HLT DQ monitoring in the last Technical Run

- Technical Run November 2007
- Monitoring
- Steering Monitoring
- HLT DQ Monitoring
  - examples from the slices

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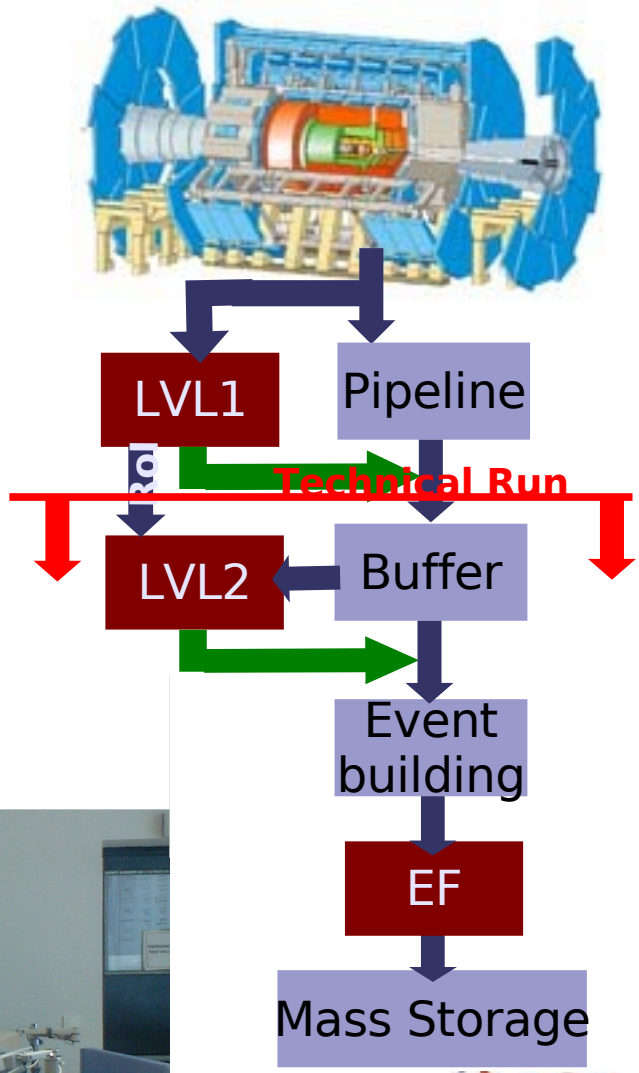
Technical Run

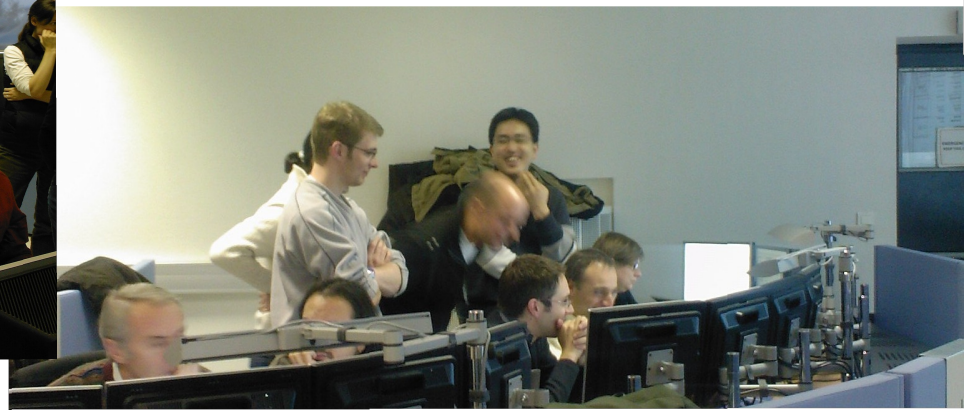
- preloaded simulated L1 output, exercise HLT, DAQ
- from sending events to L2 to writing data to Castor
- full 10^{-31} trigger menu, more than 200 chains

data samples:

- cosmics data (M4/M5)
  Monte Carlo samples: ttbar, mixed(jets)
- tdaq-01-08-03 and
  AtlasProduction 13.0.3.30 (+tags,patches)
- 7% of final HLT hardware : 5 racks = 31 machines

- shifts at run Control, DAQ and HLT desk





Monitoring

basis of monitoring: Histograms and IS objects
for HLT DataQuality: histograms produced in
HLT steering and algorithms

online Monitoring tools (developed in MWG)

- gatherer: sums up historgams from farm nodes
- MDA: automatice saving of histograms at run end -> castor

displays:

- Online HistogrammingPresenter (OHP): human histogram checking
- DataQualityMonitoringFramework (DQMF): automated histo checks
- DataQuality display : shows DQresult by DQMF

- OperationalMonitorinDisplay (OMD): IS information
  see Samis talks in previous meetings
- TriggerPresenter (TriP)
  presentation of big 2D histo signature Acceptances
  see previous talk by Judita

HLT Steering Monitoring

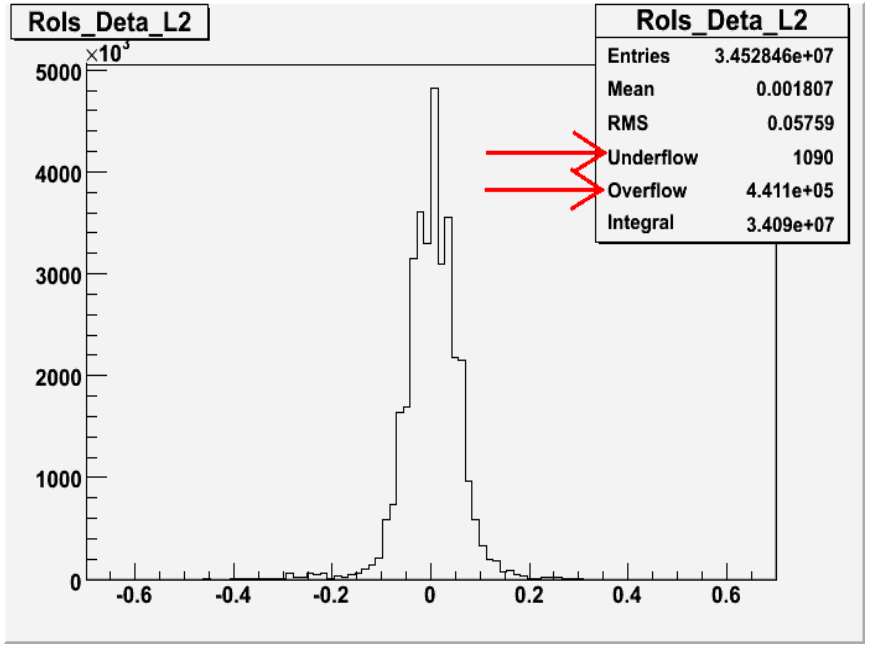
monitoring of steering decision, steering performance (e.g. ErrorCodes,timing) and also RoI information

