency

Detector news:

- Tracking Detector

Tracking Detector

- From H. Borel, IRFU CEA Saclay:
 - Presently a quite "stable" configuration has been reached
 - With an acceptable busy time
 - It can go from 330 to about 500 microsec.
 - For this some bus patches had to be excluded(45 out of 880 = 5%), but without really loosing in tracking efficiency thanks to the redundancy of the tracking. Nevertheless we are somehow at the limit.
- Problems
- HV: Two sectors HV disconnected:
 - one sector of CH4 Top Left (station 2) from January
 - another one of CH3 Bot Right quad4sec1 from mid June (it tripped and did not recover); a broken wire is suspected
 - This area has been removed from the configuration.
 - *This cannot be improved without a quite long shutdown.*
- LV: Group 5 on CH5 Bot Right: the -2.75 V lines tripping when the current is driven (concerns 3 slats)
 - A bad connection in a connector of the crate or/and a problem in a "passive dispatcher "in the LV filter box near the detectors are suspected
 - *Both will be changed at the next technical stop.*

Tracking Detector (cont.)

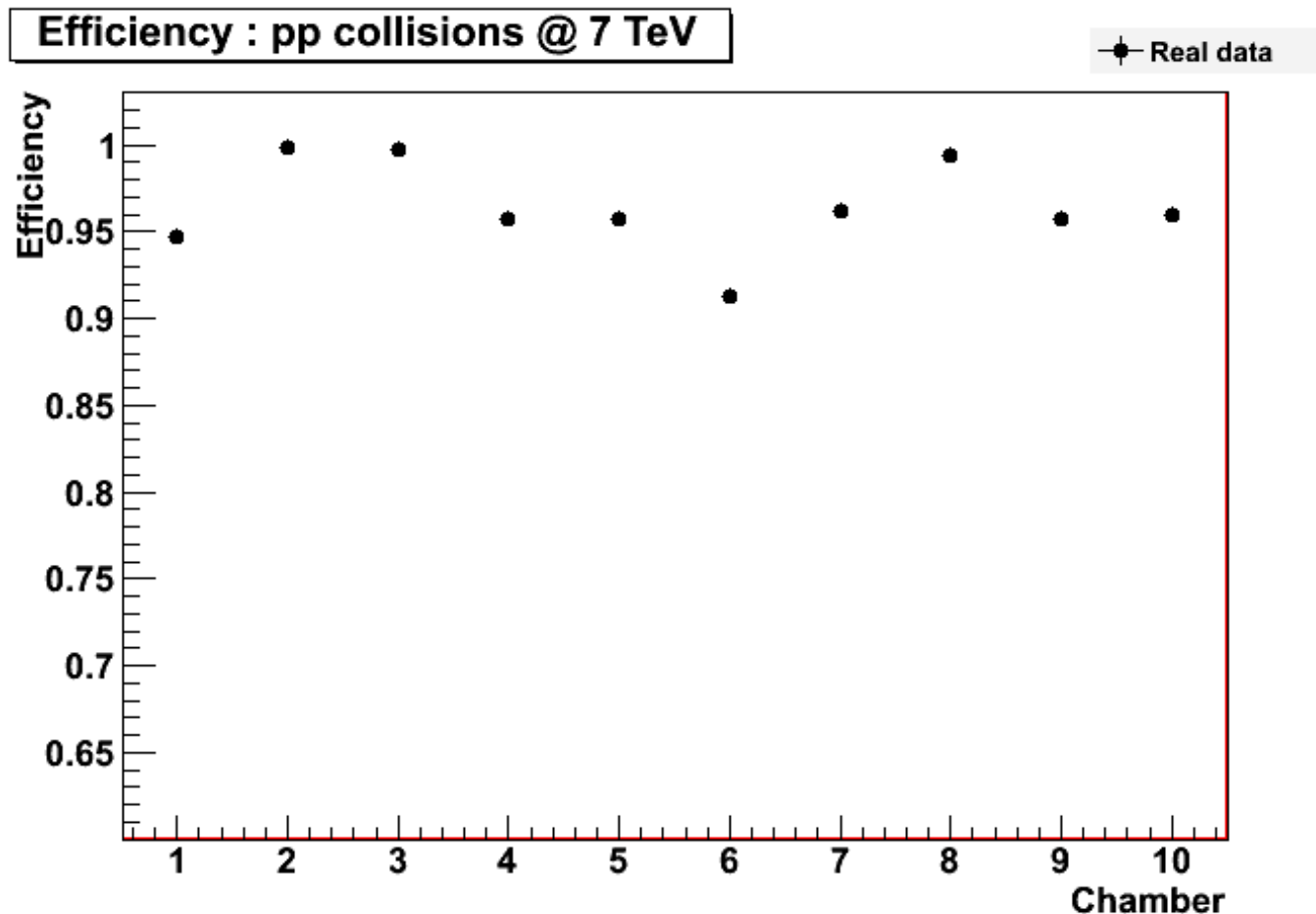
- Problems (more):
- Read-out bus patches : high occupancy - dead time
 - Several bus patches with high occupancy had to be removed from the current configuration
 - Several tests were performed to try to understand the origin of these high occupancies but without reaching yet real conclusions: different bus patches behave differently.. and intermittently !
- Concerning pedestals:
 - Usually pedestals are quite stable for several hours but for some bus patches with high occupancy, they can move and give high busy time..
- Concerning Crocus busy during a run
 - It is difficult to know the origin; the way to solve it is usually to reset the Crocus (and make a pedestal run).
- In conclusion, a real improvement in the tracking can not be reached before a quite long shutdown; only few things can be solved during technical stops if the bad area can be accessible: LV problem and few bus patches of station 3 (we do not want to open the stations 4 and 5).

