



TRT Digitation Study

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TRT Days 31.10.2013

Qualification Topic

- Understanding the response of the TRT electronics to Muons .
- Establish baseline distributions of measurable quantities needed to validate and tune TRT digitization at different $\langle\mu\rangle$ values from low to high.
- Start with low luminosity isolated muons.
- Then proceed to muons at higher $\langle\mu\rangle$.

Current Tuning Round

Used digitization tag

TRT_Dig00-11-00

TRT_PA100-00-38

Datasets

data11_7TeV.periodD.physics_Muons.PhysCont.DESD_SGLMU.pro10_v01/

+

data11_7TeV.periodM.physics_Muons.PhysCont.DESD_SGLMU.pro10_v01/

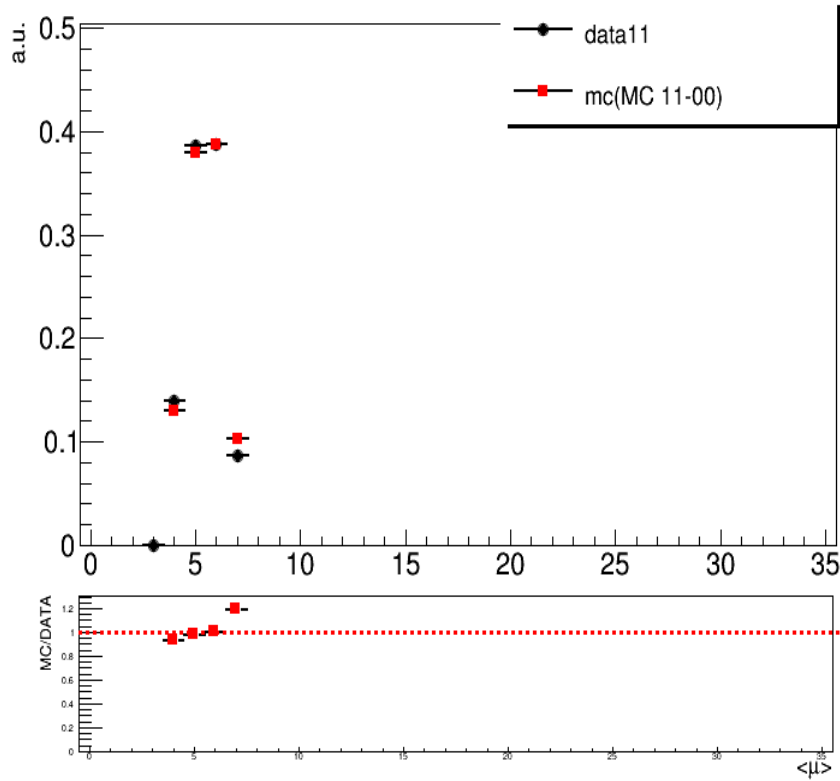
data12_8TeV.periodB.physics_Muons.PhysCont.DESD_SGLMU.repro14_v01/

MC 250kevt

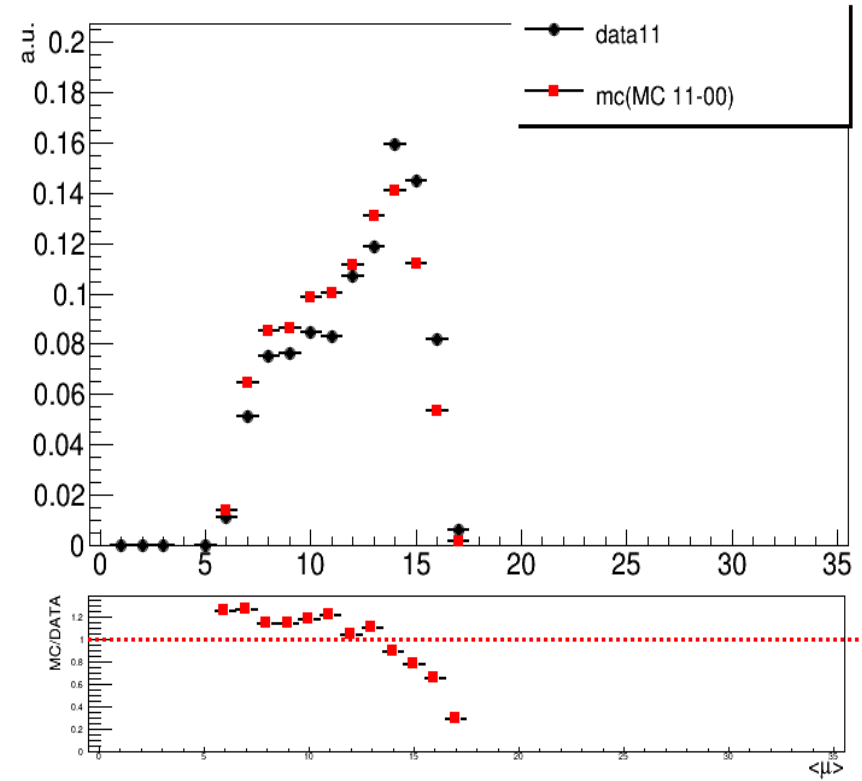
mc11_7TeV.147771.Sherpa_CT10_Zmumu.merge.HITS.e1443_s1372_s1370/

