

### CZECH TECHNICAI

# **Overview of QC**

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> of UPC, Děčín Miniwork .2019

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# Big times for ALICE are coming up

- Run 3 will bring higher interaction rate of collisions
  - 50 kHz for PbPb
  - 200 kHz for pp, pPb
- Not feasible to trigger on events anymore
  - Large pile-up: several heavy-ion collisions in one read-out time of the TPC
- Continuous read-out
  - Data throughput from the detector: ~ 1TB of data per second
- ALICE needs new computing system, which will be able to perform maximal reduction of the data volume read out from the detector as early as possible during the data-flow
  - Reconstructing the data in several steps synchronously with data taking
  - Second reconstruction stage will be performed asynchronously, using the final calibration in order to reach the required data quality

# During data taking

- Collected data have to be constantly monitored
- Someone has to be present in the ALICE Control Room 24/7
- Two persons were there to check that everything works fine:
  - One person responsible for data quality monitoring (DQM)
  - One person responsible for detector monitoring (DCS)

- Each detector had its own expert who has to be accessible by phone 24/7 to solve potential problems / questions
  - Special list with expert's names and their phone numbers

# ALICE Control Room



## ALICE Control Room



# ALICE Control Room



# Real mood in the ALICE Control Room

### Shift schedule

SAMS

Members, institutes, periods and detectors...

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### DQM

#### ALICE Electronic Logbook v1.116

& Katarina Krizkova Gajdosova [Logout]

#### 🔏 Logbook 🗄 🚯 Runs 🗄 🌽 Fills 🗄 🍂 Admin 🗄 🧠 Links 🗄

Run Quick Access:

Fill Quick Access:

		(02/12/2	Run Details - 297624 2018 16:14:54 - 02/12/2018 17:11:57)	
Run Browsing R	un Quick Access		Actions	
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General Info Trigger Info	DAQ Info HLT Info	DQM Info Migration & Offline Logs		
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### DQM

Data Quality Monitoring Info - agent 'FMDQAshifter'

and all Collapse all	Overview Permanently Archived MOs (?) Temporarily Ar	chived MOs (?) Online MOS (?)
Tree Char	General	
Other	General	
ADO	Detector: FMD	
CPV	Version: 1.74	
DAQ	# Macillar Objector 25	
EMC	# Monitor Objects: 35	
FMD	# Versions: 2100	
FMDCalib	Total Size: 22.2 MB	
FMDQAshifter	Last Updated: 02/12/2018 17:12:22	
FMDRaw		
) HLT	Runtime Parameters	
HMP		
] LHC	amoreAgent -a FMDQAshifter	
МСН	-> EMDOAshifter -s AEMD -a fmd confiafile	
MTR	Extra flags: -u -t 45	
PHS	Configuration file :	
PMD	# QA species definition. Options: [default] [calib] [low]	
SDD	[high] [cosmic]	
SPD	qa_species default calib low high cosmic	
SSD		
тоо	# Low cut for fitting energy loss specrta	
TOF	# Edit 20160701 - cholm: 0.3 -> 0.4	
TPC	ELossLowCut 0.4	
TRD	# Number of RMS to fit beyound maximum. If this is	
TRI	# zero or less, the upper bound is the maximum of the	Hun type: PHTSICS - Beam type: A-A - species: Default; LowRumpicity; Default (HighMumpicity); Cosmic; Callo;
voo	# plotted in the the fit range	Mode: Rec, Task: Raws, Specie: LowMultiplicity, Run: 297624 Mode: Rec, Task: Raws, Specie: HighMultiplicity, Run: 297624
ZDC	# ELossNRMS 0.75	
nd all Collapse all	ELossNRMS -1.	
	# Cut on chi^2/nu of fit for bad value	An Annual
	ELossBadChi2Nu 10.	
	# Cut on chi^2/nu of fit for f**ked up value	
	ELossFkupChi2Nu 100.	
	# Cut on relative error on parameters of fit	
	ELOSSGOODParError 0.1	
	# Least number of entries before fitting	
	# chi^2 in clase El ossMayEntries is zero or less	bal Bal
	ELossMinEntries 10000.	
	# Maximum number of entries before clearing (< 0 disables)	Mode: Rec, Task: Raws, Specie: Cosmic, Run: 297624 Mode: Rec, Task: Raws, Specie: Calb, Run: 297624
	# If this is larger than 0, then the ELoss spectra shows the	
	# instantanious rather than the accumulated quality	
	# ELossMaxEntries 300000.	
	ELossMaxEntries -1.	The second
	# LEast MPV value	
	# Edit 20160701 - cholm: 0.2 -> 0.3	OK S S S S S S S S S S S S S S S S S S S
	ELossMinMPV 0.3	
	# Largest xi value	
	ELOSSMAXXI 0.3	
	# Largest sigma value	Were 3 OK Marte 3 OK
	# Cut on average number of R/O errors per detector	
	ROErrorsBad 0.31	ndos ndos ndos ndos ndos ndos ndos ndos

