ALICE Data Quality Monitoring
Introduction to shifter's operations
Part 1

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Introduction to shifter's operations

- ALICE Run Control Center operations -

Introduction to ARC operations
LHC Page 1
ALICE DCS monitoring screen
ALICE runs overview

The ALICE Run Control Center (ARC)

The shift crew work together in the Control Room
Be aware about what is going on at all times, focus on your tasks, prepare yourself for the next actions, and take care of trainees
You can leave the room, after informing the SL, to eat, etc, but never during crucial moments
You are part of a team!

The Shift Leader (SL) coordinates the activities of the shift crew
Talk to the SL and to the previous and following co-shifters

Please consult the Run Coordination Web Page for practical info and shift booking
http://aliweb.cern.ch/Run_Coordination/Run/index.html

The LHC

- Particles –protons or heavy ions- are injected as trains of bunches into 2 rings, and circulate in opposite directions
- All bunches cross, and some of them collide (Bunch Crossings) at the Interaction Points (IP1, IP2, IP5, IP8)
- The filling scheme determines the timing and bunches that collide in each IP, for example:
  – 500ns_137b_129_**130**_0_8bpi18inj_IONS
- Beam 1 is injected near IP2
  – Missinjections may affect ALICE
- Beam 2 in injected near IP8
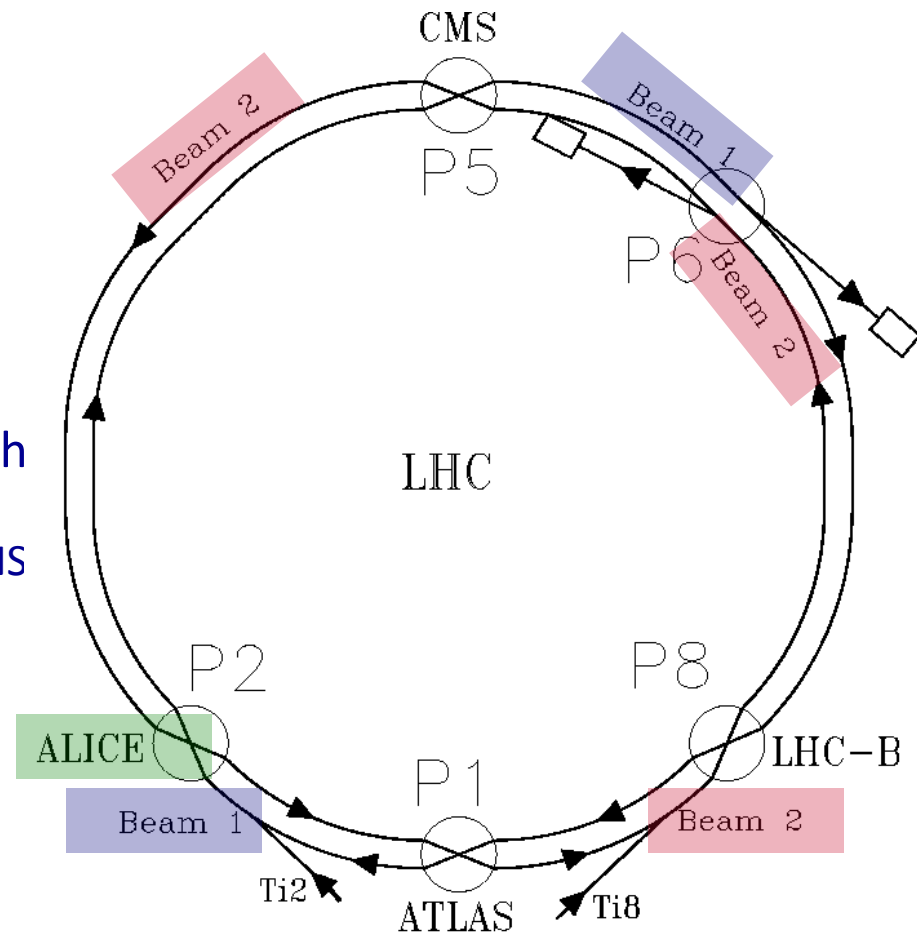
The LHC time unit: a Fill
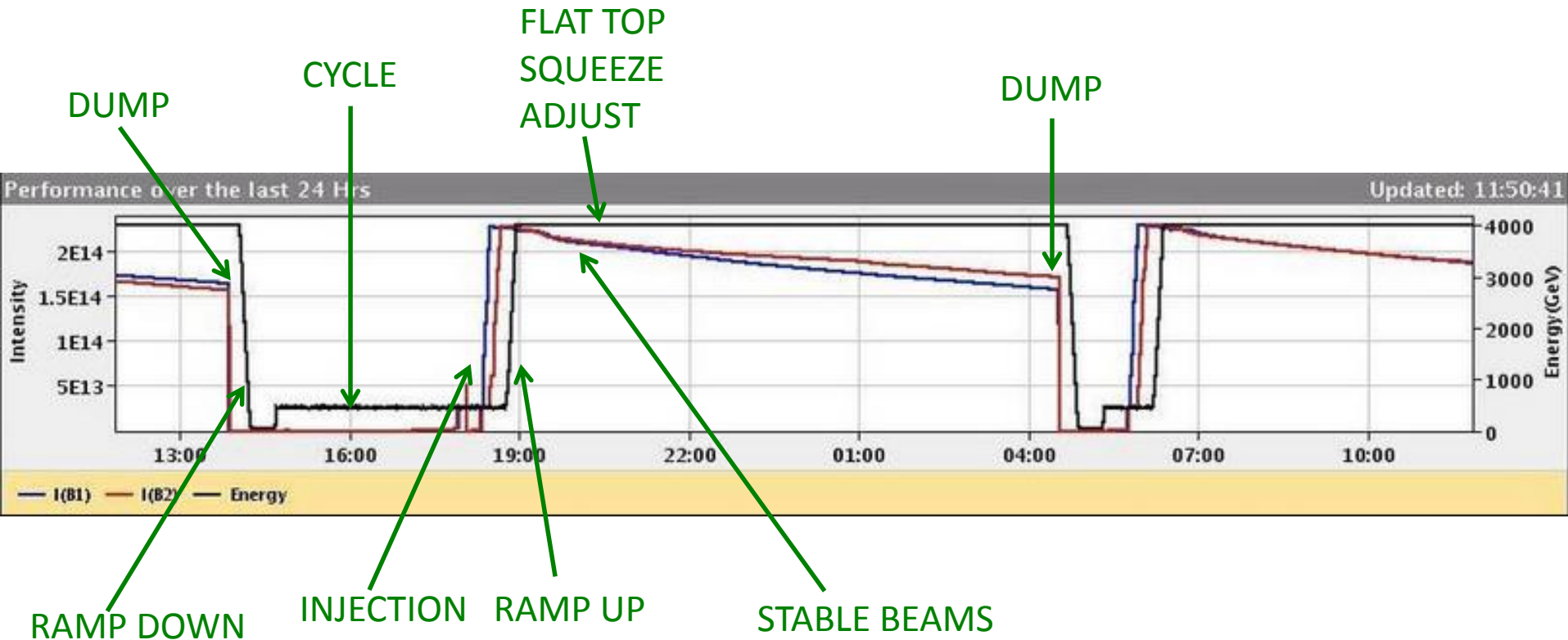
- The machine and the experiment interact through handshakes
  - the Injection Handshake initiates the sequence of actions during a Fill
- The shift crew concentrates on following this sequence of actions in order to take high quality data in the most *efficient* way during all the STABLE BEAMS time
- The duration of a Fill is usually undefined, but every second counts!

