Stato di RPC e LVL1-barrel di ATLAS

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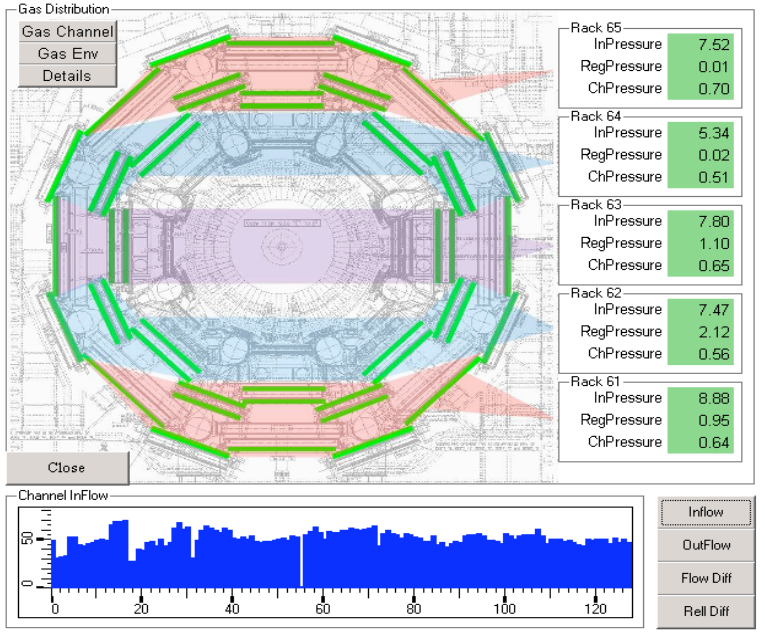
per i gruppi RPC-LVL1 di
Bologna, Lecce, Napoli, Roma1 e Roma2

- stato attuale e durante il run combinato
- attivita` durante lo shutdown

ATLAS-ITALIA, Roma1, 18/11/2008

Gas System

- All racks included in closed loop
  since middle of August
  - total volume ~18 m^3
  - total flow 6600 l/h
  - fresh gas 330 l/h (5%)
  - total gas leak ~250 l/h (mainly from 2 lines)



- Good stability of the system
  Occasional stops due to fake alarms from the iso-C_4H_{10} analyzer
  New analyzer installed by gas groiup on Oct 20th
  No problems so far

- Gas leaks:
  - 1 line (out of 128) from chambers to rack currently disconnected
    (1 layer off in sector 15)
  - 20 BOL and ~10 nonBOL stations with gaps disconnected from the gas loop
    to be recovered

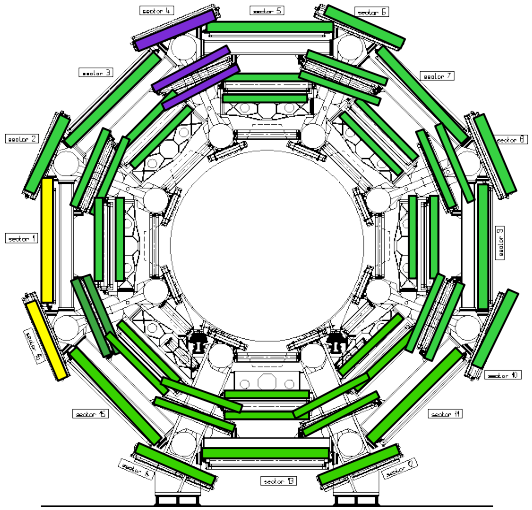
Detector Status

Cabling

All sectors cabled since beginning of August (BML7 cabling postponed to shutdown)

Sector readiness during combined running

- All sectors switched on and used in cosmic runs
- Sector 6 switched back off due to noise in clock propagation
  Re-included in data taking 2 weeks ago, under debug
- Sectors 9-10 with BO stations off because of missing CAEN boards (1 HV + 1 DAC)
  (now only 1 DAC board is missing)
- All relevant parameters monitored via DCS and archived



