

L1T DQM Introduction/Status

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Purpose of the L1T DQM



- Provide **online/offline monitoring** of the Level 1 trigger
 - Spot possible problems
 - Help diagnose reasons for issues
 - Ensure quality of the L1T operation
- **Data certification**
 - Provide handles to monitor data quality
 - Return a *global flag* for data quality LS-by-LS for the L1T

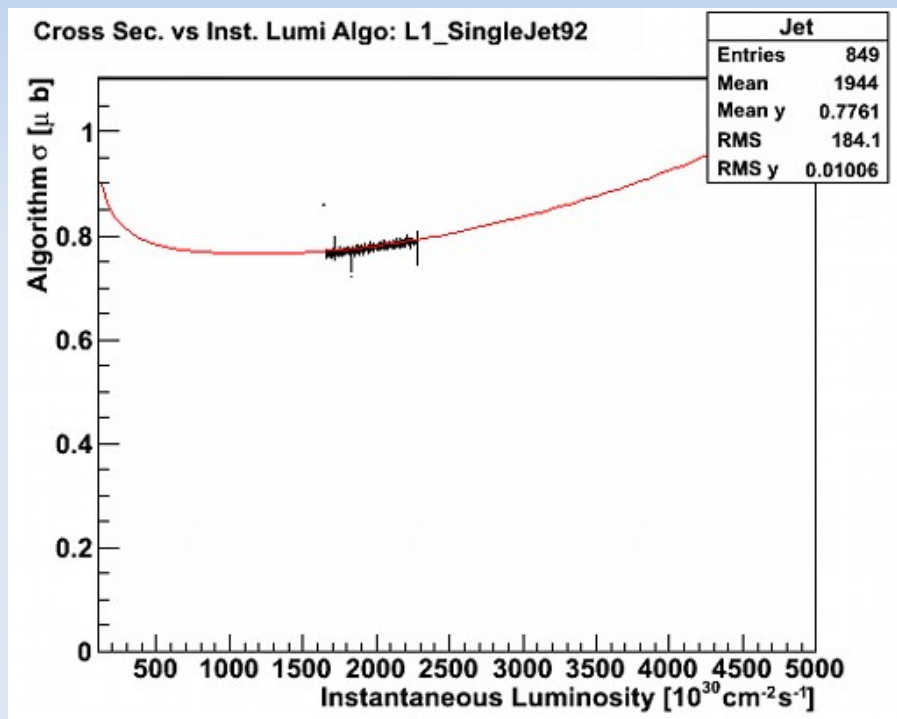
- **L1TRate**
 - Monitors L1 Trigger Rate and compares with expectation from WbM fits
- **L1TSync**
 - Monitors L1 Trigger Synchronization by comparison with the LHC Bunch Structure
- **L1TOccupancy**
 - Monitor occupancy plots to spot hot towers or dead channels
- **L1TTestsSummary**
 - Summarizes all tests above.

Status and Plans



- All tools have are online now.
- L1TOcupancy and L1TTestsSummary have been available since the beginning of the 2012 ion run but on “commisioning” mode.
- New developments on L1TSync underway... (study made but not yet implemented)
 - Use calo trigger to monitor mu triggers and vice-versa instead of using L1 Pass Troughs.