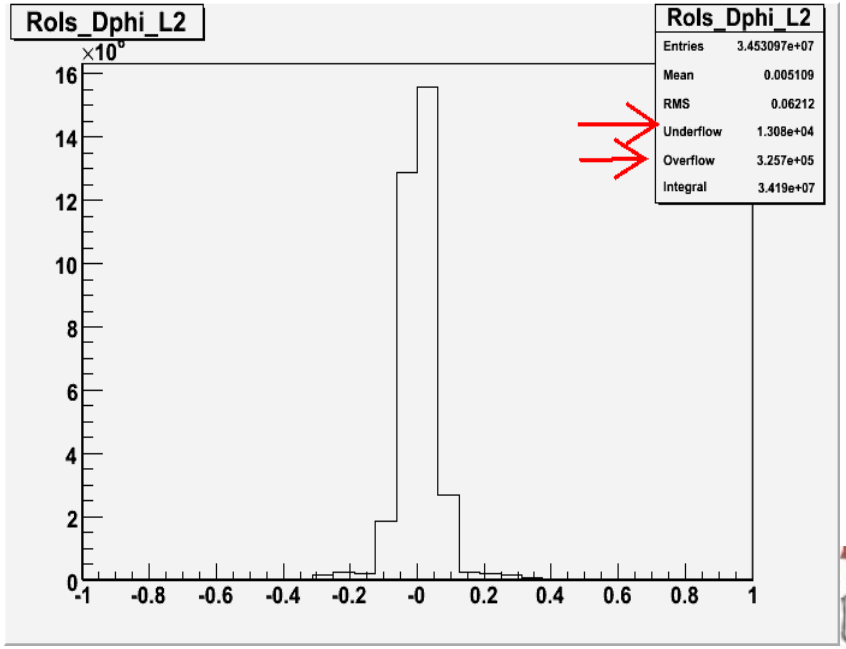
example:

difference of RoIs in eta, phi w.r.t. initial L1 RoI

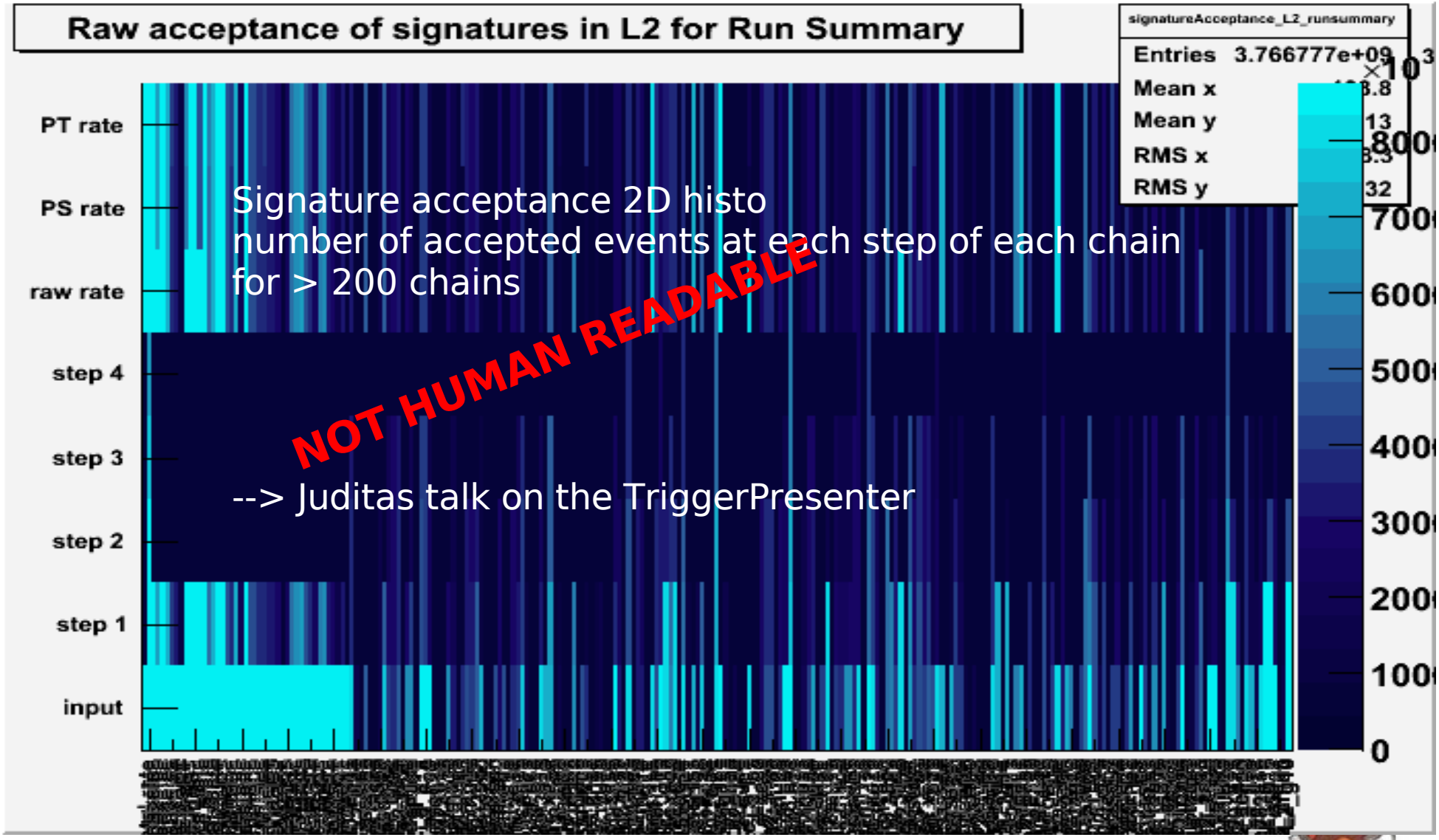
analysis of root files saved from TR: found RoIs with large $\Delta\eta$ and $\Delta\phi$

after TR: problem was also found offline (athenaMT and athenaPT)





