



# Technical Runs and Cosmics/Integration Runs

## TR, Mx - M4 (23 Aug - 3 Sept)

Exercise more and more of the "full chain":

Detectors - Trigger+DAQ - transfer to and processing at Tier0 - Tier1s... calibration/alignment data path to come

- ◆ *Technical Runs* don't include detectors, but feed simulated data or previous cosmics data into TDAQ Readout Subsystems (ROSs), upto offline storage Castor
  - ◆ TDAQ functionality, bandwidth, rates
  - ◆ Data Streaming, Luminosity Blocks, Castor2 first tested in July/Aug TR
- ◆ *Cosmics Runs* take data from more and more detectors, through TDAQ, Tier0, ship to Tier1s, ... - including conditions DB data
  - ◆ Detector integration
  - ◆ Experience from M4, next TR, M5 plans

# TR and Mx scope

Rates,  
decision times,  
bandwidth

40 MHz

2.5  $\mu$ s

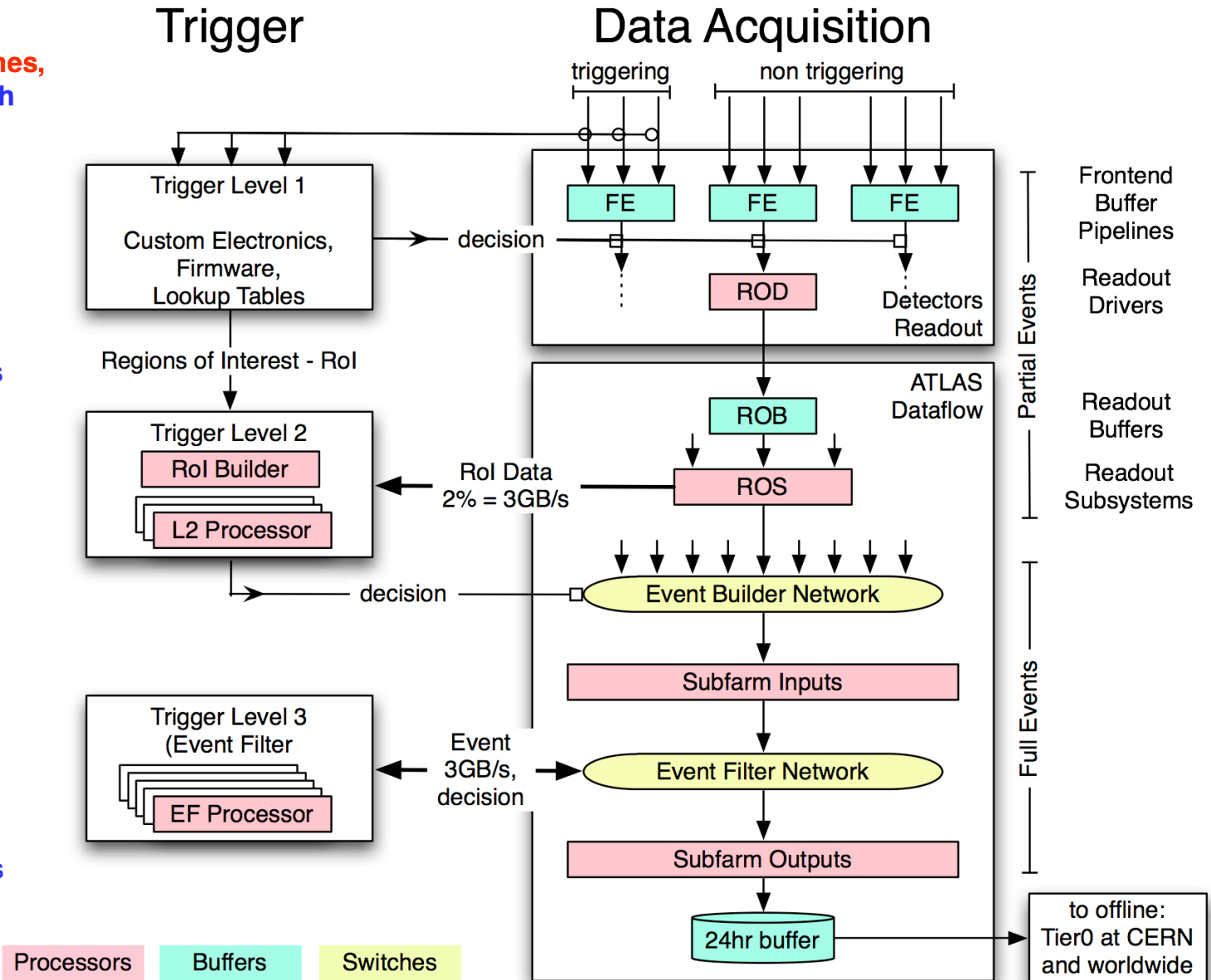
75 kHz  
120 GB/s

10 ms

2500 Hz  
3 GB/s

2 s

200 Hz  
300 MB/s



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decision times,  
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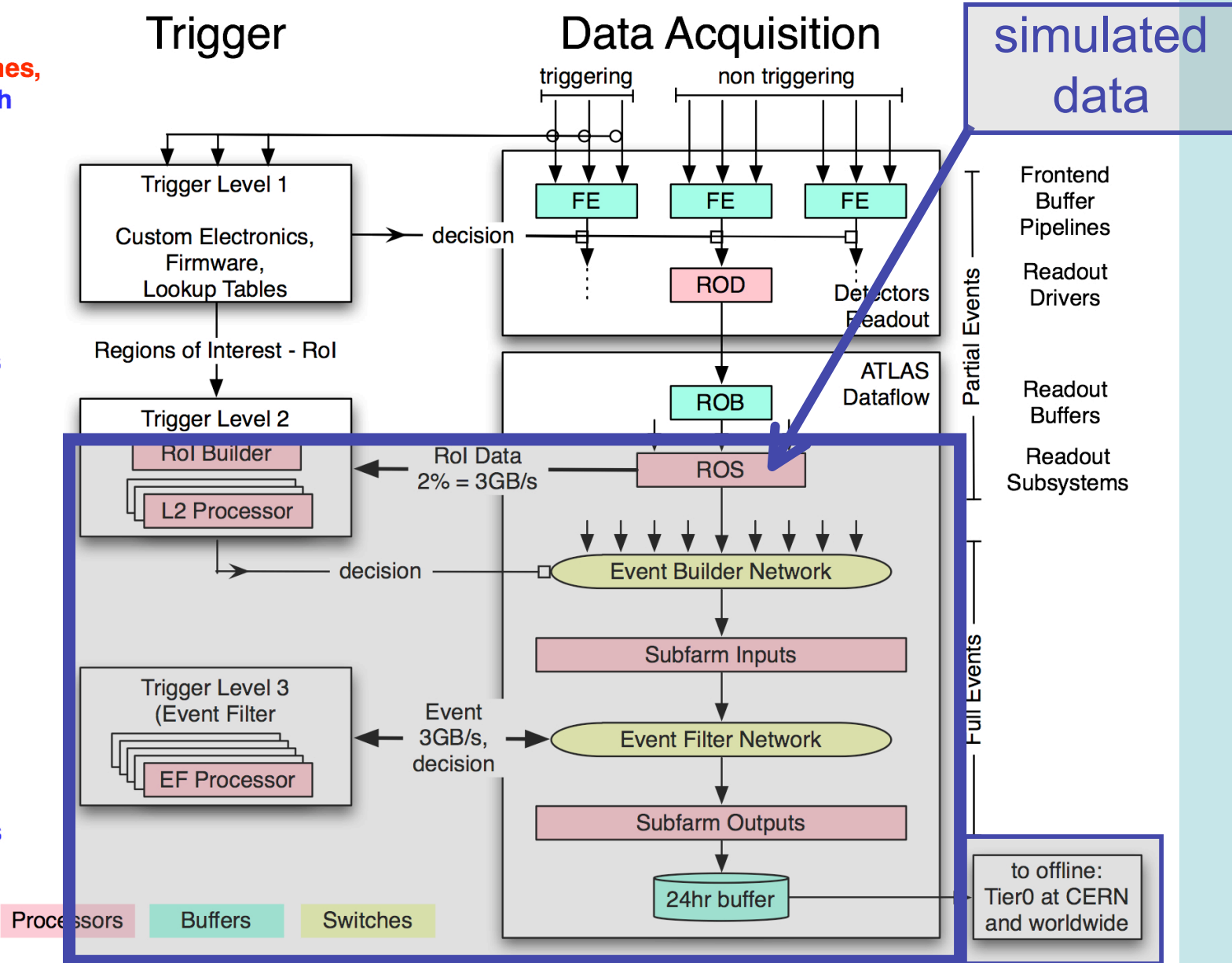
2500 Hz

