MUON DAQ INSTRUCTIONS FOR MUON SHIFTERS

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on behalf of the Muon DAQ experts

Muon Shifters Training Session
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Slides originally made by
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Outline

- Introduction and Tasks During Global Runs
- Segments of Muon Systems
- Before the Run
- During the Run
- Automated Recoveries / Removals
- Calibration Procedures

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Introduction

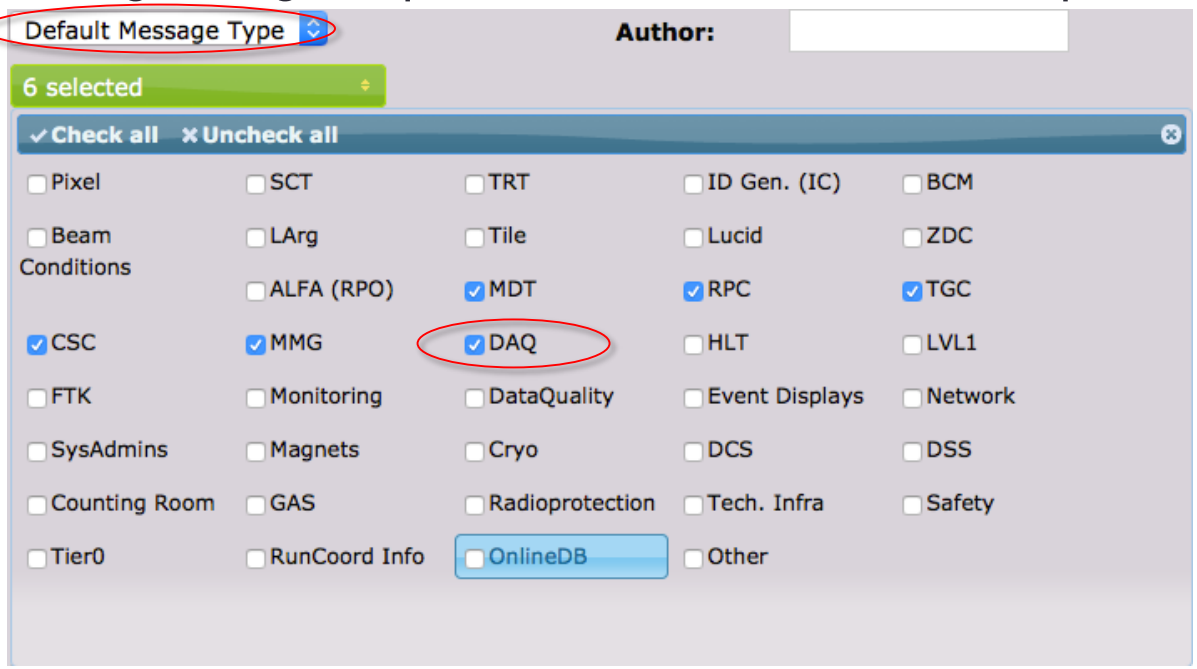
- Overview of the **main DAQ related tasks**

  (Not a guide to debug the DAQ systems)
- For each muon system
  - How the muon segments look like in the ATLAS partition
  - The automated recoveries
  - What you should do during calibration time

- *Note*: only beginning of Run II operations.
  - Not yet ultimate shifter instructions
  - Cosmic data taking is different from beam operations
  - You have to be flexible in adapting to the situation (still many experts around, so don’t worry)

In Brief

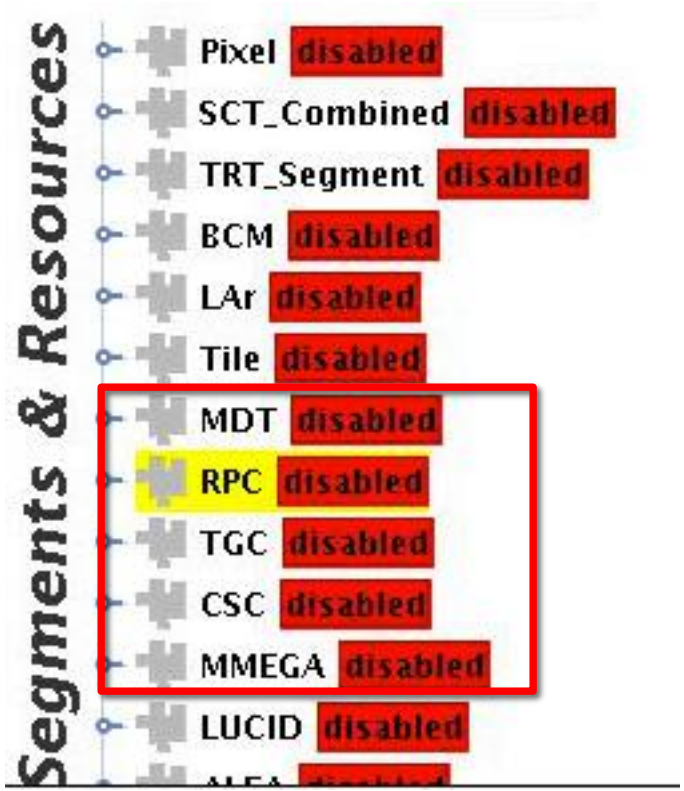
- **Call the relevant expert to**
  - Report major problems related to a muon system (e.g. ATLAS cannot take data)
  - If you do not know what to answer to the RC, Trigger and Shift leader shifters
- **Place an e-log entry choosing DAQ <u>and</u> the relevant muon detector as system affected**
  - To report muon DAQ related issues (e.g. Automated recovery took place, problems during configure, problems with the calibration partitions)



Tasks during Global Runs 1/2

When the **ATLAS partition** is in use

- Understand **the scope of the run** (standard LHC operations, cosmic run, high rate test, etc.) and its impact on DAQ (e.g. expected rates).
  - Run plan (usually projected on the wall) https://atlasop.cern.ch/twiki/bin/view/Main/PlanOfTheDay)
- Cross-check if **the five muon detectors are included in the run**
  - Should they be enabled? If yes, are all necessary sub-segments enabled? If not sure, call the on-call expert
  - TIP: Open the IGUI-SPY



Tasks During Global Runs 2/2

- Follow the RC shifter bringing the ATLAS partition in RUNNING STATE
  - Check if **the muon segments properly completed INITIALIZE and CONFIGURE**
  - If a muon application is killed or excluded → ask why!
- Follow the on-going run and react if
  - Muon system causes back-pressure → automated actions and/or call expert
  - Muon system throws many warning/error messages → e-log and/or call expert
- At the end of the run, the RC shifter should properly perform STOP, UNCONFIGURE and **SHUTDOWN** of the ATLAS partition
  - Difficult for you to follow
  - If a muon application does not allow to complete the transition → the RC shifter should and/or put OUT **only** the problematic application