mc12_8TeV.147771.Sherpa_CT10_Zmumu.merge.HITS.e1434_s1499_s1504/

$\langle \mu \rangle$ data11 and mc11

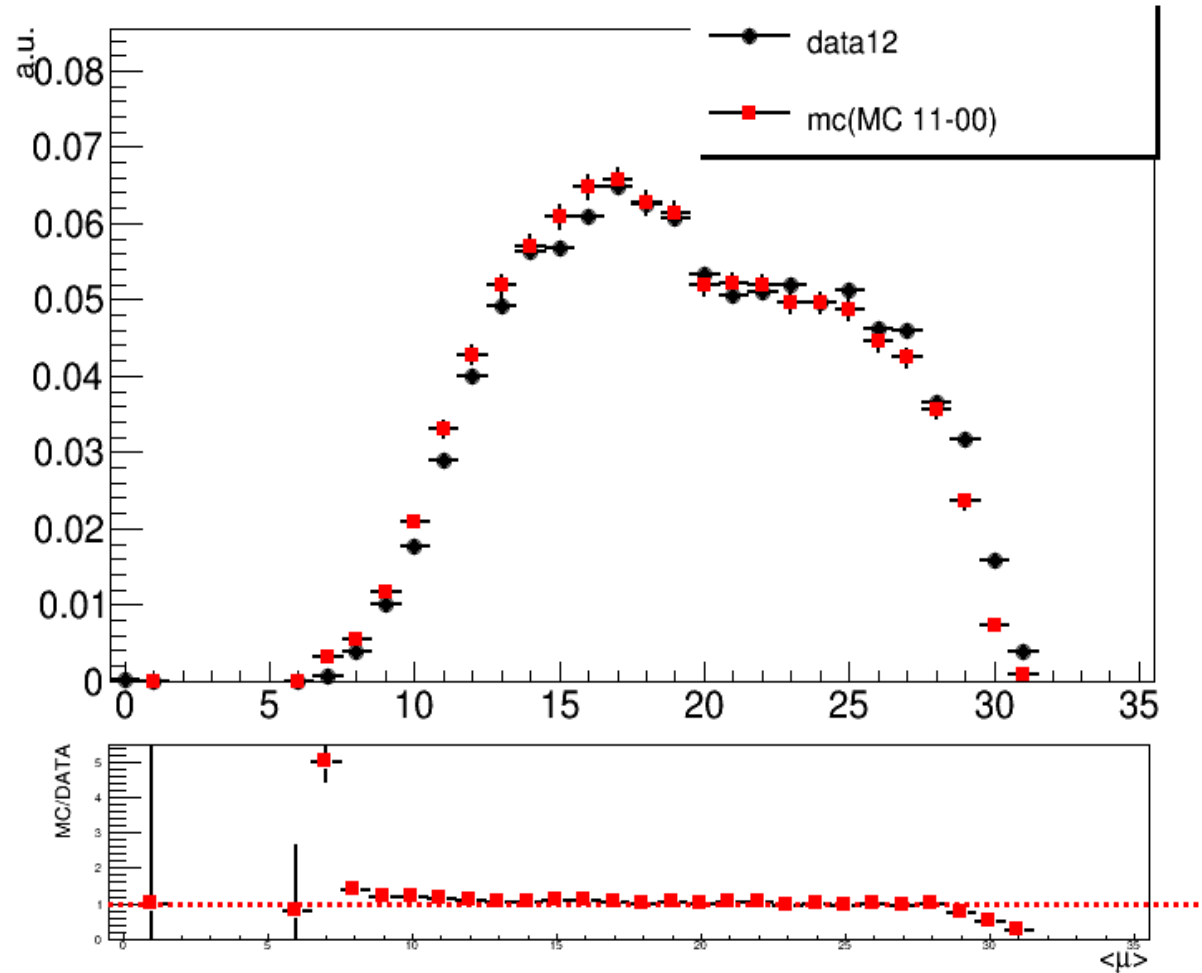


Period D $\langle \mu \rangle = 6$



Period M $\langle \mu \rangle = 15$

$\langle \mu \rangle$ data12 period B



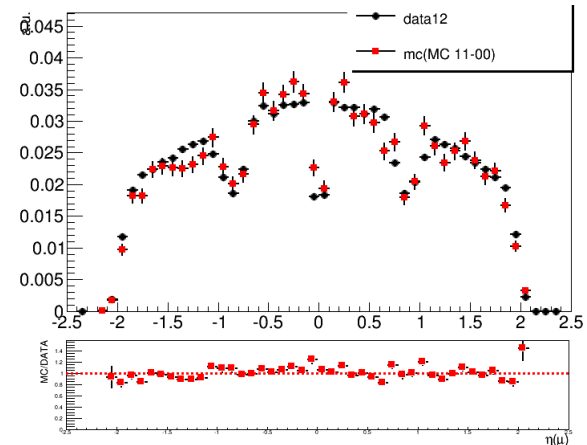
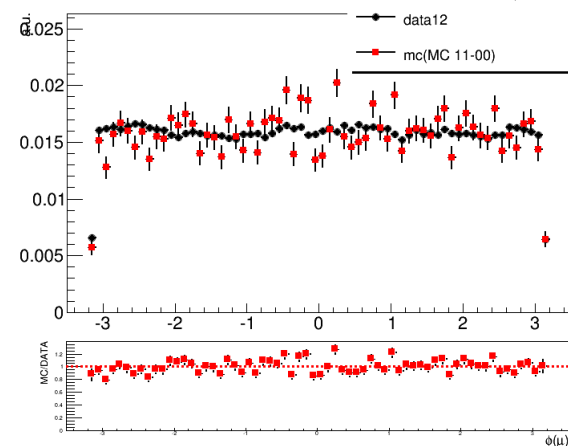
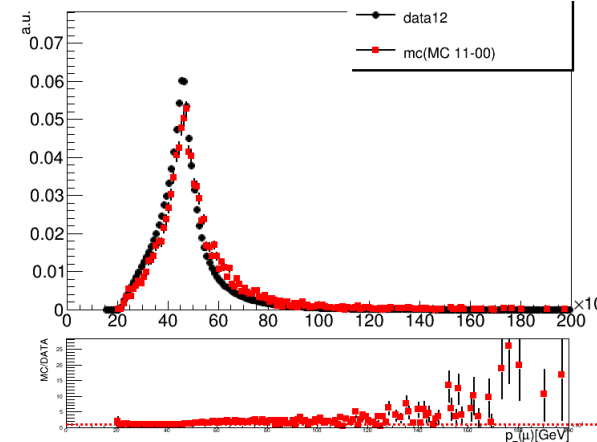
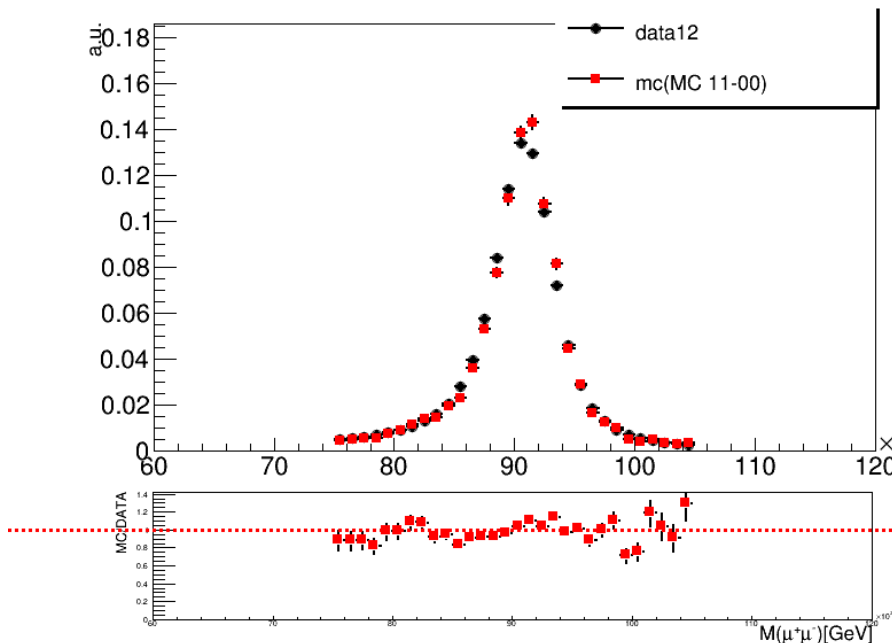
$Z \rightarrow \mu^+ \mu^-$ event selection

Trigger : EF_mu18(2011D), EF_mu18_medium(2011M)
EF_mu24_tight (2012B)

Muon type: StacoMuonCollection

Cut list (for all years)