3 GB/s

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200 Hz

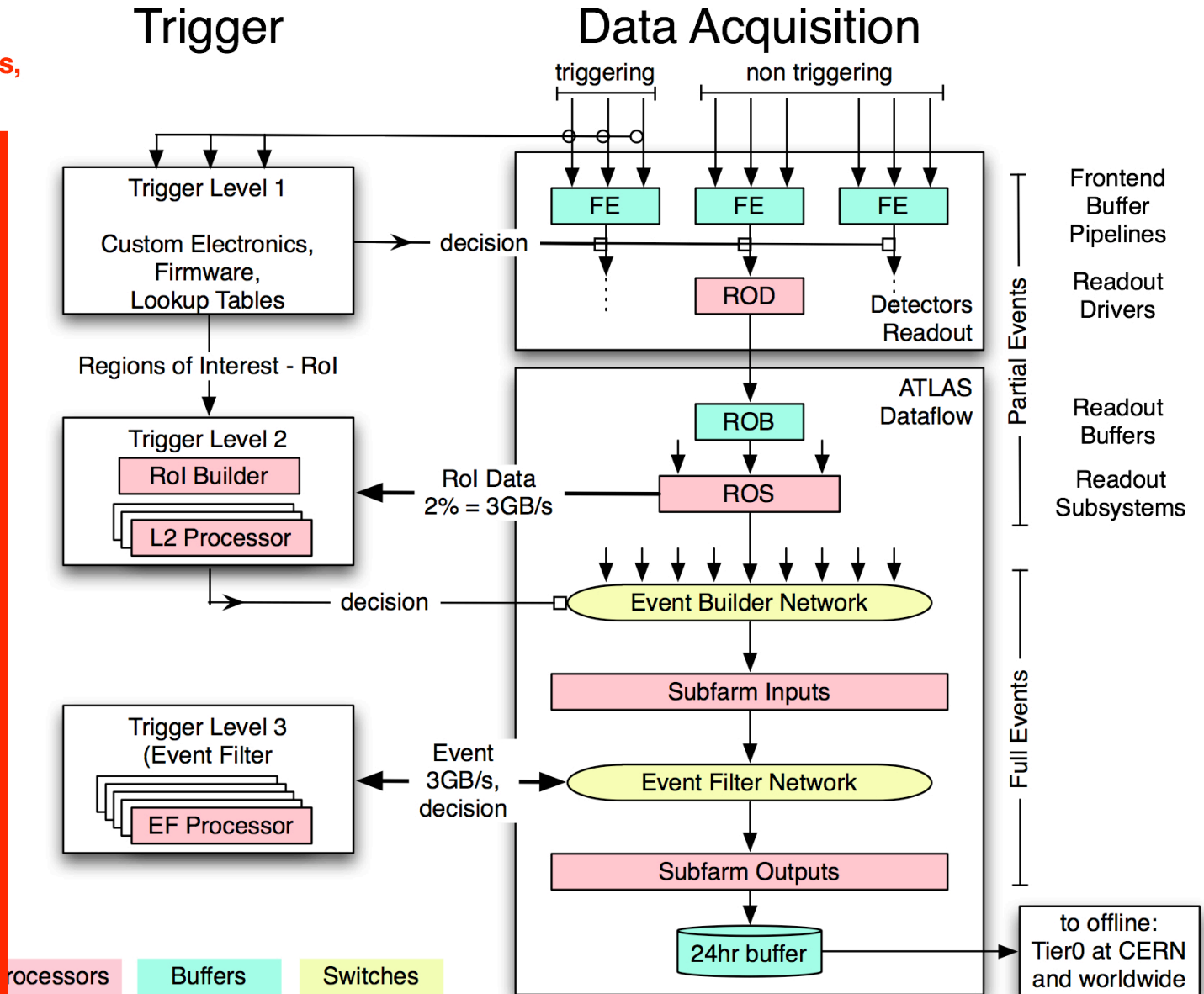
300 MB/s



# TR and Mx scope

Rates,  
decision times,  
bandwidth

RPC/TGC trigger: ~100 Hz  
Tiles trigger rate: ~0.1 Hz



# Mx integration planning

Dates	Systems Integration	Detector configuration	Operations	Cosmic run	Training	ACR
M1: 11-19/12 2006	DAQ R/O Barrel Lar & Tile CTP	Barrel calorimeters	Achieve combined run	2 days Tile cosmic trigger	N/A	Initial setup: 5 desks Central DCS
M2 28/2 to 13/3 2007	DAQ/EB DAQ V. 1.7 Muon barrel (S. 13) Monitoring/DQ	Barrel calorimeters Barrel Muon	Combined runs Mixed runs	2 x weekd ends Tile cosmic trigger + RPC cosmic trigger Periodic cosmic runs after M2	After M2 week	Increase to 7 desks
M3 4/6 to 18/6 2007	Barrel SCT Barrel TRT Muon EC (MDT, TGC) Offline	Barrel and End Cap calorimeters Barrel muon (5&6) EC muon MDT Barrel SCT, TRT EC muon TGC	1st week focus on operations, checklist management, coordination between desks	1 week Tile + Muon cosmic trigger (side A)	4/6 to 11/6	Towards final layout: 13 desks
M4 23/8 to 3/9 2 day setup 2 week ends	Level-1 Calo HLT DAQ 1.8 Offline 13	Barrel & EC calos Barrel & EC muon Barrel TRT SCT R/O Level-1 Mu, Calo	ATLAS-like operations Use of DQ assessment	1 week Try also calorimeter trigger	Whole week	Final setup
M5 22/10 to 5/11	ID EC (TRT) Pixel (probably R/O only) SCT quadrant	M4 + Pixel (R/O only, no detector)	Week 1 system assessment Week 2 ATLAS- like operations	1 week	1 week	
M6 February/March		+ SCT and Pixel detectors	ATLAS-like Operations	Whole week		

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◆ *Technical Runs weeks inbetween Mx - next: 24 Sept - 1 Oct*

# Some results from M4 (1): TDAQ

(David Francis)

## ❑ Configuration

### ❑ Hardware basically the same as that deployed for M3, except:

- o 7 more Online operations nodes
- o HLT nodes increased by factor 2, i.e. 124 nodes
  - One LVL2 rack  $30 \times 8 = 240$  L2PUs,
  - Three EF racks  $90 \times 8 = 720$  PTs (selection processes)
  - Baseline Level 2 algorithms:
    - o TrigL2CosmicMuon, TrigTRTSegFinder and TrigT2CaloEgamma
  - Baseline Event Filter algorithms:
    - o TrigEFIDCosmic and CaloRec
- o 4 final SFO machines writing to Castor 2

### ❑ Needless to say using TDAQ software release 01-08-01

- o Extensively tested during last Technical run
- o Detector mask, Start of Run, End of Run and luminosity blocks information recorded to Conditions (i.e. recommendations of metadata task force)
- o Note: Streaming was not foreseen in this release
  - Temporary implementation allowing streams based on L1 trigger Type i.e. RPC, TGC and Tile muon triggered event streams

## (1a): TDAQ high-rate tests

- ❑ elog Ramped up clock trigger reach 10kHz
  - Limit of TRT (8 kbyte ROD fragments) and SCT (clock trigger protection)
    - Segments: SCT, TRT, LArg, Tile, RPC and MDT
- ❑ Changed to “Random clock trigger”
- ❑ Achieved ~12/13 KHz
  - Rate Limited by artificial L1 busy
    - Segments: SCT, TRT, LArg, Tile, RPC and MDT
    - Segments: SCT, TRT, LArg, Tile, RPC and MDT, L1Calo
- ❑ Reconfigure L1 central trigger
- ❑ Achieved ~23 kHz
  - Rate limited by single L2SV
    - Segments: SCT, TRT, LArg, Tile, RPC and MDT, L1Calo
    - Segments: SCT, TRT, LArg, Tile, RPC and MDT, L1Calo
    - SCT frontend boards powered off !
  - Included two more L2SVs
  - Achieved ~ 50 kHz with only LArg. Only
    - Calo slice (TrigT2CaloEgamma and CaloRec) force accepting all RPC triggers (~ 20 Hz)
    - Dummy slice force rejecting all Clock triggers (~50 kHz)
    - Data written Castor

# DQMF

- In general was very successful
- By the end of M4 the DQMF configuration included:
  - LAr (13 histograms), Tile (20 histograms), TRT (15 histograms), SCT (3 histograms), CTP (97 histograms), MUONS (1332 histograms (MDT)), HLT (90 EF + 94 L2 histograms)
  - MDT configuration was using custom algorithms
- One bug in the DQMF Agent has been discovered and patched:
  - The agent died if there was no Histogramming IS server running
- Features requested:
  - DQMF Agent shall be able to reload configuration database without restarting
  - Instructions on how to interpret histograms should be provided by detectors
    - DQParameter class will have new attribute "Description" where this information should be provided

