

# Quality Monitoring in TRD

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# Overview

- ▶ multi level QA
  - ▶ raw data – formal structure, noise maps
  - ▶ clusters – charge and spatial distribution
  - ▶ ESDs – TPC–TRD correlation, energy deposit, PID
  - ▶ calibration parameters – stability
  - ▶ quasi-physics –  $\Upsilon$  family position and resolution
- ▶ technologies involved
  - ▶ data monitoring framework
  - ▶ analysis framework
  - ▶ Root GUI

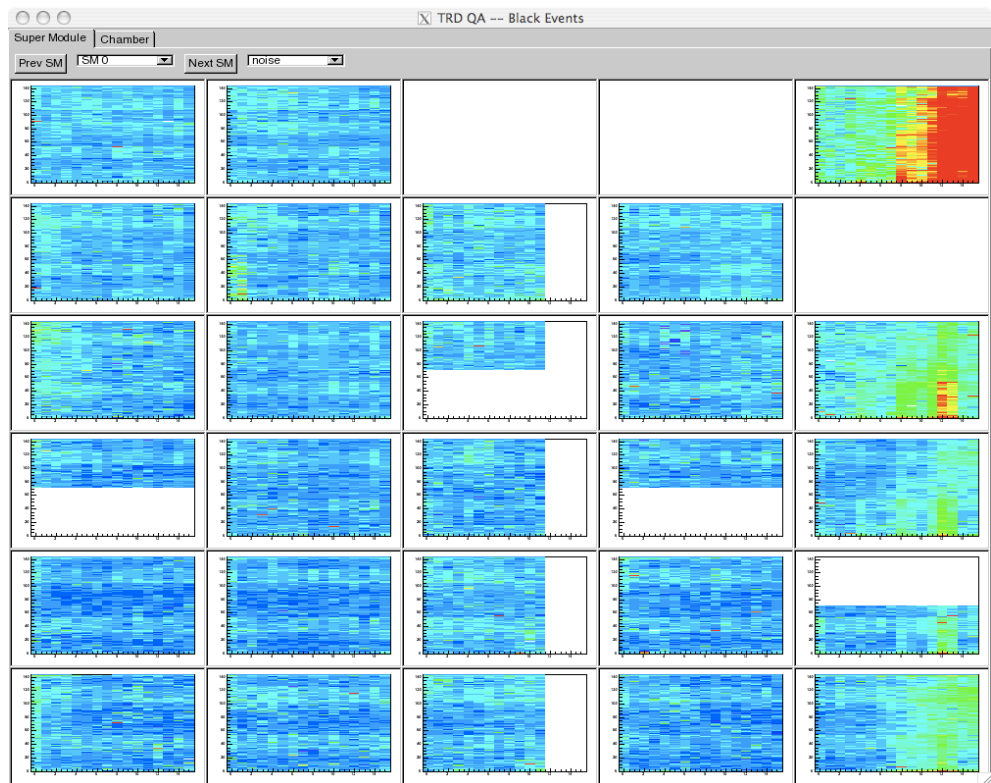
# Development Steps

- ▶ definition of histogram
  - ▶ granularity – detector structure and number of bins
- ▶ filling the histograms
  - ▶ events / clusters / track selection
- ▶ processing histograms
  - ▶ implemented in EndOfCycle
  - ▶ fitting, mean value calculation
  - ▶ contains understanding of detector performance
- ▶ comparing to the reference
  - ▶ I would like to compare with a flat line