MUON-TRK DAs

- From J.-L. Charvet, IRFU CEA Saclay
- No new features
- Both Pedestal and Calibration DAs are working fine.
- On line: Pedestal and Calibration can be processed in both “Beam Tuning” or “Standby_Configured” DCS levels.

Tracking Chambers Efficiency

- From: M. Lenhardt, SUBATECH



- Matthieu is trying his task to be included in the PWG1 train.

Detector news:

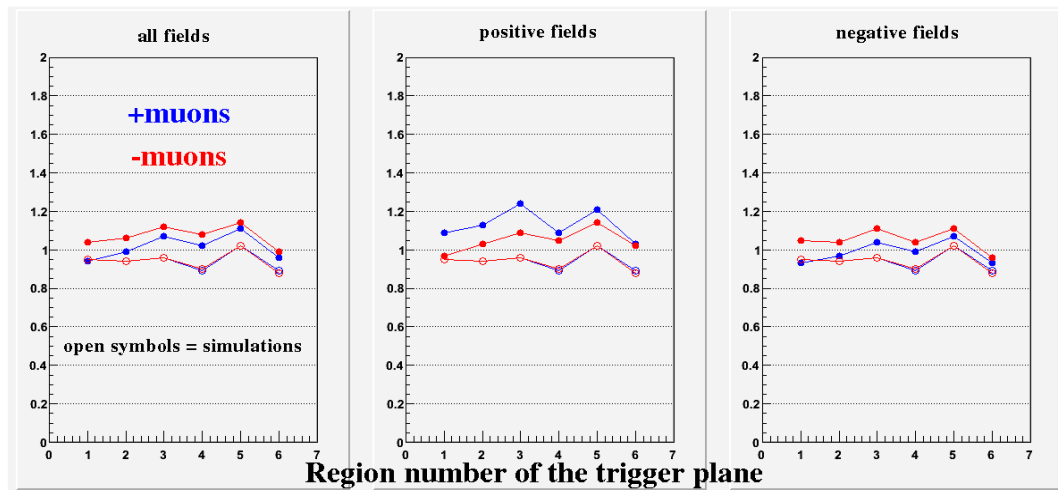
- Trigger Detector

MTR DA

- From B. Vulpescu, LPC
- Bug fix in the MTR DA: during the runs where half of the trigger chambers ("outside" half) was out of order, the DA did not mask correctly the local boards from this side.
- A new version of the MTR DA with a "multi-thread" DA library, called "version 2" (presented by Sylvain Chapeland in the DAQ meeting in March 24) implemented and tested
 - Not yet in trunk, the idea is to keep both versions in coexistence.