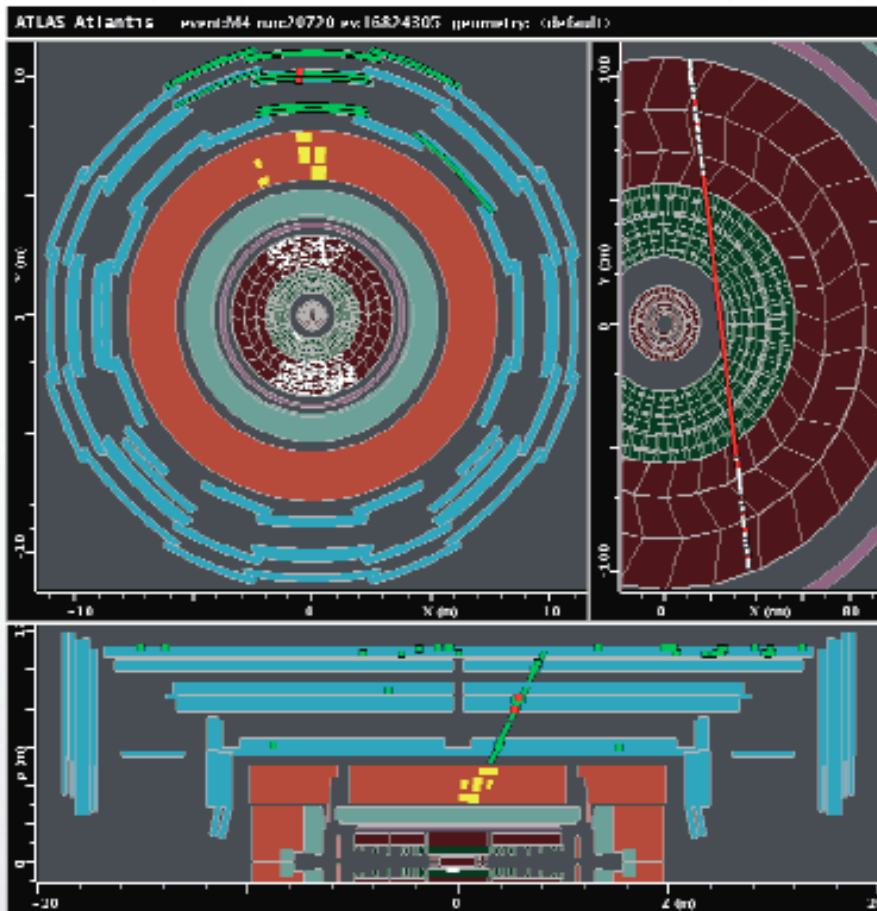


# Event Displays

- Atlantis ED was working on :
  - Was running on pc-atlas-cr-05
  - Some requests:
    - Have date/time on Canvas
    - Need pause/resume button when in server mode
    - Have different sizes of unconnected hits and hits on tracks
- VP1 display was integrated:
  - It was running on pc-atlas-cr-02 (temporary solution)
  - If we want to use it then we have to find a way of doing proper X display authentication via PMG agents
- General issue:
  - We have to make sure that these displays are addressing requirements of detectors experts

# (3): Higher Level Trigger (Alessandro Cerri)

## One picture...



And some talks:

### •TRT:

- Alex@ID commissioning: <http://indico.cern.ch/getFile.py/access?contribId=0&resId=0&materialId=slides&confId=20473>
- Jamie@CHEP: <http://indico.cern.ch/getFile.py/access?contribId=5&resId=1&materialId=slides&confId=20059>
- Laura & Francisco@TAPM:
  - <http://indico.cern.ch/getFile.py/access?contribId=0&resId=0&materialId=slides&confId=19641>
  - <http://indico.cern.ch/getFile.py/access?contribId=0&resId=1&materialId=slides&confId=19641>