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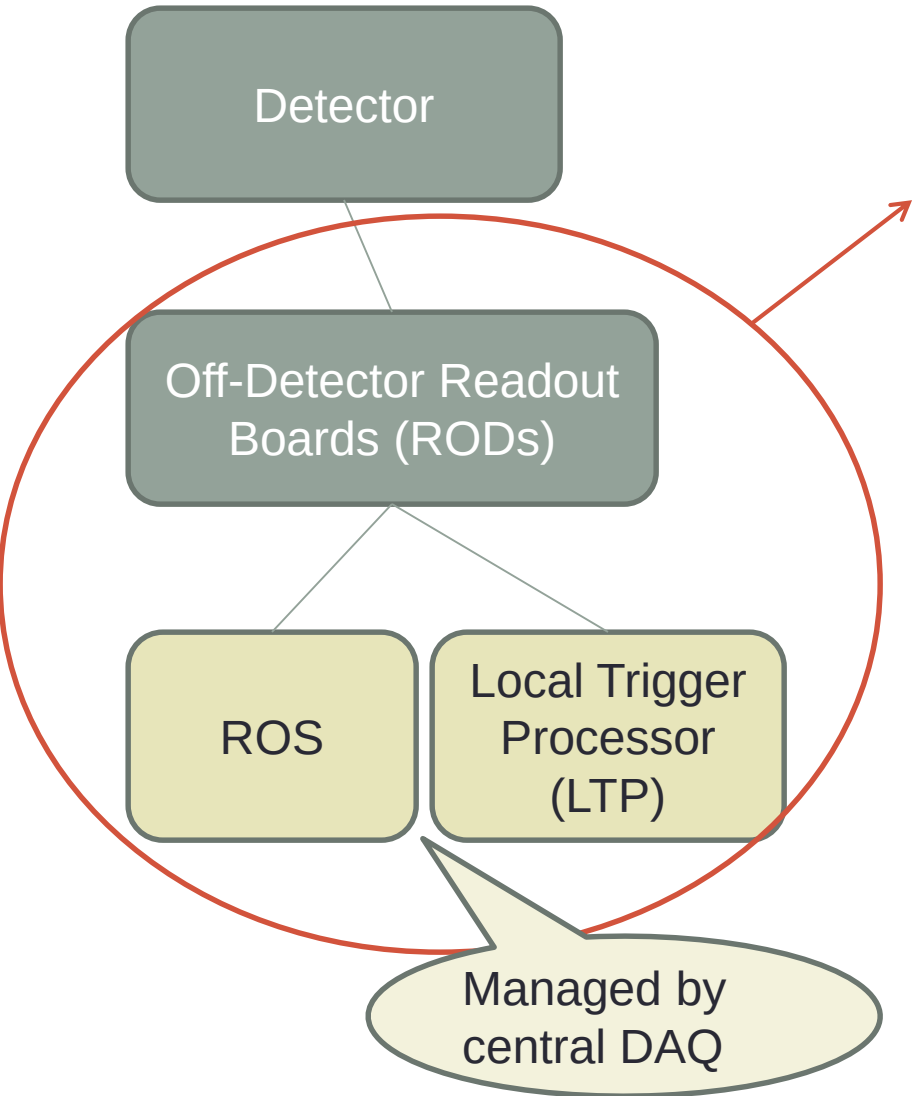
TTC (Timing, Trigger & Control) Partition



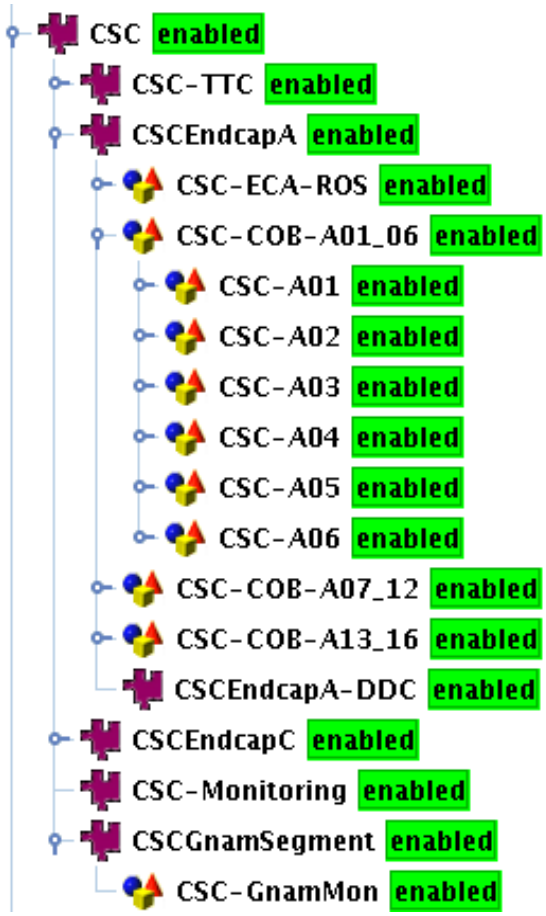
A part of the readout which can individually take data.

- Represented as a segment
- Can be excluded from a global run and used in parallel for tests

Detector	# of TTC Partitions
CSC	2 (Endcap A, Endcap C)
MDT	4 (Barrel A, Barrel C, Endcap A, Endcap C)
RPC	2 (Barrel A, Barrel C)
TGC	2 (Endcap A, Endcap C)
MMEGA	1

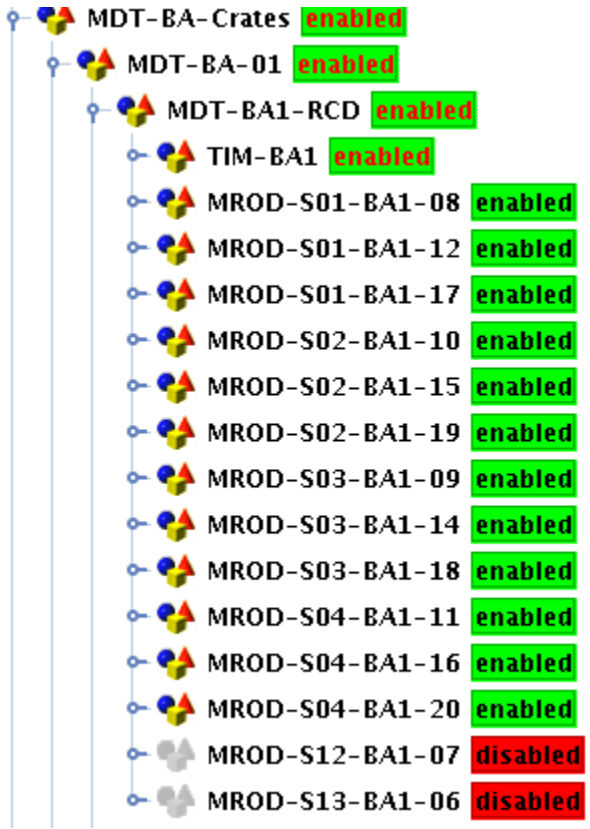
CSC Segments

- CSC readout is **new**! It uses ATCA as platform
  - Transparent for you, but some names different from the rest of ATLAS
  - Top segment called CSC
- Each endcap has 16 ‘RODs’
- 5 main segments:
  1. TTC
  2. EndcapA
  3. EndcapC
  4. CSC-Monitoring: For firmware monitoring
  5. Gnam: For data monitoring
- Each Endcap segment has:
  1. 3 COBs: a COB groups 4 to 6 chambers
  2. 1 ROS
  3. DDC (= DAQ to DCS Communication) to exchange information with DCS