MTR Pt-cut LUT

- Three versions of pt-cut couples (low/high pt-cut) installed at Point2:
 - a) cut1 = 0 GeV/c; cut2 = 1.0 GeV/c - currently in use
 - b) cut1 = 0 GeV/c; cut2 = 1.7 GeV/c
 - c) cut1 = 1.0 GeV/c; cut2 = 1.7 GeV/c
- The pt-cut value was extracted and compared with the simulations.
 - The average Pt- cut over the "regions" of the muon trigger acceptance:

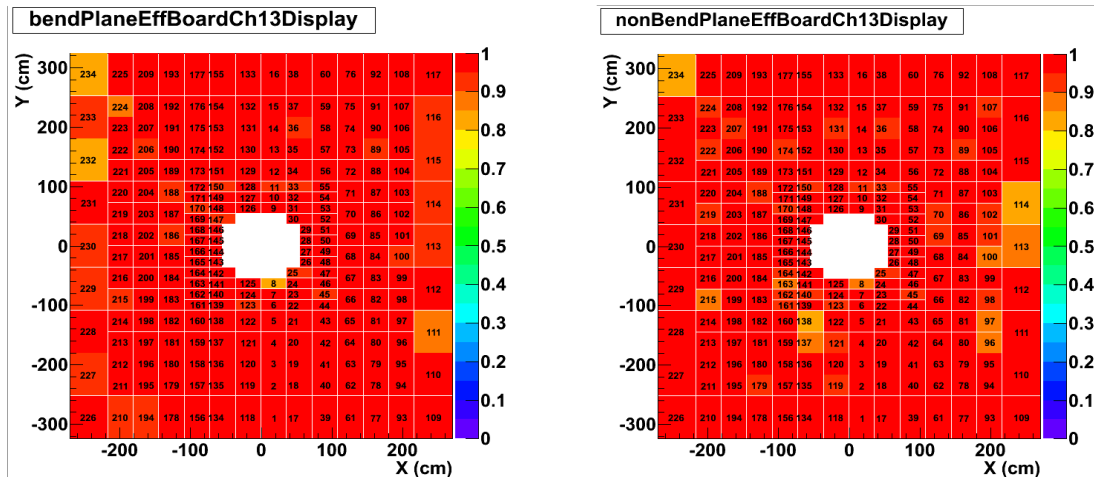


Good uniformity over the trigger acceptance and small differences between the data and the simulations, especially the variation from one region to the other.

- The method of calculating LUTs based on simulations is in general validated.

MTR RPC Efficiency

- From D. Stocco, SUBATECH and F. Bossu, INFN Torino:
- Trigger chamber efficiencies stable during data taking.
- Efficiencies with finer granularity (>230 points) can be provided.



- Readout problems in the second half of LHC10c: now fixed.
- The task for efficiency calculation is now running on the PWG1 analysis train: the output histograms can be easily used to build a CDB object for simulations

