

# M6 Offline Analysis

Katarina Pajchel

University of Oslo

April 18, 2008

- Continuation from Online monitoring → Offline
- Offline Monitoring histogram display
- Offline analysis results from M6
- Event gallery
- Propagation of the information to the Condition Database

- Online

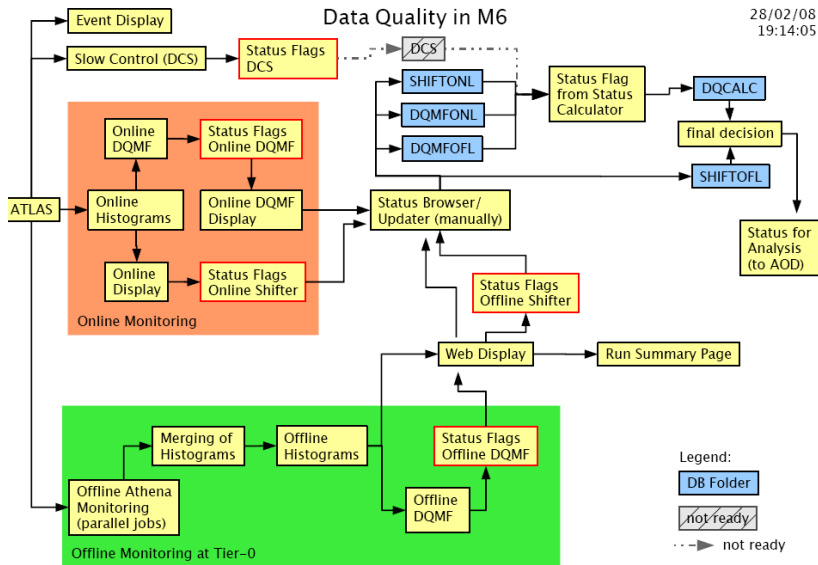
- Run at the Point-1 computing facility
- Live detector performance - continuous updates
- Organized according to the subsystems
- Analysis of basic quantities
- If problems, sub-detector experts are notified, a run status immediately reported to database

- Offline (Tier-0) monitoring

- Run during reconstruction on Tier-0
- Results are not monitored in real time
- Access to calibration available, full detector reconstruction
- More complex, reconstructed, derived quantities may be monitored
- Organized according to the subsystems
- Merging of results
- Run/Luminosity Block (LB) aware monitoring
- Longer time scale, monitoring of trends
- Results stored in Condition Database COOL

# Data Quality Monitoring for M6 from Sebastian Schatzel

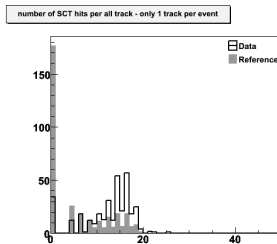
28/02/08  
19:14:05



## Run 42325, physics\_HLT\_Cosmics\_NIM4:

- Overall Status: Undefined
  - CentralTrigger: **Red**
  - Global: Undefined
    - Efficiency: Undefined
      - IDMuons: Undefined
      - IDTile: Undefined
      - TileMuons: Undefined
    - Synchronization: Undefined
      - BCID: Undefined
      - L1ID: Undefined
  - InnerDetector: **Red**
    - Global: Undefined
    - IDAlignment: **Red**
      - InDetCosmic\_Tracks: **Red**
        - GenericTracks: **Green**
        - HitEfficiencies: **Red**
        - Residuals: **Red**
    - SCT: Undefined
      - Barrel: Undefined
        - Efficiency: Undefined
        - Errors: Undefined
        - Hits: Undefined
        - Noise: Undefined
        - TBin: Undefined
        - Tracks: Undefined
      - NegativeEndcap: Undefined
        - Efficiency: Undefined
        - Errors: Undefined
        - Hits: Undefined
        - Noise: Undefined
        - TBin: Undefined
        - Tracks: Undefined
      - PositiveEndcap: Undefined
        - Efficiency: Undefined
        - Errors: Undefined

