Code Development for RPC Performance Measurement
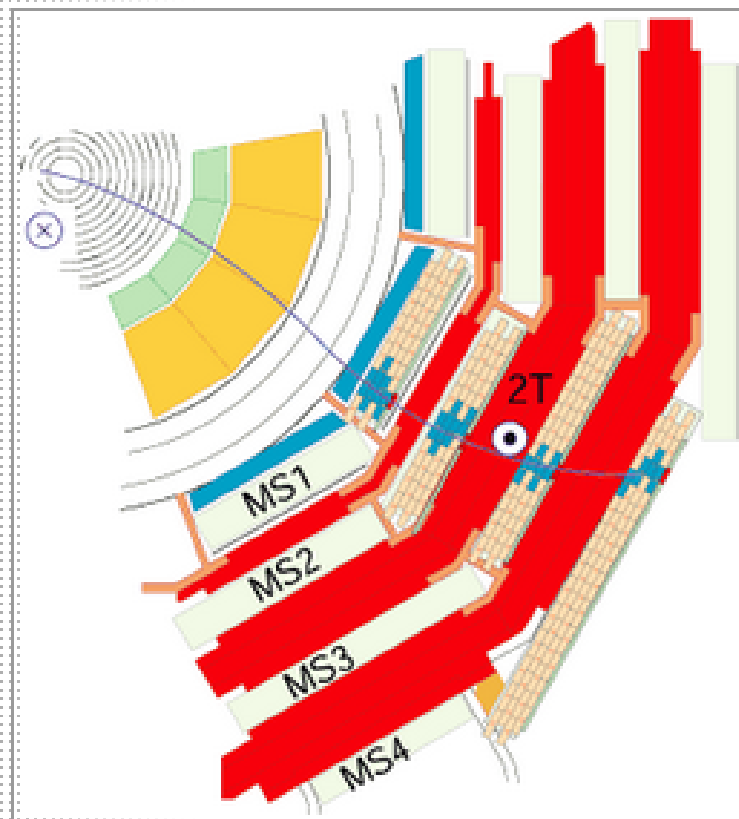
YoungKwon Jo

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- Summary

Muon System

In total there are 1400 muon chambers: 250 drift tubes (DTs) and 540 cathode strip chambers (CSCs) track the particles' positions and provide a trigger, while 610 resistive plate chambers (RPCs) form a redundant trigger system, which quickly decides to keep the acquired muon data or not. Because of the many layers of detector and different specialities of each type, the system is naturally robust and able to filter out background noise.

DTs and RPCs are arranged in concentric cylinders around the beam line ("the barrel region") whilst CSCs and RPCs, make up the "endcaps" disks that cover the ends of the barrel.
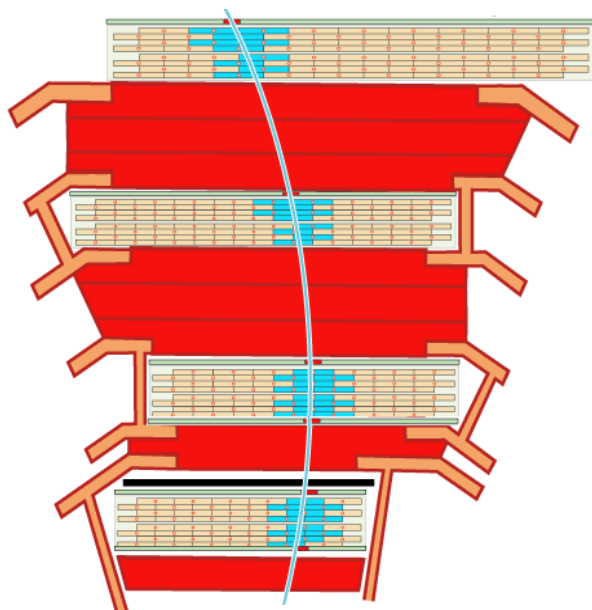
http://cms.web.cern.ch/cms/Detector/Muons/index.html

RPC Commissioning

▸ It has check RPC status about gas, high voltages, temperature, current, trigger-rate and etc. at P5.

▸ There are also analysis data for RPC status reports about efficiency, resolution(residual), Bunch Crossing, Cluster Size, Noise and etc at CAF.
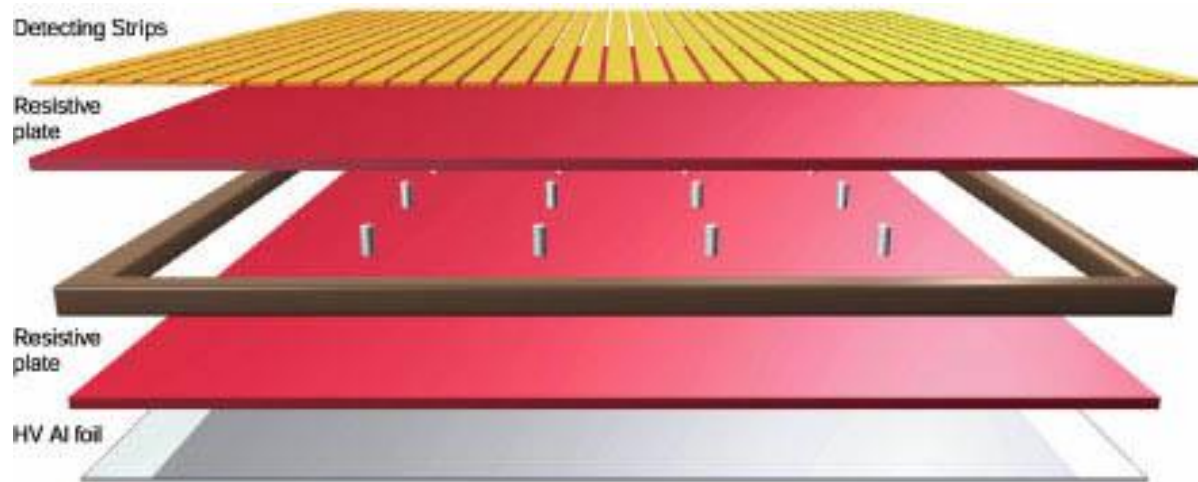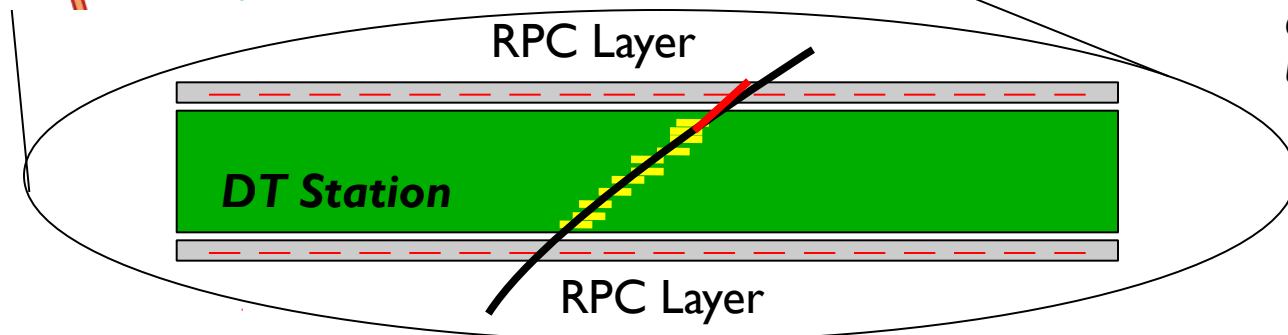
The STA extrapolation method

The method propagates the Stand Alone Muon tracks through the RPC planes.

For each layer the measurement corresponding to the closest DT or CSC RecHit with respect the center of the Roll is considered.

A measurement is defined as an object which contains both the fit position estimation and the propagation direction.

Then the stepping helix propagator is used to extrapolate on the RPC surface following up the magnetic field.

RPC Layer

DT Station

RPC Layer

CMS RPC group, 09 September 2009
RPC Analysis group, 02 Sept 2009

This page is Raffaello Trentadue's presentation

The STA extrapolation method
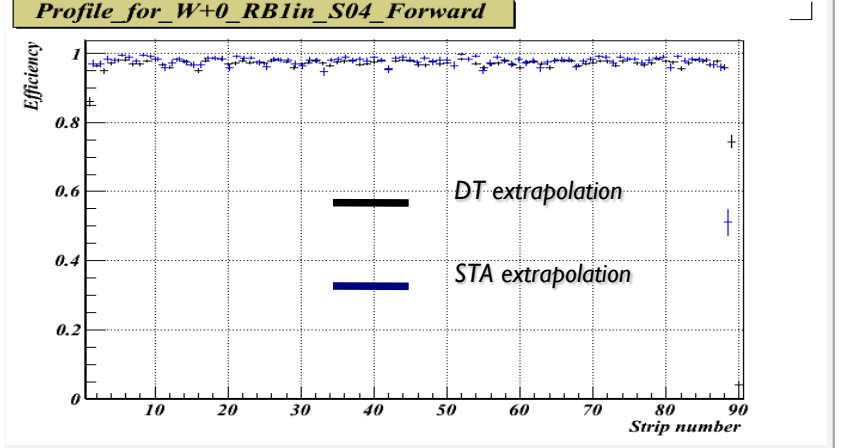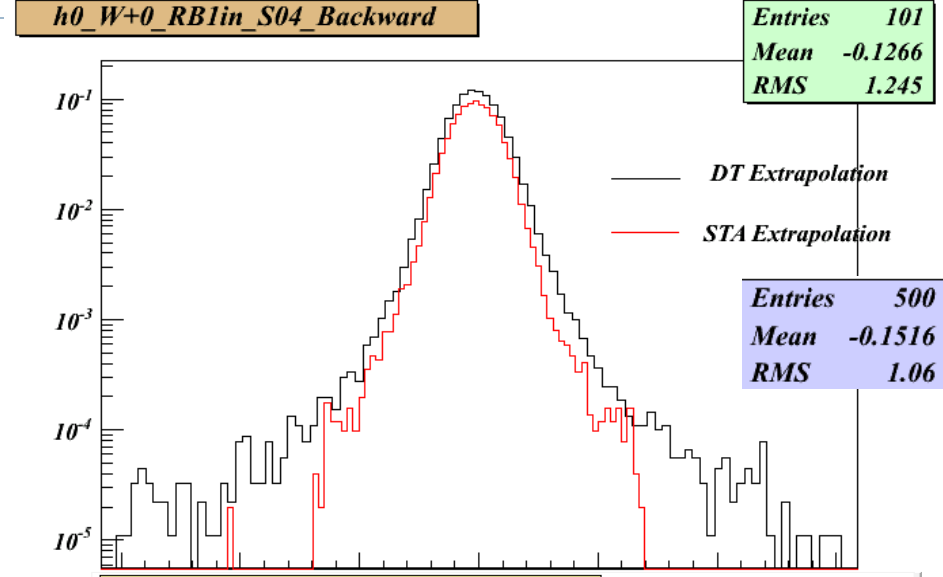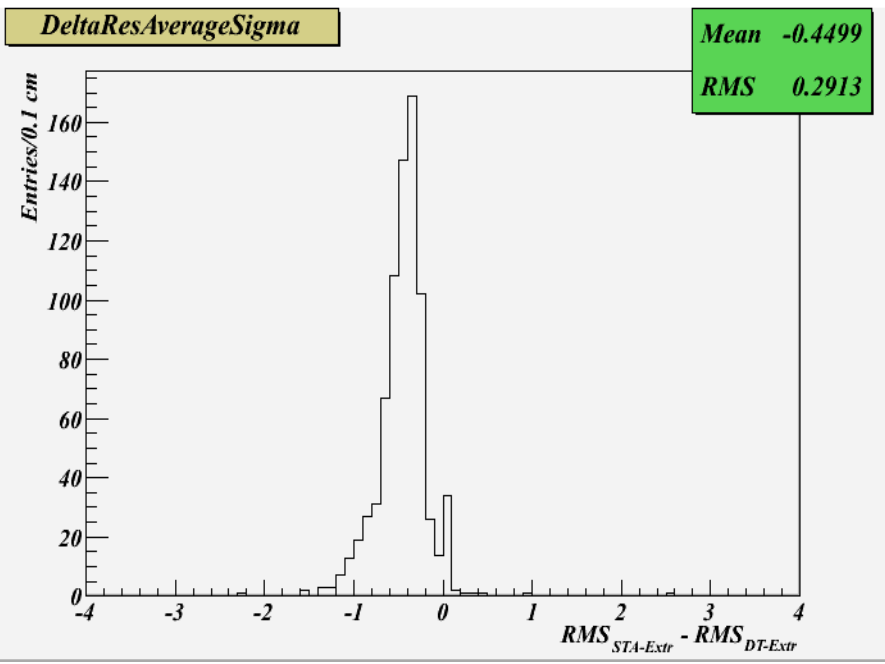
The residuals distributions for the STA method have a RMS lower than DT Extrapolation one.
The precision of the extrapolation is higher. The method is not affected by the poor quality of segments.