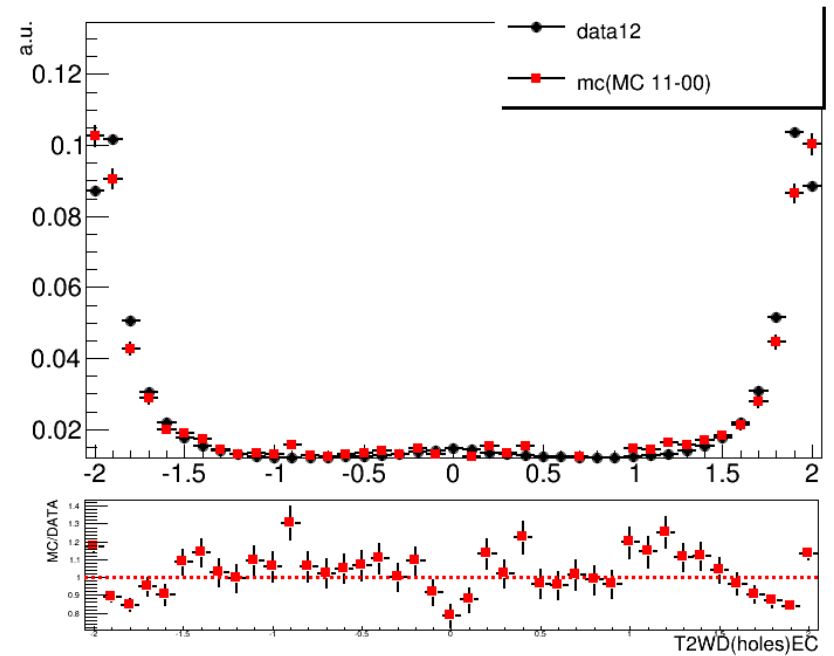
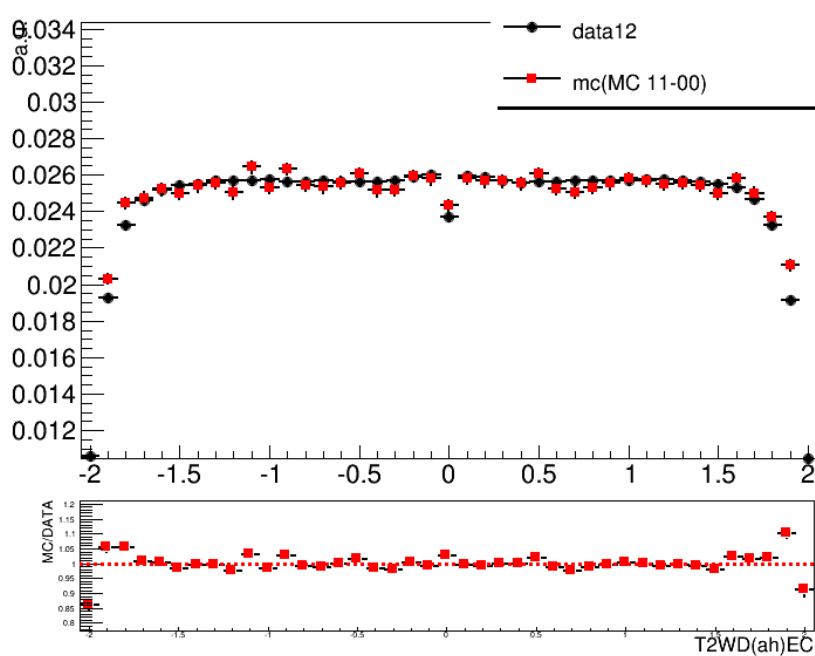
- $|\eta| < 2.0$
- $p_T > 20$ GeV
- $\Delta R > 0.3$
- $75 < M_{mm} < 105$ GeV



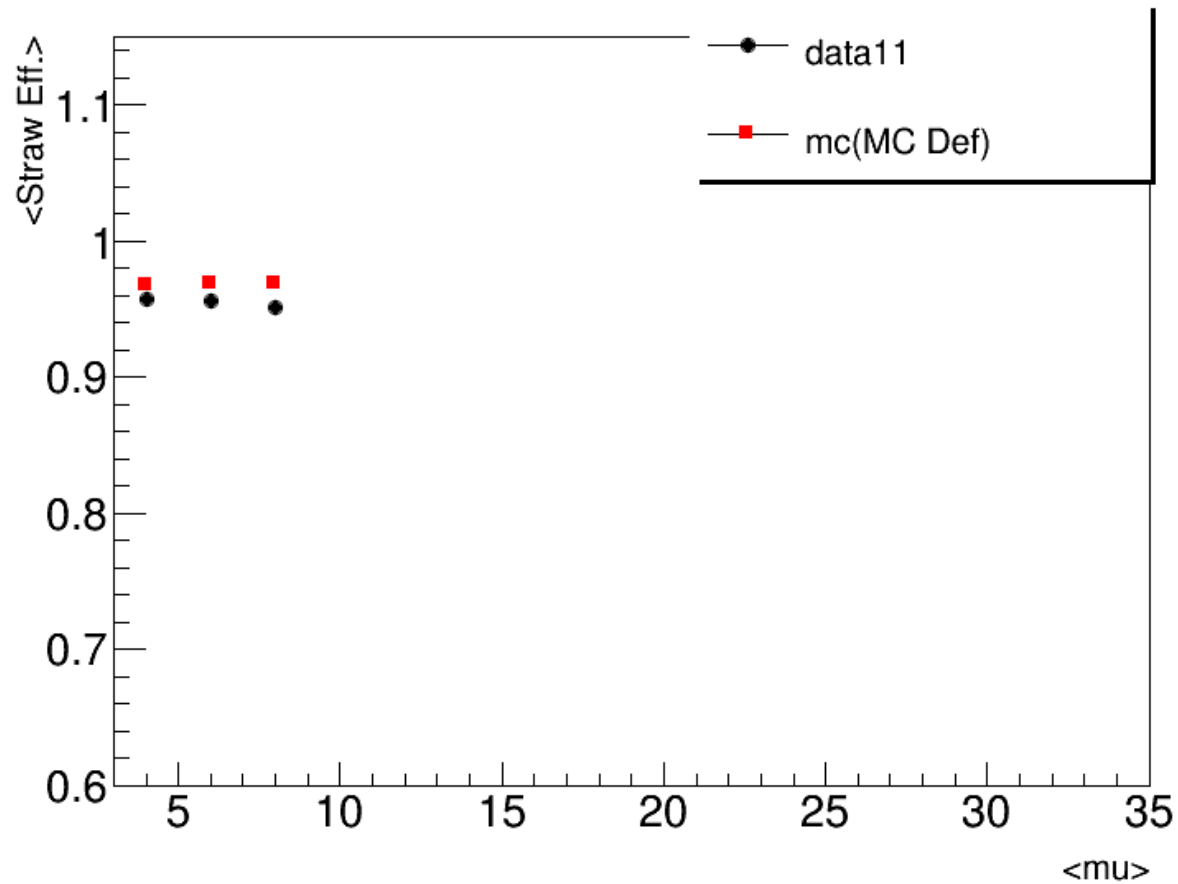
In what we are interested?