HLT Steering Monitoring



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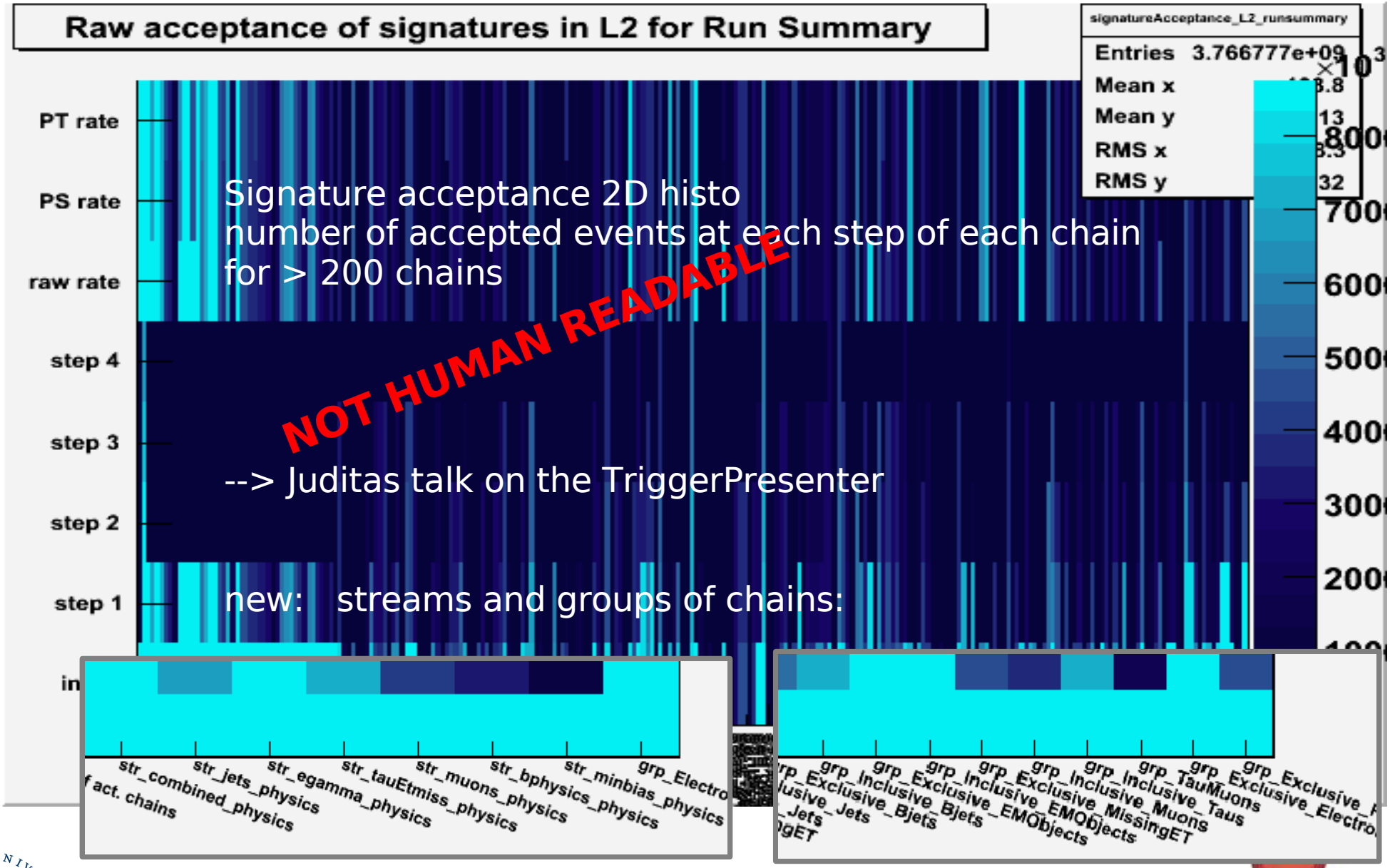

HLT DQ monitoring

algorithms (FEX and HYPOS) in LVL2 and EF fill DQ histograms

online histogram checking: automatic (DQMF) and by-eye (OHP)
histograms also saved for offline analysis

slices that have implemented DQMF checks
* Muon
* Tau new since M5 !
* Jets new!
* Missing ET new!
* Bphysics new!
* ID new!

~250 checks performed
(50% Histogram_Not_Empty,
other Checks: Mean,RMS,..)

DQMF algorithms used:
most simple checks:
`Histogram_Not_Empty`
`Histogram_Empty`
`Histogram_Effective_Empty`
mean (and width) of histogram/fit:
`CheckHisto_Mean`
`Simple_gaus_Fit`
comparison with reference:
`KolmogorovTest_Prob`
accustomised algorithm:
`Binratiotest`

next slides: examples
histos+DQChecks
most of the histos from
run 31616 (ttbar events)
some taken from previous TR or talks at DQ workshop

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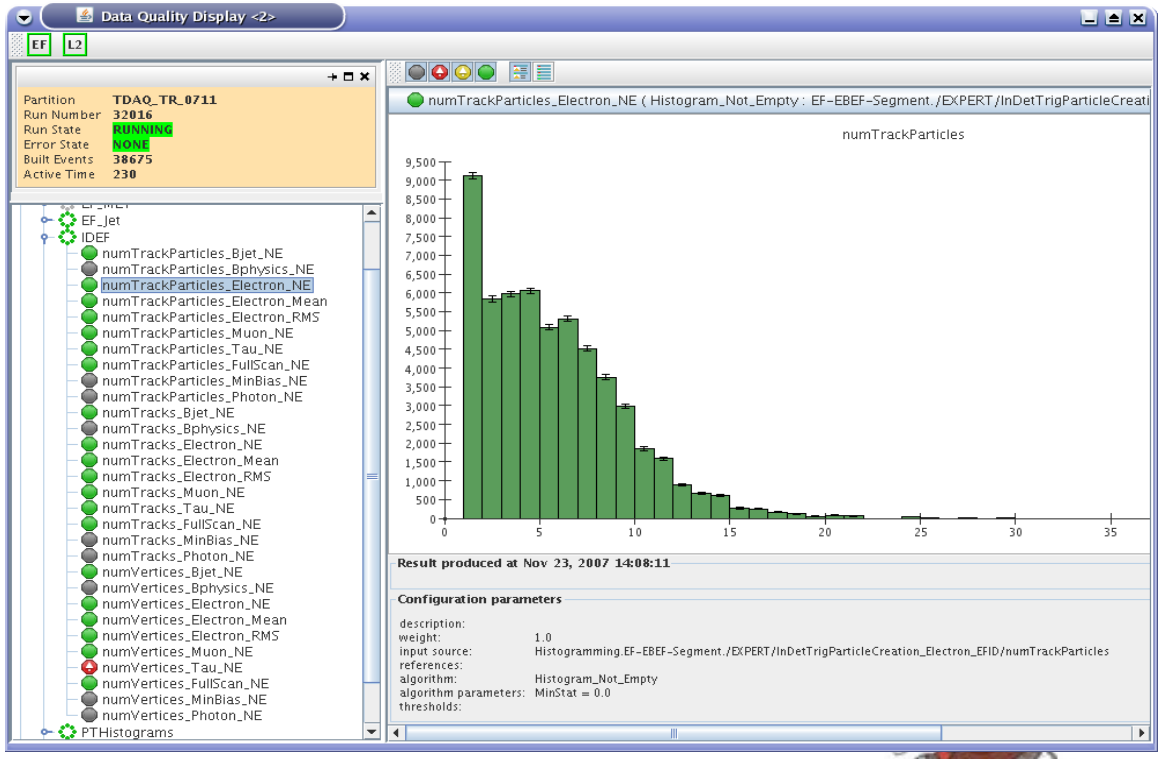