This page is Raffaello Trentadue's presentation

Development the code TrajectoryRPCEff

- TrajecotryRPCEff is a CMS.EDAnalyzer using STA extrapolation method.

- We has analysised Craft09-Data by it.

- DataSet: /Cosmics/CRAFT09-PromptReco-v*/RECO

- You can see analysis-result the web.
  - http://higgs.skku.ac.kr/CMS/result id: rpc-com, pw:RB04RB13

```
Have a run:
cmsrel CMSSW_3_1_1
cd CMSSW_3_1_1/src/
cvs co -r V01-02-01 TrackingTools/TrackRefitter
cvs co -r HEAD UserCode/youngjo/sccosmic/CosmicAnalyzer/test
cd UserCode/youngjo
mv sccosmic ../../
cd ../../
scram b
cd sccosmic/CosmicAnalyzer/test/
cmsenv
cmsRun trajectoryRPCeff_cfg.py
```

Result-01 Track(cosmicMuons)
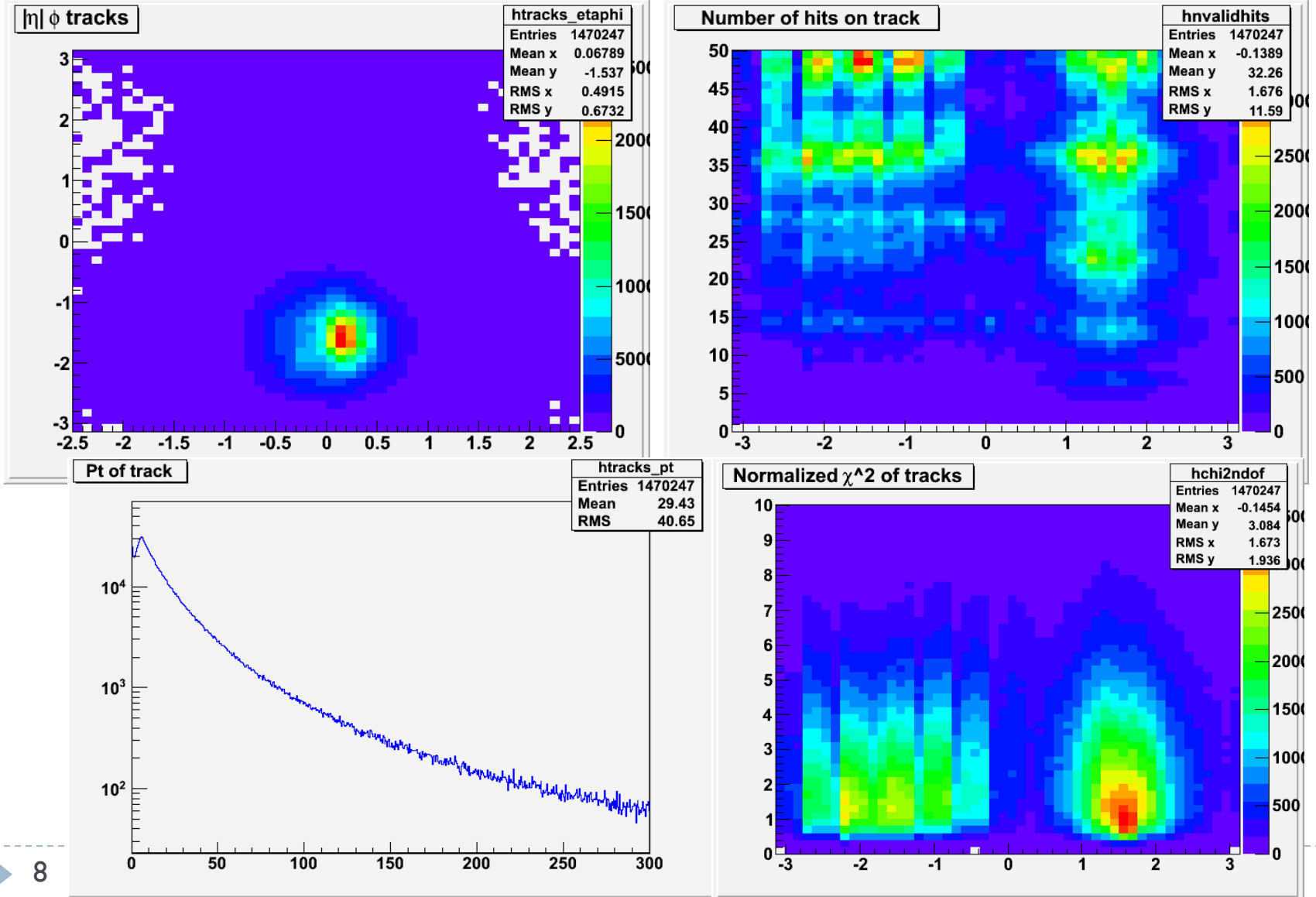
Result-02 Reco hits(muon systems)
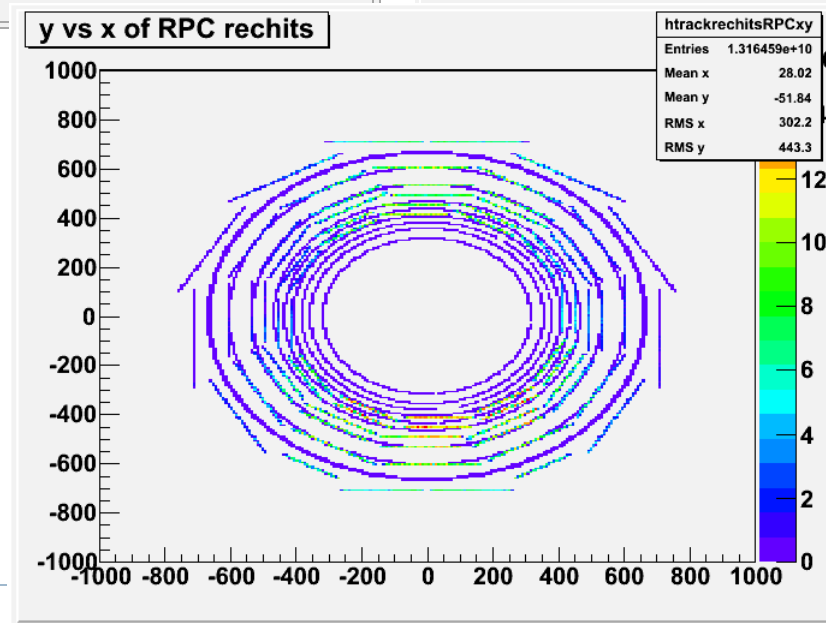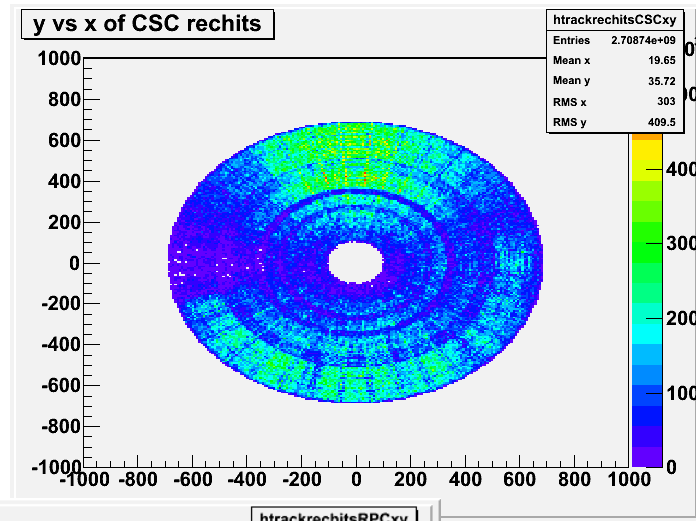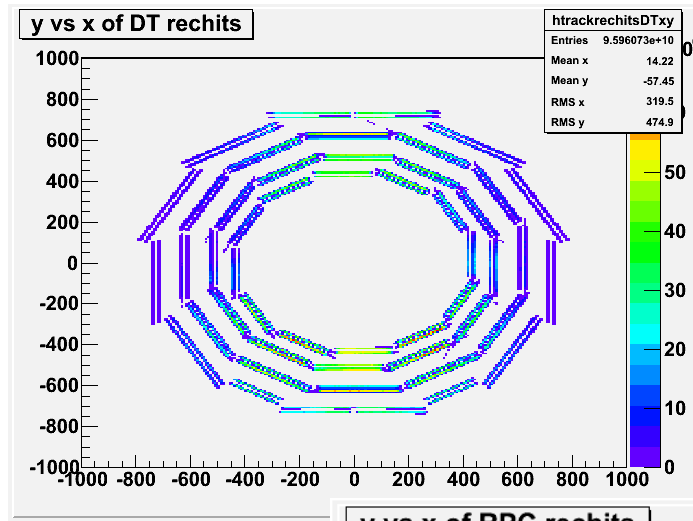
Result-03 at a roll of RPC

