

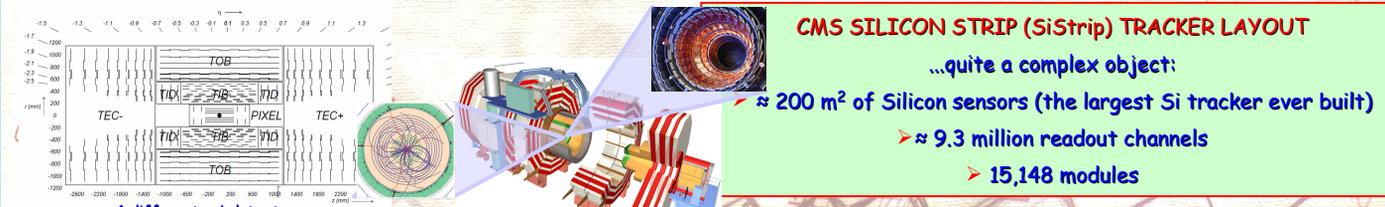


Data Quality Monitoring of the CMS Silicon Strip Tracker Detector



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Data Quality Monitoring (DQM) is being built to provide complete and coherent monitoring data (online and offline) at low latency, to ensure the optimal working of the hardware and software and to certify the quality of the data for analysis in an efficient way



DQM ONLINE
 from HLT and Storage Manager operates @ Point5 (CMS site) during data taking

DQM OFFLINE
 use Full statistic and a first calibration operates @ Tier 0/1 - within day/hours

CERTIFICATION PROCEDURE
 prepare Tracker flag on data quality before storage
 Manual + Automatic, operates @ Tier 0/1 - within few days

Data Bookkeeping System
 (data for Physics)

WHAT DQM MONITORS (Monitor Elements, ME):

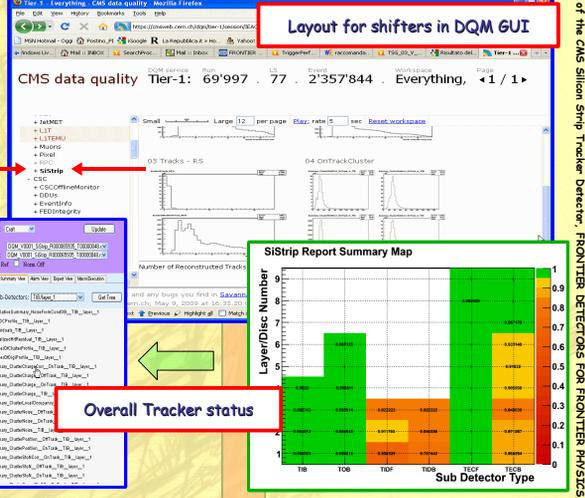
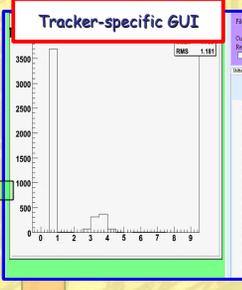
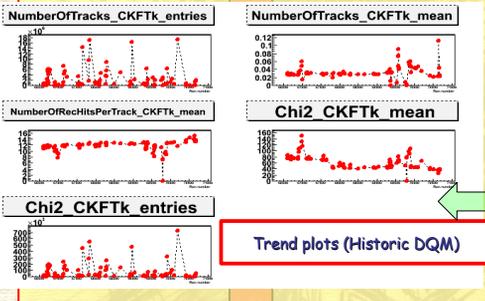
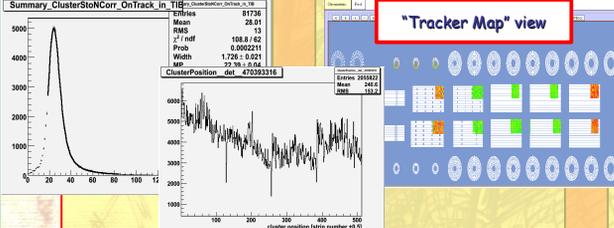
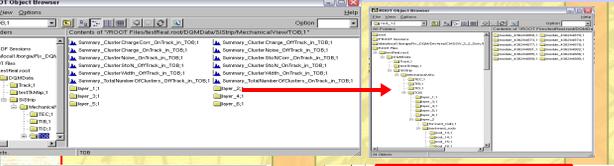
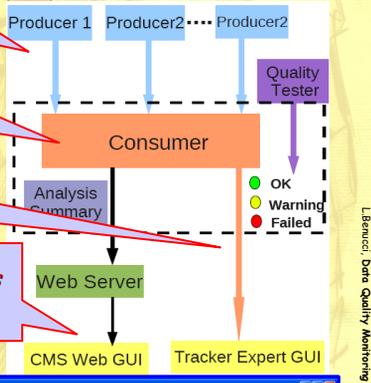
- RAW data (readout and unpacking errors)
- DIGIS and Cluster (related or not to a track)
- track parameters
- Hit residuals

The data quality is assessed through histograms (about 300,000 histograms defined). They are organized in hierarchical tree like folder structure reflecting the tracker geometry and are filled accessing information from data at various levels of data reconstruction. Finally they are stored in Root files

HOW DQM MONITORS:

- Producers (source) book and fill ME
- Consumers (client) access ME and produce Summaries to merge informations from each histogram of each module
- Quality tests: compare with reference histograms or reference values (mean,rms etc.) generate 3 (adjustable) alarm levels

visualize with Graphical User Interface (GUI)
 → CMS DQM GUI is web based: it is accessible from everywhere a web browser is available



ONLINE: Monitor a reduced set of data
 - give prompt feedback to Tracker experts about hardware status
 - identify problems very efficiently during data collection to take prompt actions

OFFLINE: Analyze the full statistic
 - Re-assess Tracker status using full reconstruction and best calibration constants
 - spot reconstruction, calibration or other unexpected problems

Merge informations together
 - from results of Quality Tests (automatic procedure) and manual checks from shifters
 - detect and flag new or temporary Tracker problems and classify each run according to hardware, reconstruction and calibration conditions



The system was used during extensive cosmic data taking of CMS in Autumn 2008:
 -> The SiStrip DQM system demonstrated to have a flexible and robust implementation and has been essential to improve the understanding of the detector
 -> It was possible to set up and test the first prototype of data certification procedure



→ Enable any user to consult the certification results and select suitable runs for specific commissioning/physics analysis tasks