Detector Status and Data Taking

- Until STABLE BEAMS, the detectors are kept in the required safe states, calibration runs are taken, and preparations for PHYSICS running take place

- As soon as STABLE BEAMS are declared, detectors are moved to *READY* state, the *run* is started, the *trigger* checked, the *data quality* monitored; detector *alerts* are always inspected
  - The Shift Leader coordinates all actions

- Seven big screens in the ARC show the status of the machine and the experiment – please become familiar with these displays
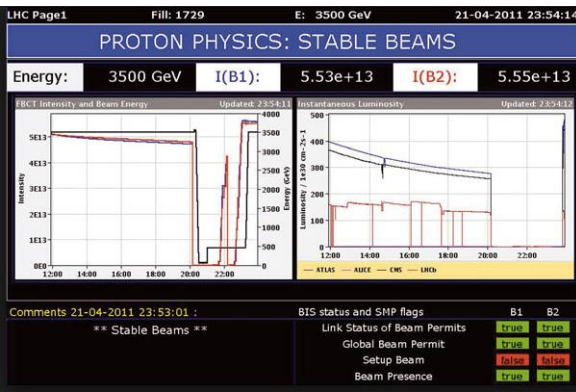
LHC Page 1

DCS Overview
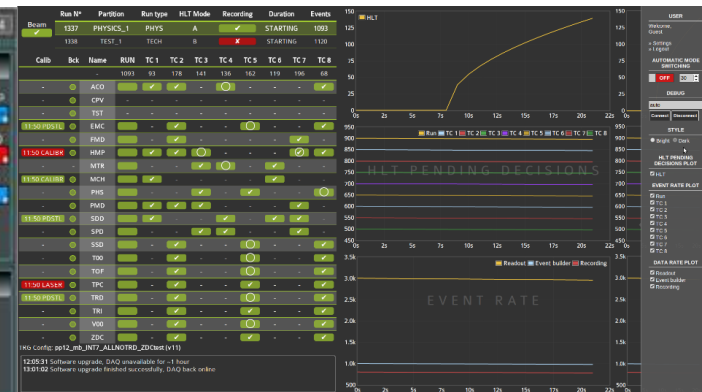
Online systems overview

... and so on

DCS monitoring screen

Detector Control System

14:59:57   Tue, 28/10/2014

Magnets

Dipole	Solenoid
dead	dead
negative	negative
-0 A	17 A
0 mT	0 mT

Alarms

DSS	CSAM
Ok	Ok

ALICE Permit

- 🟢 ALICE injection supersafe
- 🟢 Beam permit
- 🔴 Injection permit 1
- 🔴 Injection permit 2
- 🔴 Dipole beam permit

LHC status

NO BEAM

no handshake active

Detectors

ACO	AD0	CPV	EMC	FMD	HMP	MCH
READY	DEAD	DEAD	DEAD	DEAD	STBY_CONF	STANDBY
U X	U	U ...	S	SS ...	SS N	SS N

MTR	PHS	PMD	SDD	SPD	SSD	T00
DEAD	DEAD	OFF	READY	BEAM_TUNI	READY	OFF
SS N	S	SS N	S X	SS X	SS X	SS N

TOF	TPC	TRD	V00	ZDC	PIT	TRI
MIXED	DEAD	ERROR	OFF	BEAM_TUNI	OFF	DEAD
SS X	SS	S N	SS N	SS X	U X	U ...

DCS on Fri 25/04/2014, 11:26

Detectors are released, experts can take the control

LHC on Tue 14/10/2014, 11:47

How to check the hardware status of detectors

Detector Control System 14:59:57 Tue, 28/10/2014

Magnets

Dipole	Solenoid
dead	dead
negative	negative
-0 A	17 A
0 mT	0 mT

ALICE Permit
- ● ALICE injection supersafe
- ● Beam permit
- ● Injection permit 1
- ● Injection permit 2
- ● Dipole beam permit

Alarms

LHC status

Detectors

ACO	AD0	CPV	EMC	FMD	HMP	MCH
READY	DEAD	DEAD	DEAD	DEAD	STBY_CONF	STANDBY

MTR	PHS	PMD	SDD	SPD	SSD	T00
DEAD	DEAD	OFF	READY	BEAM_TUNI	READY	OFF

TOF	TPC	TRD	V00	ZDC	PIT	TRI
MIXED	DEAD	ERROR	OFF	BEAM_TUNI	OFF	DEAD

HC on Tue 14/10/2014, 11:47

Colors indicate the <u>hardware status</u> of each detector

Green: READY

Blue: HW OK but not READY (BEAM_TUNING/STDBY_CONF/OFF)