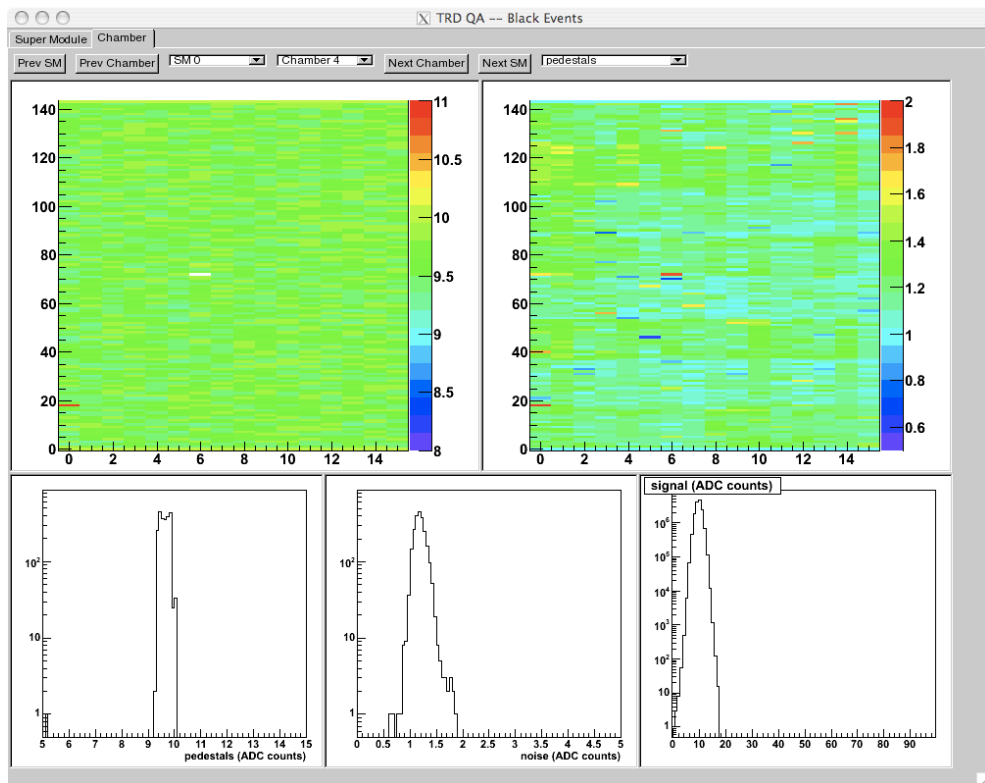
# GUI

- ▶ gui displays histograms created by AliTRDQADataMakerRec
- ▶ no logic or processing inside
  - ▶ only browsing functions (next super-module, next chamber)
  - ▶ exception: projection of 2D histograms into 1D
- ▶ located in TRD/qaGUI
  - ▶ build using ROOT GUI framework with Signal/Slots
  - ▶ classes are generic can be reused / adapted

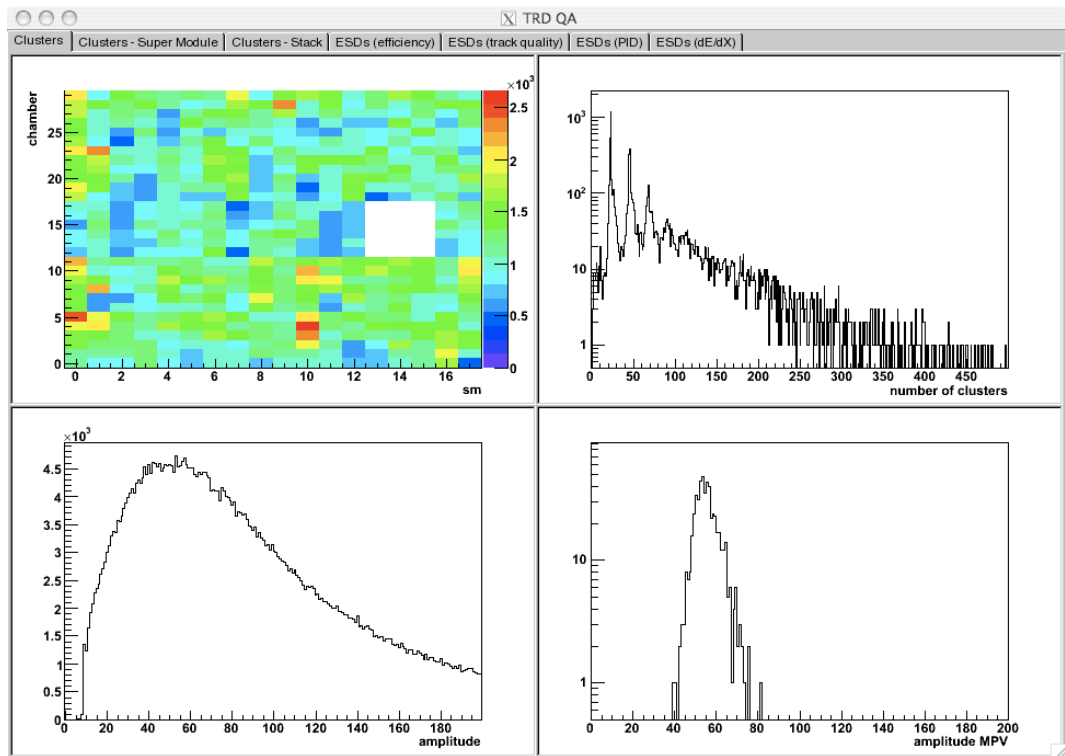
# Raw Data, black events from cosmic run