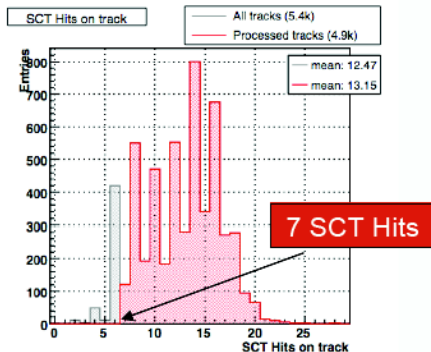
- Summary histograms are available on the web
- Histograms are analyzed - flags **Red**, **Green**, **Yellow**, **Undefined**
- Example: ID global Monitoring SCT number of hits per track mean: 11.84



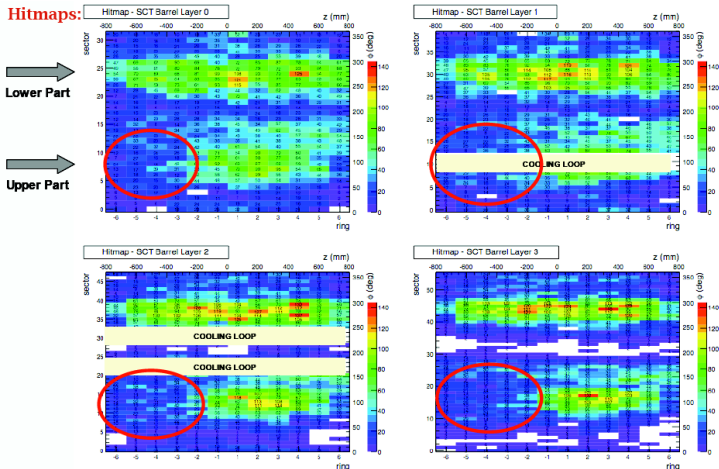
# M6 Offline Analysis Summary

## SCT offline analysis by Regina Moles (IFIC)

- A large number of good runs were analyzed - used for alignment
- Number of events: 13393
- Number of tracks: 5401 (tracks used for alignment  $\geq 7$  hits: 4910)
- Number of SCT Hits: 64543



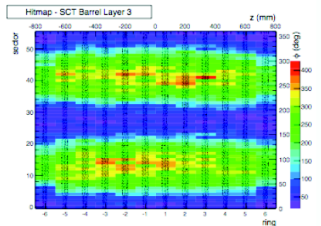
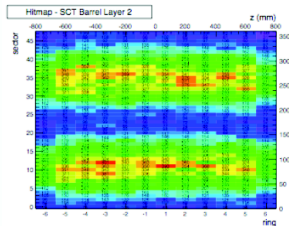
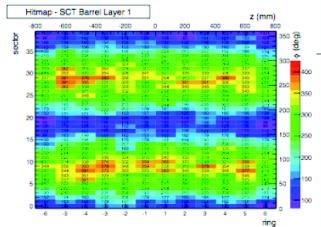
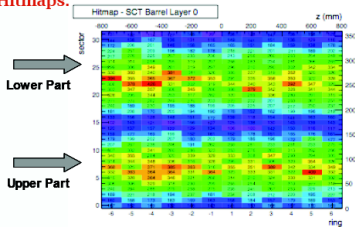
# M6 Hitmap study



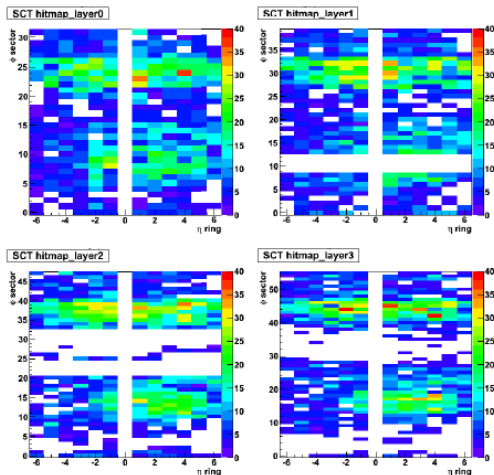
- Some cooling loops were not functioning → white bands.
- No tracks on one side of the upper part. The scintillator trigger placed only on one side of the detector. See backup slides.