### •LAr:

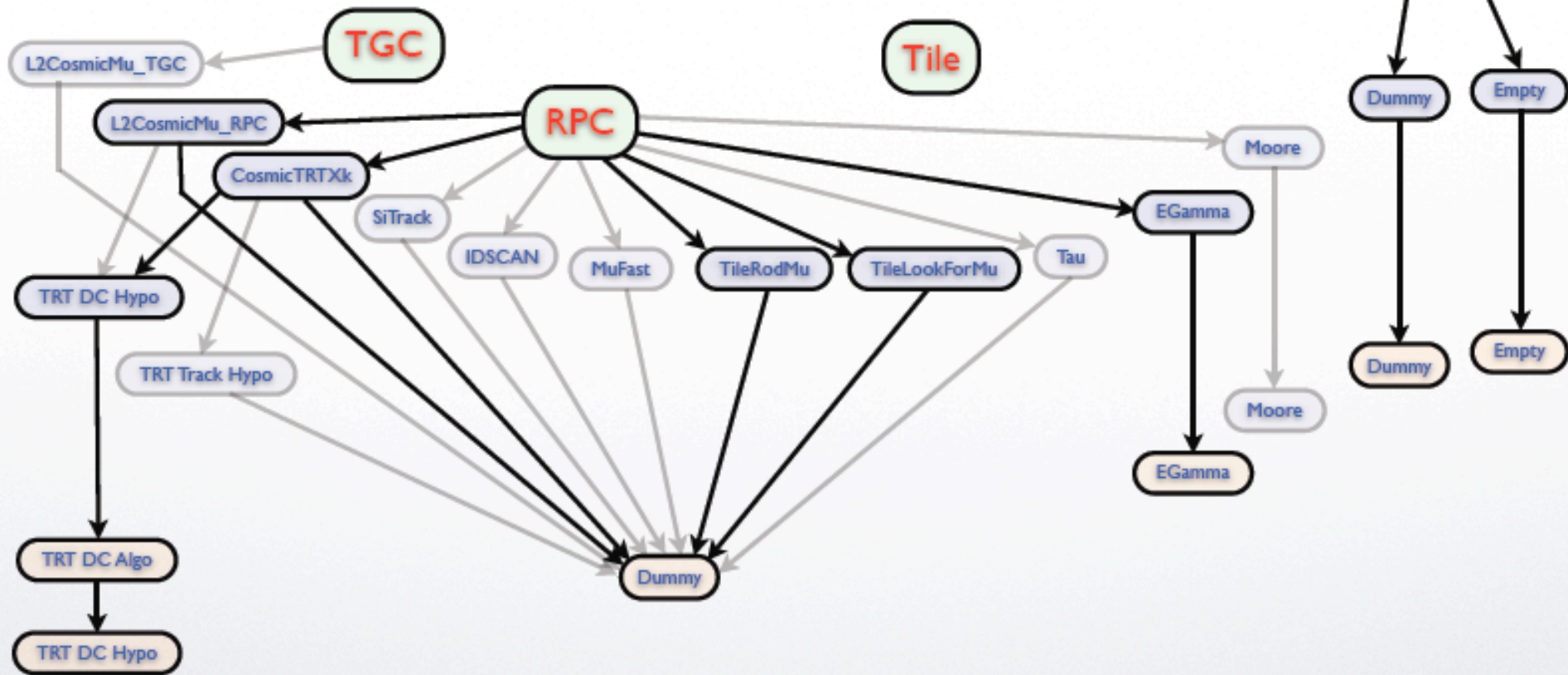
- Denis@TAPM: <http://indico.cern.ch/getFile.py/access?contribId=2&resId=1&materialId=slides&confId=15674>

### •Muons:

- Gaston & Takanori: see Jamie's talk above

# (3a): Higher Level Trigger - trigger slices

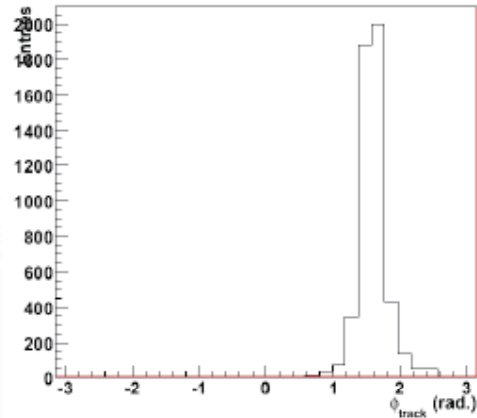
L1 L2 EF What we used:



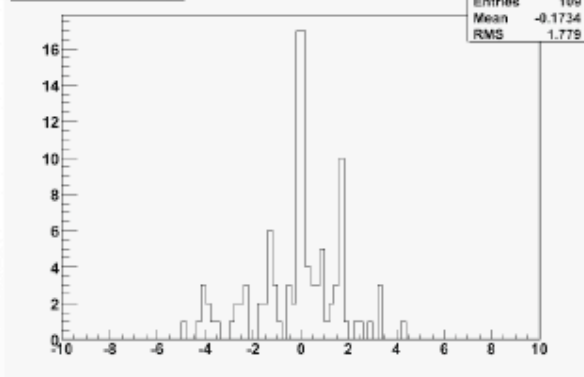
## (3b): Higher Level Trigger

# Higher level results...

Online  $\phi_{rec}$  (rad.)