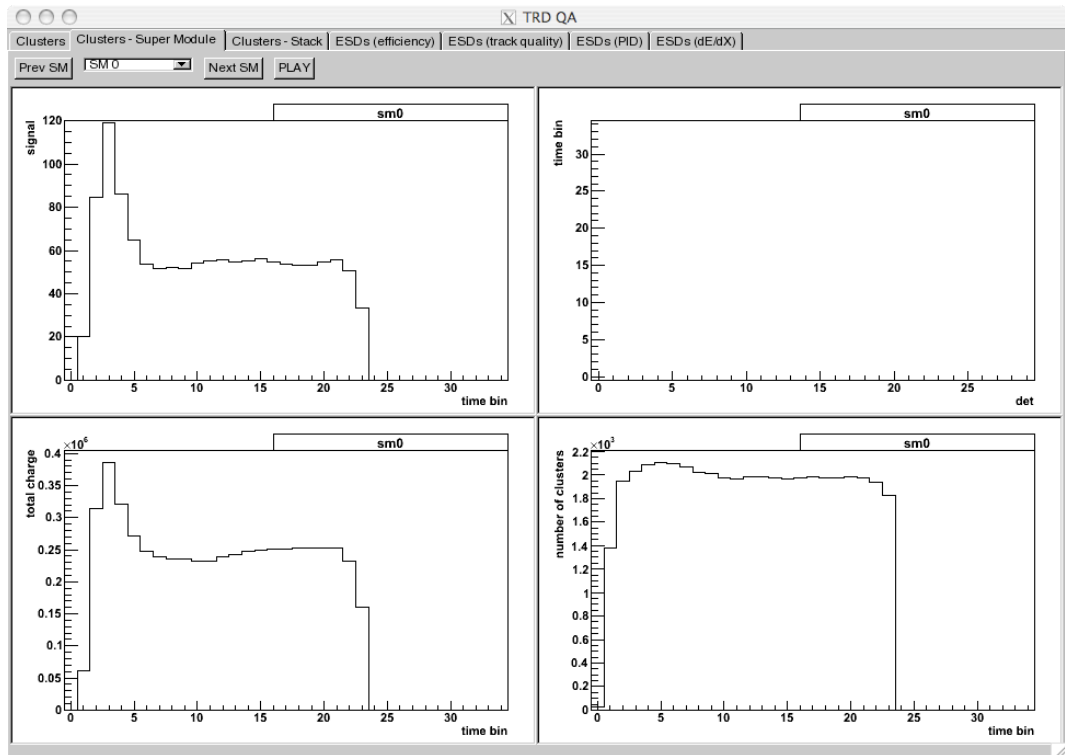
# Black Events, chamber by chamber



# Clusters – detector overview

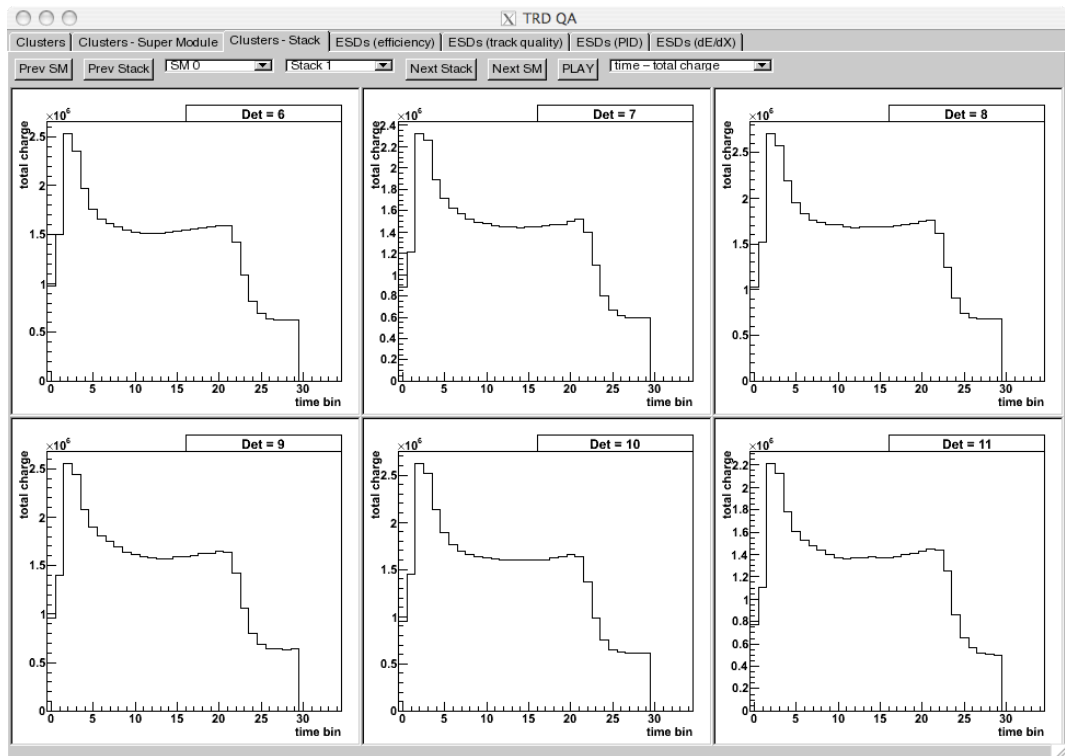


# Clusters – sector by sector

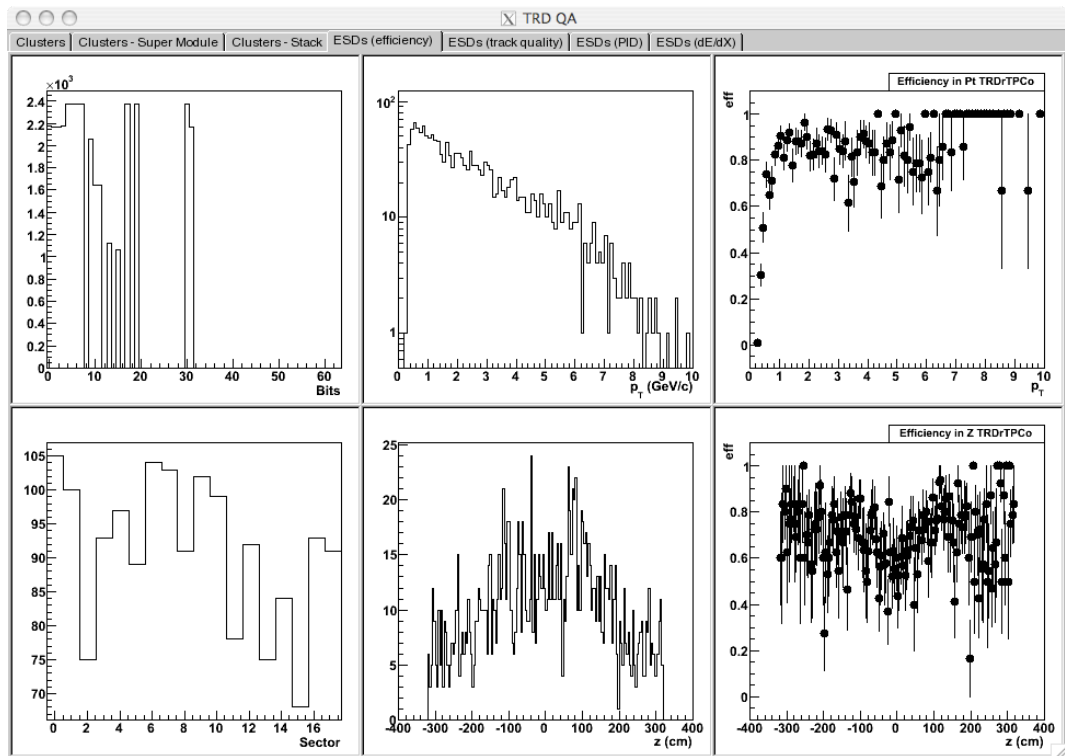




# Clusters – a closer look



# ESDs



# Quasi physics analysis

- ▶ quasi physics analysis ensures long term stability
  - ▶ place to understand detector performance