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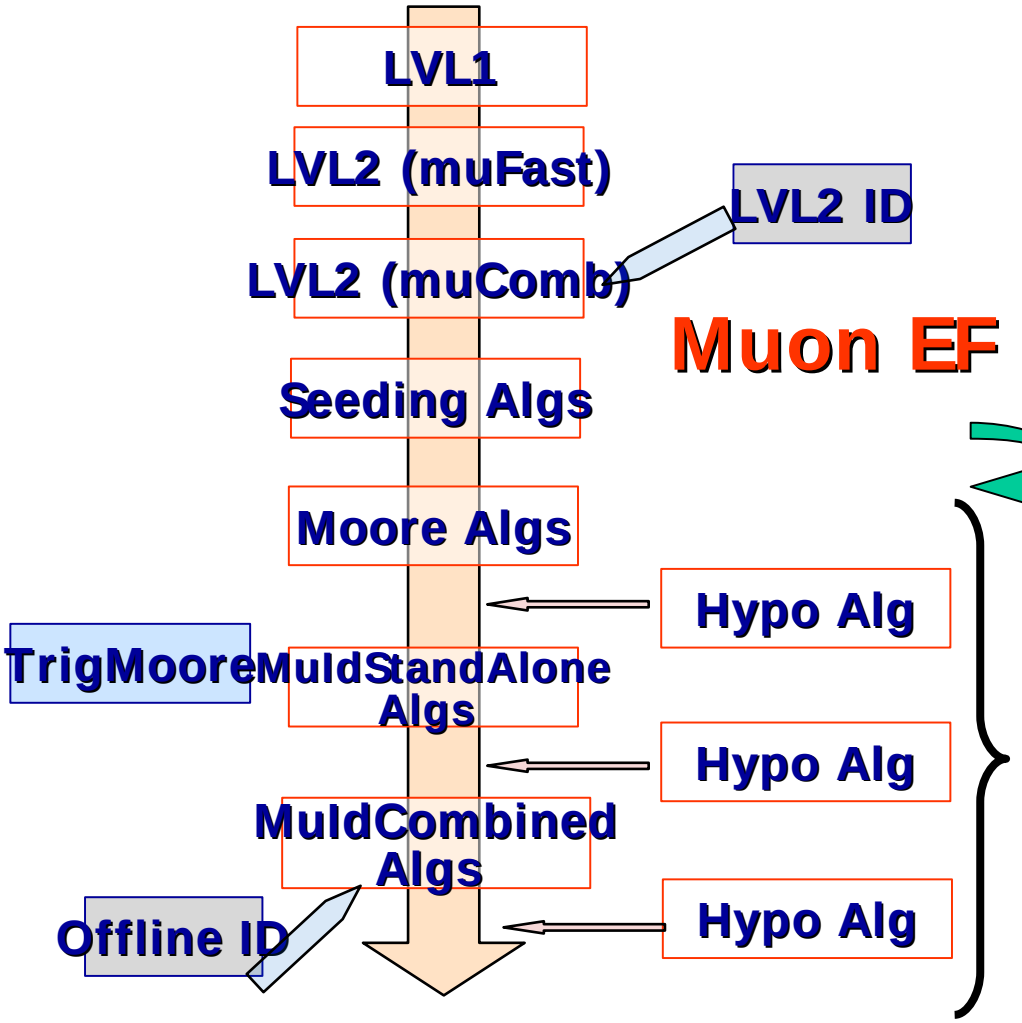
muon slice



Muon slice algorithms:

FEX LVL2
- muFast (fast reco. muon system)
- muComb (comb. with ID)
- myIso (isolation)

FEX EF
- Moore Algs (muon system)
- MuIdStandalone Algs (extrapol to ID)
- MuIdCombined (comb. with ID)