# Hitmaps Cosmic Ray simulation

Hitmaps:

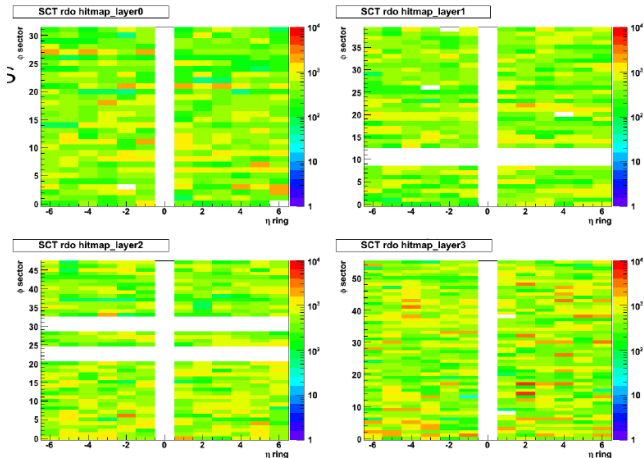


# Hitmaps - events with tracks in SCT



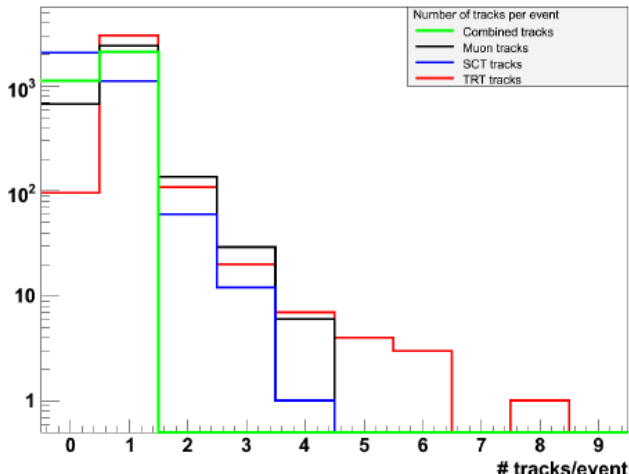
- Study of occupancy - Run 34719
- From Maria Moreno Llacer

# Hitmaps - no tracks, noise study



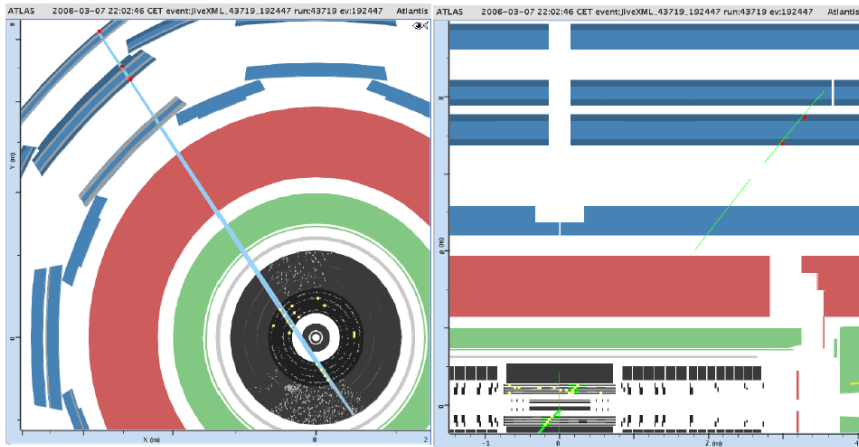
- Noisy modules could be identified - Run 34719
- Reported to SCT experts and recorded in the detector condition DB
- From Maria Moreno Llacer