HV stability

During 2 months of combined running a few channel failures not recovered because of cavern closure and ~10 gas volumes with increasing current to be re-conditioned

RPC Temperatures

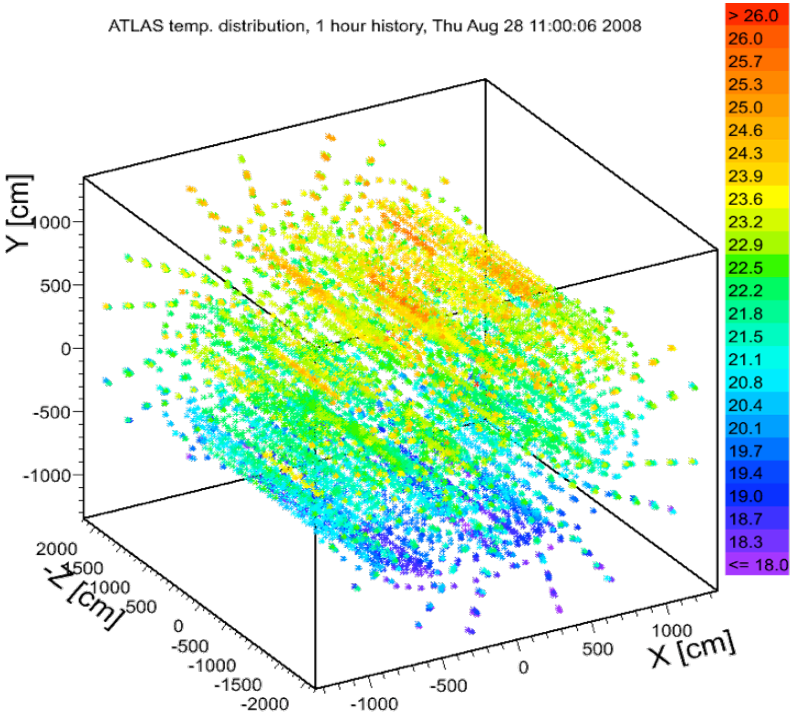
Status during combined running

Our probes installed but not yet commissioned

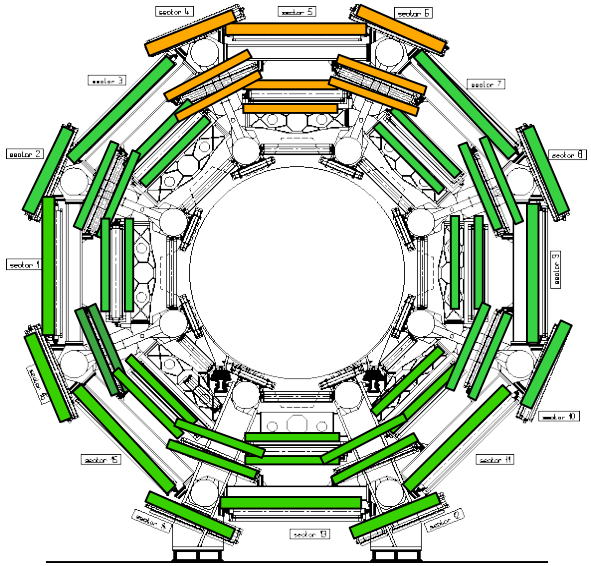
Temperatures monitored using measurements from MDTs

RPC temperature wish: the lower the better, 24 ^{o}C still tolerable for a minority of chambers

Temperatures ranging from 19 to 26 ^{o}C



Top sectors (4-5-6) were operated at lowered voltage (9.6 ⇒ 9.2kV)



Full support from technical coordinator:
during the shutdown plan to bring cooling air directly on hot sectors

DCS status and RPC operation

Status

- Mapping of the whole RPC detector (16 sectors, HV/LV etc.) completed
- Full FSM tree for the whole detector generated (via automatic scripts)
- FSM pictures a true detector status allowing detailed browsing to trace problems via expert panels to single chambers or channels