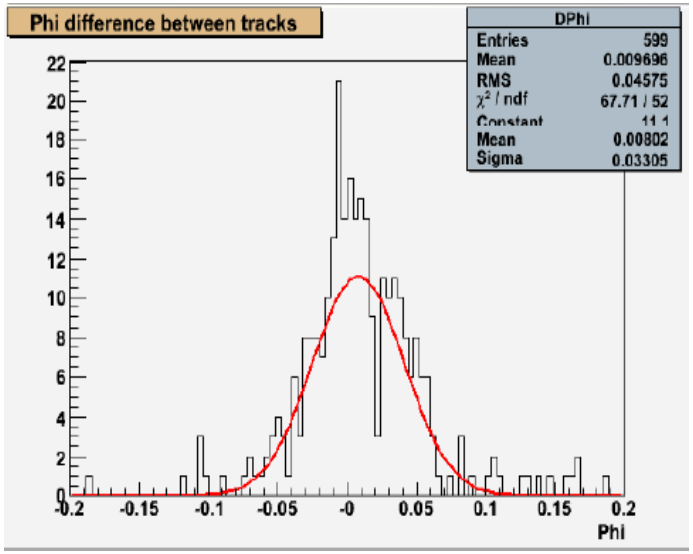
monitor functionality & reconstruction

& several HYPOS
monitor selection

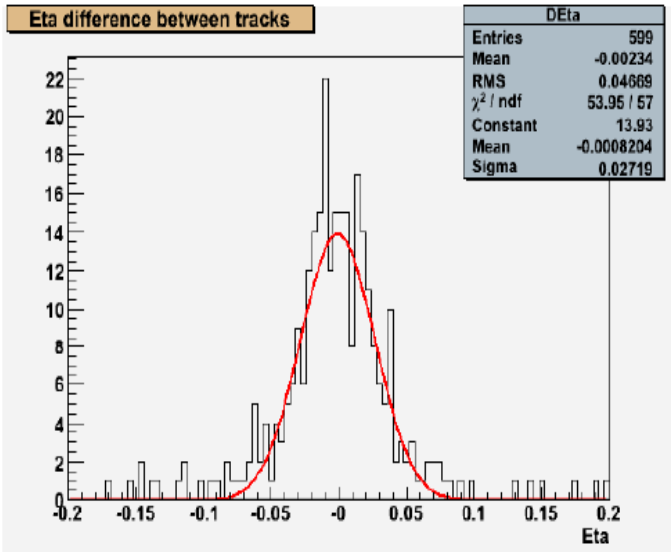
muon slice

muComb: combination of muon system and ID
difference between matched tracks

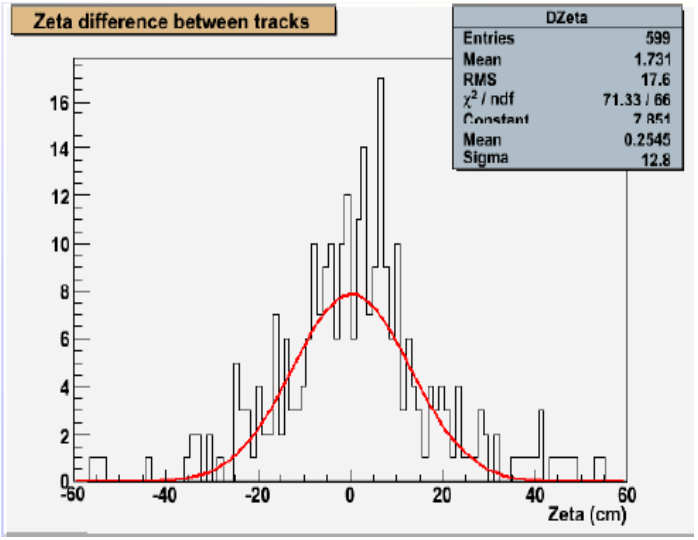
DQ Checks: perform gaus fit, compare sigma and mean to thresholds



Mean < 0.3
σ < 0.035



Mean < 0.3
σ < 0.03

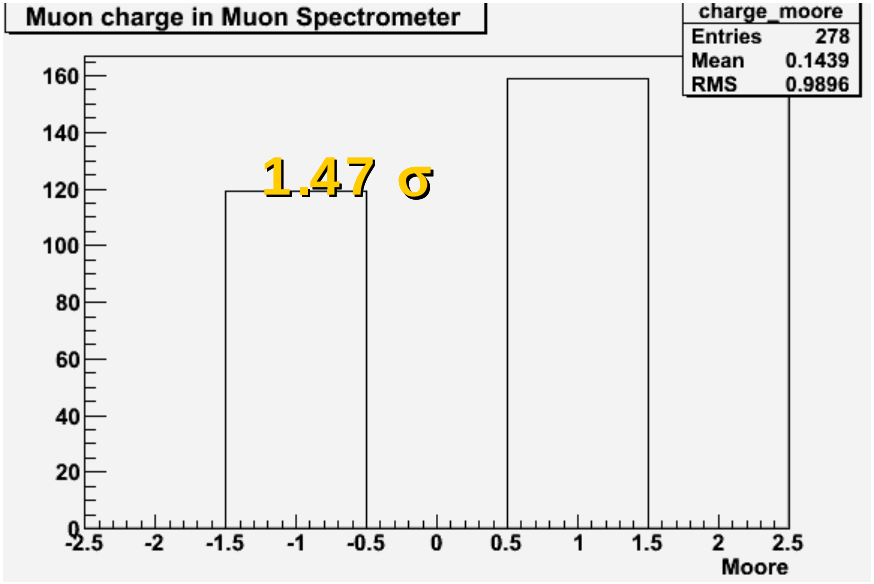


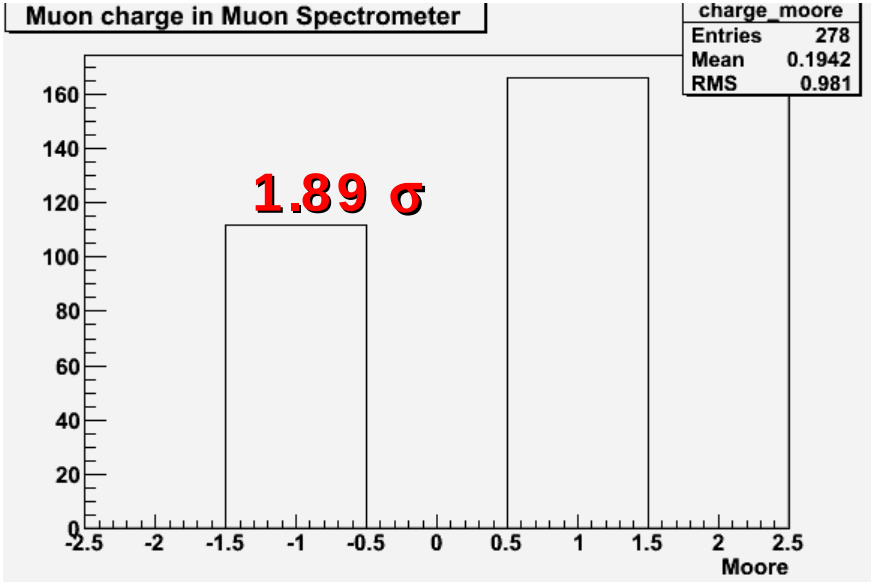
Mean < 0.3
σ < 14

Sensitive to track association and alignment of detectors

muon slice

TrigMoore: muon charge





Check ratio between muon charges:
number of sigma away from 1 ?
(using customised DQMF algorithm to check the binratio)