Red: ERROR

Other: transient states

New panel
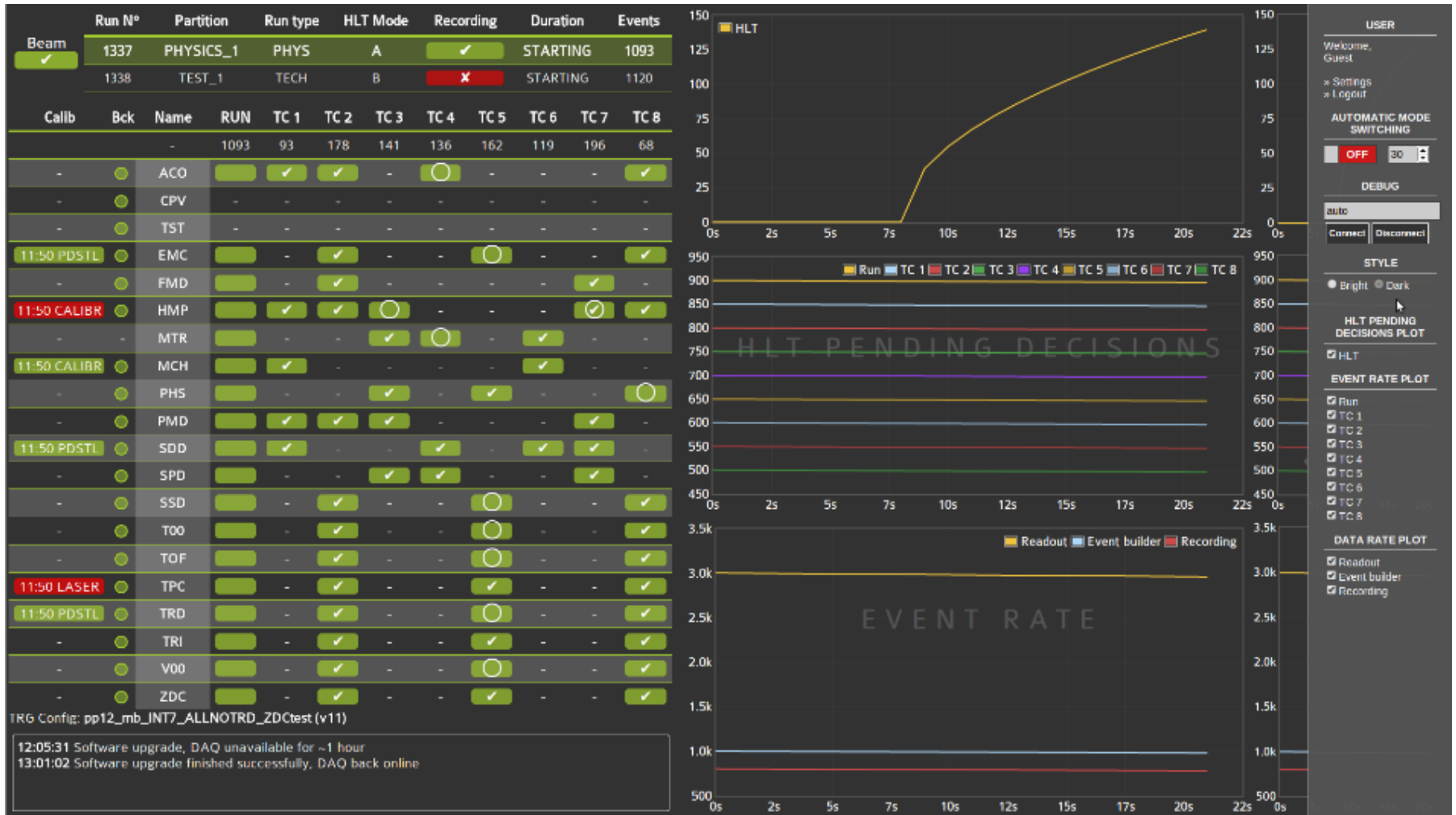
Runs overview

Detectors participating in runs at 17:37:13

✓ **Readout Detector**   ◯ **Trigger Detector**   ☑ **Trigger & Readout Detector**

BEAM	RUN	PARTITION	HLT MODE	DURATION	SUBEVENTS	ACORDE	CPV	DAQ TEST	EMCAL	FMD	HMPID	MUON TRG	MUON TRK	PHOS	PMD	SDD	SPD	SSD	T0	TOF	TPC	TRD	TRIGGER	V0	ZDC
N	166061	PHYSICS_1	A	19.5 m	236 k	✓					✓	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
		1			121.9 k	✓		◯			✓	✓		✓	✓	✓	✓	✓	✓	✓	✓	☑	✓	✓	✓
		2			122.1 k	✓		◯			✓	✓		✓	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓
N	166062		A	17.8 m	1.3 M						✓														

Announcements

No results found

Colors indicate data **recording (green)** / **no recording (orange)**. Most commonly
- technical runs are with "no recording"
- physics / cosmic runs are with recording

But always check the run type in the logbook if you're not sure if it is technical or physics!