Last developments

- Two CAEN mainframe (2 -> 4) added to improve stability (1 spare, 1 from E-Pool)
- Monitoring of LVL1 crates included in DCS
- Handling of V0 / V1 implemented
- Full detector data archived on Oracle
- Development on ConfDB started

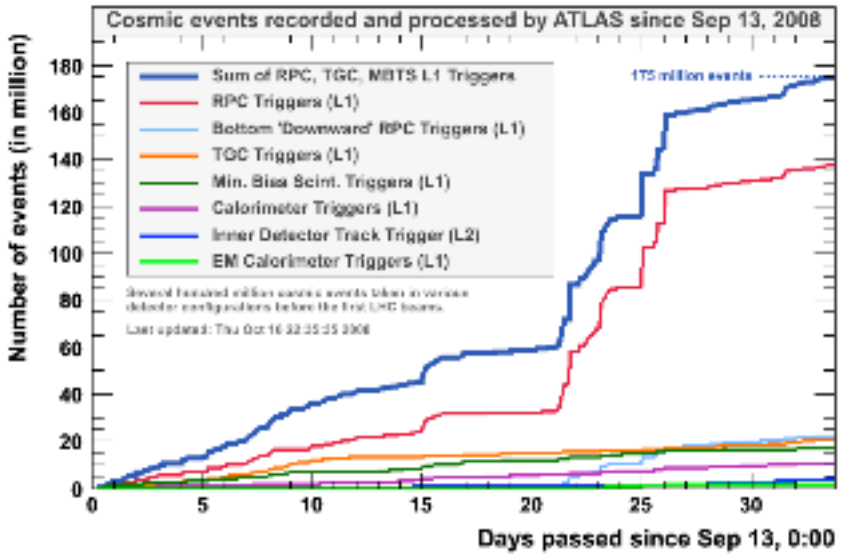
RPC operation in control room

- Any system failure properly propagated to the FSM and/or alarms panel
- Dedicated RPC person on shift during combined running, but planning to have non-expert shifter for the combined run at end November
- Twiki instructions available, not completed but already useful for the shifter

LVL1/DAQ status

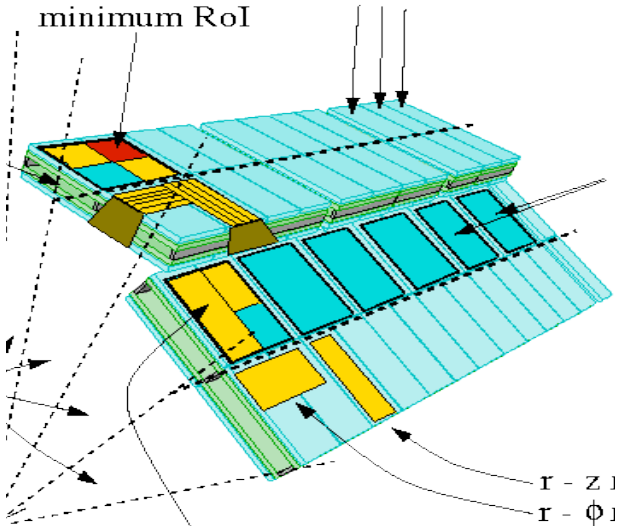
- Trigger/DAQ system tested with cosmics since a long time
- The system has proven to be stable even at high rates
  RPC successfully tested in ATLAS up to 100 kHz (random trigger)
- Currently a major effort is the timing alignment (next slides)
- The present configuration has been setup trying to accommodate the request from the ATLAS community for an enhanced number of tracks delivered to the other detectors

⇒ A huge amount of data has been taken with the RPC trigger



LVL1 timing

- Timing done using cosmic tracks, via a multi-step procedure:
  - Layers within the same CM
  - Views (eta,phi) within the same PAD
  - PADs within the same trigger sector
  - Sectors w.r.t each other