  - ▶ benchmark the calibration / alignment
- ▶ implemented as AnalysisTask
  - ▶ need rather large statistics
  - ▶ currently strict track quality cuts
  - ▶ location TRD/qaAnalysis
- ▶ currently in development
  - ▶ transverse momentum spectrum stack-by-stack
  - ▶ electron/pion separation
  - ▶ track pointing resolution
  - ▶  $J/\psi$  analysis

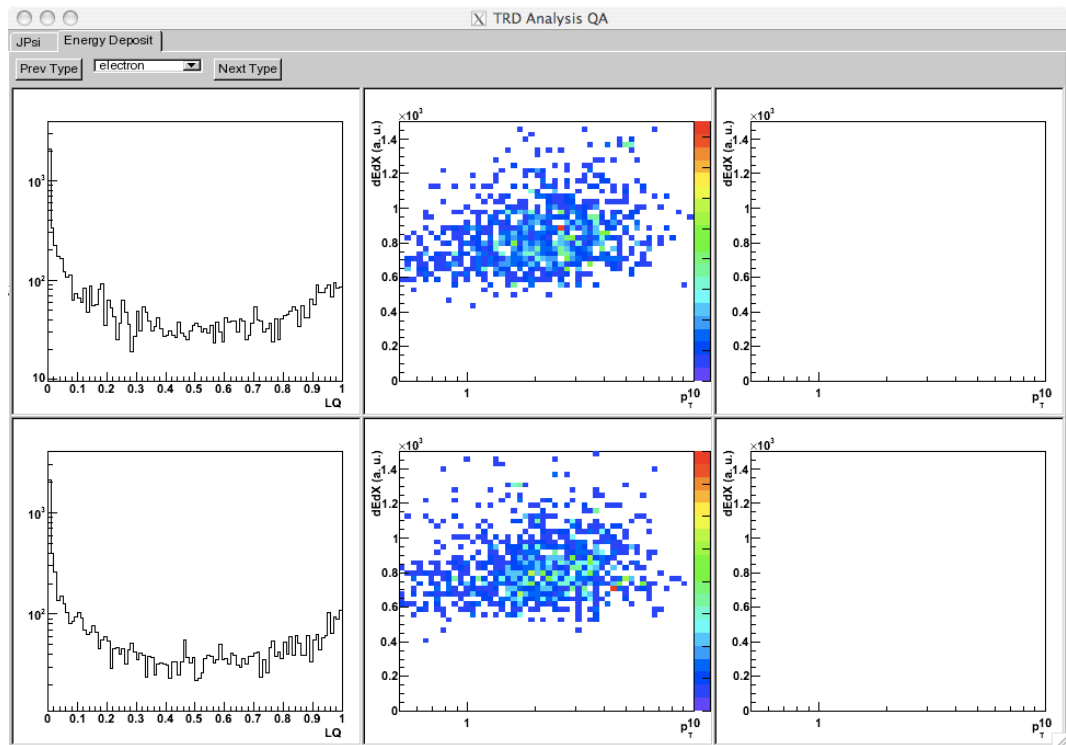
# Transverse momentum stability

- ▶ list of histograms
  - ▶ number of track stack-by-stack
  - ▶ number of electron tracks (weighting and threshold)
  - ▶ transverse momentum spectrum stack-by-stack
  - ▶ electron  $p_T$  spectrum stack-by-stack
  - ▶ "typical  $p_T$ " distribution in time and space
- ▶ check the symmetries ( $\eta$  and  $\phi$ )
- ▶ cuts are essential
  - ▶ detector is not necessary symmetric for background tracks