W-2_RB2in_S04_Backward
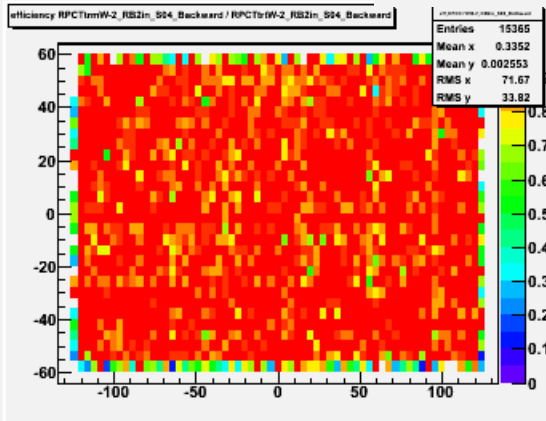
local position efficiency
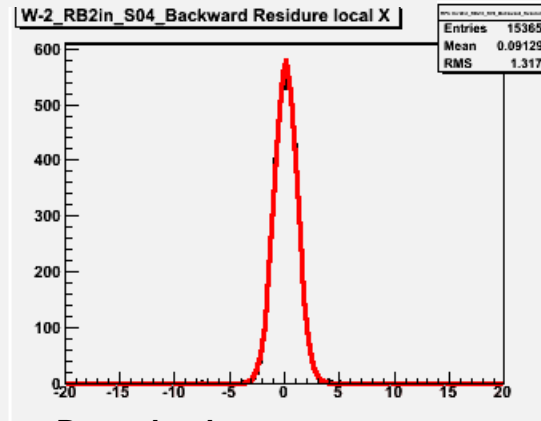
Residual
(distance with trajectory and real-hit)
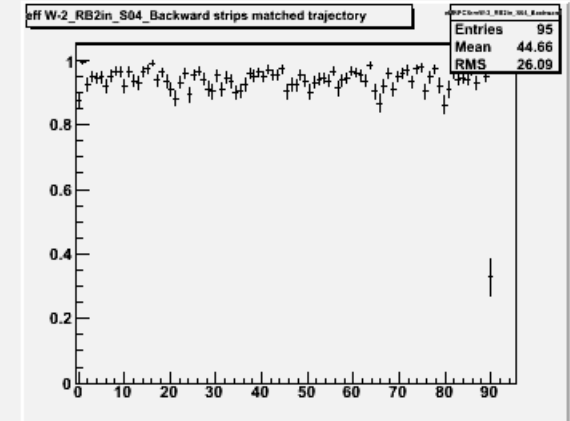
Strip by strip efficiency
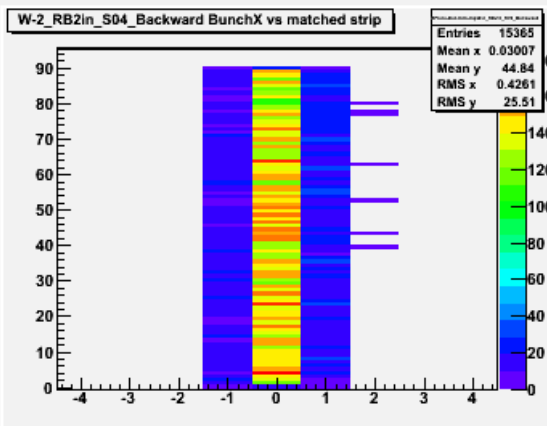
Matched strip Bunch Crossing
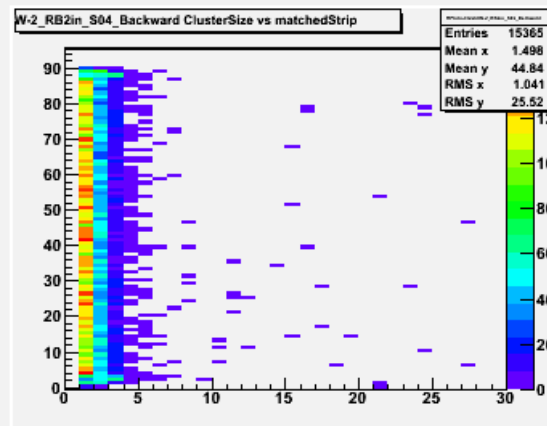
Matched strip Cluster Size