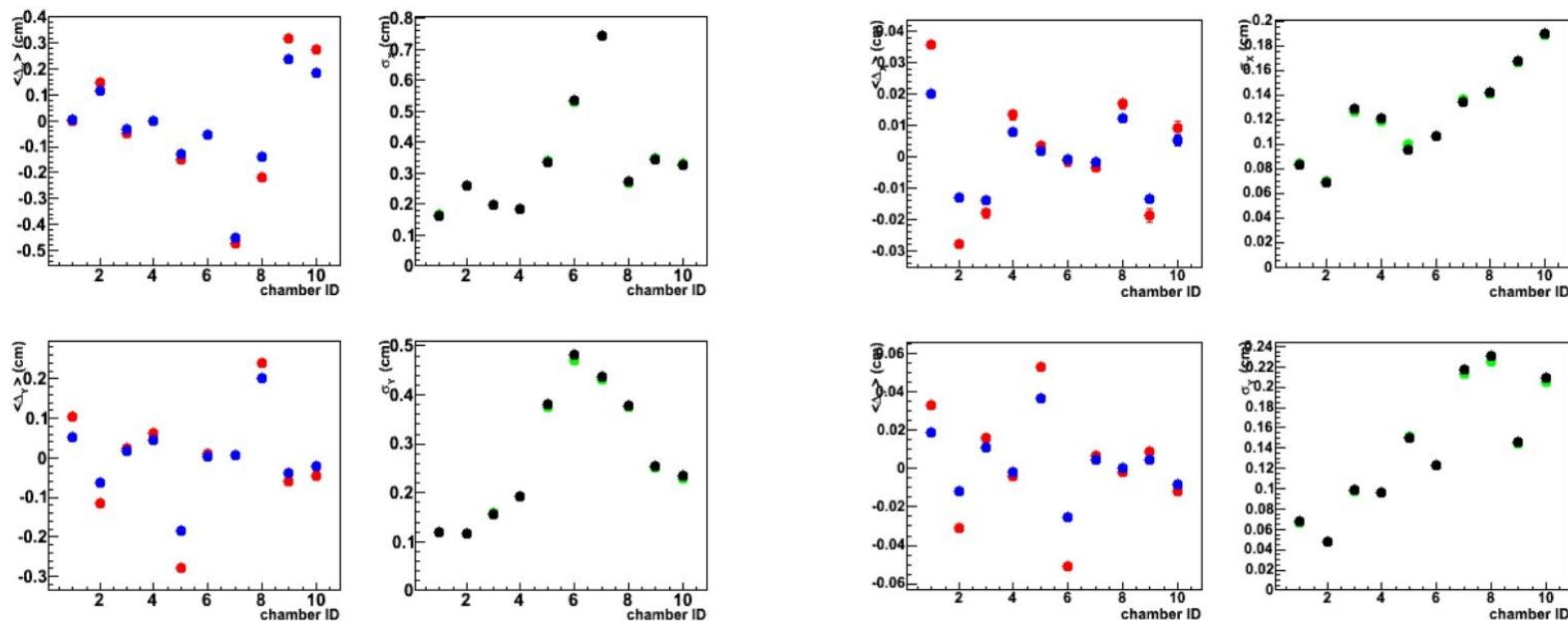
MTR RPC Efficiency (cont.)

- Study of MTR RPC efficiency
 - In addition to the work of Diego, a group has been setup in LPC to work on the MTR RPC efficiency with alternative methods, by using simulations (PDC09, not quite ideal for describing our 7 TeV data) and runs at 7 TeV.
 - This work is in progress...

Detector news: - Alignment

The results from alignment

- The straight tracks alignment done by J. Castillo, IRFU CEA Saclay
- The improvement on the chamber and detection elements resolution (from P. Pillot, SUBATECH presentation on PWG3-MUON meeting)
 - Chamber resolution: before: 5-7 mm => after: 1-2 mm