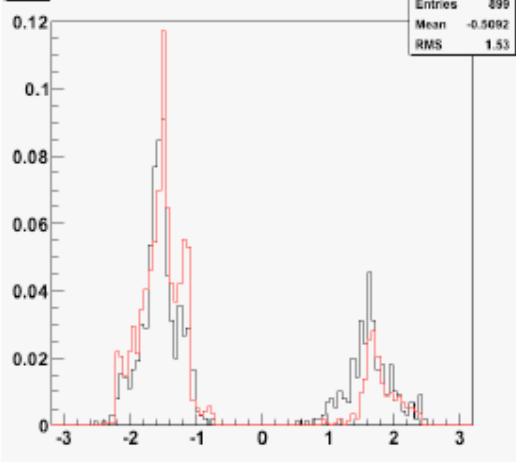


MDT residual (cm)

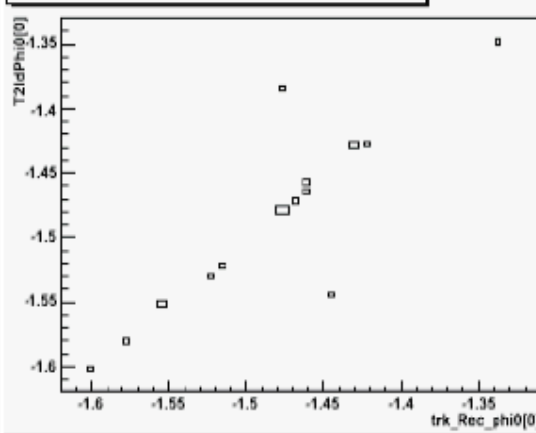


- Working on understanding why we couldn't run algs in some situations
- Everybody busy improving/checking their code!

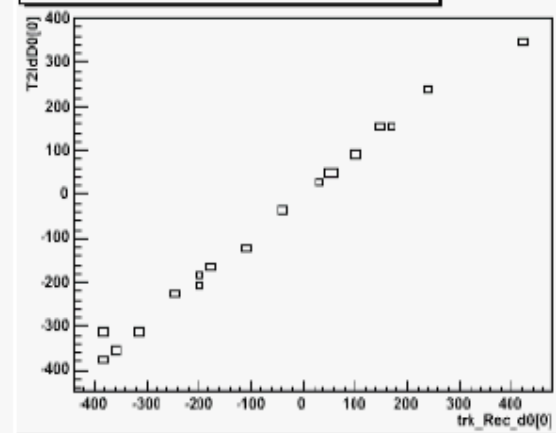
phi



T2IdPhi[0]:trk\_Rec\_phi[0] (T2IdPhi[0]<0&&trk\_Rec\_phi[0]<0)



T2IdD[0]:trk\_Rec\_d[0] (T2IdPhi[0]<0&&trk\_Rec\_phi[0]<0)



## **(4): Offline commissioning**

*(Walter Lampl)*

- Release 13.0.25 frozen on August 12<sup>th</sup>
  - Snapshot of a 13.0.30-nightly
  - SLC4 and SLC3 build, 32 bits
  - Numbered release, can be deployed on the grid
- AtlasHLT-13.0.25 created on August 14<sup>th</sup>
- Create AtlasPoint1 patch area with nightly builds
  - Can be used for packages with no or few clients
    - Like ByteStreamCnv and Monitoring tools
  - Several issues were still open at this point
    - E.g. migration of some MonTools

# (5): Tier0 - datasets, files, volumes

(Armin Nairz)

- CASTOR pool occupancies

- t0perm (permanent files, tape archival): 23.7 TB / 249.6 TB (9.5%)
- t0merge (temporary files, logfiles): 6.5 TB / 48.2 TB (13.5%)

- Datasets and files

- Permanent files

Data Type	Nr. of Datasets	Nr. of Files	Avg. File Size [MB]	Total Volume [GB]
RAW	1,436	27,964	660.7	18,475
ESD	1,437	9,134	95.3	870
CBNT	1,437	9,134	117.3	1,072
MUNT	849	4,257	0.5	2
HIST	616	616	6.5	4