RPC strip Real hit

10
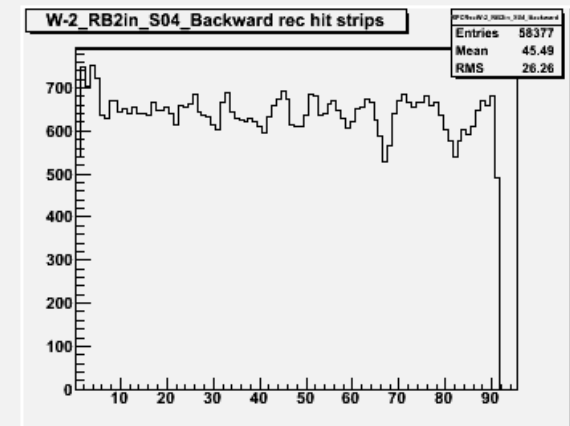
Result-04 a barrel part of RPC

Efficiency(%), Dead-strips & Residuals(cm) of Wheel -2 far
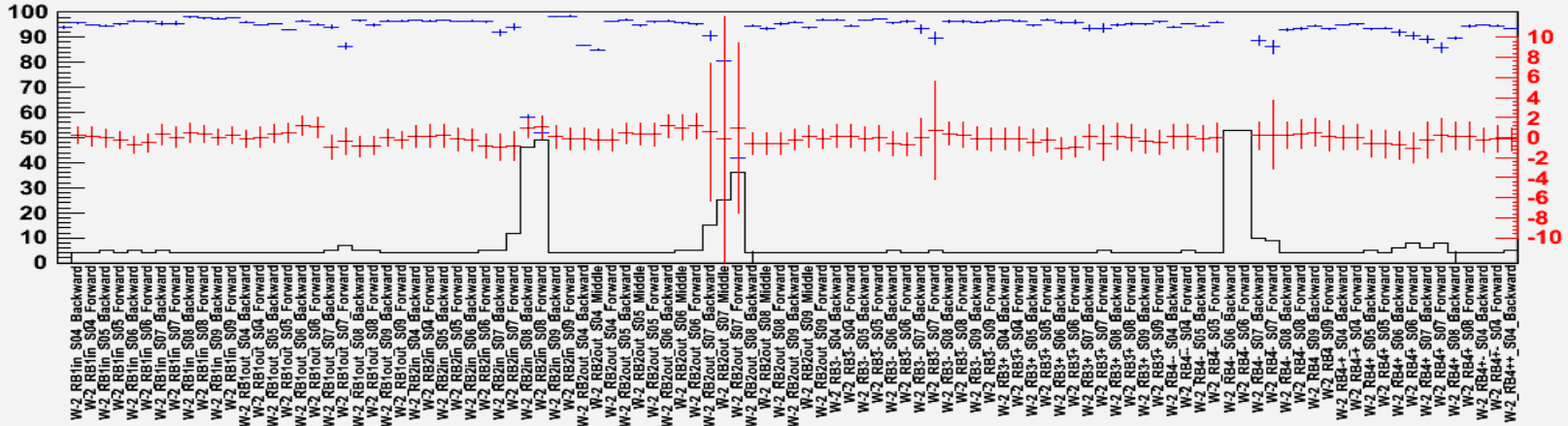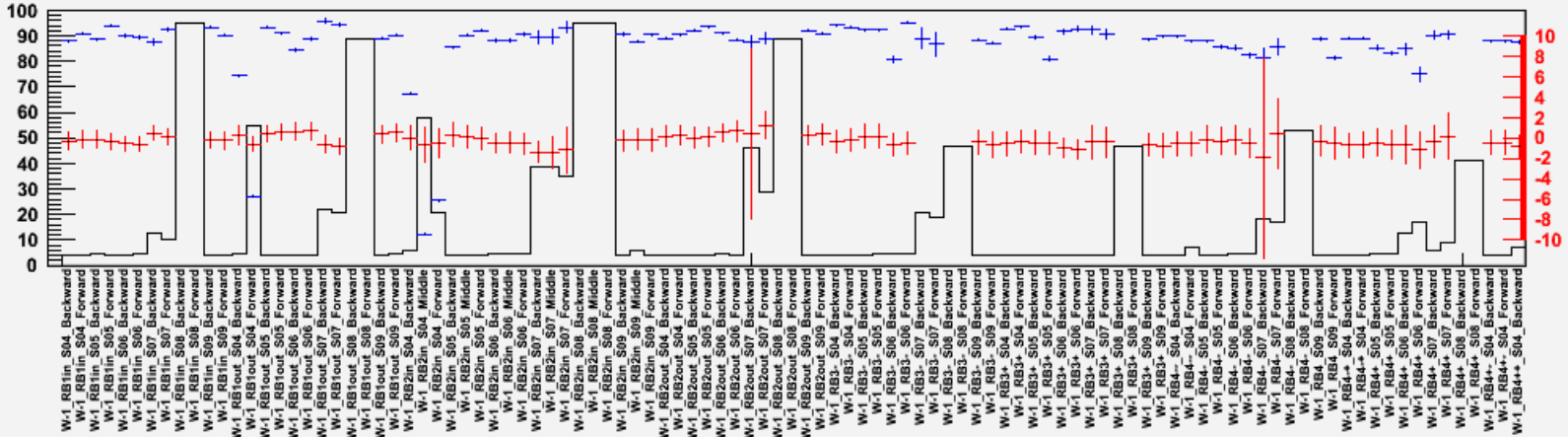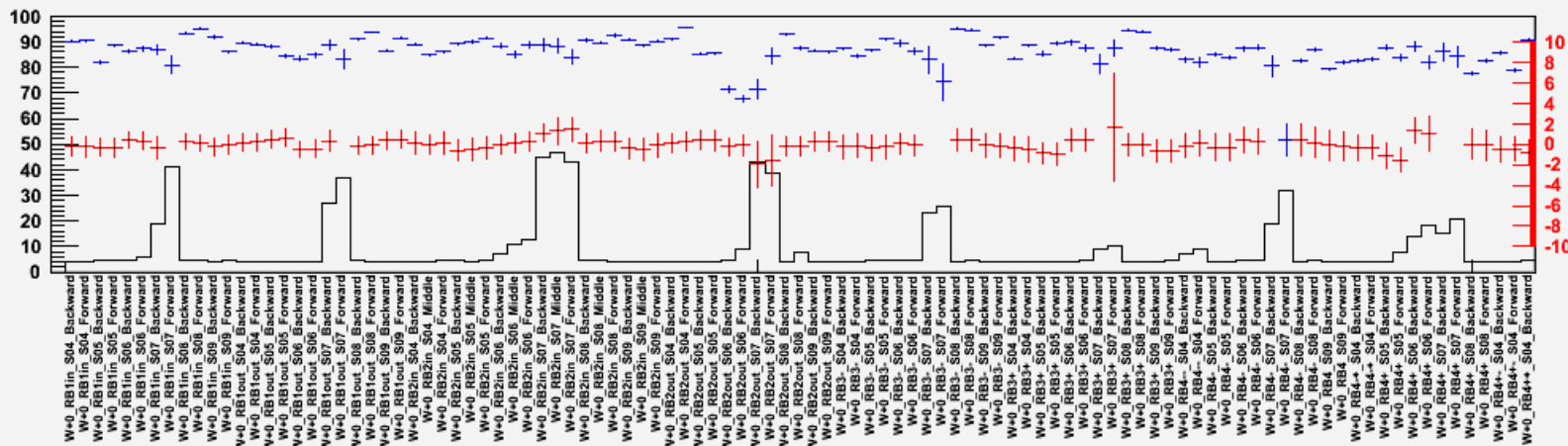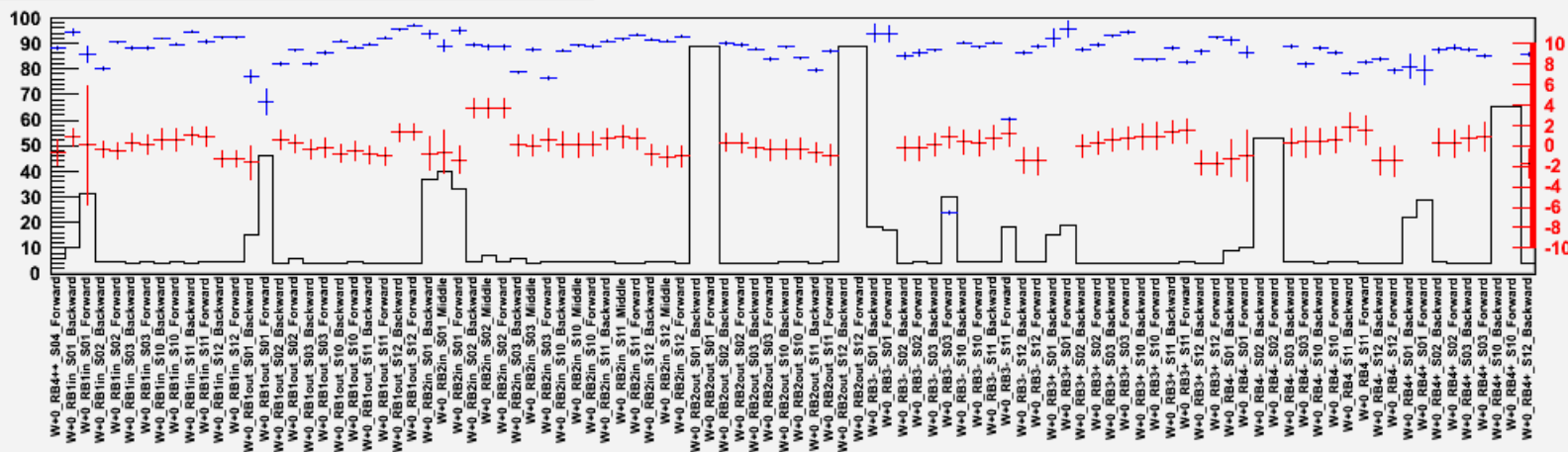