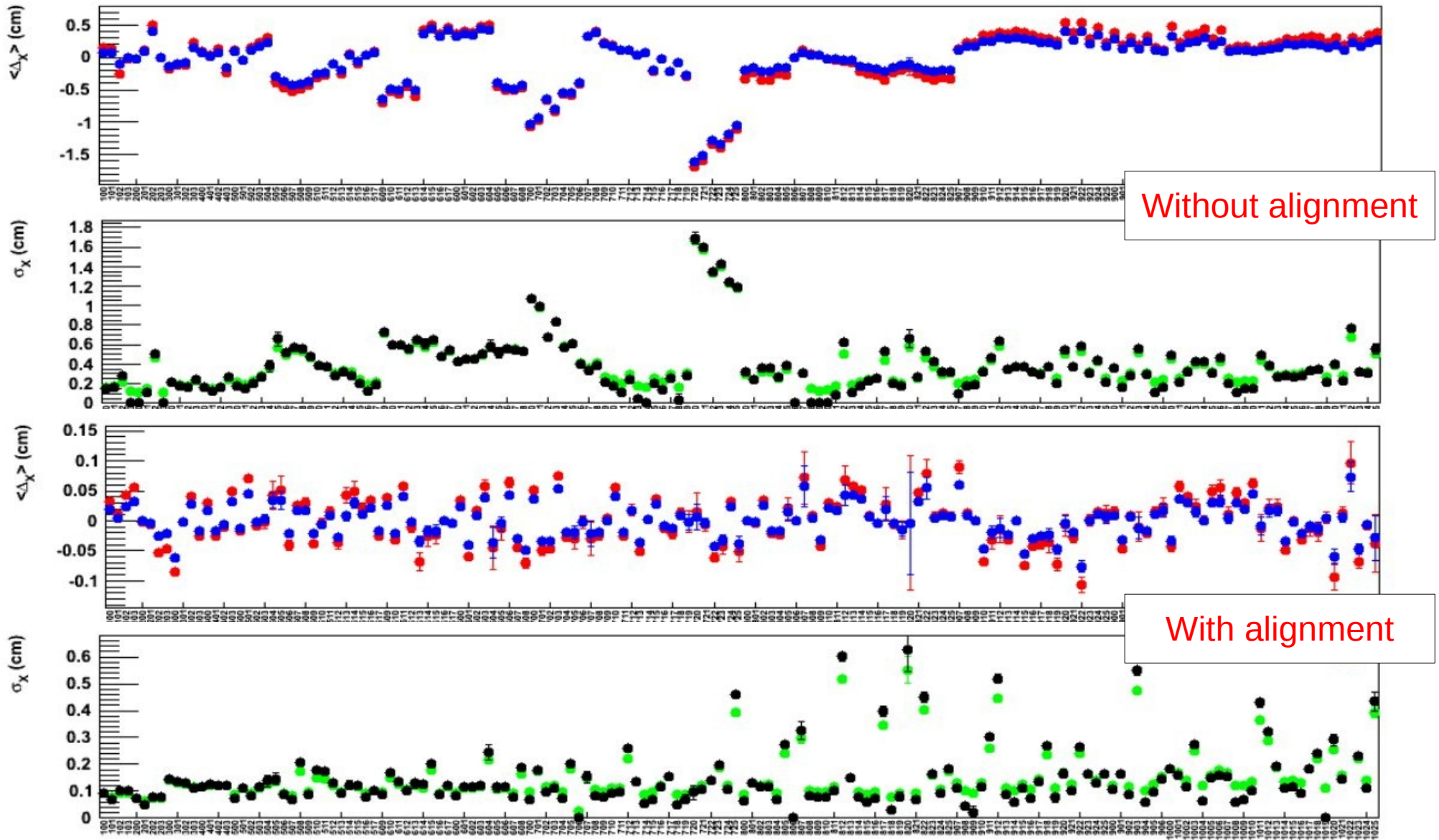


Without alignment

With alignment

The results from alignment (cont.)

- The improvement on the detection elements resolution:



Recent updates in the MUON code



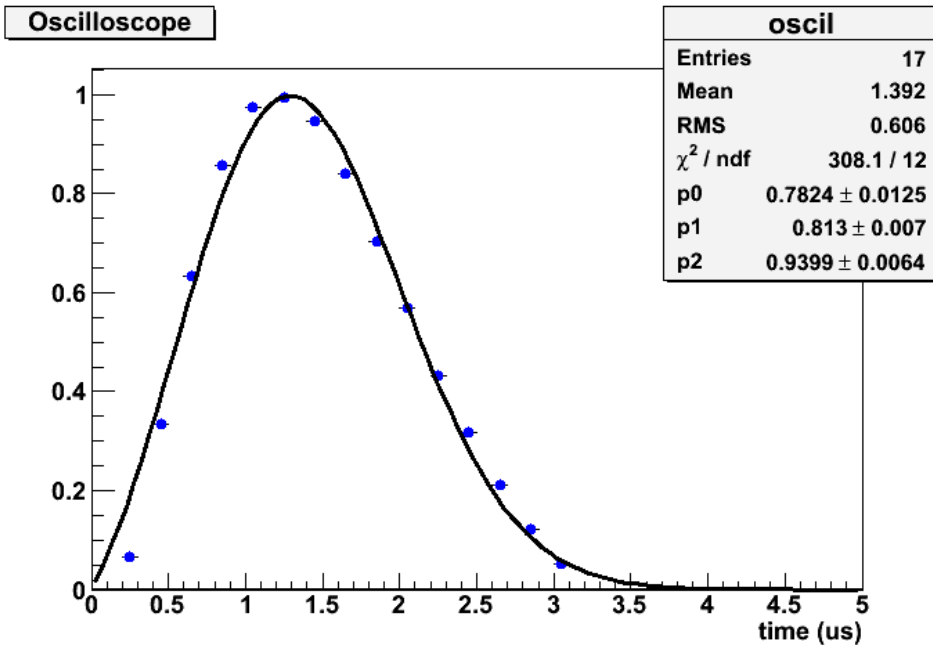
Pileup in the muon spectrometer

By Mercedes López Noriega, IPN Orsay
07/05/2010

Fits to the response function

The charge dependence on time:
Charge = f(t)