- How behaves Straw Efficiency over the $\langle\mu\rangle$
- How behaves hitResiduals over the $\langle\mu\rangle$
- LE (will be studied in nearest future)
- HTprobability (will be studied)

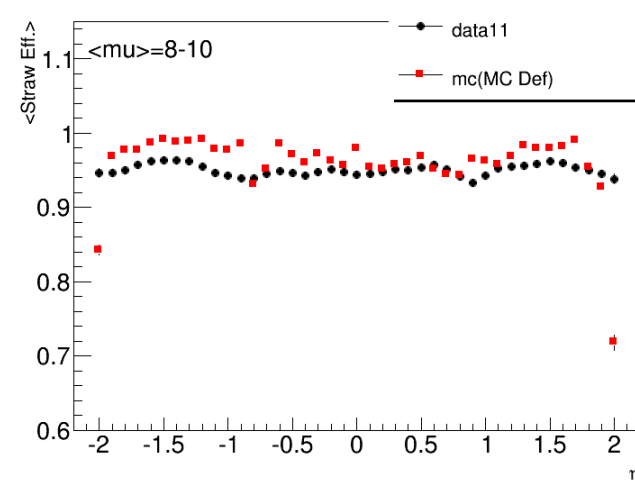
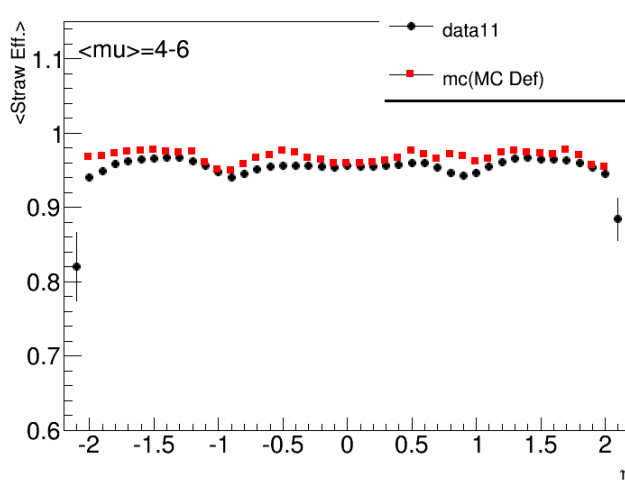
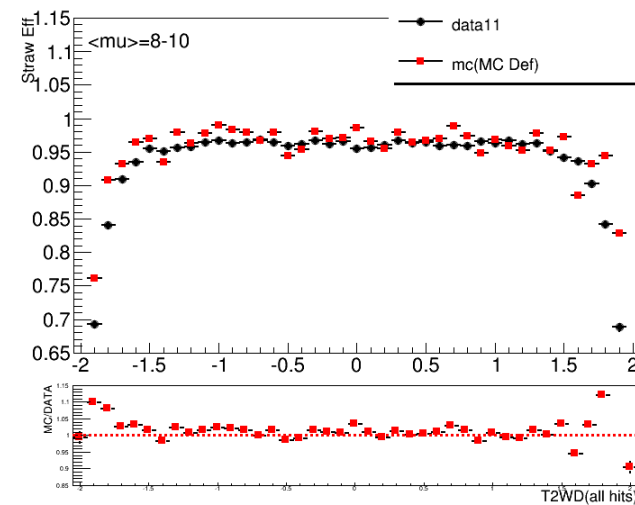
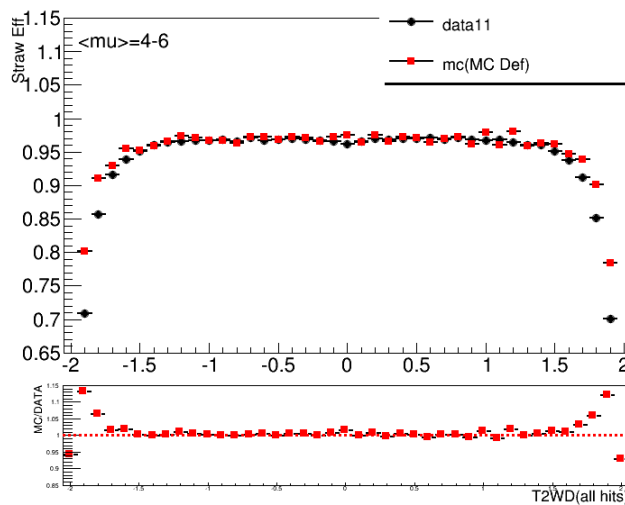
Track to Wire Distance – all hits and holes



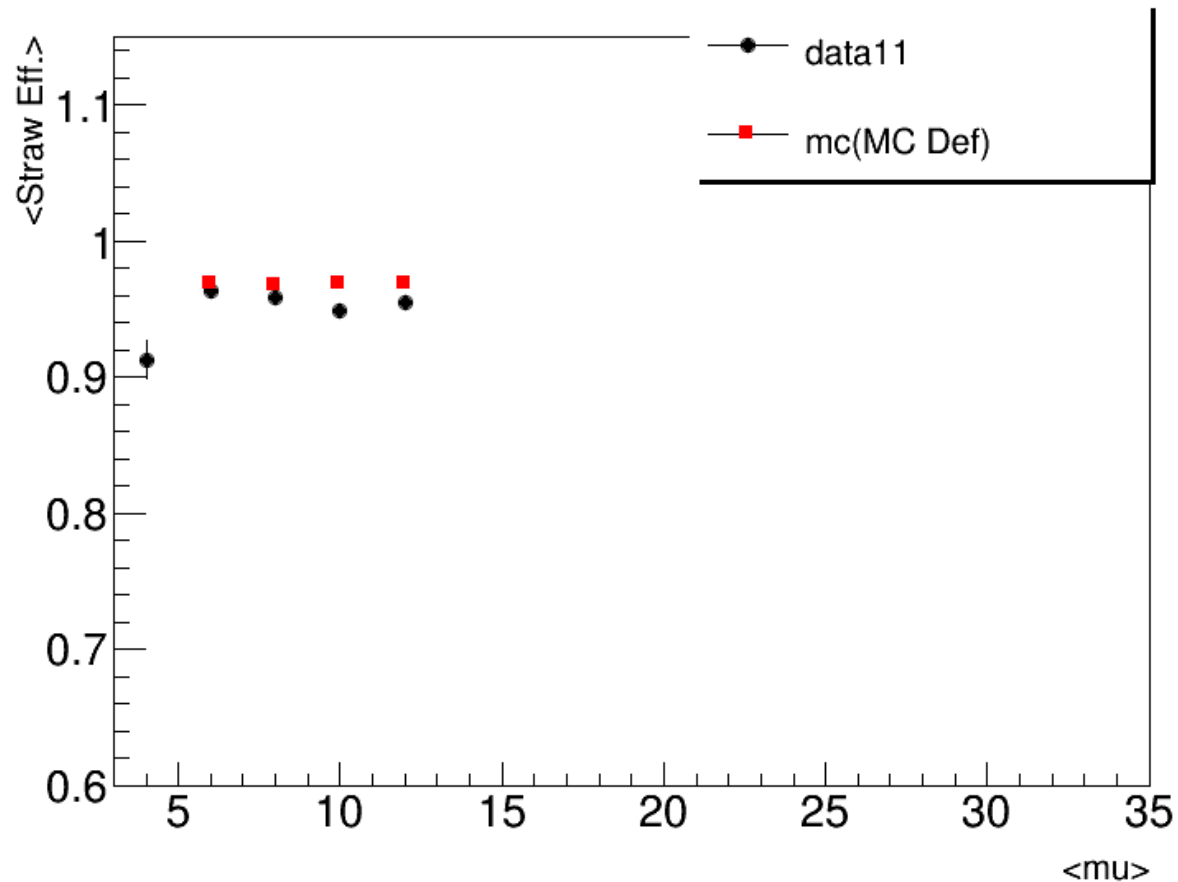
$\langle \text{Straw Eff}(\text{all hits}) \rangle$ data11-D evolution $\langle \mu \rangle$