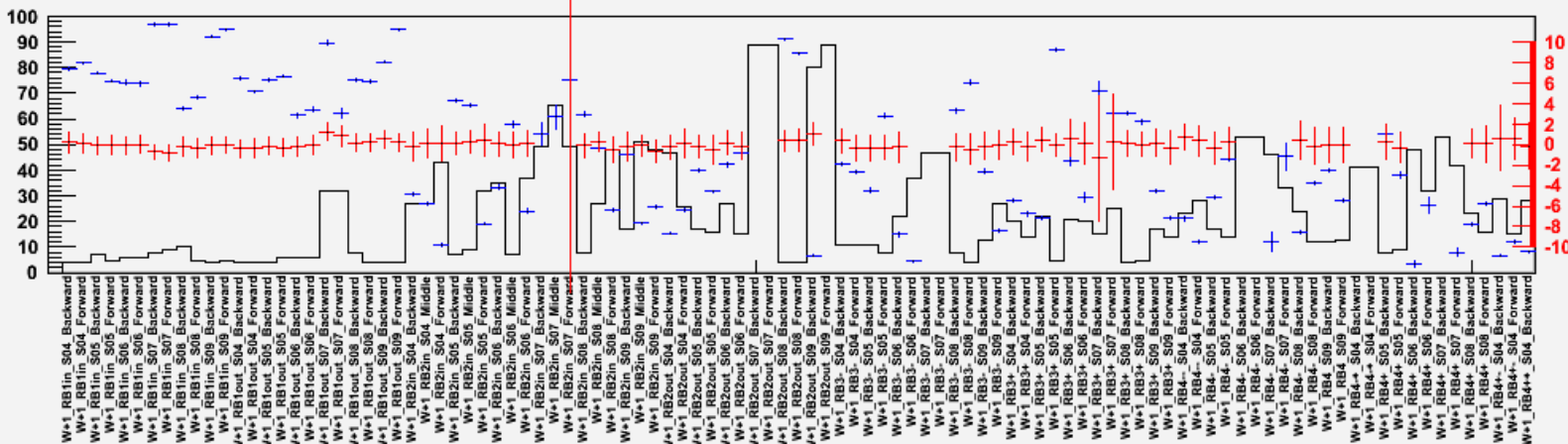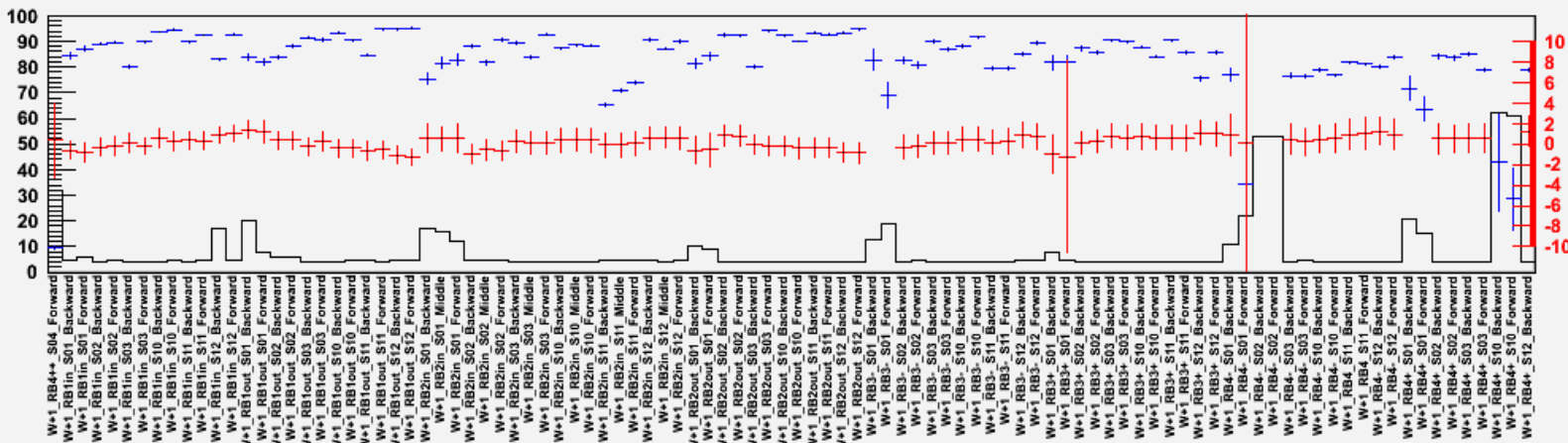Efficiency(%), Dead-strips & Residuals(cm) of Wheel -2 near
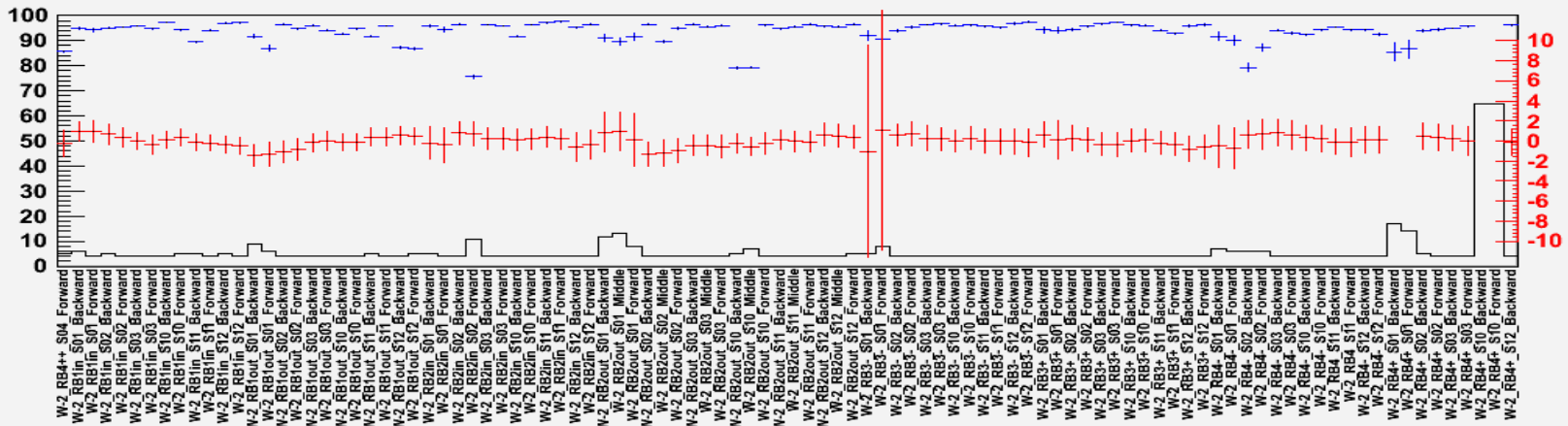
Result-05 a EndCaps part of RPC
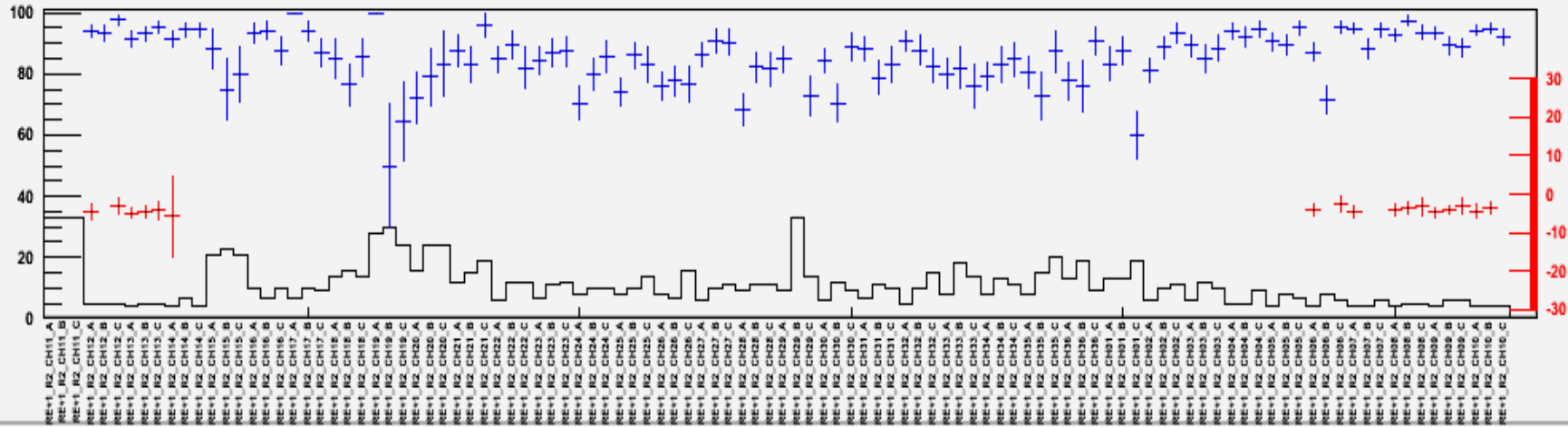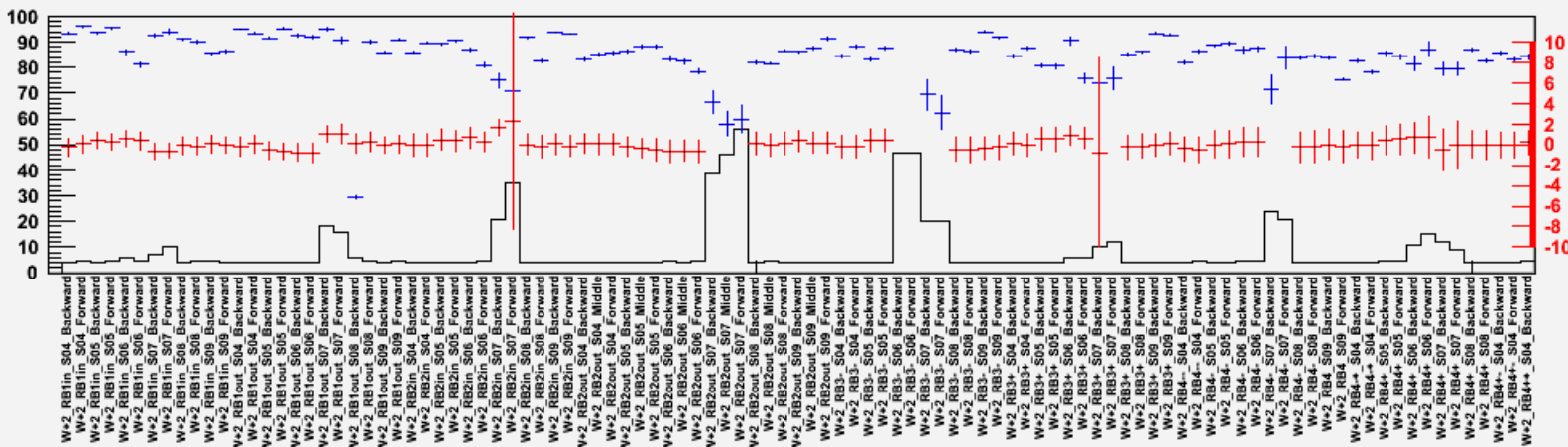
Summary