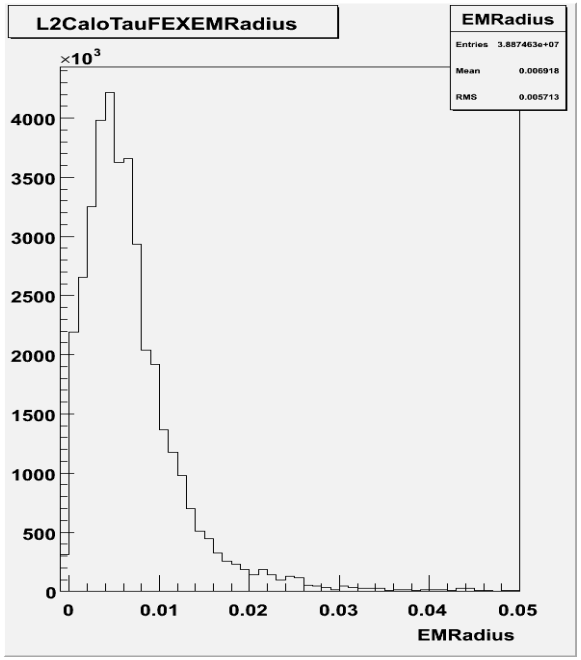
other checks:

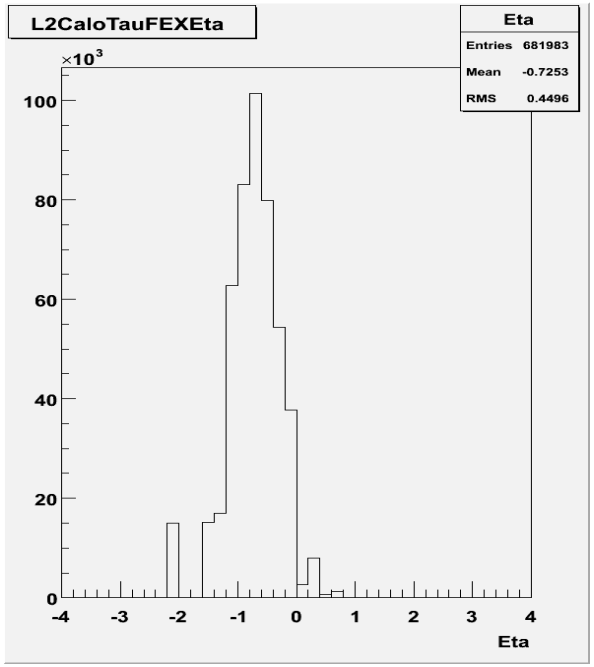
- chi2 and hit residuals of tracks, number of hits,stations
  mean and RMS either from histogram or from gaussian fit
- pt, eta, phi of muon candidates compare to ref. histogram

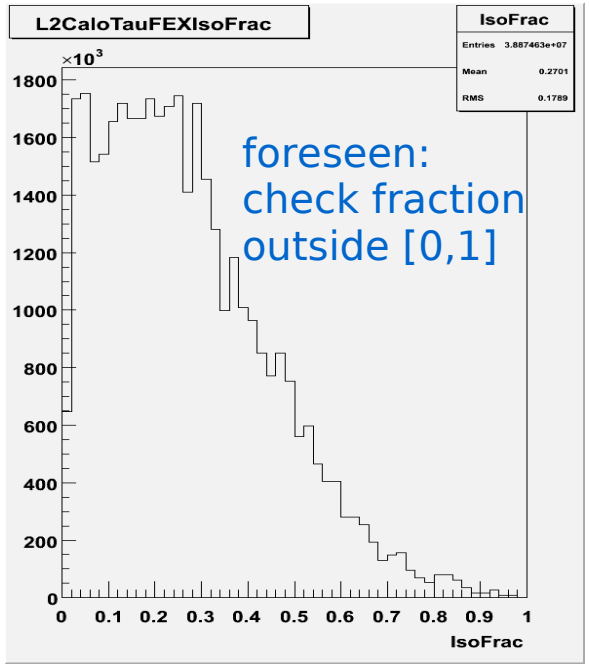
tau slice

Tau slice algorithms:

FEX LVL2: T2TauFEX and T2CaloTauFEX
FEX EF: TrigTauRecFEX
& Hypos: T2CaloTauHypo, T2IDTauHypo, T2TauHypo, EFTauHypo