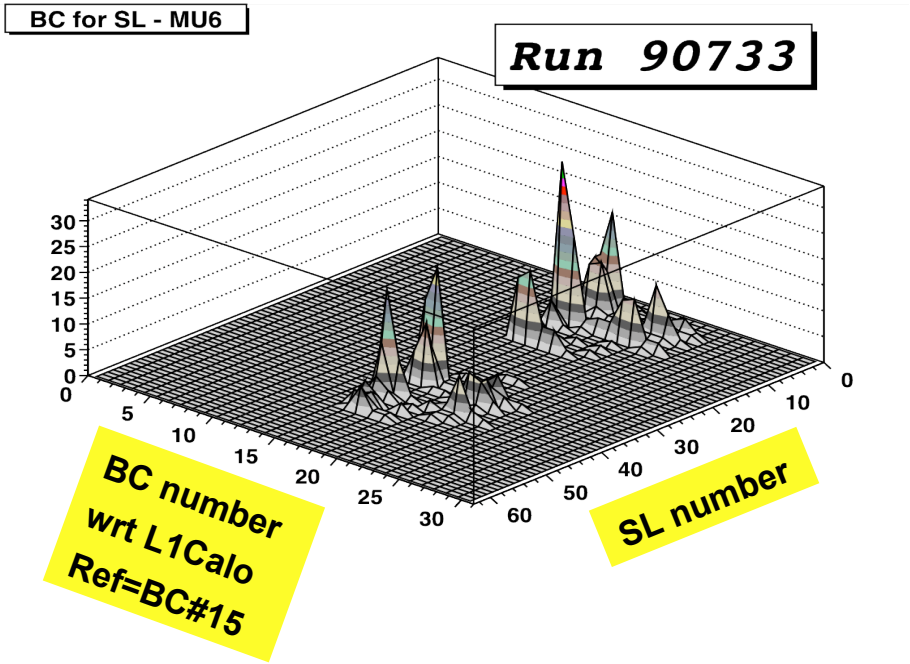


⇒ Trigger towers aligned within 2-3 BC in each trigger sector

⇒ Global alignment between sectors still ongoing

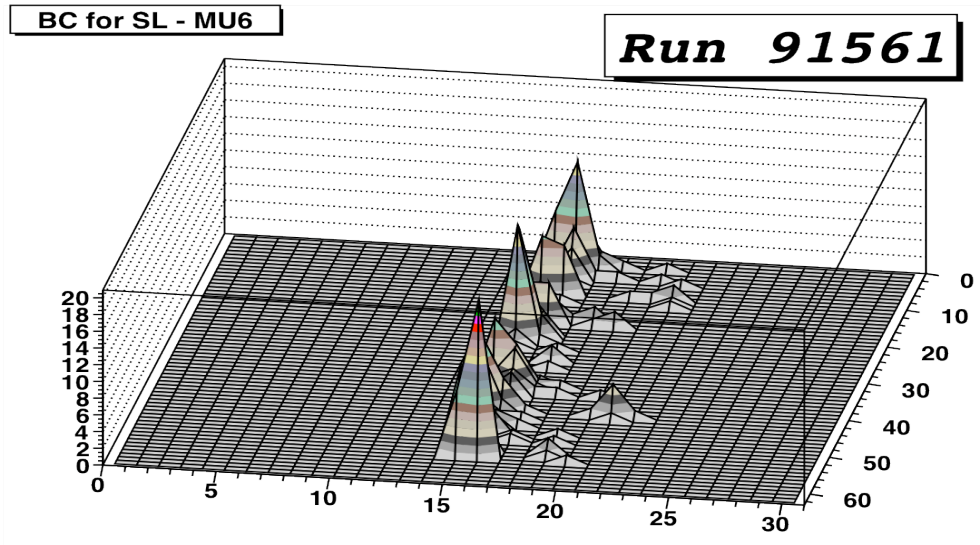
- Present timing to be reset for collisions (instead of cosmic rays)
- The bottom sectors were setup to maximize tracks for the inner detector
- Presently we are focusing on these, to test and develop all the necessary tools
  Once this will be done it will provide collision-like setup to be used as reference for the setup of the top sectors as well