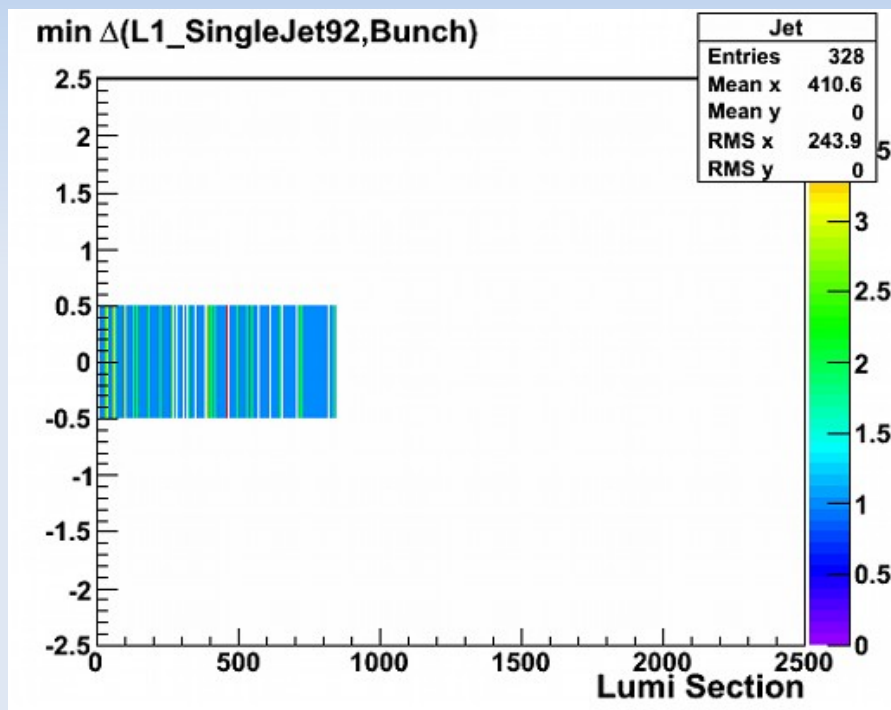
L1TRates



[More information](#)

- Monitors L1 rates from Lowest Unprescaled Single Object Triggers
- Running for several months now.
- Used frequently for online diagnosis and certification
- Every LS outputs observed rate over expected (from fit) for the current instantaneous luminosity

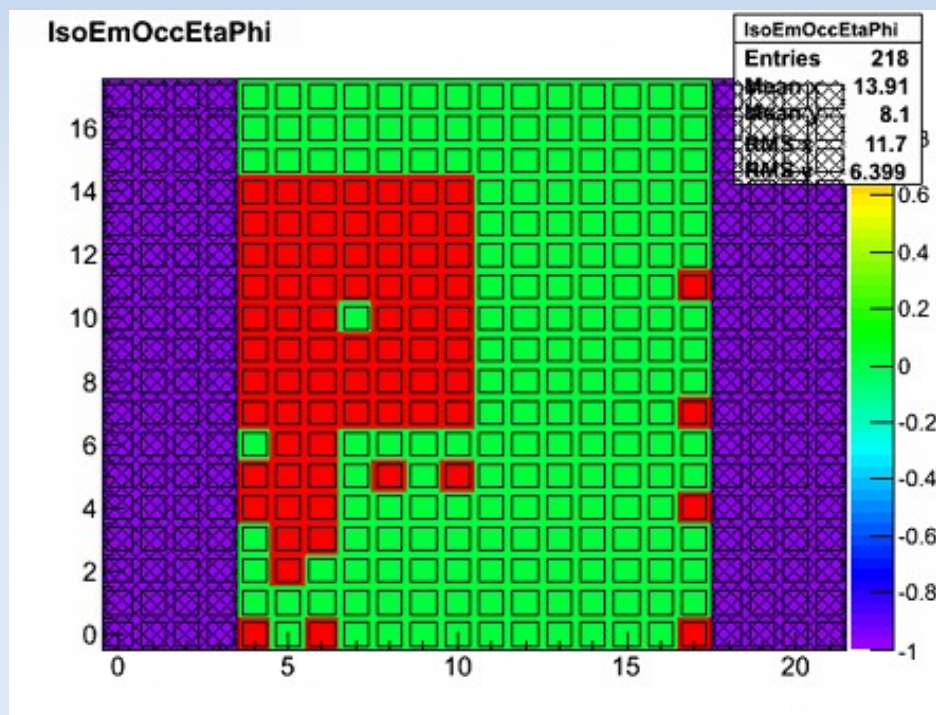
L1TSync



[More Information](#)

- Monitors L1 Synchronization for Lowest Unprescaled Single Object Triggers
- Running for several months now.
- Used frequently for online diagnosis and certification
- Effort being done to get more statistics in a unbiased way without depending on L1 Pass Throughs
- Every LS Block outputs fraction of in time (compared with LHC Bunch Structure) triggers