# Electron identification stability

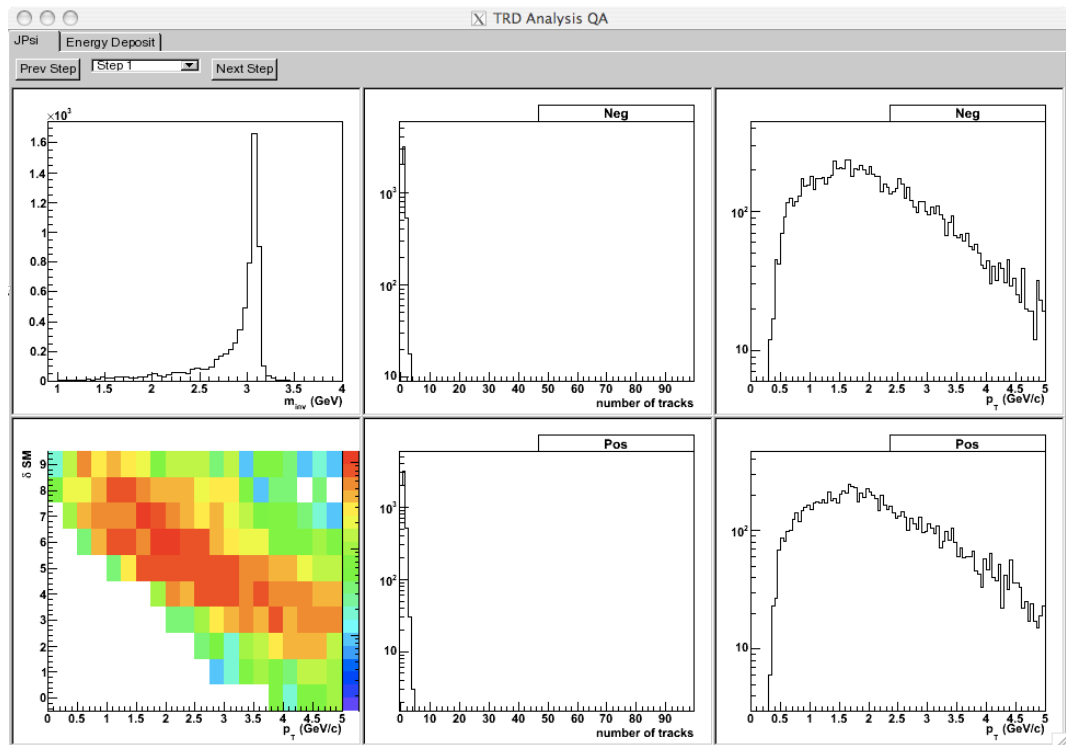
- ▶ segmentation limitations
  - ▶ statistics
  - ▶  $dE/dx$  resolution (rather stack than chamber level)
- ▶ histograms
  - ▶  $dE/dx$  vs  $p$  for electrons (weighted or threshold)
  - ▶ playing with 4  $dE/dx$  we have (total, amplification, plateau, TR)
- ▶ benchmarking response for a pure sample
  - ▶ electrons – conversions
  - ▶ pions –  $K_S^0$
  - ▶ protons –  $\Lambda$
  - ▶ kaons – TPC + TOF

# Energy Deposit



# Analysis

- ▶ resolution studies with ESDFriends
  - ▶ analyzes residuals vs angle
  - ▶ chamber-by-chamber
  - ▶ there are some problems reading friends.
- ▶  $J/\psi$  analysis
  - ▶ electron selection stability
  - ▶ azimuthal stability
  - ▶ currently code quality not data quality issue





# Plans

- ▶ deployment
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- ▶ documentation and user training
- ▶ online monitoring – under investigation
- ▶ quasi-online analysis and black events – Ixplus
- ▶ offline analysis – CAF