RPC-LVL1 timing



L1Calo aligned with
beam pick-up

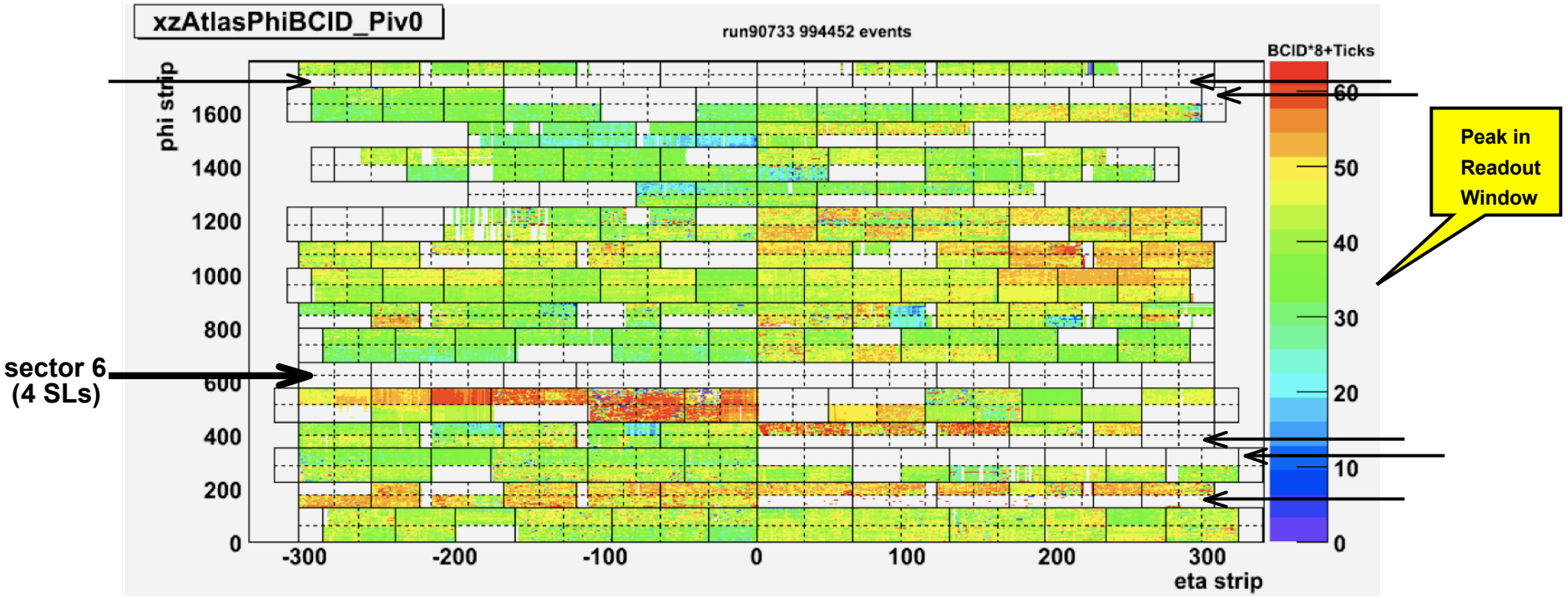
Missing sectors
excluded from DAQ
or out of time



After time alignment
all sectors within 2-3 BCs

Cosmic trigger rate for
Inner Detector increased x70

RPC readout timing VS coverage



RPC readout window = 8 BC (x 8 ticks)

Excluded Sector Logic

Most sectors centered in readout window

Dead areas explained in next slide

DAQ status in combined running

1 Sector Logic = 6 trigger towers = 1/4 Spectrometer Sector

Sector Logics usually in the readout				
sector	**sideC**		**SideA**	
	HV	**RO**	**HV**	**RO**
1	yes	yes	yes	yes
2	yes	yes	yes	no
3	yes	yes	yes	no
4	yes	yes	no	yes
5	yes	yes	yes	yes
6	no	no	no	no
7	yes	yes	yes	yes
8	yes	yes	yes	yes
9	yes	yes	yes	yes
10	yes	yes	yes	yes
11	yes	yes	yes	yes
12	yes	yes	yes	yes
13	yes	yes	yes	yes
14	yes	yes	yes	yes
15	yes	yes	yes	no
16	yes	no	yes	no