# M6 - Combined tracks

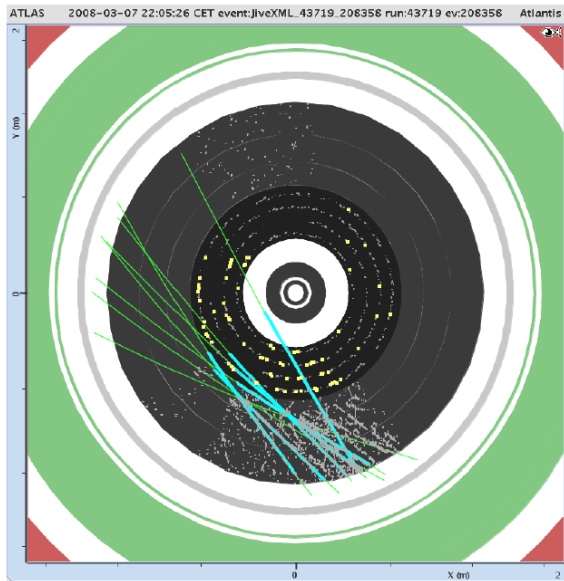


- Combined tracks - Run 34719
- From Maria Moreno Llacer

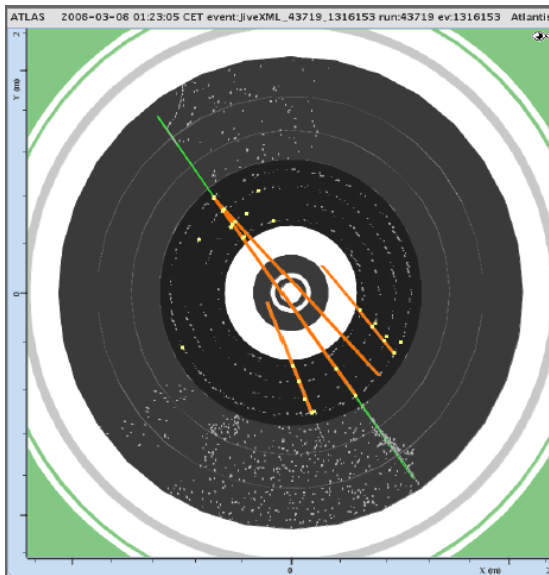
# M6 - Nice events



# M6 - Nice events - Shower?

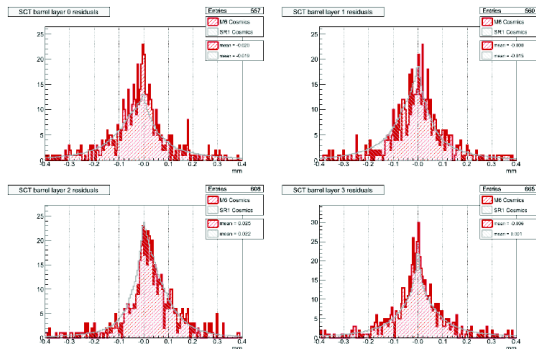


# M6 - Nice events - 4 tracks in SCT



# Offline comparison M6 run 42325 with SR1 tests

Comparison wrt SR1 residuals:



Residual:

$$r = p_{track} - p_{cluster}$$

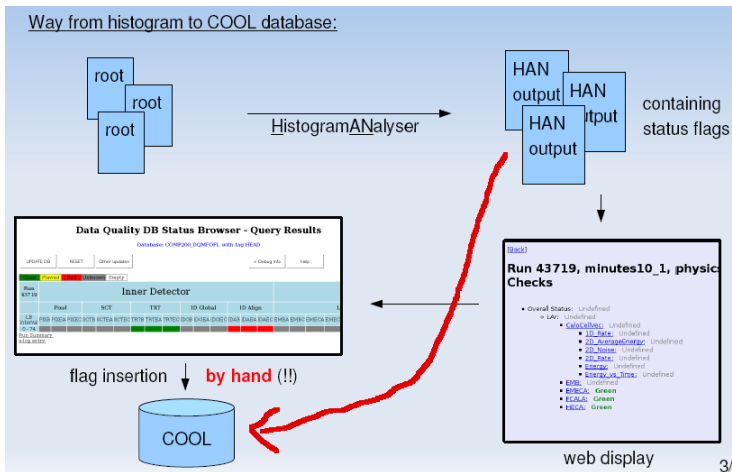
$p_{track}$  - predicted position of a cluster of hits in SCT calculated on the basis of track perigee parameters