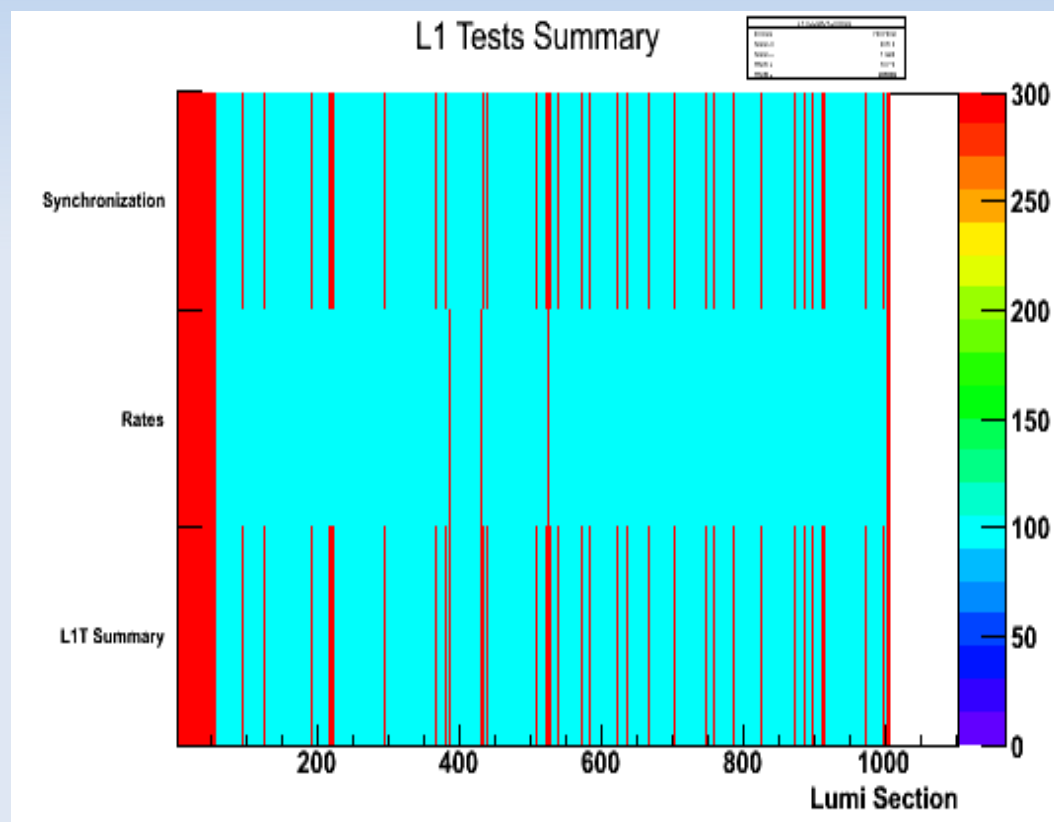
L1TOccupancy



[More Information](#)

- Online for some months.
- Monitors occupancy of predefined plots
- To be fully functional needs:
 - Calo plots to implement min Pt on their trigger primitives
 - Mu plots that have absolute trigger primitive counts
- Every LS Block outputs fraction of bins that are not masked and fail the test.

L1T Tests Summary



- Online for a few months.
- Summarizes all tests preformed in L1TRate, L1TSync (and in the future L1TOccupancy)
- Allows to spot problems by looking at a single plot
- Every LS outputs the status of all tests and merges them into a single quality flag

Implementation Offline



- **L1TRate**
 - Requires saving Monitored trigger rate every LS
- **L1TSync**
 - Requires saving number of triggers on/out-of time per LS
 - Requires Central DQM providing block certification capability in the offline environment
- **L1TOccupancy**
 - Requires saving differential snapshots of the monitored plots every LS
 - Requires Central DQM providing block certification capability in the offline environment
- **L1TTestsSummary**
 - Must be run after all other tests are finished.

Conclusions



- All foreseen tools for the L1T online DQM are implemented and currently running online. But still some things to be done:
 - Remove the dependence of L1 Pass Troughs for L1TSync
 - Make monitored trigger selection capable to recognize BPTX AND triggers. (Ion Runs)
- For this tools to get to their full potential some action is required by the sub-systems
 - Some plots need to be produced differently (i.e normalization) by the mu sub-systems
 - Calo systems filling their plots with primitives above a given threshold.