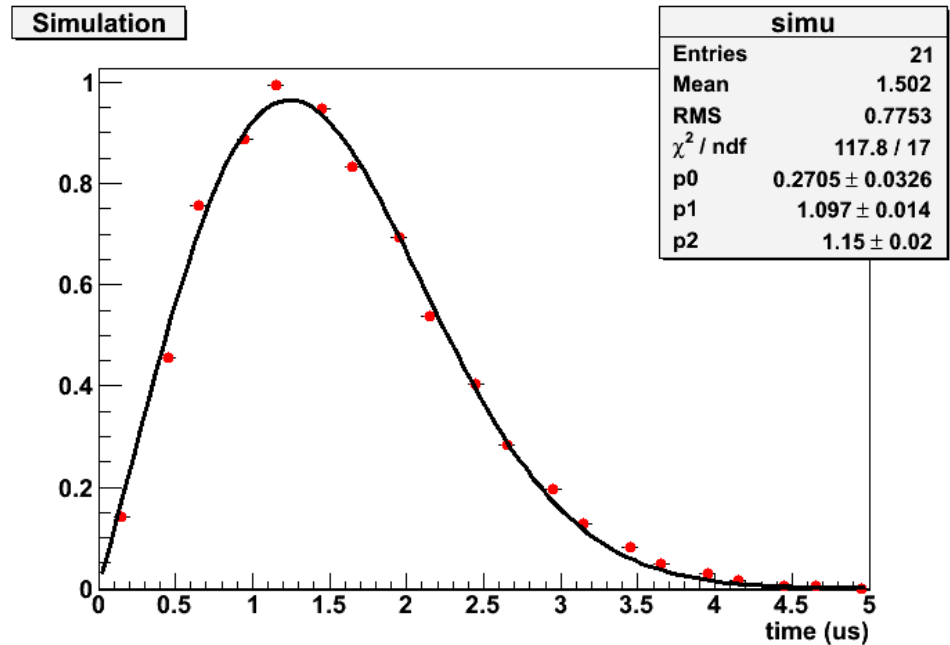
$$f = N \cdot x \cdot e^{-\frac{(x-\mu)^2}{2\sigma^2}}$$



$$\mu = 0.78$$

$$\sigma = 0.81$$

$$\text{max} = 1.29$$

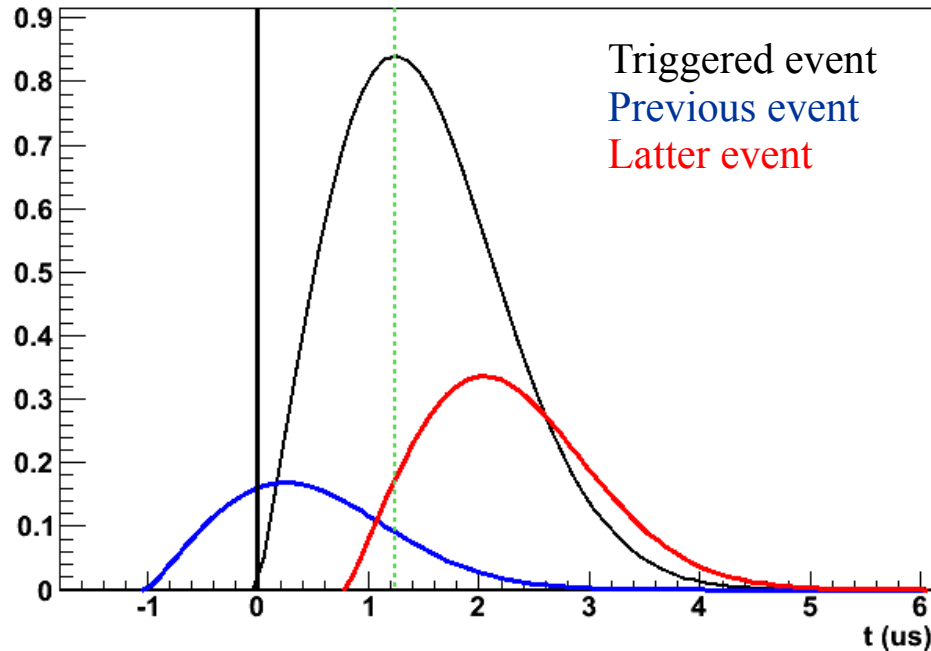


$$\mu = 0.27$$

$$\sigma = 1.1$$

$$\text{max} = 1.24$$

Reduction factor for the charge



- The reduction factor will be applied to the charge of the digits that belong to a track coming from a pileup event within the following time range