$p_{cluster}$  - observed cluster position

- 42325 - Long stable over-night run
- Comparison with the cosmic ray test on the surface in SR1 Atlas assemble hall (clean room)
- from Carlos Escobal

- Monitoring provides the information about the data taking conditions
- Status information is stored and retrieved from the COOL conditions database
- Indexing: Luminosity Block (LB), absolute timestamps
- Focus on summary information
  - 'Traffic light' type status per subdetector part (red/yellow/green)
  - Fraction of dead modules
  - Thrust of the dead modules - an indication of their spatial correlation
  - Comments
- /GLOBAL/DETSTATUS/LBSUMM the final 'summary' folder for offline analysis
- The information can be accessed in Athena during reconstruction and analysis

# Data Quality Monitoring → Condition DB



Development towards a more automated process.

From Benedikt Vormwald

# Detector Condition Data Base COOL

| Monitoring   | Schema  | COOL folder <sup>1</sup> | indexing  | Filled by                        |
|--------------|---------|--------------------------|-----------|----------------------------------|
| DQMFOOnline  | online  | DQMFONL                  | timestamp | Online DQMF                      |
| ShiftOnline  | online  | SHIFTONL                 | run-LB    | Online shifter                   |
| DCS          | offline | DCSOFL                   | timestamp | Status from DCS system           |
| DQMFOffline  | offline | DQMFOFL                  | run-LB    | Offline DQMF                     |
| DQCalc       | offline | DQCALCOFL                | run-LB    | Status Calculator application    |
| ShiftOffline | offline | SHIFTOFL                 | run-LB    | Offline shifter <sup>2</sup>     |
| DQStatus     | offline | LBSUMM                   | run-LB    | Final summary status, for Athena |

Long list, complex system.

Can it serve as an overview and summary of the monitoring?

More about COOL

<https://twiki.cern.ch/twiki/bin/view/Atlas/CoolDetStatus>

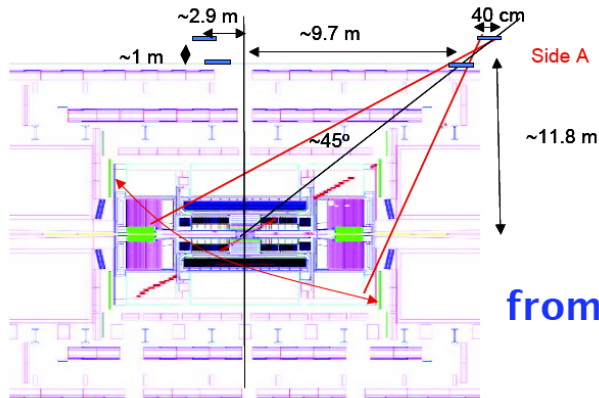
---

<sup>1</sup>All Cool folders have /GLOBAL/DETSTATUS/ in front.

<sup>2</sup>if disagreement with DQCalc

- Promising results from offline analysis of the SCT
- Improvements of the monitoring system from M5 to M6
- The information flow is getting more automated
- The condition database is being updated by the different parts of the detector monitoring and control system
- This information will become important in analysis of real data which we all prepare for

# Backup - M6 Scintillator setup



From Anatoli Romaniouk

A comment from Pippa Wells (one of the SCT-bosses) said when she took over one of the shifts. “Anything exciting? No? Good, it is not supposed to be exciting!”