▸ We has developed and upgraded algorithm of STA extrapolation method. There are added it in the Prompt Analysis Toolkit for RPC CAF Analysis.

- http://cmssw.cvs.cern.ch/cgi-bin/cmssw.cgi/UserCode/trentad/NewGUI/

▸ We can check also RPC efficiency and residuals and Bunch Crossing, Cluster Size and etc. by code TrajectoryRPCEff. But I would be upgraded EndCaps part of RPC, not completed now.

Back up

Efficiency(%), Dead-strips & Residuals(cm) of Wheel -2 far
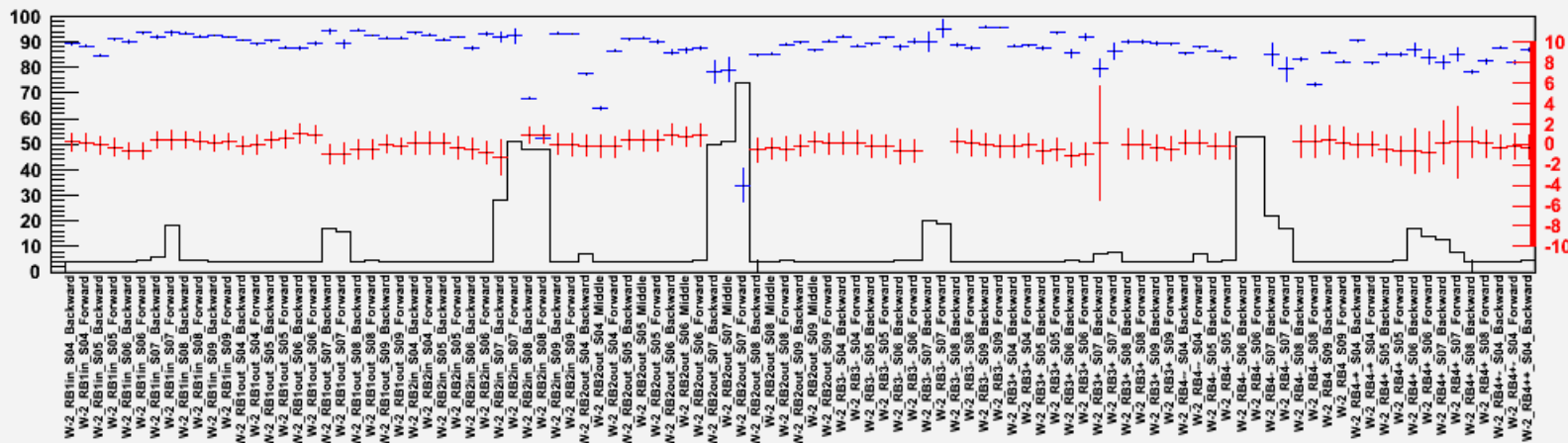
Efficiency(%), Dead-strips & Residuals(cm) of Wheel -2 near
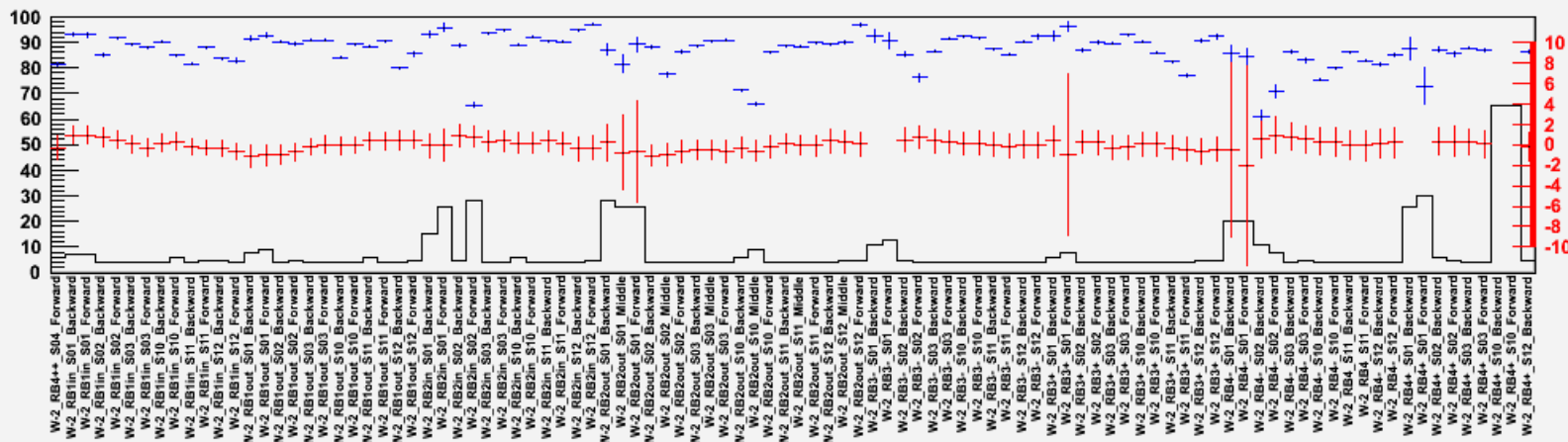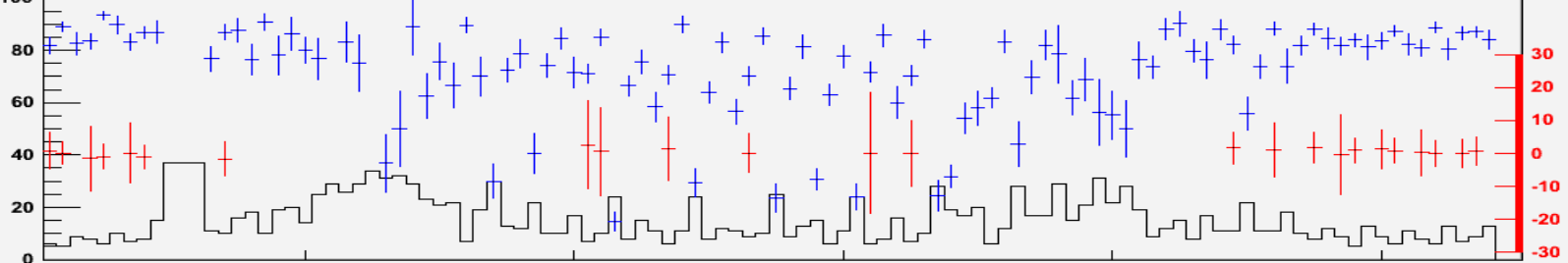
Efficiency(%), Dead-strips & Residuals(cm) of Wheel -1 far
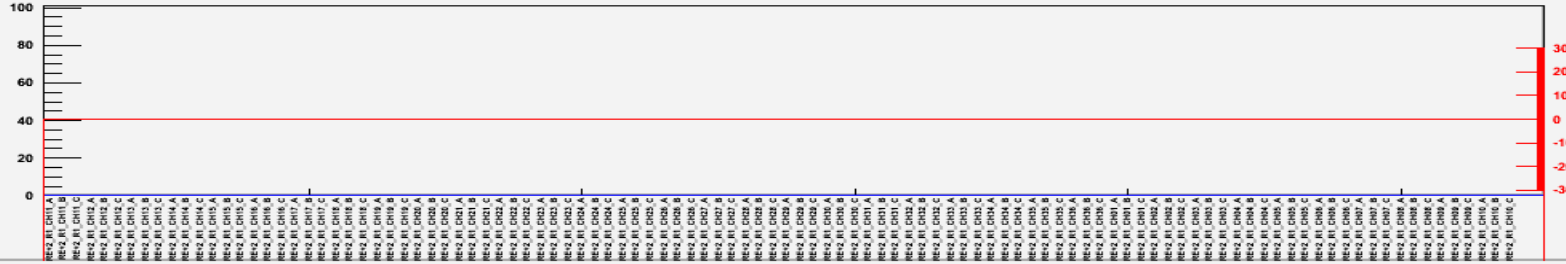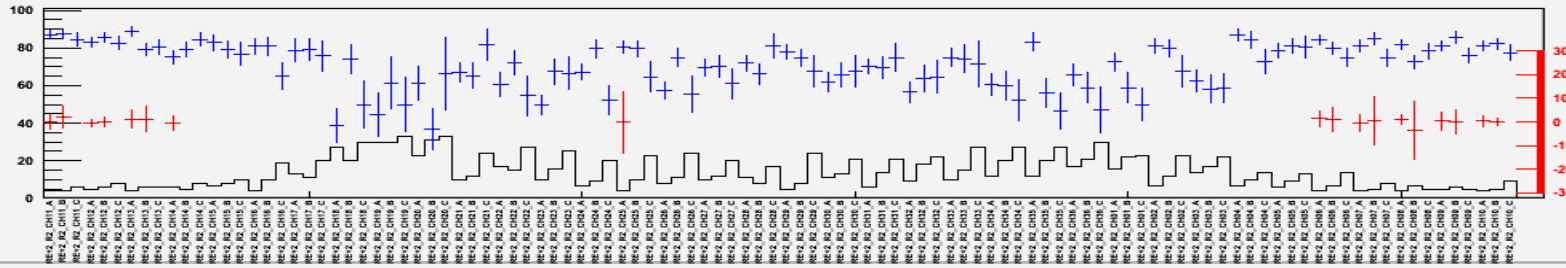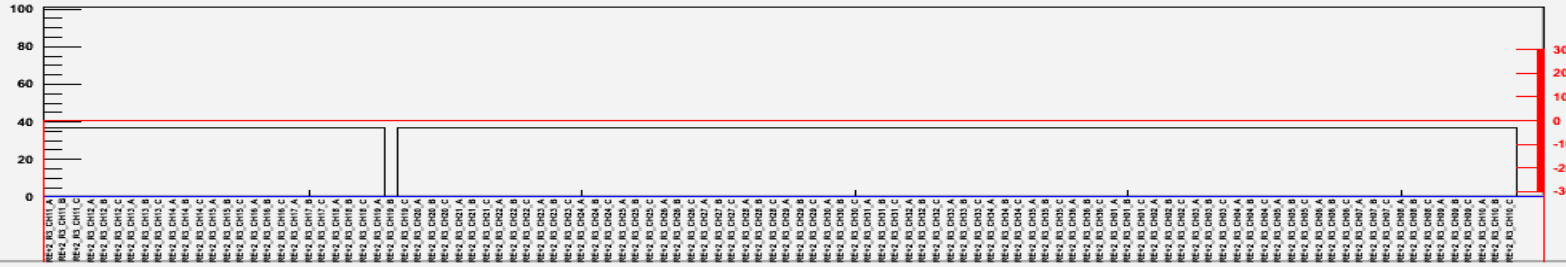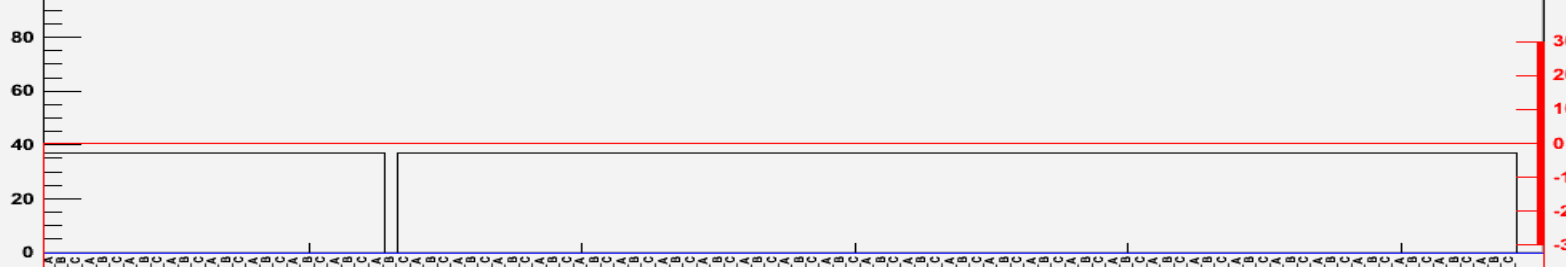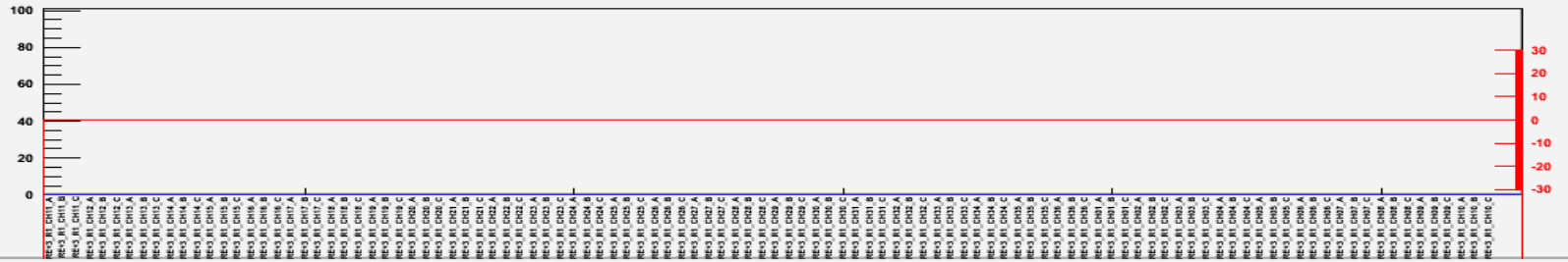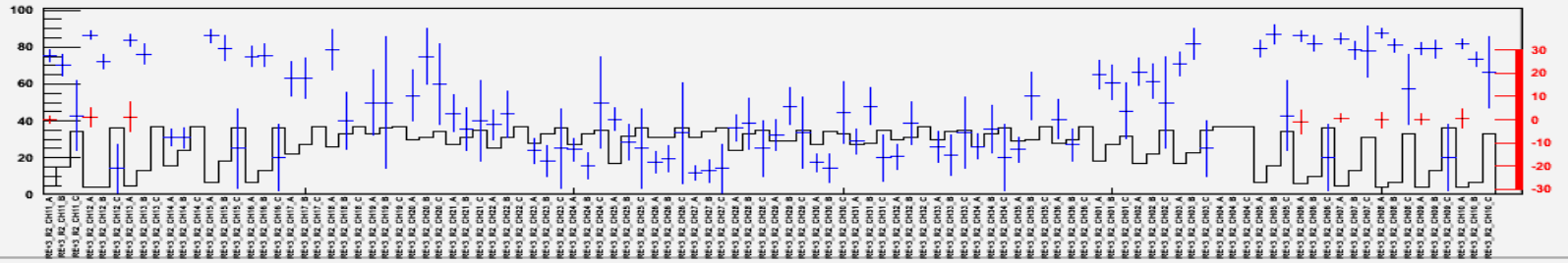
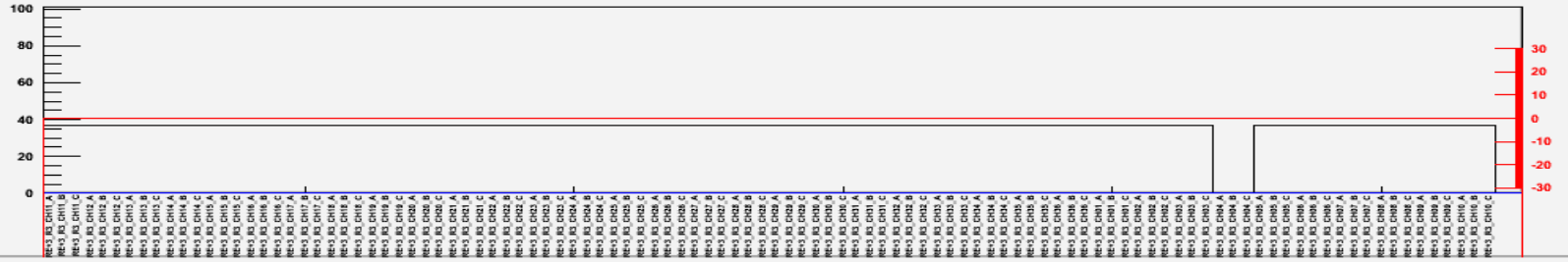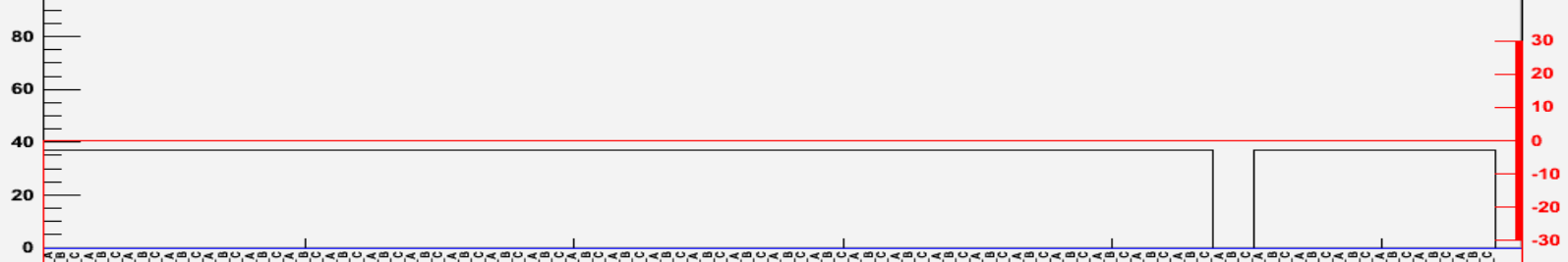Efficiency(%), Dead-strips & Residuals(cm) of Wheel -1 near
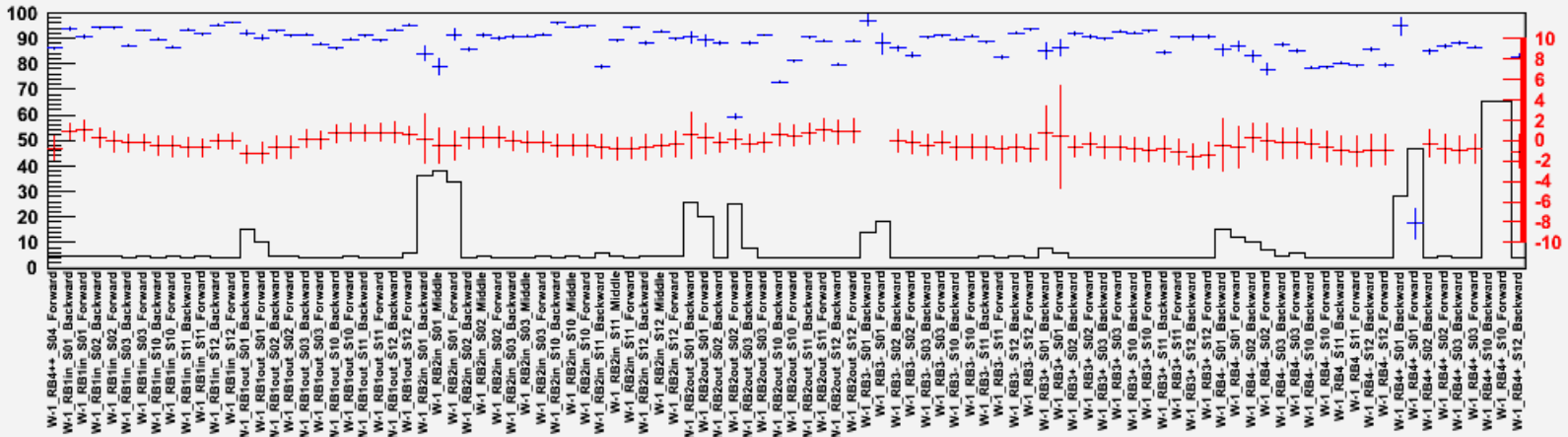
Efficiency(%), Dead-strips & Residuals(cm) of Wheel 0 far

Efficiency(%), Dead-strips & Residuals(cm) of Wheel 0 near

Efficiency(%), Dead-strips & Residuals(cm) of Wheel 1 far

Efficiency(%), Dead-strips & Residuals(cm) of Wheel 1 near

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Efficiency(%), Dead-strips & Residuals(cm) of Wheel 2 far