$$t = (-3.5, 1.2) \mu\text{s}$$

- All hits produced outside this time range with respect to the hits belonging to the triggered event in a given chamber will not be considered and therefore no digit will be generated for those hits

$$Q_1 = Q_1^{\text{max}} = \text{measured charge}$$

$$Q_2^{\text{max}} \sim B \cdot f(1.24) \quad \left. \begin{array}{l} \\ \\ \end{array} \right\} Q_2 = Q_2^{\text{max}} \frac{f(1.24 + |t_2|)}{f(1.24)}$$

$$Q_2 \sim B \cdot f(1.24 - t_2)$$

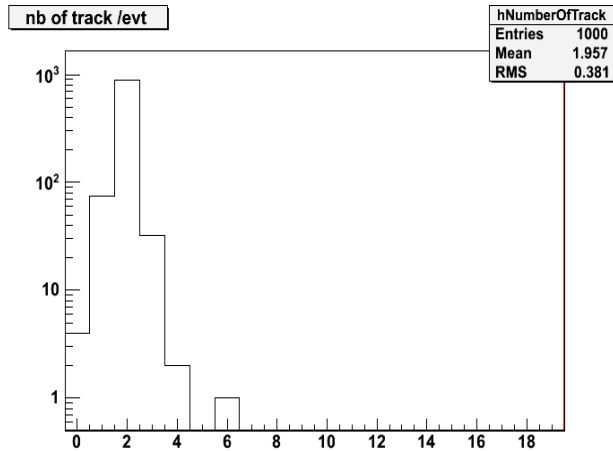
$$Q_3^{\text{max}} \sim C \cdot f(1.24)$$