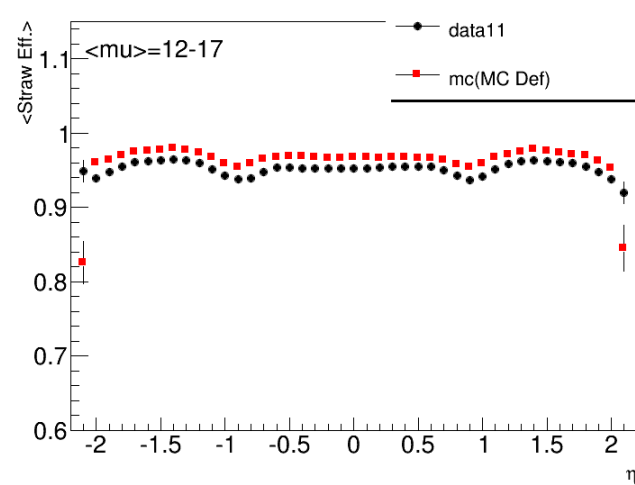
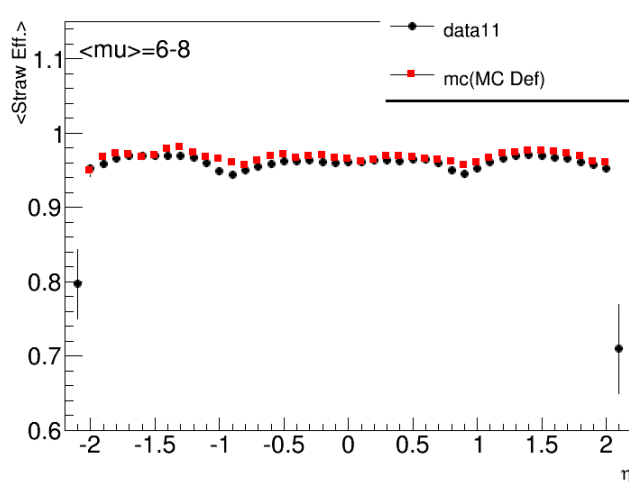
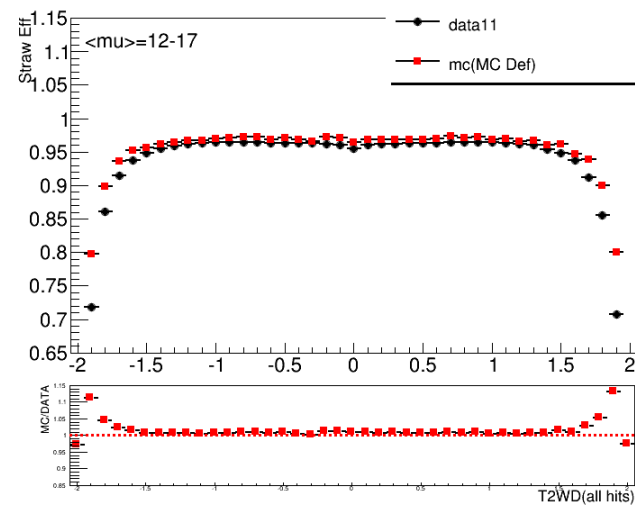
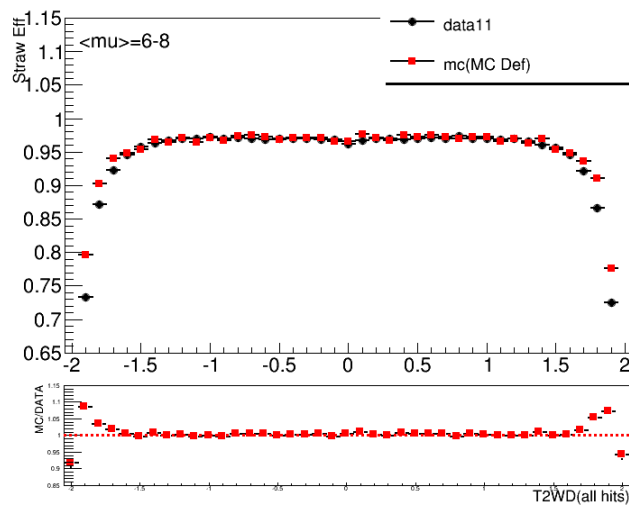
$\langle \text{Straw Eff}(\text{all hits}) \rangle$ data11-D evolution $\langle \mu \rangle$



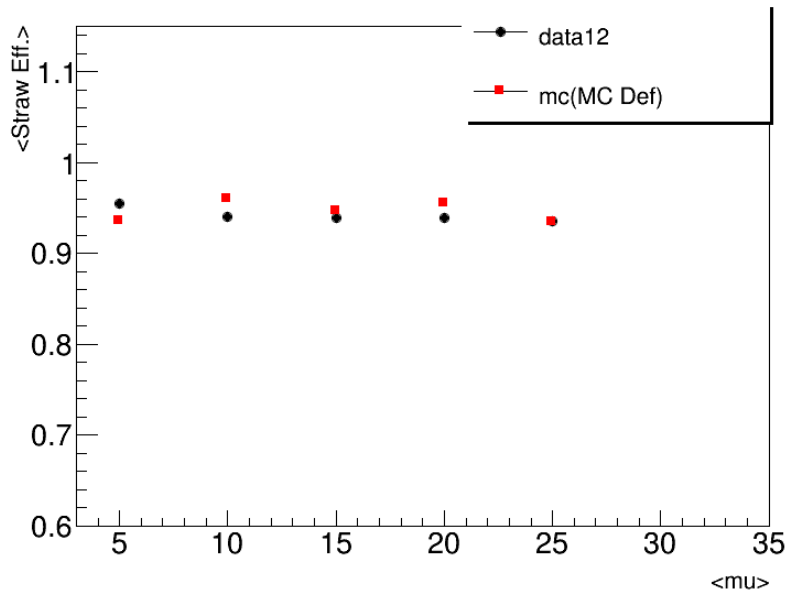
<Straw Eff(all hits)> data11-M evolution < μ >