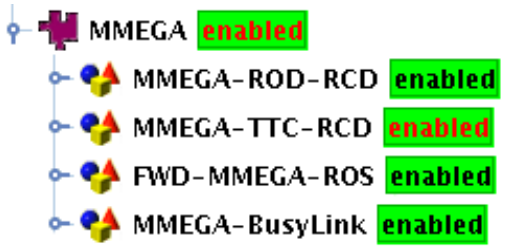
MDT Segments

- MDT has 210 RODs (for reading out ~1200 chambers) & 14 ROSes (6 for the barrel, 8 for the end-cap)
- 4 main segments (1 per TTC partition) + 2 monitoring applications (MDA & DQM)
- Each segment has:
  1. TTC
  2. DDC (= DAQ to DCS Communication) to exchange information with DCS
  3. 4 Crates, each with 13 or 14 RODs and 1 TIM busy module)
  4. ROS
  5. Links
  6. BusyLinks



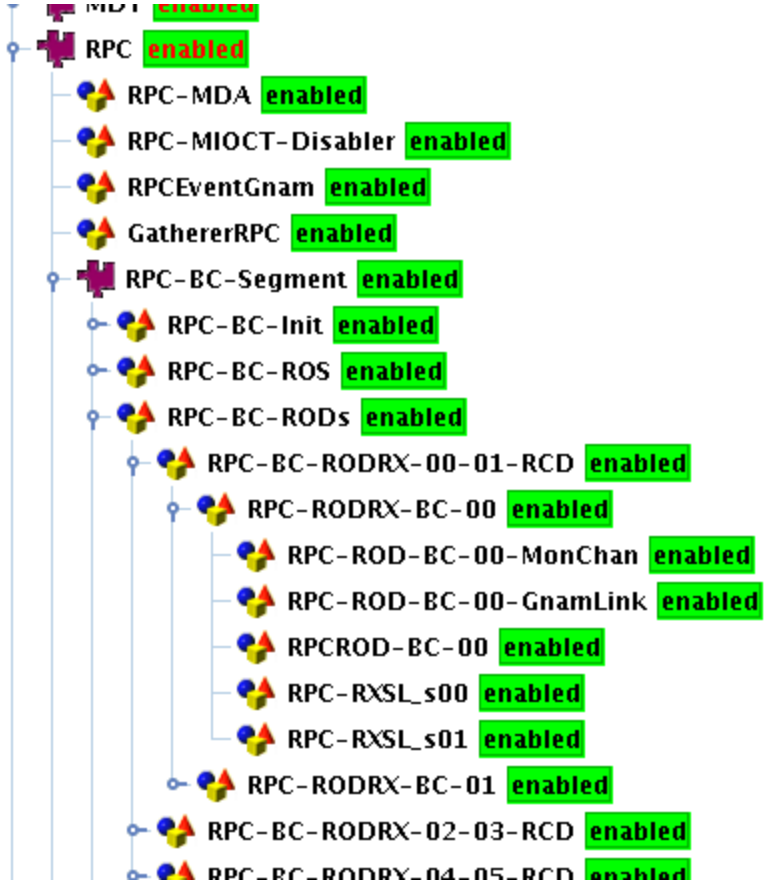
MMEGA Segments

- MMEGA is a prototype in preparation for Phase-I
- There is no detector connected to the readout yet
- 1 ROS and 1 ROD
- 4 main segments:
  1. ROD
  2. TTC
  3. ROS
  4. BusyLink



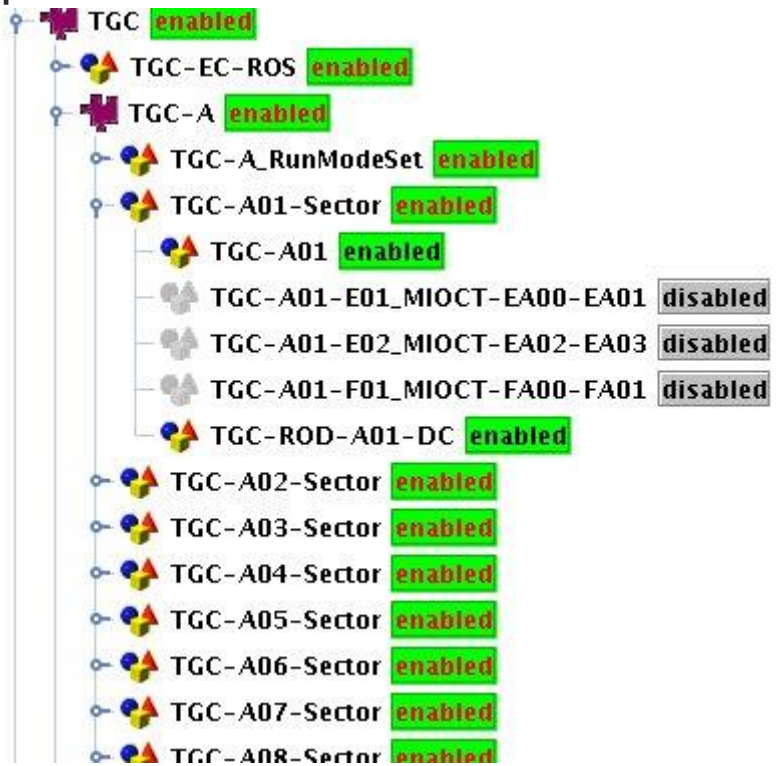
RPC Segments

- RPC has 1 ROS and 16 RODs per side
- 2 main segments
  1. Barrel A
  2. Barrel C
- Each one has:
  1. Init
  2. ROS
  3. RODs composed of RODRX segments
     1 RODRX contains **1 ROD**
     and 2 **SectorLogic (SL)**
  4. Gnam
  5. Slink
  6. TTC



TGC Segments

- TGC has 12 sectors per side, 1 ROS, 24 RODs, grouped in 4 VME crates, numbered from A01 to C12
  - Each ROD reads the FE electronics through 8 or 9 **SSW** (Star Switches = data concentrators)
  - 1 SSW covers ~ 1/2% of the entire system
- 5 Segments:
  1. ROS
  2. A/C side
     The sides are organized in **Sectors**
     each Sector contains **1 ROD** and
     3 trigger chambers (**MIOCT**)
  3. Gnam
  4. Db-monitoring



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Enabling/Disabling Resources

- Before an ATLAS run, prior to press INITIALIZE, the RC shifter might be asked (by an expert or the shift leader or YOU) to enable/disable a muon segment
  - /!\ BE SURE ABOUT WHAT YOU AND THE RC SHIFTER ARE DOING! /!\
- The resources should already be properly linked by DAQ experts
  - E.g. If you remove a ROD, the corresponding ROS link and busy line will be removed too
- Enabled/Disabled Resoures are partition specific
  - If you disable a chamber in standalone partition → it will NOT be automatically disabled in the ATLAS partition.
  - See back-up slide for MDT, ROD or chambers exclusion from DAQ.
- Write in the elog if a segment was enabled or disabled during the shift.