$$Q_3 = Q_3^{\text{max}} \frac{f(1.24 - |t_3|)}{f(1.24)}$$

$$Q_3 \sim C \cdot f(1.24 - t_3)$$

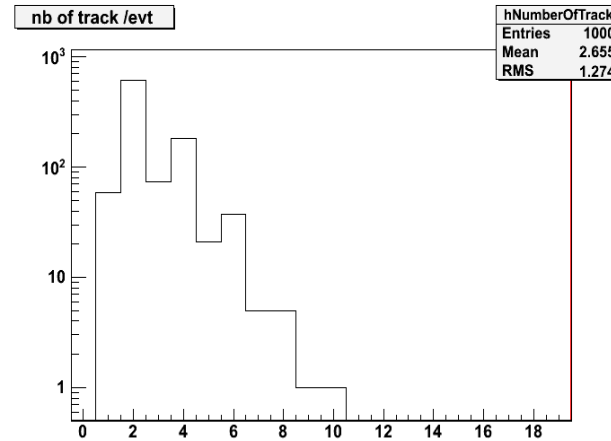
Effects in our results

No pileup



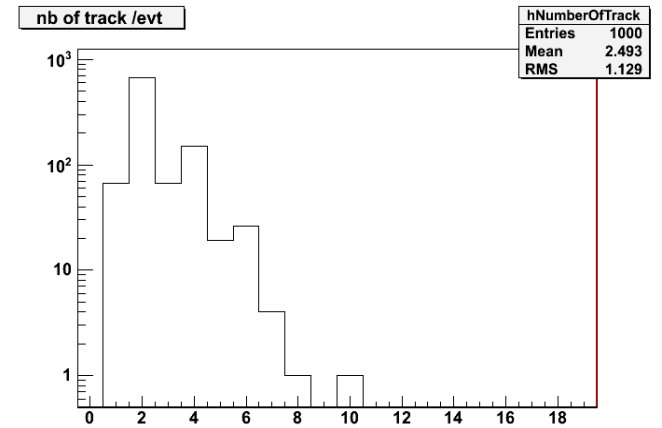
Pileup

No reduction factor applied

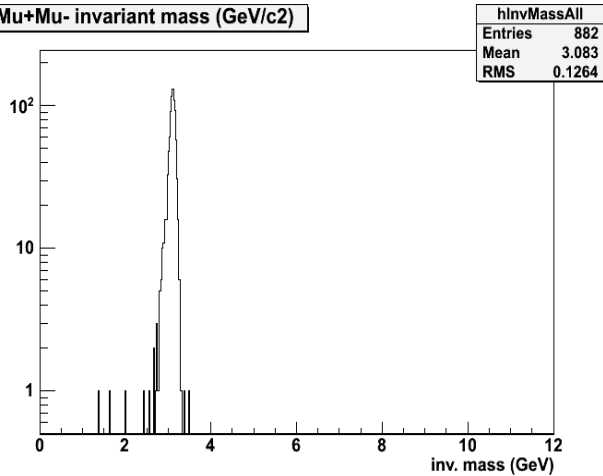


Pileup

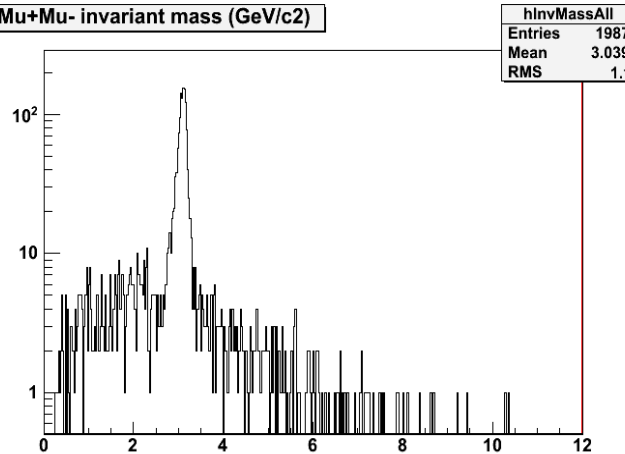
Reduction factor applied



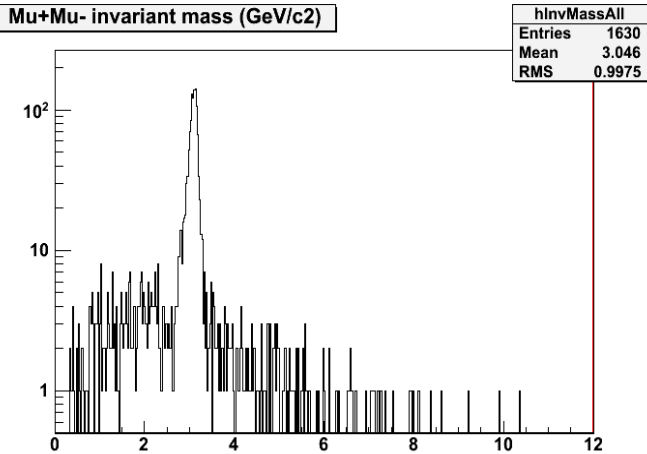
Mu+Mu- invariant mass (GeV/c²)



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Code Committed in SVN trunk on 19 May 2010

Reconstruction

- From P. Pillot, SUBATECH
- Pass 2 reconstruction done with alignment
- Recovering of part of the zero field data whose raw file was corrupted.
 - Modifications committed in trunk rev 41336.
- Tuning of the recoParam based on the aligned pass2 data is in progress
 - In p-p this tuning is not expected to change much the performances of the reconstruction.

Update in trigger chamber efficiency calculation

From D. Stocco, SUBATECH, F. Bossu, INFN Torino

- Clean-up of the OCDB object:
 - Its class (AliMUONTriggerEfficiencyCells) now contains only the basic functions to access the data members.
 - All the additional methods to handle the efficiency in simulations are moved to another class (AliMUONTriggerChamberEfficiency)

Improvements in simulations

- Old implementation: efficiency of bending and non-bending plane of the same chamber calculated independently (following the trigger algorithm)
- New implementation: added histograms allowing to account for correlations. This allows to better reproduce data:

Fraction of events with/without a hit in a bending/non-bending plane:



Backup Slides

MTR Pt-cut LUT

- The RPC efficiency (definition)

Left:

- Black: all tracks
- Red: tracks which have passed the higher cut (1.0 GeV/c)

Right:

- The ratio of the two spectra