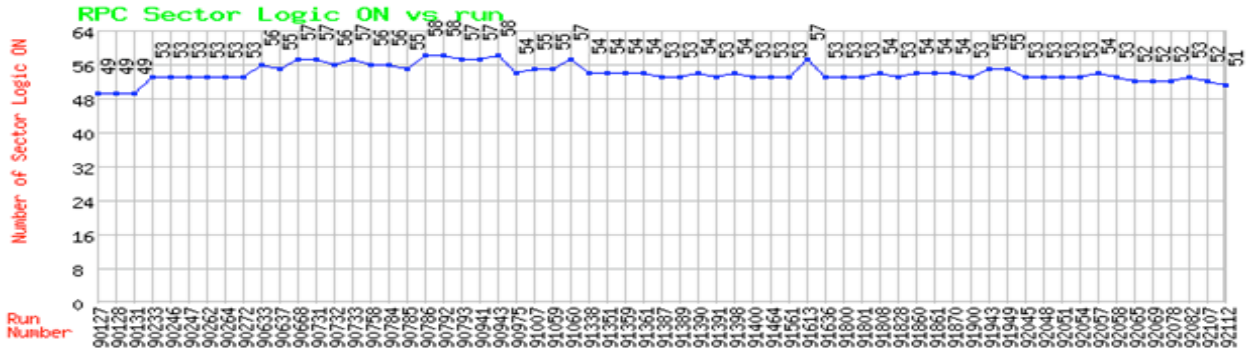
10 SLs always excluded from read-out:
noise or busy problems

Other 48 trigger towers excluded beacaus of:

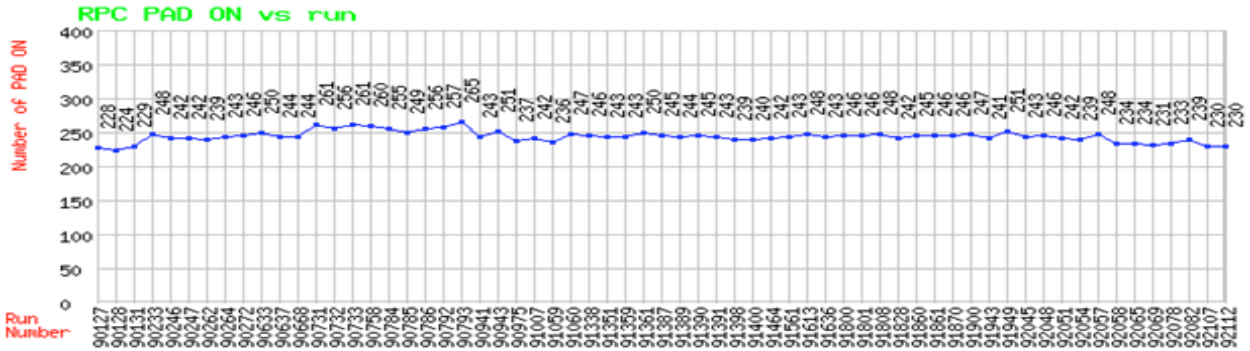
- broken optical fibre
- Power Supply problems
- broken PADs
- …