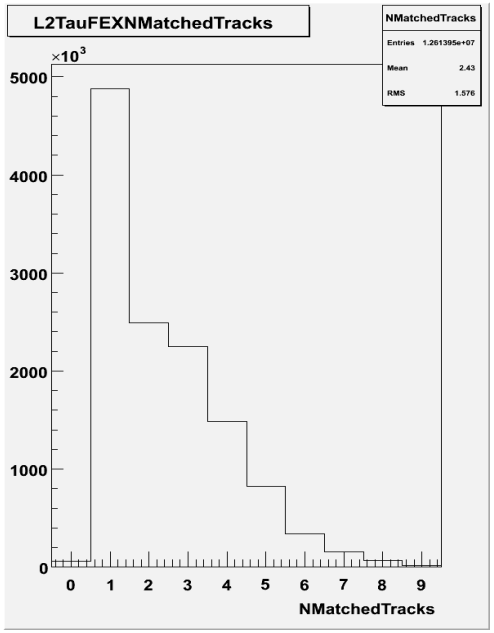


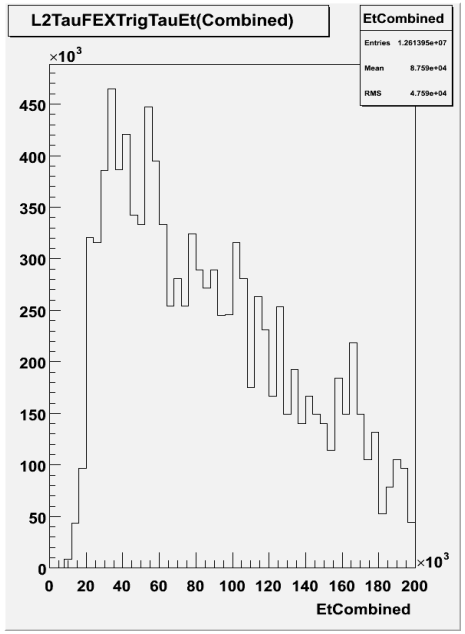


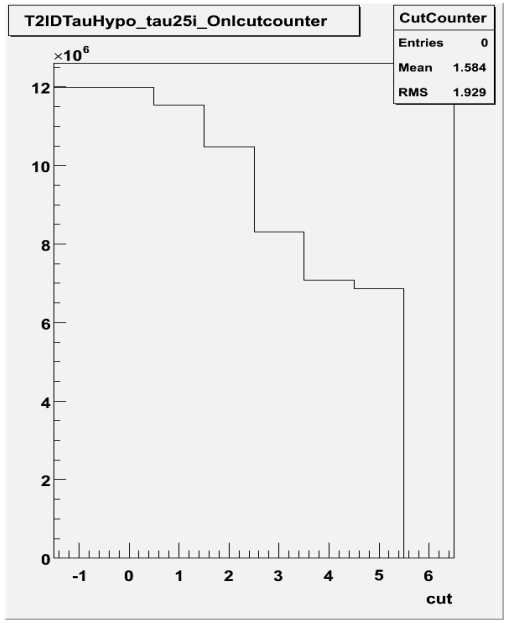
T2CaloTau histos: EMRadius, Eta, Phi, Isolation Fraction, EtCalib
DQ Checks: Kolmogorov Test, Check_Histo_Mean, Histogram_Not_Empty

tau slice

T2TauFinal histos: Delta eta and Delta Phi between Track and Cluster
(Check_Histo_Mean)
N Matched Tracks, EtCombined DQ Checks not yet defined

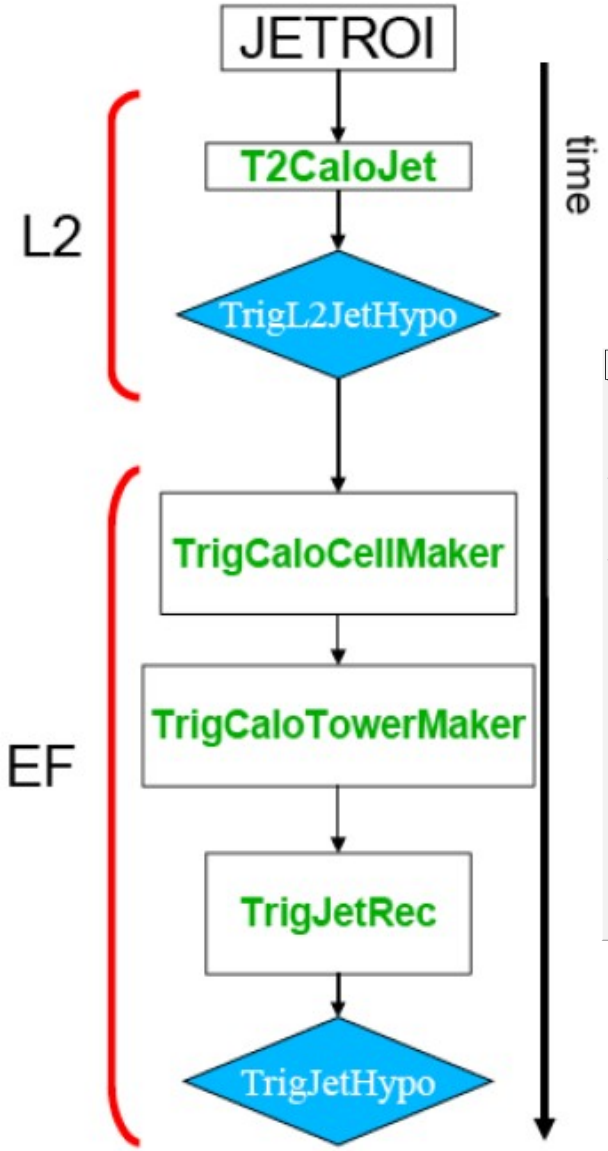






all Tau Hypos: Cut counter histograms
check that mean < 0.41

jet slice

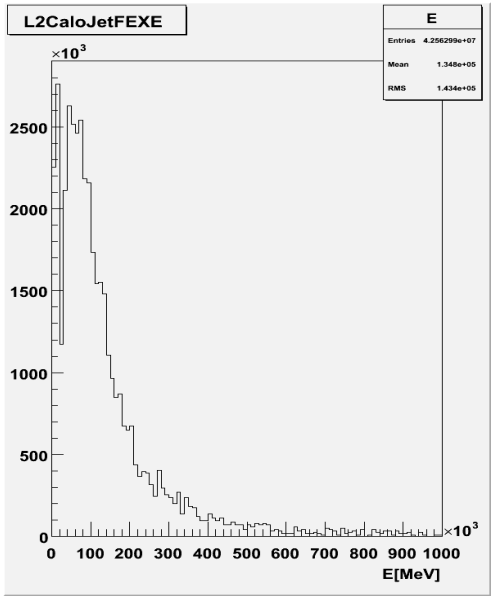


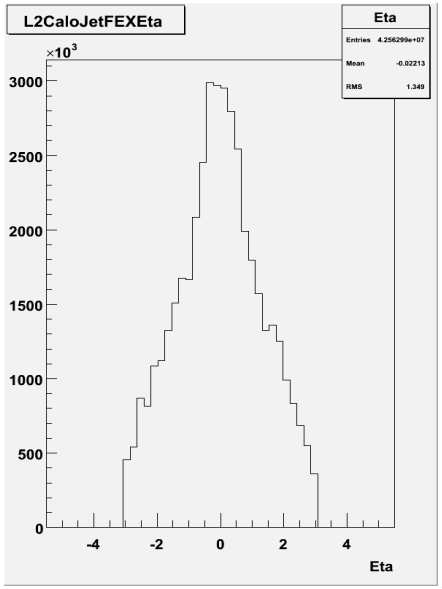
DQ histos:

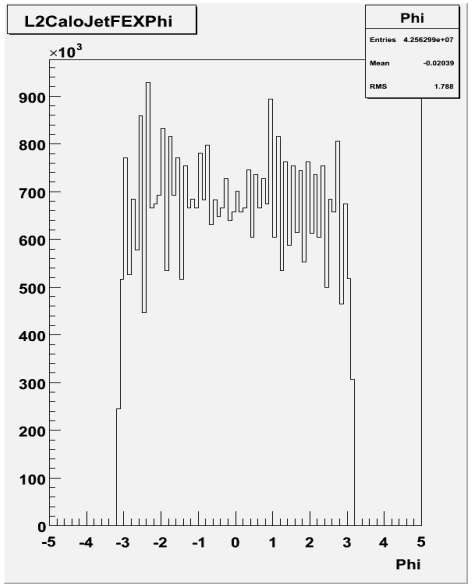
L2 FEX: E, eta, phi, DeltaR

HYPO: cut counter

EF FEX: Njet, Et, eta, phi

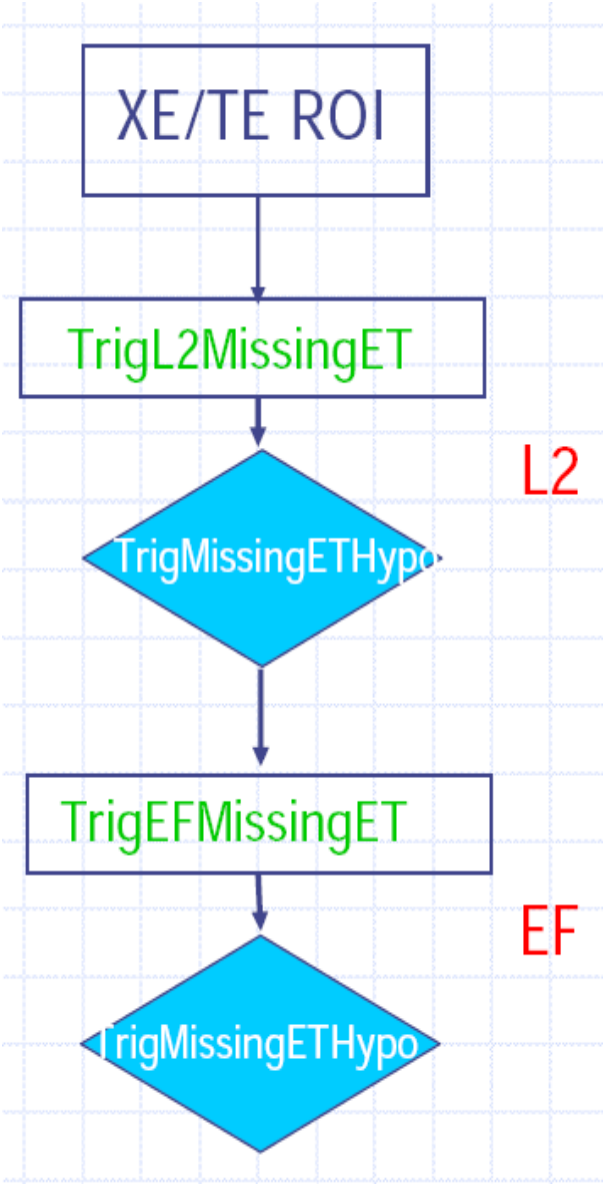






No DQ checks defined yet

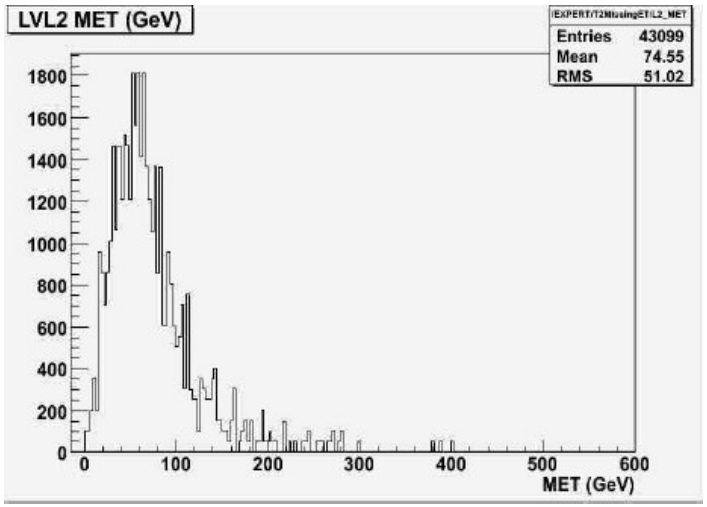
Missing ET slice

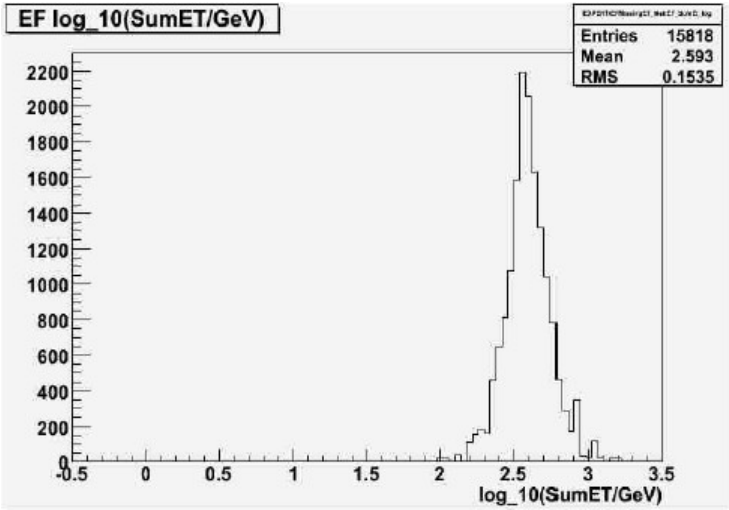


DQ histos:

L2 FEX: L1 METx,y ,MET, METPhi, SumET
L2 METx,y ,MET, METPhi, SumET
HYPO: cut counter, MET & SumET variables

EF FEX: METx,y , MET, SumET (lin&log)
HYPO: cut counter





No DQ checks defined yet

Other slices status of DQ Checks

- Inner Detector

- EF only
- check number of tracks, vertices
- Electron/Photon/Muon/Tau/Bjet/Bphysics/MinBias/FullScan algorithms

only few Dqchecks (Check_Histo_Mean) so far

- B physics/B jets

- L2 only
- histograms from DsPhiPiFEX and timers

no DQchecks yet

- Minimum Bias, e/gamma

-...coming soon

Summary

- for last TR tried to get more input from HLT slices
  many more DQ histograms in DQMF
  with more sensible DQ checks

- from “exercising the DQ infrastructure” to “assesment of DQ”

- Next steps:
  - complete list of DQ histograms and Dqchecks, all slices
  - evaluate sensitivity to DQ of histograms
  - select histograms for OHP/by-eye checks

  - shift instructions – what to do in case of bad DQ status
  - M6: use to evaluate quality of cosmics data?

- future dates early next year: next technical run & M6