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### DQM

Data Quality Monitoring In	fo - agent 'FMDQAshifter'	
xpand all Collapse all	Overview Permanently Archived MOs (?) Temporarily A	rchived MOs (?) Online MOs (?)
Tree	Concerni	
Other	General	
	Detector: EMD	
	Newsign 1.74	
	Version: 1.74	
	# Monitor Objects: 35	
	# Versions: 8995	
FMDCalib	Total Size: 95.2 MB	Call expert
FMDQAshifter FMDRaw	Last Updated: 23/11/201 03:05:58	
	Runtime Parameters	
HMP		
- C LHC	amoreAgent -a FMDQAshifter	
🗀 МСН	-a EMDOAshifter -s AEMD -s fmd confisfie	
🗀 MTR	Extra flags: -u -t 45	
📋 PHS	Configuration file :	
C PMD	# QA species definition. Options: [default] [calib] [low]	
C SDD	[high] [cosmic]	
🔁 SPD	qa_species default calib low high cosmic	
🔁 SSD		
👝 тоо	# Low cut for fitting energy loss specrta	
TOF	# Edit 20160701 - cholm: 0.3 -> 0.4	
трс	ELossLowCut 0.4	
	# Number of RMS to fit beyound maximum. If this is	
	# zero or less, the upper bound is the maximum of the	Run type: PHTSICS . Beam type: A-A . Species: Default; LowMultiplicity; Default (High Tuttplicity); Cosmic; Calib;
V00	# nistogram. If positive, then the ELOSS his are only	Mode: Rec, Task: Raws, Specie: LowMultiplicity, Run: 296750 Mode: Rec, Task: Raws, Specie: HighMultiplicity, Run: 296750
	# ELossNRMS 0.75	
pand all Collapse all	ELossNRMS -1.	
und un contapse un	# Cut on chi^2/nu of fit for bad value	Construction of the second sec
	ELossBadChi2Nu 10.	
	# Cut on chi^2/nu of fit for f**ked up value	
	ELossFkupChi2Nu 100.	
	# Cut on relative error on parameters of fit	
	ELossGoodParError 0.1	
	# Least number or entries before fitting # This is also used as the base for scaling the	Marke 2 - OK
	# chi^2, in clase FLossMayEntries is zero or less	
	ELossMinEntries 10000.	∝ ⊢ · · · · · · · · · · · · · · · · · ·
	# Maximum number of entries before clearing (< 0 disables)	Mode: Rec, Task: Raws, Specie: Cosmic, Run: 296750 Mode: Rec, Task: Raws, Specie: Calib, Run: 296750
	# If this is larger than 0, then the ELoss spectra shows the	
	# instantanious rather than the accumulated quality	
	# ELossMaxEntries 300000.	
	ELossMaxEntries -1.	
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	# Largest XI value	
	# LArgest sigma value	
	ELossMaxSigma 0.6	Marte_7 OK Marte_7 OK
	# Cut on average number of R/O errors per detector	
	ROErrorsBad 0.31	HICH RICH RICH RICH RICH RICH RICH RICH

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# Monitoring data: The old way (Run1&Run2)

### Data Quality Monitoring (DQM)

- Online automatic monitoring
- Aimed for experts and shifters in the Control room
- After each run a manual check by detector experts was required to set a quality flag -> DQM was also used offline
- Quality Assurance (QA)
  - Offline manual monitoring
  - After (also during) full data reconstruction
  - Checked manually by detector experts and Data Preparation Group (DPG)
  - Available for users (run\_no/pass1/QAresults.root or run\_no/pass1/trending.root)

#### · DPG groups and meetings:

- PROC: Raw data processing (Preparation and follow-up), Monte Carlo productions (Preparation and follow-up)
  - Coordination meeting focused on production: Wednesday at 1 pm (Geneva time): Indico category 2
- QAT: Quality Assurance on current data and MCs and development of QA Tools for Run2 and Run3

  - QA-tools weekly meeting: Wednesday at 2.30 pm (Geneva time) Indico category 2
  - AnalysisQA meetings: Friday at 9 am (Geneva time)

AOT: Analysis Objects and Tools

- Event selection and properties: meeting on Thursday at 4 pm (Geneva time): Indico category 2
- Track selection and properties: meeting on Thursday at 11.30 am (Geneva time): Indico category 2



## After LS 2: O<sup>2</sup>

- ALICE will undergo a transition from Online and Offline computing to a new common system O<sup>2</sup>
- This system will be able to cope with synchronous & asynchronous data taking
  - Detector read-out, event building, data recording, detector calibration, data reconstruction, physics simulation and analysis



- Continuous read-out, large data flow, ... -> we need to have good monitoring system
  - The old system will not work anymore

# Monitoring data: The new way (Run3&Run4)

• QC = Data Quality Control and Assessment

- DQM and QA are merged into a single QC framework
- This should handle both online immediate quality assurance, as well as data monitoring during asynchronous data reconstruction, calibration
- QC should work on an automatic basis (to prevent latency caused by human checks)
- Fast feedback while there is still time to take action (during data taking)







- Producer
  - Now Monte Carlo, during data taking it will be real data



- Data sampling:
  - "spying" on the main continuous data processing flow
  - Selects and transfers necessary data to QC (can be few %, or whole data sample)



- QC tasks:
  - Filling monitoring objects (histograms) with information

- Input information
  - Data Origin: ITS, MFT, ...
  - Data Description: clusters, raw, tracks, ...
  - Other specifications



- Checker:
  - Inspects data quality (too many dead pixels, too high threshold values, ...)



- Repository
  - A place to store histograms and quality flags
  - Web GUI for shifters

# Web GUI (QCG)



# Web GUI (QCG)



### QC task development



# Backup

### DCS

### **Detector Control System**

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



### D(S)

### **Detector Control System**

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

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### QC workflow - simple idea



• Overall, QC is designed to cope with ~ 5000 objects (histograms)