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DAQ Monitoring

- Keep an eye on the ERS monitoring window
  - Suggested ERS subscription filters muon only messages.
- If you see an abnormal flow of messages or if the RC shifter ask you about some muon-related message
  1. use the LogManager tool to read the message
  2. Place an e-log entry describing what is going on and reporting the message
- In case of problems, call experts

What can be restarted while running

- Restart = RC shifter should right-click on an element and click on ‘Restart’, if available
- Usually no individual RC applications/segments should be restarted while running (see: Automated Actions)
- Monitoring applications/segments like Gnam or DQ can be restarted while running

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Automated Actions to prevent/remove busy

Detector	Stopless Removal	Stopless Recovery	TTC Restart
CSC	COB	-	CSC segment
MDT	ROD	-	MDT segment
RPC	ROD+SL	ROD+SL	RPC segment
TGC	ROD+SL	ROD+SL	TGC segment
MMEGA	ROD	-	MMEGA segment

- **Stopless Removal**: the RC shifter will get a pop-up window and he should ask you before pressing YES or NO
  - YES: part of the detector will stop taking data
  - **NOTE: During stable beams, removal happens automatically!**

- **TTC Restart**: it should be executed by the RC shifter only on demand (extrahordinary situation)
  - Expects tons of errors till the end of the restart (it usually takes ~5 minutes)

Procedure during Automated Actions

- **Stopless Removal**:
  - CSC: say YES and then call the expert.
  - MDT: say YES. If more than 3 RODs are kicked out → ask to perform a TTC Restart
  - TGC: say YES. Then call the expert and be ready to use the TGC panel (see next slides)
  - RPC: say YES and then call the expert
  - MMEGA: say yes and call the expert
- **Stopless Recovery**: If it occurs more than twice within minutes on the same component, it is not properly working → call the expert
- In the future there will be a way to automatically monitor the amount of dropped resources
  - Just take into account that too many disabled resources imply recording useless data for physics

CSC Recoveries

- CSC Stopless Removal will happen if a chamber goes busy
- It removes a COB (4-6 chambers)
- There is no automated recovery
- TTC Restart will recover the whole CSC

MDT Recoveries

- The MDT ROD stopless removal is sort of ‘the last resort action’
- Normally, DAQ will drop mezzanines or chambers (NO pop-up window will appear for that)
- A dropped mezzanine or chamber is automatically recovered under DCS control
  - If automated recovery does not work → see DCS’ presentation
- You can detect the dropped mezzanine/chambers via ERS messages, or via the DCS dropped recovery panel (actually simpler that way).
  - In the future the Shifter Assistant will help you

RPC Recoveries

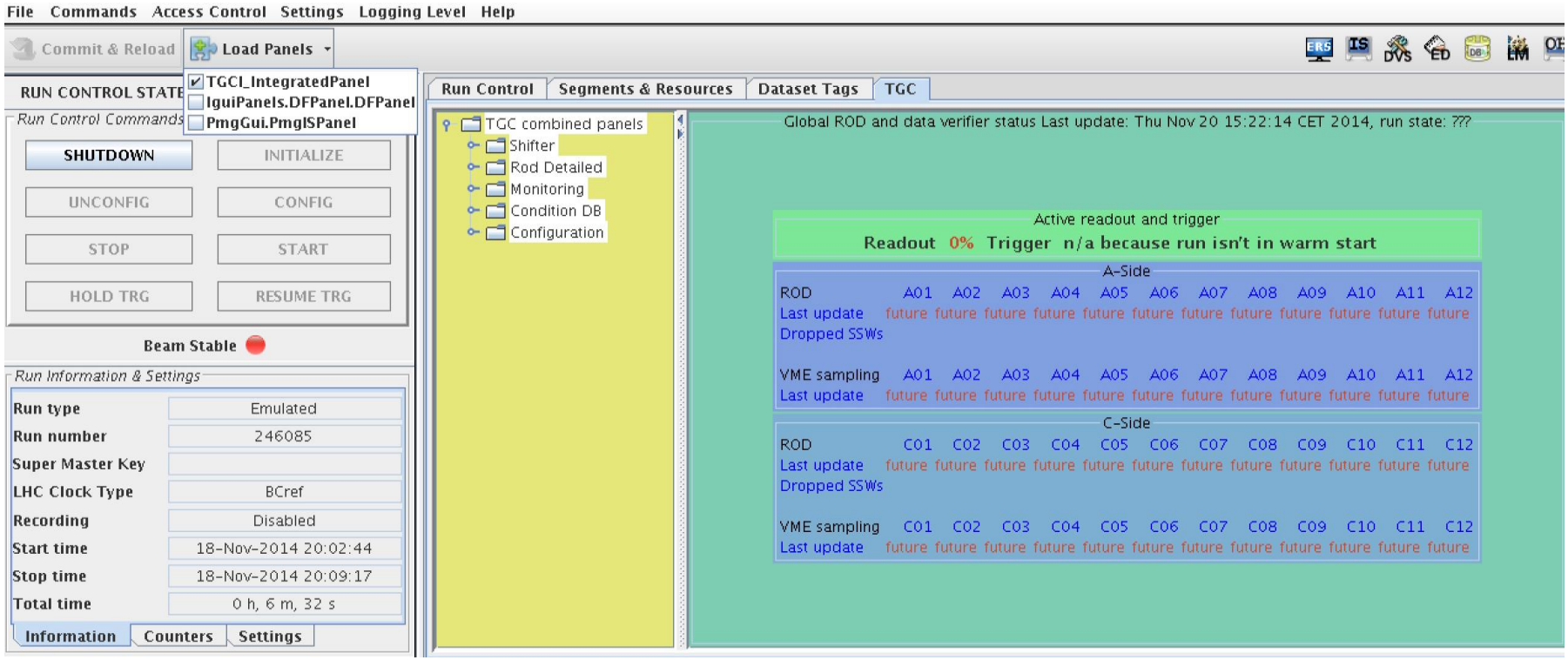
- In case of RPC ROD stopless removal (popup window in RC desk) → call the L1 RPC on-call, since this indicates a major problem
- Trigger towers are automatically recovered/removed
  - You can detect the trigger towers recovery/removal via ERS
  - You can see the removed trigger towers via DCS
  - The list of masked trigger towers should be in the white board