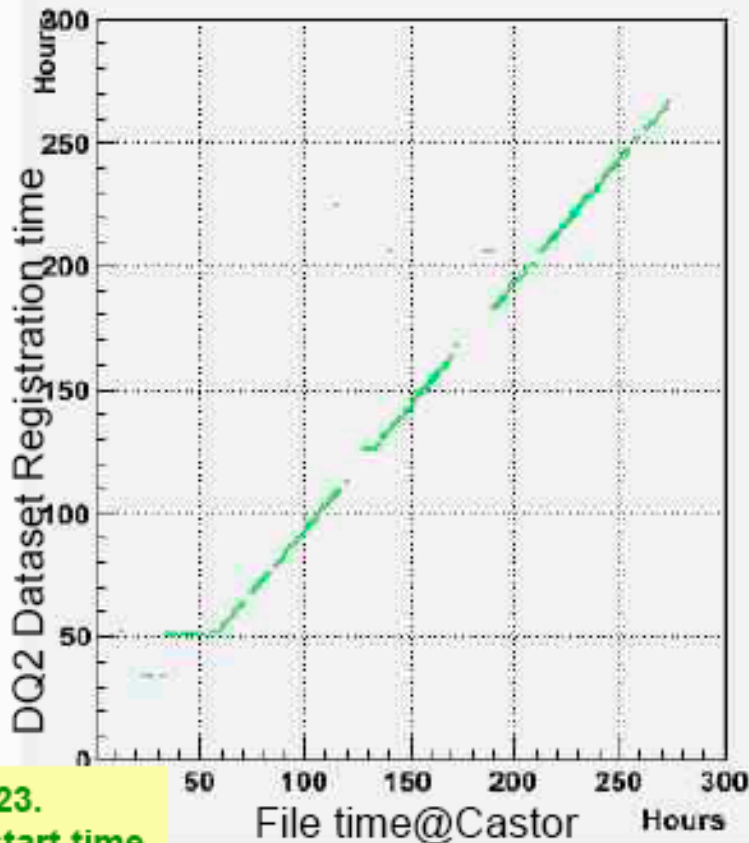
- Temporary files and logfiles

Data Type	Nr. of Datasets	Nr. of Files	Avg. File Size [MB]	Total Volume [GB]
HISTTMP	1,437	8,014	5.0	38
recon.log	1,437	11,687	4.0	47
merge.log	616	985	2.0	2

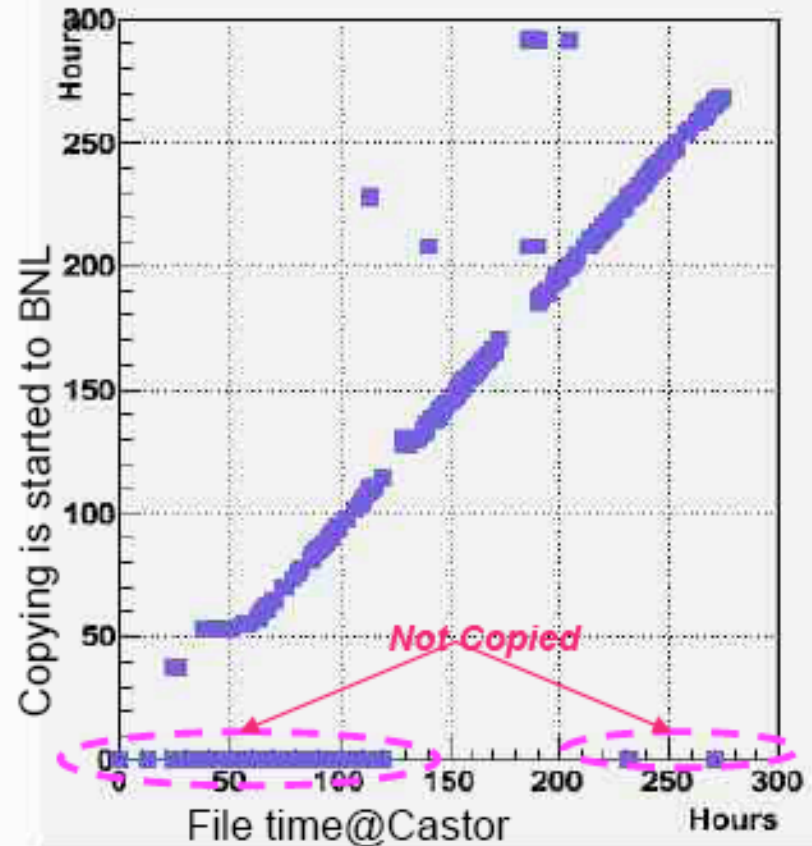
# (6): Distributed Data Management - RAW to Tier1s (Alexei Klimentov)

## M4 Cosmic Run (Aug-Sep 2007)

DQ2 Registration vs CASTOR File Time



File Copy Time (BNL) vs CASTOR File Time



Aug 23.  
M4 start time

# TDAQ+Detector plans - after M4

## ● Debugging of problems found in M4

- De-synchronization of read-out (muons)
- De-synchronization of Tile at high rate
- May be common problem: very serious!

## ● Use of the system beyond M4

### • Muon spectrometer proposals:

- 1/10 to 7/10: 6 MDT barrel sectors + 2RPC sectors+ EncCap side C + some TGCs
- 3/12 to 10/12: 10 MDT barrel sectors + 4 RPC sectors+ EncCap side A&C + some TGCs

### • Calorimeters

- Week ends...

### • Inner detector

- TRT: high rate tests with multiple LTPs (before end of the year)

### • DAQ technical week: 24/9 to 28/9

- Add Pixel (R/O only), SCT detector quadrant ?
- More detector parts
- Build on M4; better operations
- Improve on DQ/monitoring
- Known problems fixed before M5
  - New ones after M5, unless we get really stuck