32 trigger towers involving BML7 stations
not yet commissioned

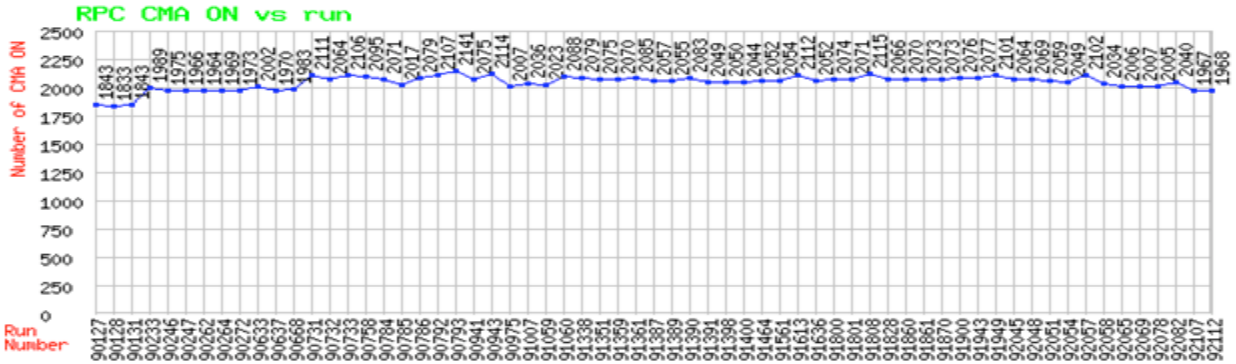
DAQ-LVL1 stability (from off-line DQ)



N. of active Sector Logics



N. of active PADs



N. of active
Coincidence Matrices

Run Number *(2 months time range)*

DQ status

Online

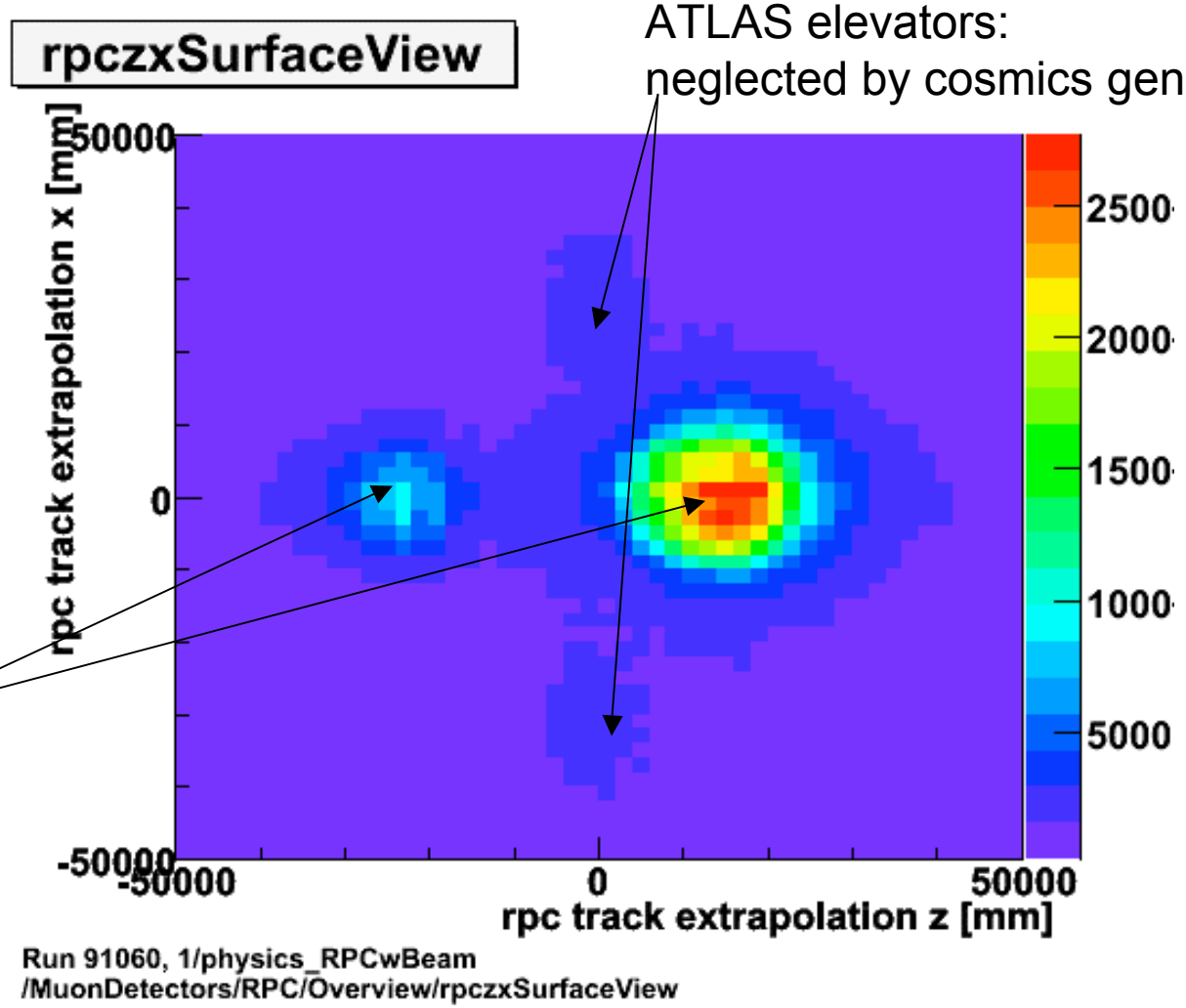
Histograms produced but difficult consultation (only for experts)
Looking for manpower inside the RPC community for developing tools