TGC Recoveries

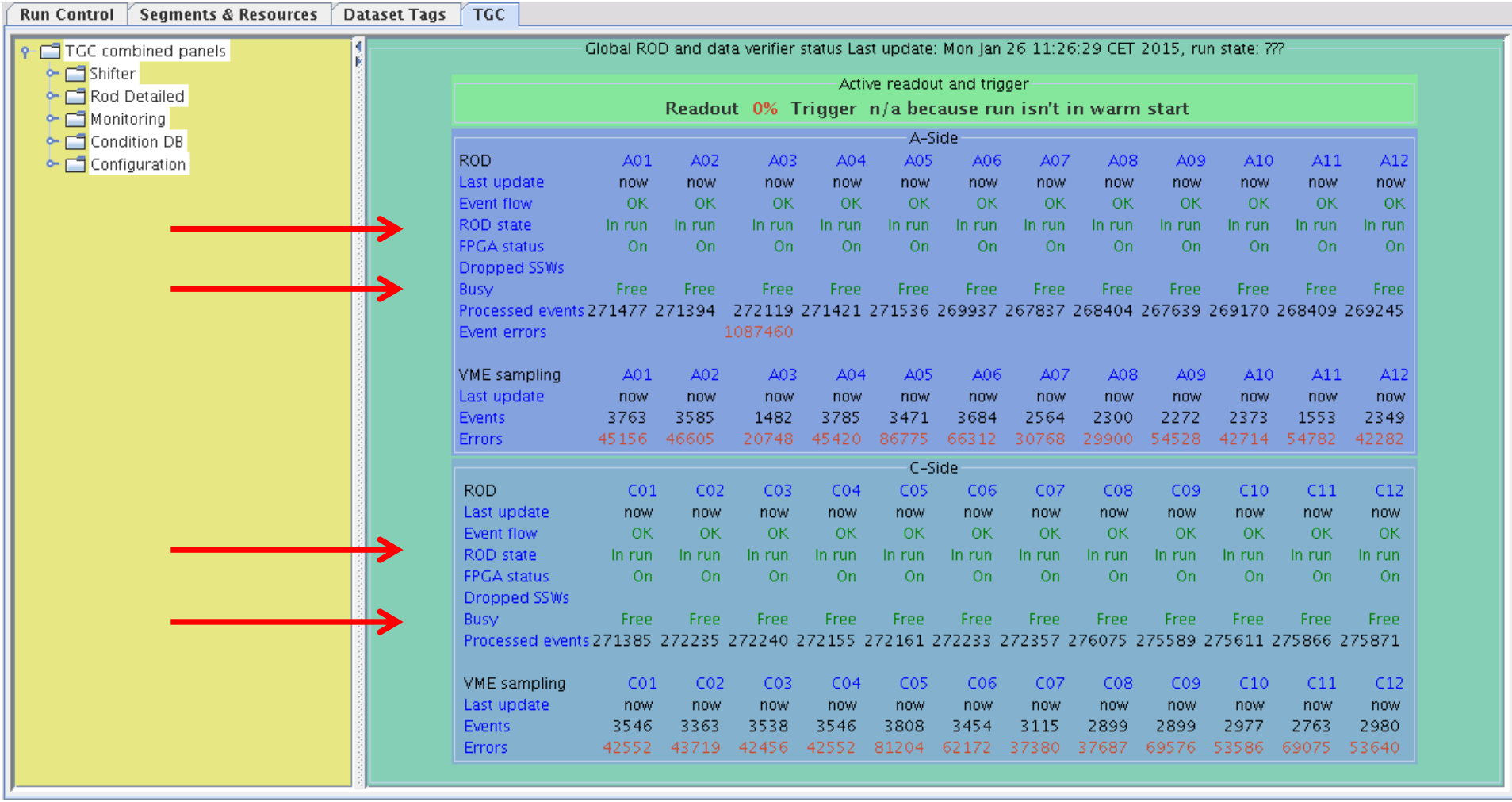
- The **SSW** (Star Switches) can drop during the run
- An automatic and fast recovery automatically occurs
- You can detect the recovery only via ERS messages
  - In the future the Shifter Assistant will notify you
- During Run I, multiple SSWs drop was a major ATLAS problem
  - Not yet 100% solved, that’s why we need to keep an eye on it
  - See next slides for TGC panel

TGC – ad-hoc Panel

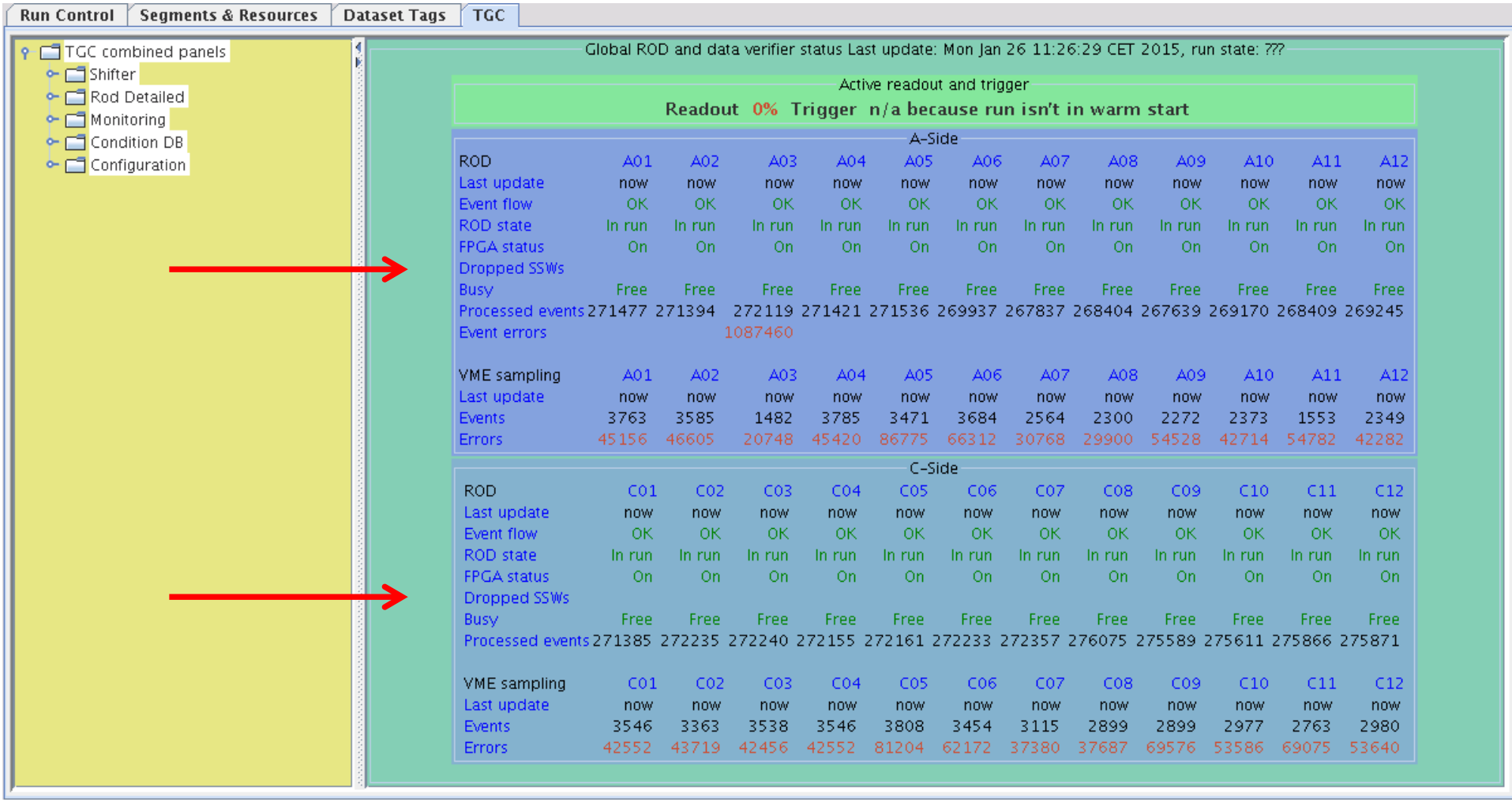
- You have to monitor and take actions via a dedicated TGC Panel during ATLAS runs:
  - Open the panel on your SPY IGUI through the ‘Load Panels’ tab