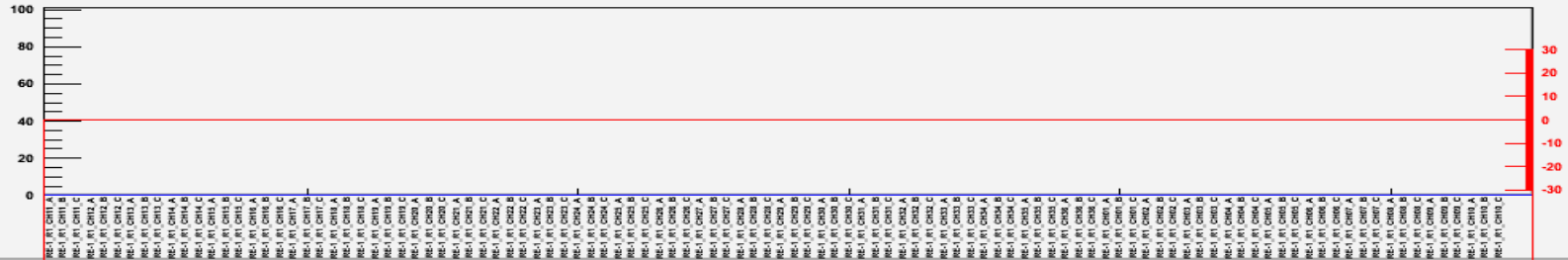Efficiency(%), Dead-strips & Residuals(cm) of Wheel 2 near

Run. 112397
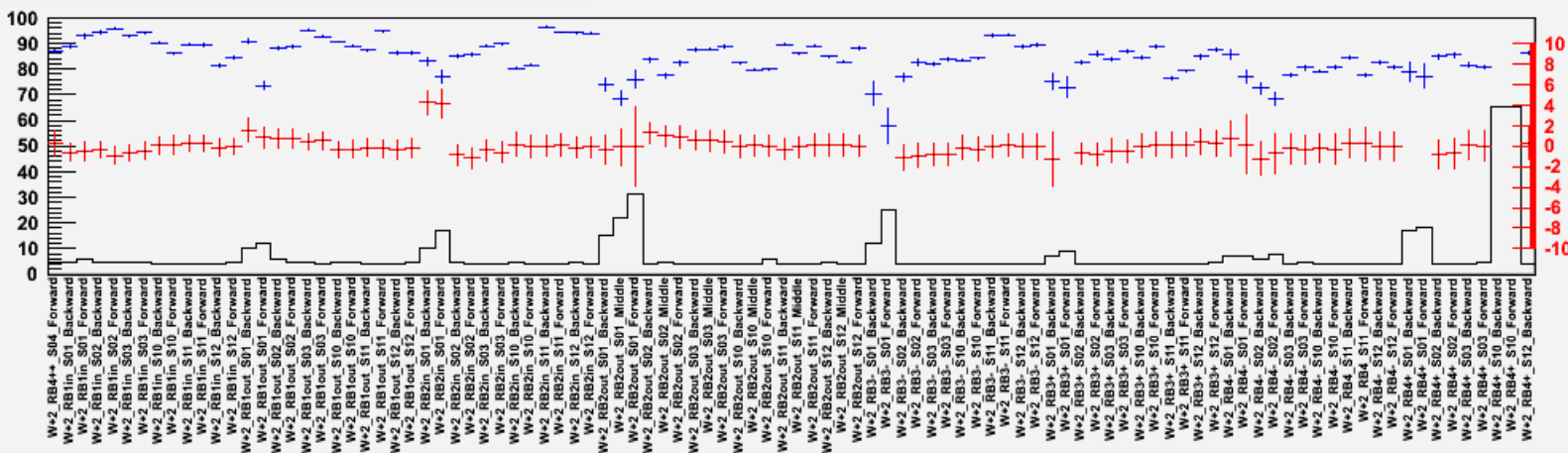
efficiency(%), dead strips & residuals(cm) of RE+1R1
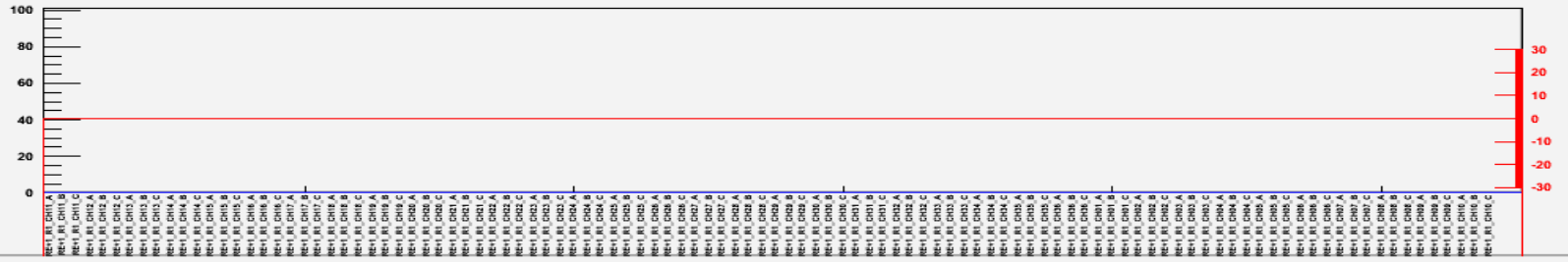
efficiency(%), dead strips & residuals(cm) of RE+1R2
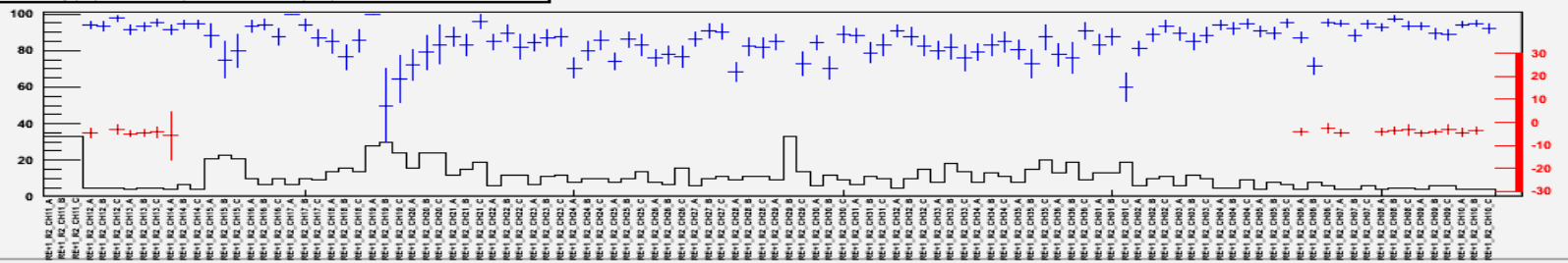
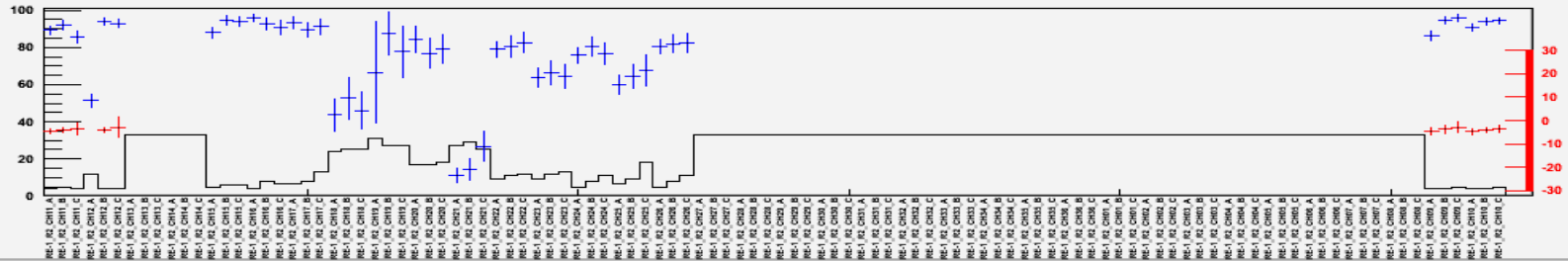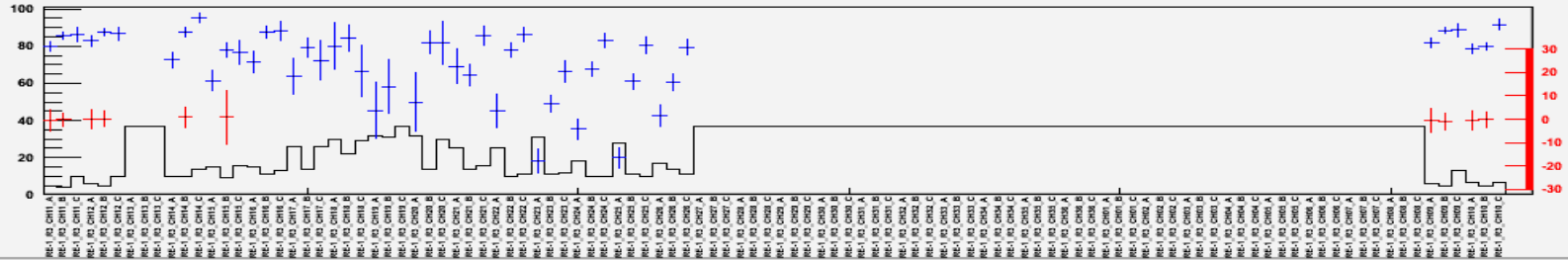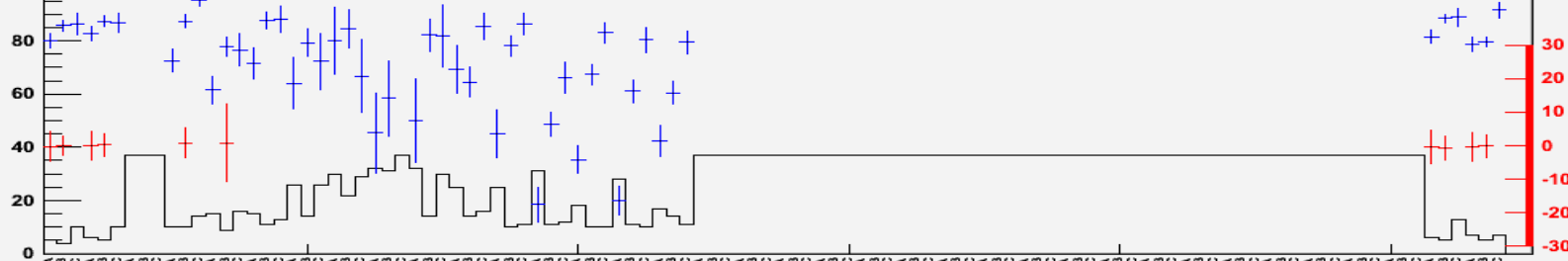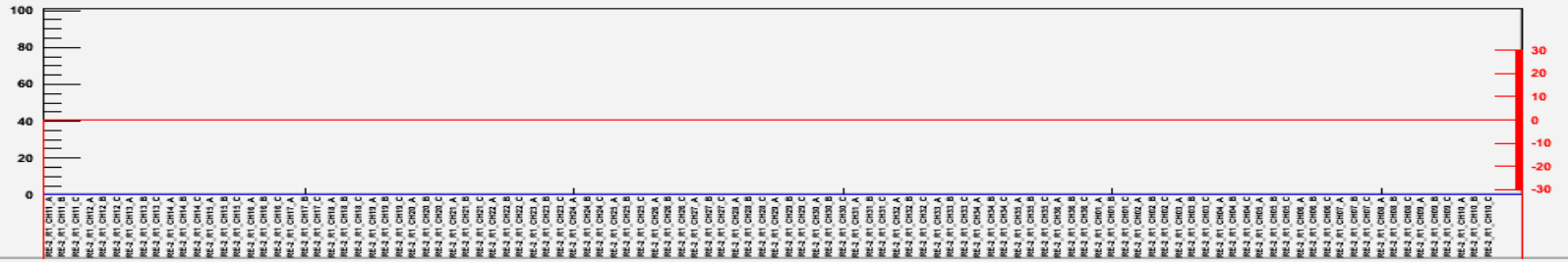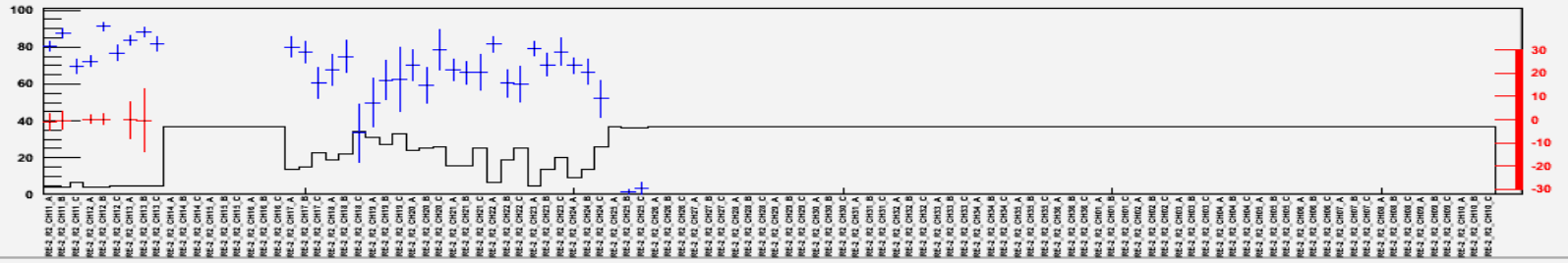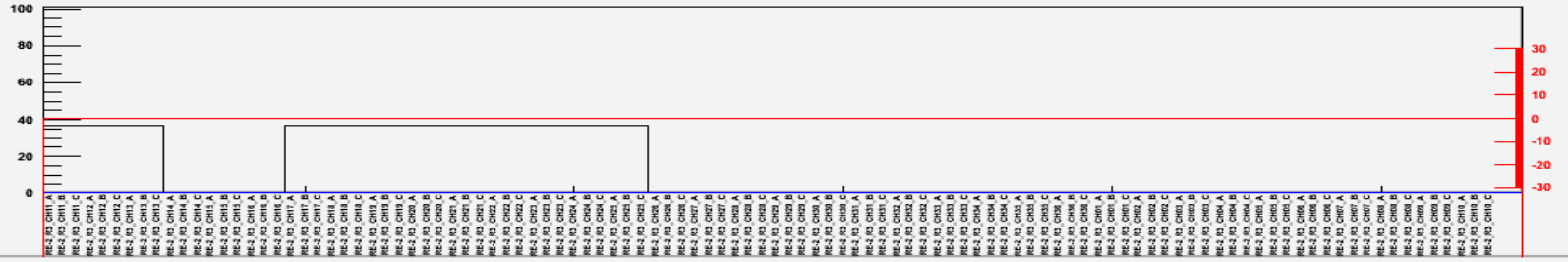efficiency(%), dead strips & residuals(cm) of RE+1R3