How to check beam presence

Detectors participating in runs at 17:37:13

✓ **Readout Detector**   ○ **Trigger Detector**   ☑ **Trigger & Readout Detector**

BEAM	RUN	PARTITION	HLT MODE	DURATION	SUBEVENTS	ACORDE	CPV	DAQ TEST	EMCAL	FMD	HMPID	MUON TRG	MUON TRK	PHOS	PMD	SDD	SPD	SSD	T0	TOF	TPC	TRD	TRIGGER	V0	ZDC
N	166061	PHYSICS_1	A	19.5 m	236 k	✓					✓	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
		1			121.9 k	✓		○			✓	✓		✓	✓	✓	✓	✓	✓	✓	✓	☑	✓	✓	✓
		2			122.1 k	✓		○			✓	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓
N	166062		A	17.8 m	1.3 M								✓												

Announcements

No results found

The beam presence (Yes/No) is also indicated
For more details about the beam check the LHC Page 1

How to check running partition

Detectors participating in runs at 17:37:13

BEAM	RUN	PARTITION	HLT MODE	DURATION	SUBEVENTS	ACORDE	CPV	DAQ TEST	EMCAL	FMD	HMPID	MUON TRG	MUON TRK	PHOS	PMD	SDD	SPD	SSD	T0	TOF	TPC	TRD	TRIGGER	V0	ZDC
N	166061	PHYSICS_1	A	19.5 m	236 k	✓					✓	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
		1			121.9 k	✓		○			✓	✓		✓	✓	✓	✓	✓	✓	✓	✓	⊘	✓	✓	✓
		2			122.1 k	✓		○			✓	✓		✓	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓
N	166062		A	17.8 m	1.3 M						✓														

Announcements

No results found

Name of the partition

Globals partitions are called PHYSICS_1 or _2, _3, …

Only detectors included in global partitions have to be monitored (unless requested by experts)

How to check HLT mode

Detectors participating in runs at 17:37:13

✓ **Readout Detector**   ○ **Trigger Detector**   ◉ **Trigger & Readout Detector**

B E A M	R U N	P A R T I T I O N	H L T M O D E	D U R A T I O N	S U B E V E N T S	A C O R D E	C P V	D A Q T E S T	E M C A L	F M D	H M P I D	M U O N T R G	M U O N T R K	P H O S	P M D	S D D	S P D	S S D	T 0	T O F	T P C	T R D	T R I G G E R	V 0	Z D C
N	166061	PHYSICS_1	A	19.5 m	236 k	✓					✓	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
		1			121.9 k	✓		○			✓	✓		✓	✓	✓	✓	✓	✓	✓	✓	◉	✓	✓	✓
		2			122.1 k	✓		○			✓	✓		✓	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓
N	166062		A	17.8 m	1.3 M								✓												

Announcements

No results found

HLT mode:

A – HLT not used

B – HLT is active but does not affect data taking (for testing)

C – HLT is active and TPC data are compressed (you will see lower event size for TPC)

When HLT is in mode C you also have to monitor HLT DQM plots!!!

How to check the duration of the run

Detectors participating in runs at 17:37:13

✓ **Readout Detector** ◯ **Trigger Detector** ☑ **Trigger & Readout Detector**

BEAM	RUN	PARTITION	HLT MODE	DURATION	SUBEVENTS	ACORDE	CPV	DAQ TEST	EMCAL	FMD	HMPID	MUON TRG	MUON TRK	PHOS	PMD	SDD	SPD	SSD	T0	TOF	TPC	TRD	TRIGGER	V0	ZDC
N	166061	PHYSICS_1	A	19.5 m	236 k	✓					✓	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
		1			121.9 k	✓		◯			✓	✓		✓	✓	✓	✓	✓	✓	✓	✓	☑	✓	✓	✓
		2			122.1 k	✓		◯			✓	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
N	166062		A	17.8 m	1.3 M						✓														

Announcements

No results found

Duration of the run:

DQM plots are reliable only for runs that last more than 5 minutes

Remember that some statistics is needed before stating the quality of the data...