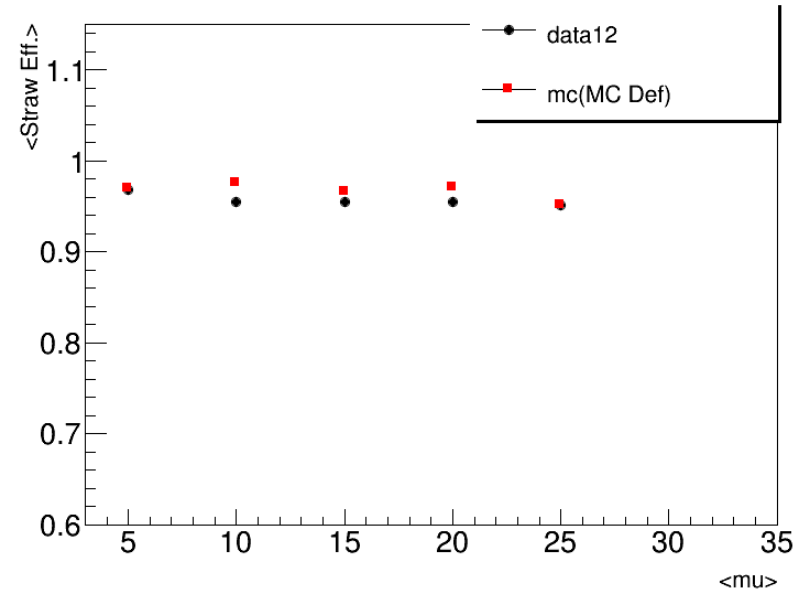
$\langle \text{Straw Eff}(\text{all hits}) \rangle$ data11-M evolution $\langle \mu \rangle$



$\langle \text{Straw Eff}(\text{all hits}) \rangle$ data12-B evolution $\langle \mu \rangle$

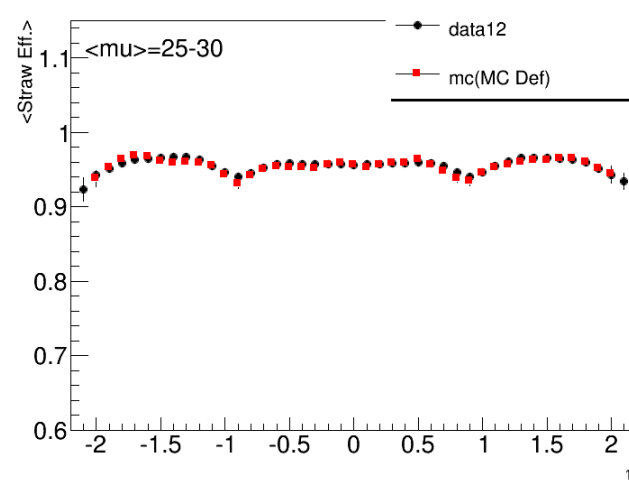
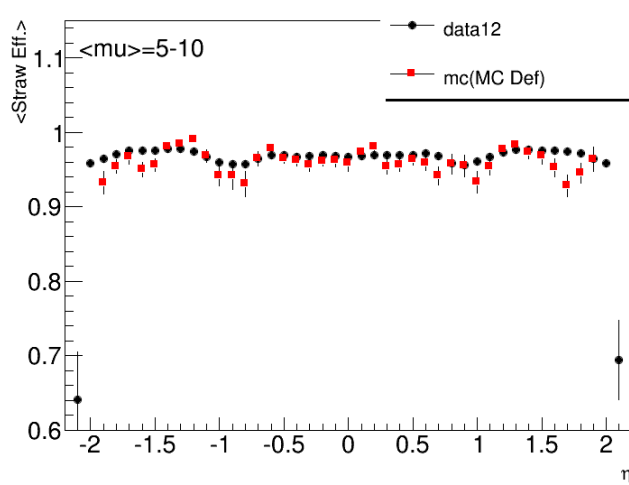
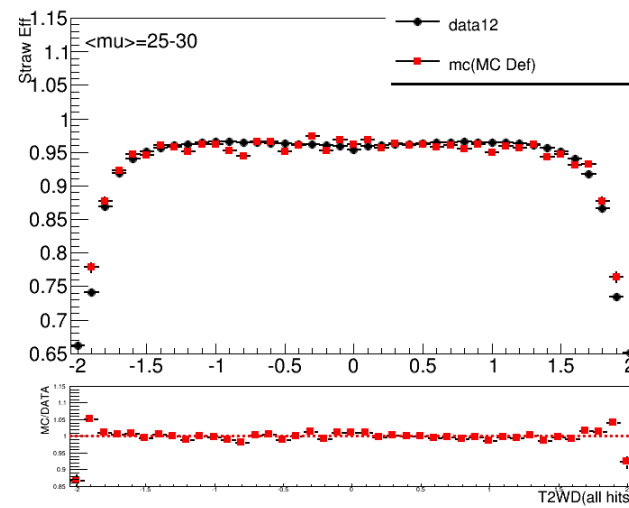
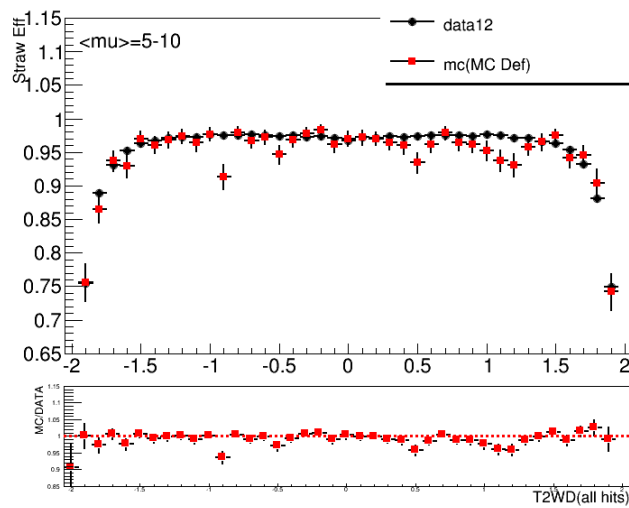


Barrel

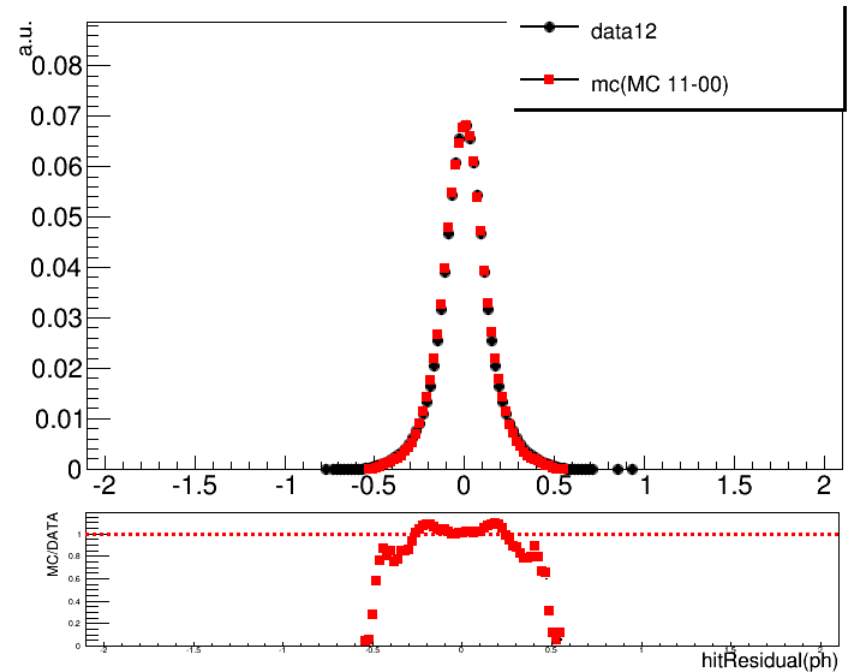
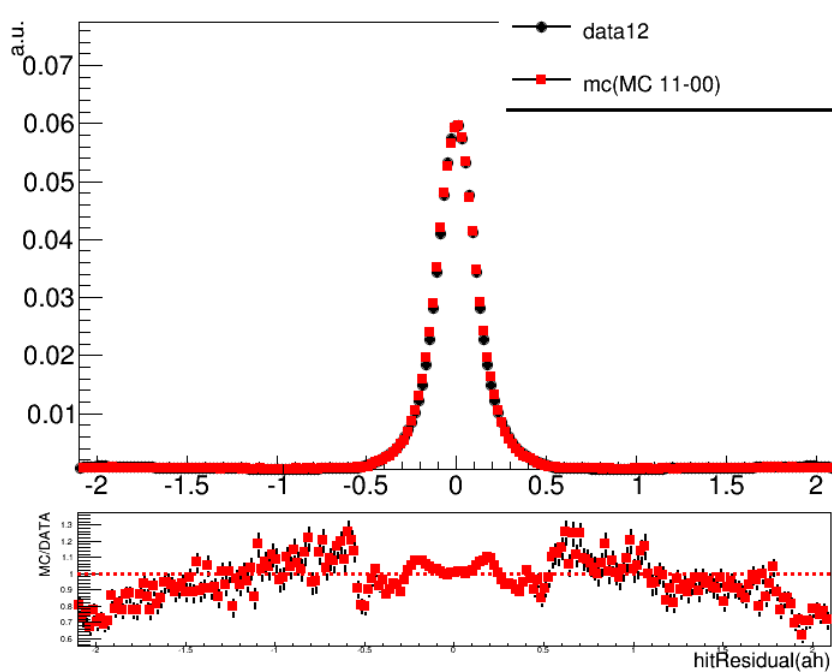