Offline

RPC data quality currently based only on off-line monitoring
(tier0 monitoring, RPC and LVL1 macros)
Detailed instructions about DQA plots inserted in the Twiki page of the RPC shifter manual
Detailed monitoring plots produced at Tier0 for shifter and experts:
- RPC, LVL1 and MDT_vs_RPC quantities
- 1D profiles, 2D maps, timing, efficiency, cluster size, occupancy, RPC standalone tracking, trigger coverage, trigger conditions, ...

No algorithm automatically applied for selecting good runs (decision committed to the RPC DQA shifter) but all algorithms and technology in place

Commissioning with cosmics



Cosmics Impact Point on surface from RPC stand-alone in tier0 Offline Monitoring

Shutdown plans

Data taking with cosmics

- timing studies:
  - several periods during daytime according to our needs
  - 1 day per week of run using ATLAS partition together with MDT and L1Calo
- combined run for Inner Detector: 25/11 - 01/12

Gas leak fixing

- Repair or replace output line in sector 15 (gas group)
- Repair broken inlets on all non-BOL stations
- Repair broken inlets on BOL stations in external position (BOL6)
- Under investigation the possibility of intervention on the remaining BOL stations

Gas infrastructure and running

- Running with standard gas mixture till Christmas
- Switch to Argon
- Chamber reconditioning from January 7th (2 weeks)
- Switch back to nominal mixture ~January 23rd

  (meanwhile work on Gas Infrastructure to be performed by the gas group)
- HV operation ~5 days later

Shutdown plans

BML7 special stations

Some cabling needed on chambers (extensions from nearby BML6 station)
Testing of cables from rack to chamber to be done (3-4 weeks)

S2-S3 special stations

Chambers to be powered and monitored for a significant time (a few weeks)

Environmental and gas sensors

Complete the installation (some probes to be installed in the bottom sectors)
Finalize the commissioning (~2 weeks)

Cabling completion/cleanup

Installation of HV recovery lines (~1 week)
Infrastructure enhancements (lee readout, cable cleanup: ~1 week)
Vpad cabling completion: 2 pad/cable (help from S. Maliukov desired)

Shutdown plans

Trigger/DAQ

Repair broken fibers

Replace pads or recover noisy ones

Pad, Sector Logic, ROD firmware upgrade

ROD-RX software integration, RX control software cleanup

DCS

Install Honeywell Watchdog

Finalize FSM control and non expert tools

Implement databases

Other detector activities

HV and threshold scans, calibrations, …

After March?

Apr-May: calibration runs

Jun-Aug: likely resuming of ATLAS shifts

Activity schedule