Run. 112397

efficiency(%), dead strips & residuals(cm) of RE+3R1

efficiency(%), dead strips & residuals(cm) of RE+3R2

efficiency(%), dead strips & residuals(cm) of RE+3R3
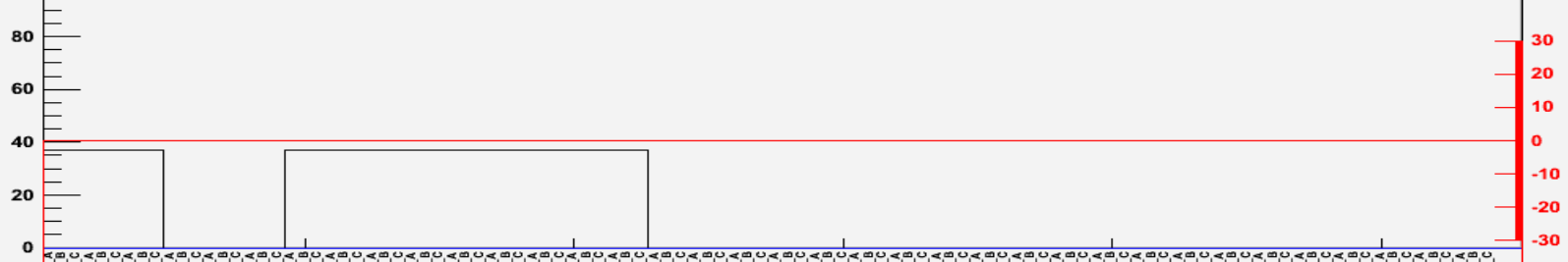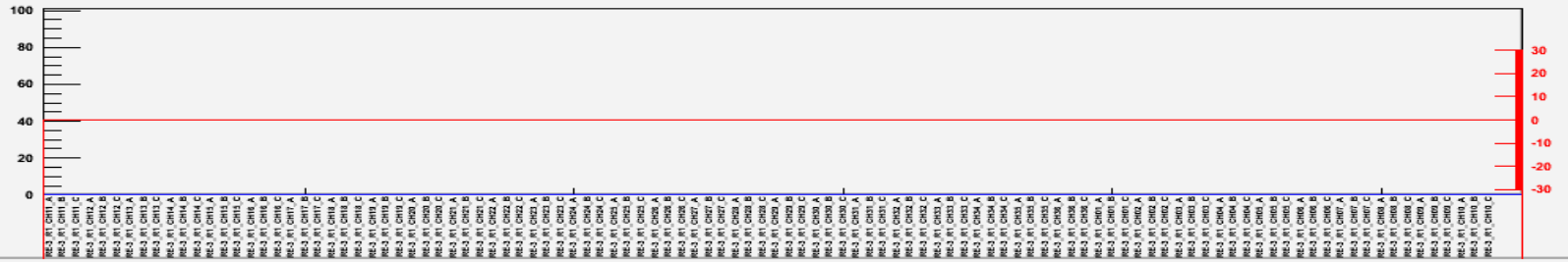
Run. 112397
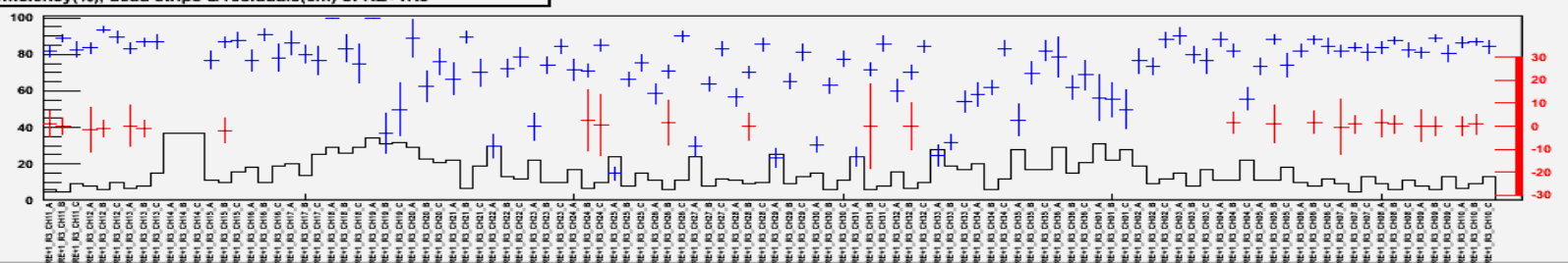
efficiency(%), dead strips & residuals(cm) of RE-2R1

efficiency(%), dead strips & residuals(cm) of RE-2R2

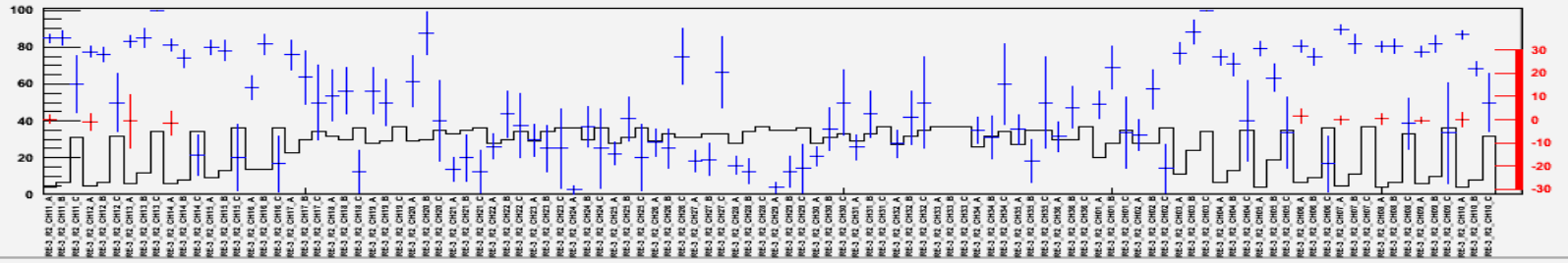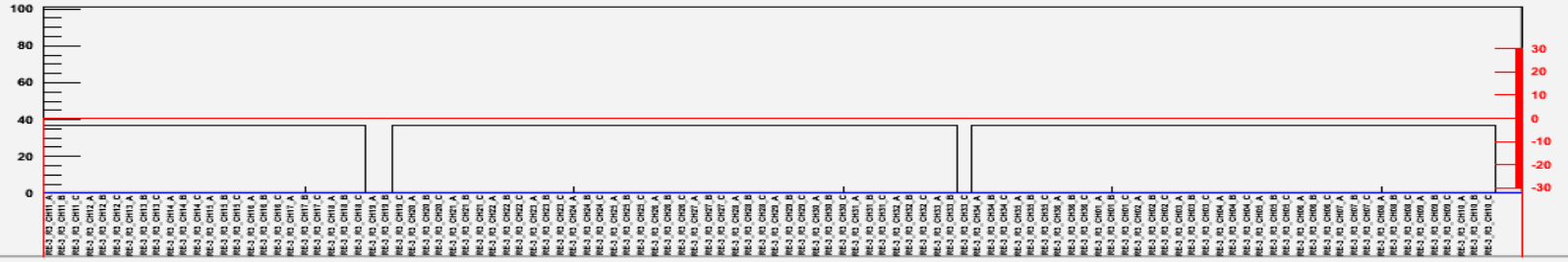efficiency(%), dead strips & residuals(cm) of RE-2R3

Run. 112397