TGC: check no ROD is busy nor ignored

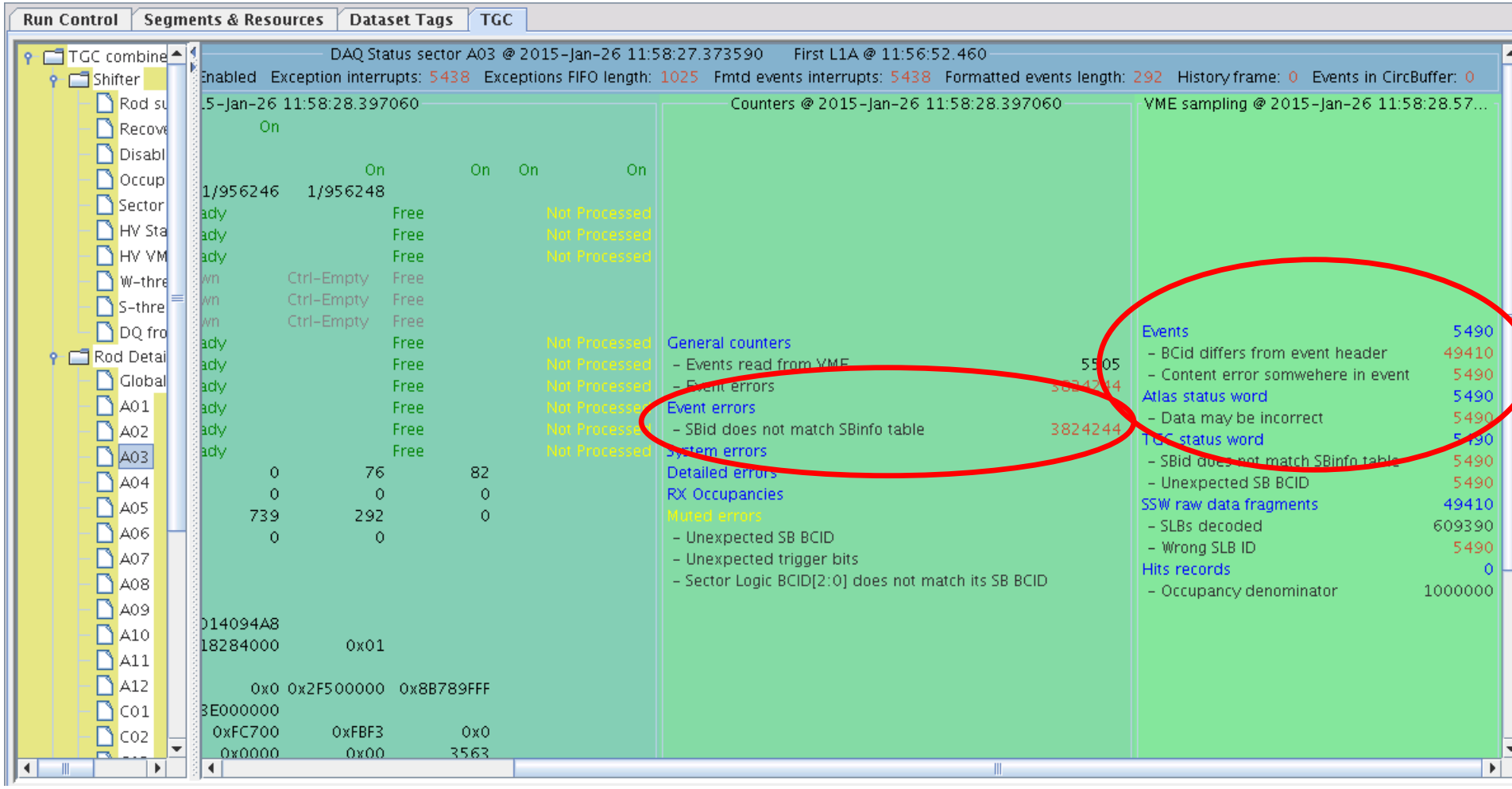


TGC: Check how many StarSwitches (SSW) are dropped



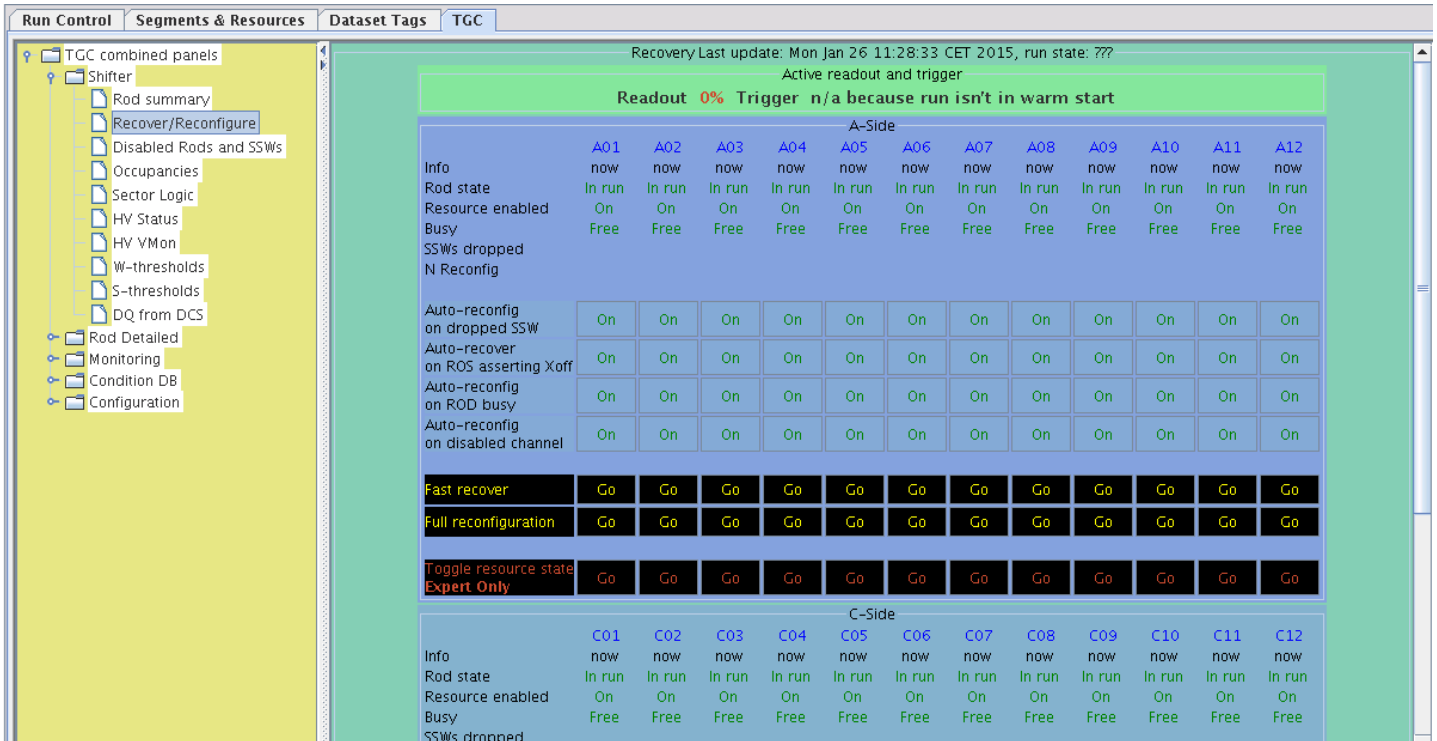
TGC: Looking for ROD exceptions and errors