Before reporting any problem wait at least 10 minutes from the Start Of Run (SOR)

Introduction to shifter's operations

- The basics -

Before coming to the shift

DQM TWiki & documentation

DQM shifter tasks

DQM+offline shift

Since 2012 the **DQM shift is merged with the Offline**

- DQM tasks

- Event display -> see dedicated slides

- Offline tasks -> see dedicated slides

DQM IS ABOUT DETECTORS.
This training cannot cover all information needed to judge the detector's data quality, due to time reasons.
This training is about how to run and use the DQM framework.

It is important that **you check out the detectors Twiki** and take advantage of the experience during the training shift!

Before coming to the shift

- ✓ attend the training class (announcement to alice-member mailing list)
- ✓ Complete the test for the DQM+Offline shifter at the following link:

  https://alice-project-dqm-training.web.cern.ch/alice-project-DQM-training/

- ✓ book DQM+Offline training shifts from the SAMS page: 3 day shift
- ✓ read carefully the DQM Shifter's guide **before** going to the training at P2

  https://twiki.cern.ch/twiki/bin/viewauth/ALICE/AliceDQM

- ✓ Make sure that you have write access to the logbook **before your shift**:

  - Check it during your training
  - if you don't have it ask daniele.de.gruttola@cern.ch or elisa.meninno@cern.ch to give write permission to you

Complete the DQM+offline test
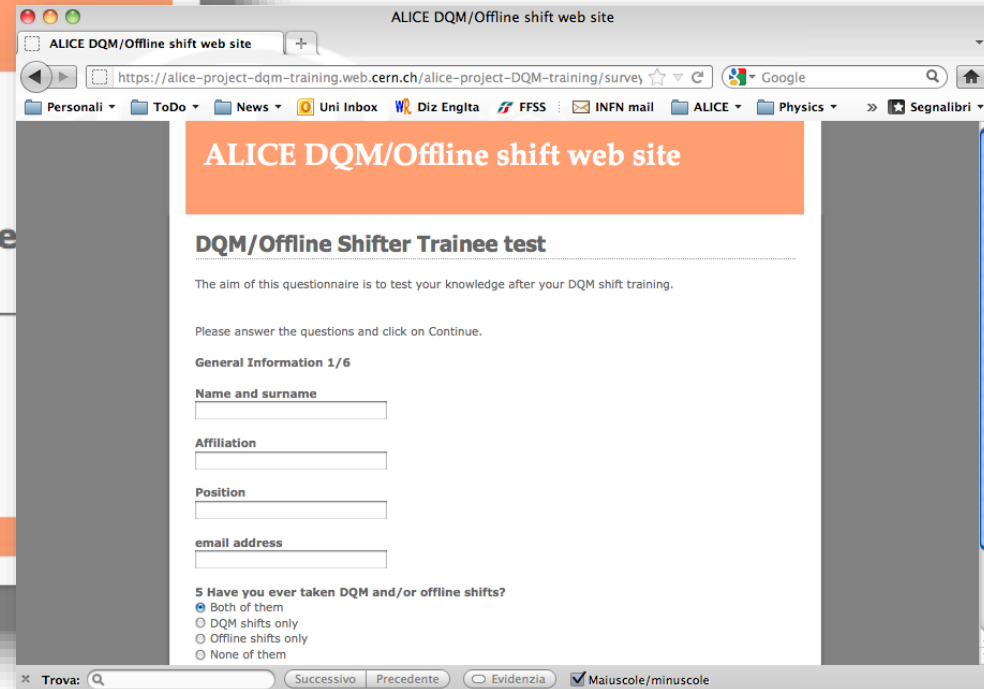
https://alice-project-dqm-training.web.cern.ch/alice-project-DQM-training/