EC

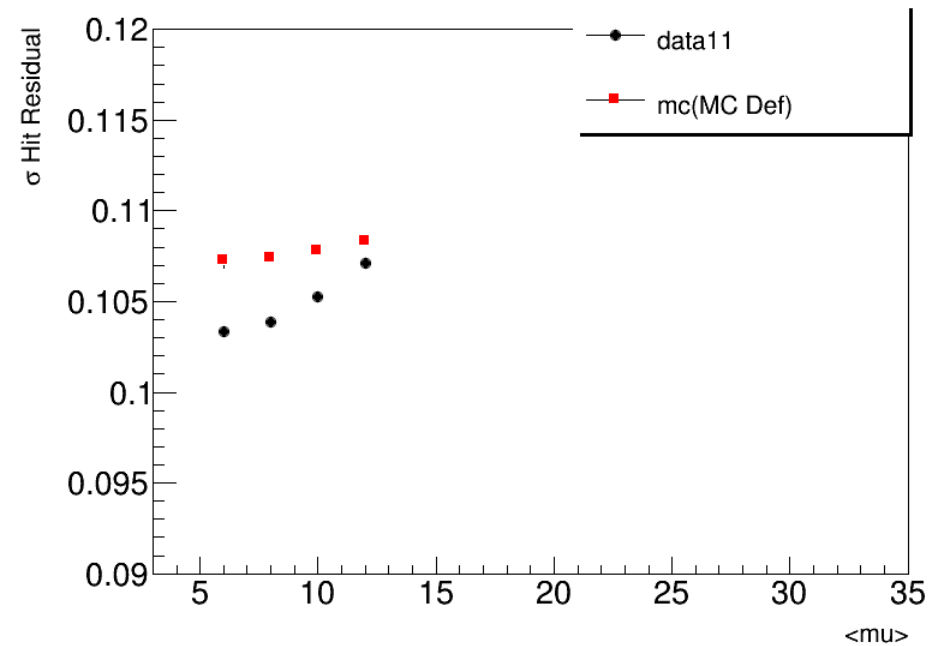
$\langle \text{Straw Eff}(\text{all hits}) \rangle$ data12 evolution $\langle \mu \rangle$