TGC: detailed error panel e.g. A03 (what should be reported to expert)

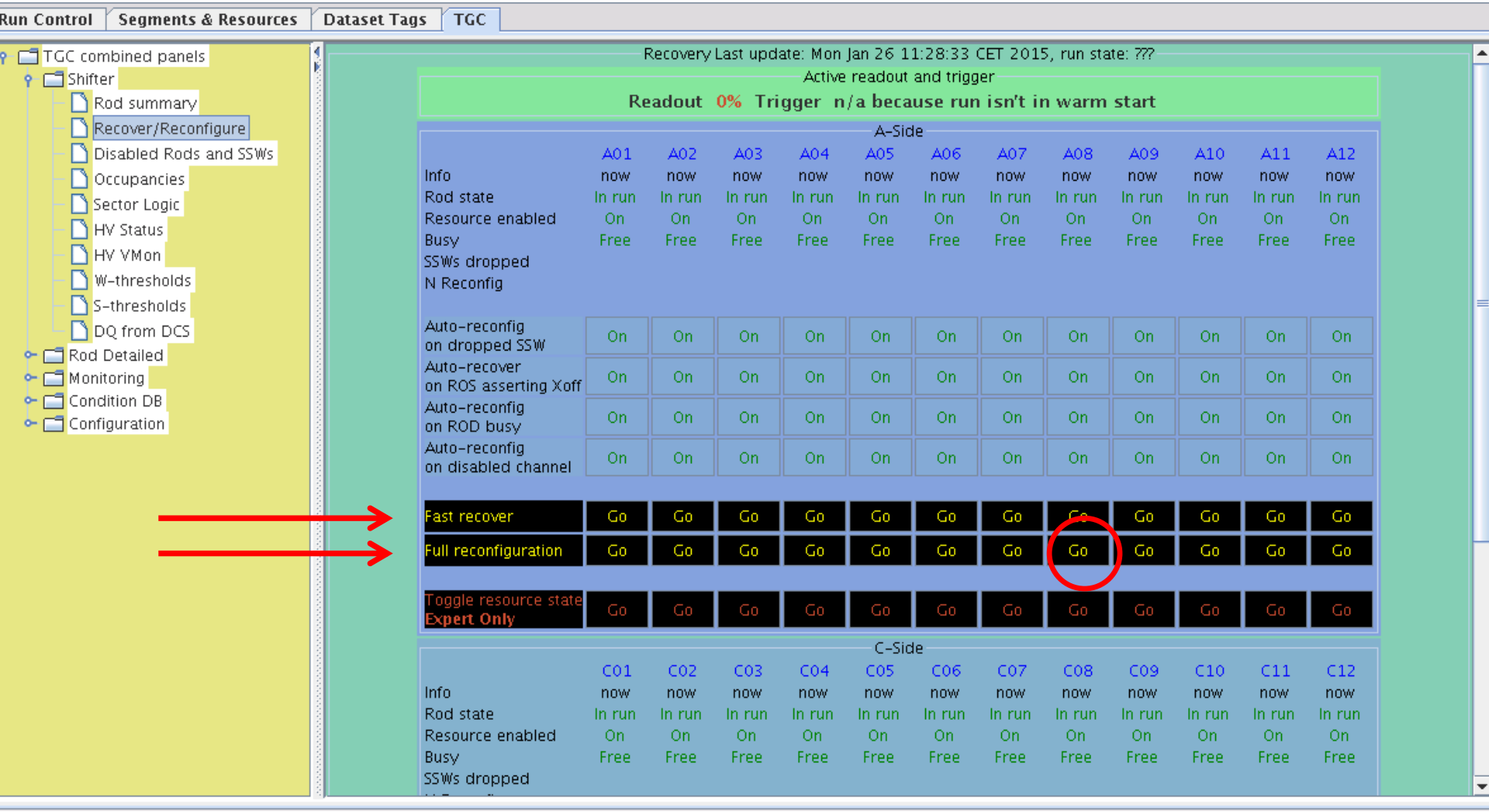


TGC: Special Recoveries

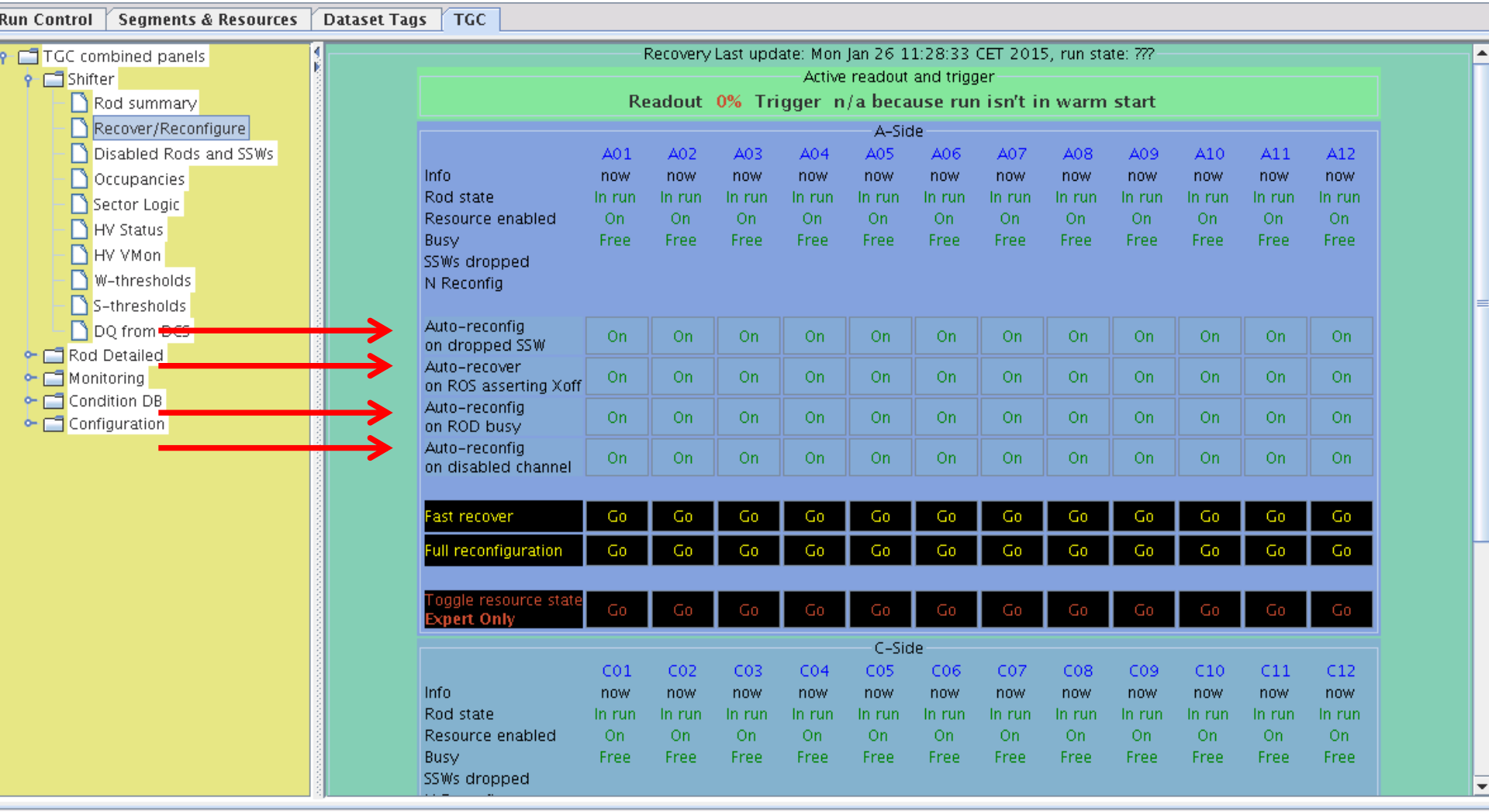
- **Sector recovery**: flush FE FIFOs and reconfigure the ROD.
  - Automatically performed by the DAQ system with a guard of <3 times in 1 hour. Can also be done manually
  - If the guard disabled it, muon shifter can re-enable it (see next slide)
- **Sector reconfiguration**, as above + FE sector reconfiguration
  - Manual (muon shifter) using the “Recover/Reconfigure” panel