Please notice: you have to complete part 1 AND part 2
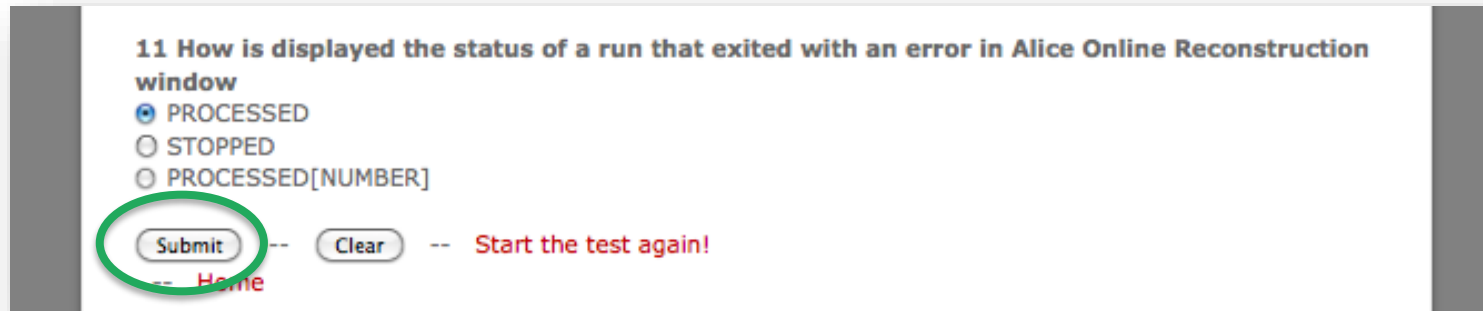
no deadline to complete the test
but do it at least 1 week before your training shift!

DQM+offline test

https://alice-project-dqm-training.web.cern.ch/alice-project-DQM-training/

Answer the questions and at the end select "submit":

You will get a summary page with the test result
The DQM and Offline SRC will receive an automatic e-mail with your result

Max. number of tolerated errors in
- **Part 1 (general DQM + offline): 0**
- **Part 2 (detector part): 10**

Max. number of attempts: 3

DQM SRC will enable your shift after you pass the test
no deadline to complete the test
but do it at least 1 week before your training shift!

DQM documentation

Link to the Twiki main page: https://twiki.cern.ch/twiki/bin/viewauth/ALICE/AliceDQM

TWiki > ■ ALICE Web > AliceDQM (16-May-2012, FrancescaBellini

AliceDQM: this manual can be found at: https://twiki.cern.ch/twiki/bin

ALICE Data Quality Monitoring

This wiki is used to describe the DQM system of ALICE.
It also link to the web page dedicated to the DQM shifters and to the

Comments are welcome!!!

SHIFTER'S GUIDE

DQM Shifter's Guide: https://twiki.cern.ch/twiki/bin/viewauth/ALICE/DQMShiftersGuide

- Blackboard and temporary issues: https://twiki.cern.ch/twiki/bin/viewauth/ALICE/DQMBlackboard

- Technical Runs: https://twiki.cern.ch/twiki/bin/viewauth/ALICE/TechnicalRuns

Offline shifter's guide (ALOSHI): https://aloshi.cern.ch/

LINK TO DETECTOR'S PAGES:

ACORDE DAQ EMCAL FMD HMPID MCH MTR PHOS PMD SPD SDD SSD T0 TOF TPC TRD V0 ZDC Vertex HLT TRI

TROUBLESHOOTING: https://twiki.cern.ch/twiki/bin/viewauth/ALICE/DqmTroubleshooting

TRAINING FOR NEW SHIFTERS AND TEST

General training sessions:

Shifter's guide:

https://twiki.cern.ch/twiki/bin/viewauth/ALICE/DQMShiftersGuide

Blackboard:

https://twiki.cern.ch/twiki/bin/viewauth/ALICE/DQMBlackboard

Technical runs instructions:

https://twiki.cern.ch/twiki/bin/viewauth/ALICE/TechnicalRuns

Link to offline shifter's guide

https://aloshi.cern.ch

DQM Twiki – Detector DQM responsibles

https://twiki.cern.ch/twiki/bin/viewauth/ALICE/AliceDQM

DETECTOR DQM RESPONSIBLES:

System	DQM responsible	System responsible
ACO	Mario Rodriguez Cahuantzi (Mario.Rodriguez.Cahuantzi@cernSPAMNOT.ch)	Arturo Fernandez Tellez (Arturo.Fernandez.Tellez@cernSPAMNOT.ch)
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Trigger	Evgeny Kryshen (Evgeny.Kryshen@cernSPAMNOT.ch)	Anton Jusko for CTP (Anton.Jusko@cernSPAMNOT.ch)