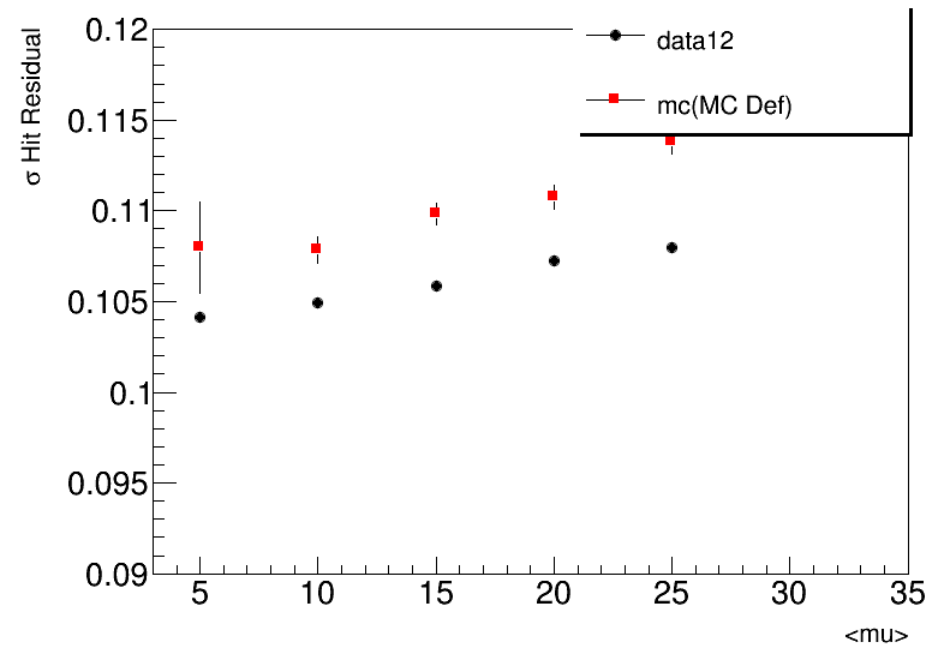
Hit Residuals – all and precision hits



Data11, Data12 σ Hit Residual evolution $\langle\mu\rangle$

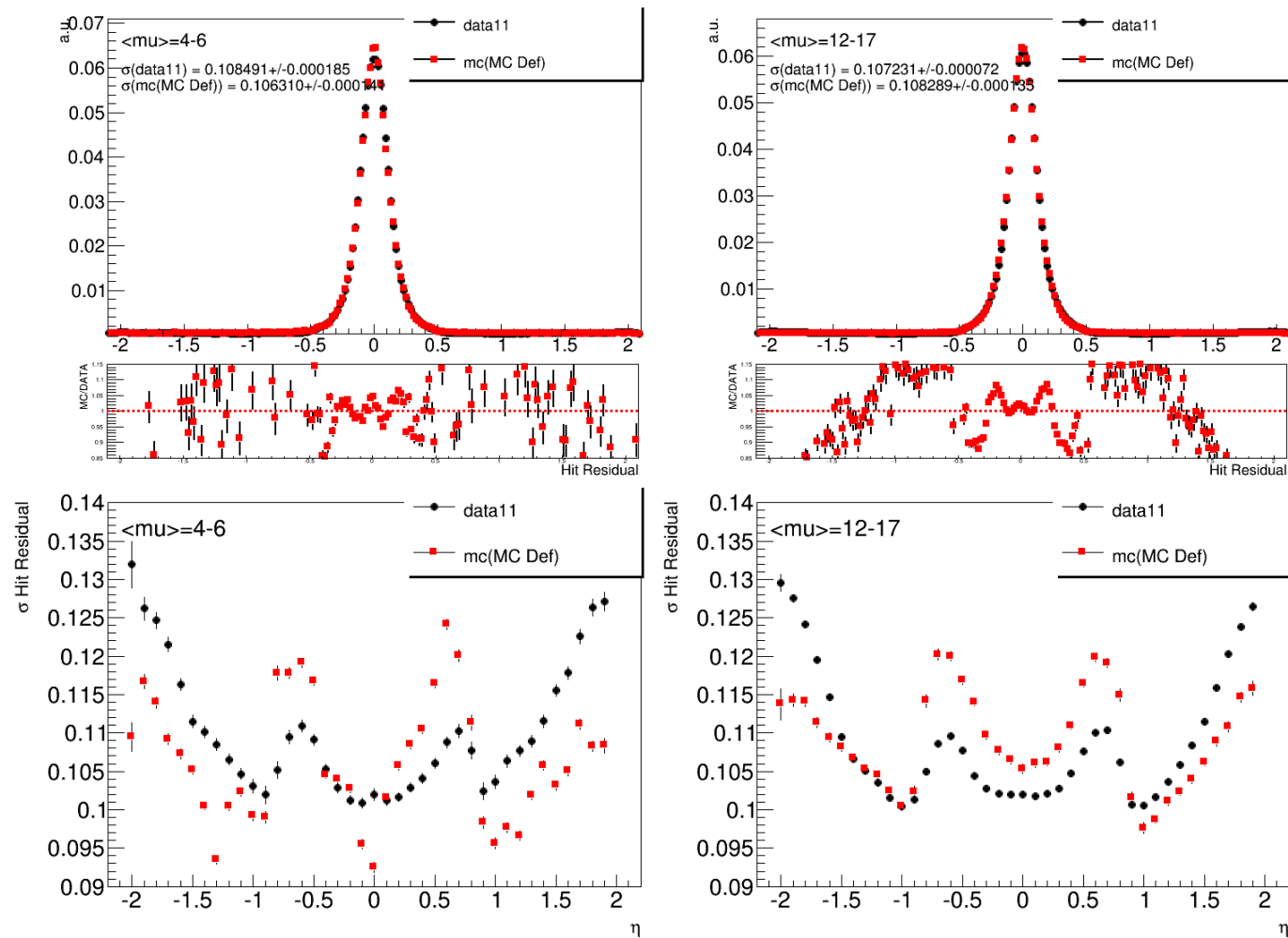


Data11

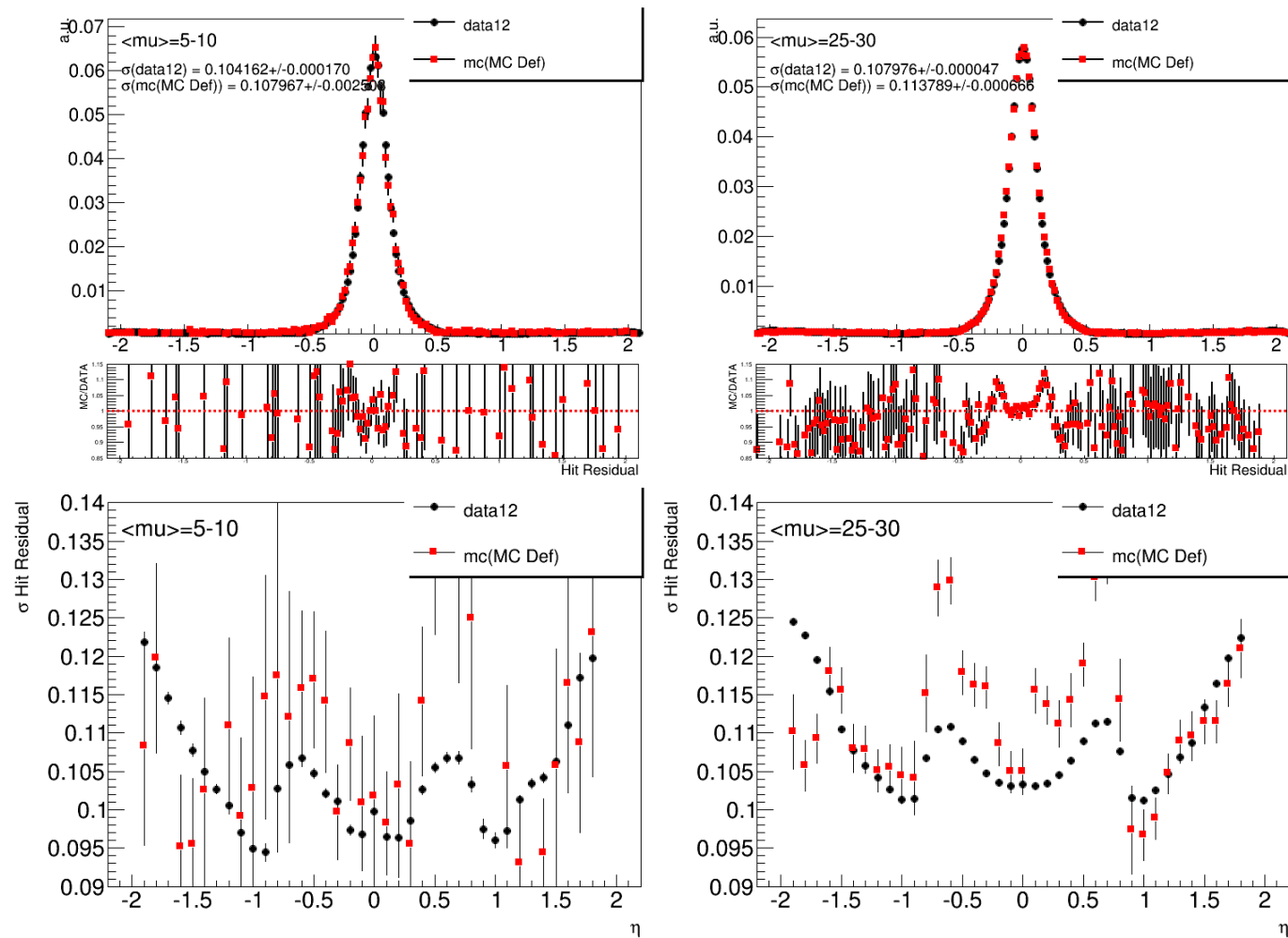


Data12

Data11 σ Hit Residual evolution $\langle\mu\rangle$



Data12 σ Hit Residual evolution $\langle\mu\rangle$



Conclusions and plans

- Created framework for easy and fast access to the TRT information in different $\langle \mu \rangle$ periods
- Data samples found and used for $\langle \mu \rangle = 6,35$
- First tuning for LowTreshold parameters is done.

Plans

- look for the LE and HT probability behavior
- Maybe something else
- Prepare documentation concerning TRT Digitization Tuning