TGC: manual fast recover/ full reconfiguration (e.g. reconfigure A08)



TGC: Re-enable auto recovery (after consultation with expert!)



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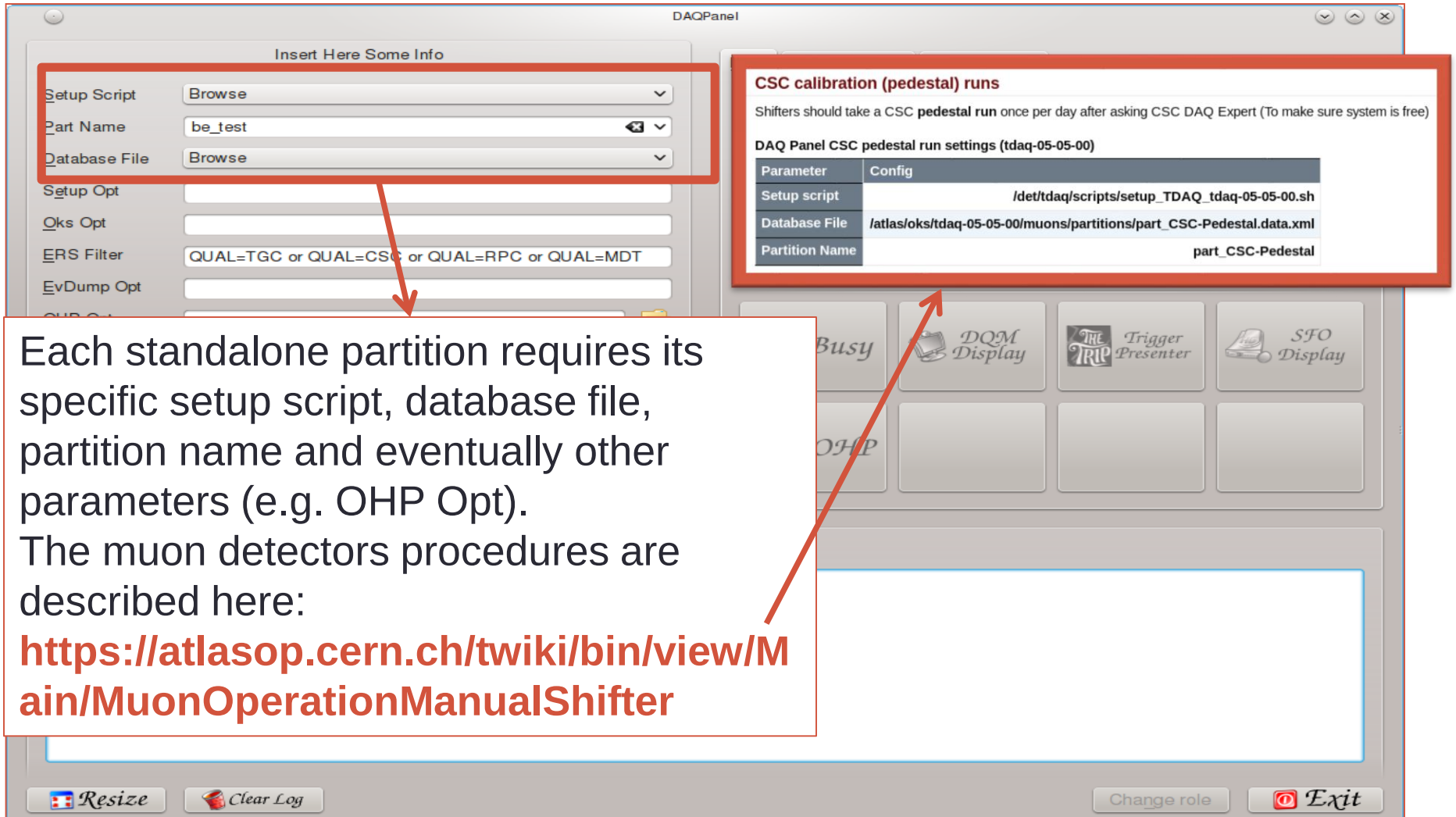
Standalone Partition

Start it via the DAQ Panel



Each standalone partition requires its specific setup script, database file, partition name and eventually other parameters (e.g. OHP Opt).
The muon detectors procedures are described here:
https://atlasop.cern.ch/twiki/bin/view/Main/MuonOperationManualShifter

Calibration Procedures

- During LHC interfills, ATLAS detectors can be calibrated or standalone runs can be taken
- The RC shifter has to shutdown the ATLAS partition, YOU steer the muon operation
- You have to finish in time to join the next ATLAS run
- **Only for CSC, shifters should start taking pedestal runs, after combined run is stopped in the morning, if resources are free**

Detector	Calibration	Required Procedure
MDT	Calibration data recorded during each ATLAS run, within the ATLAS partition infrastructure. The DAQ architecture is called Calibration Stream	NO
CSC	Pedestal runs	YES
RPC	NO	NO
TGC	Three types: Random, Track test, ASD test (not yet for shifters)	YES
MMEGA	NO	NO

THANKS!

Back-Up

MDT Removing a ROD Chamber from DAQ

- If asked by an MDT expert to disable ROD or a chamber from DAQ, this can be done from RC desk

For Example, go to:
→Segment and ressources
→MDT
→To the partition (here BarrelA).
→Crates.
→And then the MROD.

You can disable directly the ROD, there is no need to disable the chambers one by one!