Troubleshooting section in TWiki

https://twiki.cern.ch/twiki/bin/viewauth/ALICE/DQMShiftersGuide#10_Troubleshooting
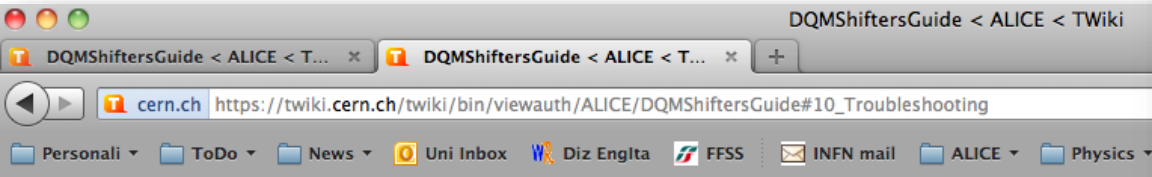
↓ **10. Troubleshooting**
  ↓ Empty plots
  ↓ Histograms not updating
  ↓ Agents manager issues
  ↓ AMORE GUI issues
  ↓ Frozen windows / connection problems
  ↓ TRIGGER GUI issues

10. Troubleshooting

Empty plots

If some histograms of ONLY ONE detector are empty during a PHYSICS RUN with beam, before calling the DQM or detector on-call do the following:

1. Check if the detector is included in the run. If not, then this is why it does not have plots!
2. Check the lenght of the run: if it is <10 minutes, the statistics might be too low. Wait 5 minutes...
3. Check if only that detectors has empty plots. If all or most of them have the same problem, go to the following instruction in this troubleshooting section below...
4. If only this detector has empty plots check the timestamp of the last update. If the plot is not updated please check the following item in this troubleshooting section.
5. Check if the agent is alive and running. If it is not running restart it with default parameters and wait a few minutes.
6. If the agent is already running, open the logs by selecting the agent in the amoreAgentsManager window and look for the monitor cycle number. If the agent is processing data properly you should see the monitor cycle index increasing and the processed event counter to be updated at every cycle. If this is not the case, try restarting the agent.
7. If the restart does not help, check if there are error messages concerning that agent in the InfoBrowser.
8. If the monitoring cycle stays stuck even after the restart, check the acquisition rate and ask the shift leader if that is the normal rate. If the acquisition rate is too low you might have too low statistics and this explains why hte plot is empty.
9. If the acquisition rate is normal, then call the detector on-call expert and ask him to verify the proper behaviour of the detector.
10. If the detector expert tells you that everything seems normal from the detector side, notify the DQM on call via email.

If some histograms of ALL detectors are empty during a PHYSICS RUN with beam, before calling the DQM or detector on-call do the following:

1. Check the beam type in the Logbook (in Run Details > Run Condition > Beam conditions). If it is flagged as "Unknown" the event specie which is filled is Cosmic. This means that the plots in the physics layout will not update and a lot of DQM plot look empty or display FATAL error.
2. **Instructions**: Close everything and start ./dqm_cosmic to monitor the correct plots.
3. If the beam type is correct but still plots are empty for most of the detectors, call the DQM on call.

Histograms not updating

If some histograms are not updating:
1. Check that the detector of the agent whose histograms are not updating is in the partition.

**THIS and AND MORE!
CHECK IT OUT!**

DQM tasks

- ✓ **inspect** the data quality monitoring **histograms** for the detectors during **physics and technical** runs (global partitions only, unless specific instructions)

- ✓ promptly **report** detector's problems from the content of the plots to the shift leader and detectors' on-call

- ✓ check if DQM plots are properly **saved** in the logbook

- ✓ **report** problems of the DQM framework

- ✓ **report** problems of the detector's AMORE agents

- ✓ update properly the blackboard with understood problems

- ✓ enter a summary of your observations in the electronic logbook at the end of the shift (**EOS report**)

- ✓ check the **quality flag** set by detectors' experts and send them emails if not done (night shifter)

- ✓ **pass all the relevant information to the following shifter**