Welcome to the Run-2 Shift Training

General Introduction for all shifters

v.2.4

Acknowledgement:
Alina C.R. ,Thilo, Stephanie

A. Polini, A. Cerri

February 25th 2014

Outline:

- Some general information on ATLAS
- General Information about this training
- Control Room Desktop and Shift Tools
- Overall operation and preparation for Run-2
- Schedule: Preparation and Milestone 8 (February 2nd onwards)

Introduction

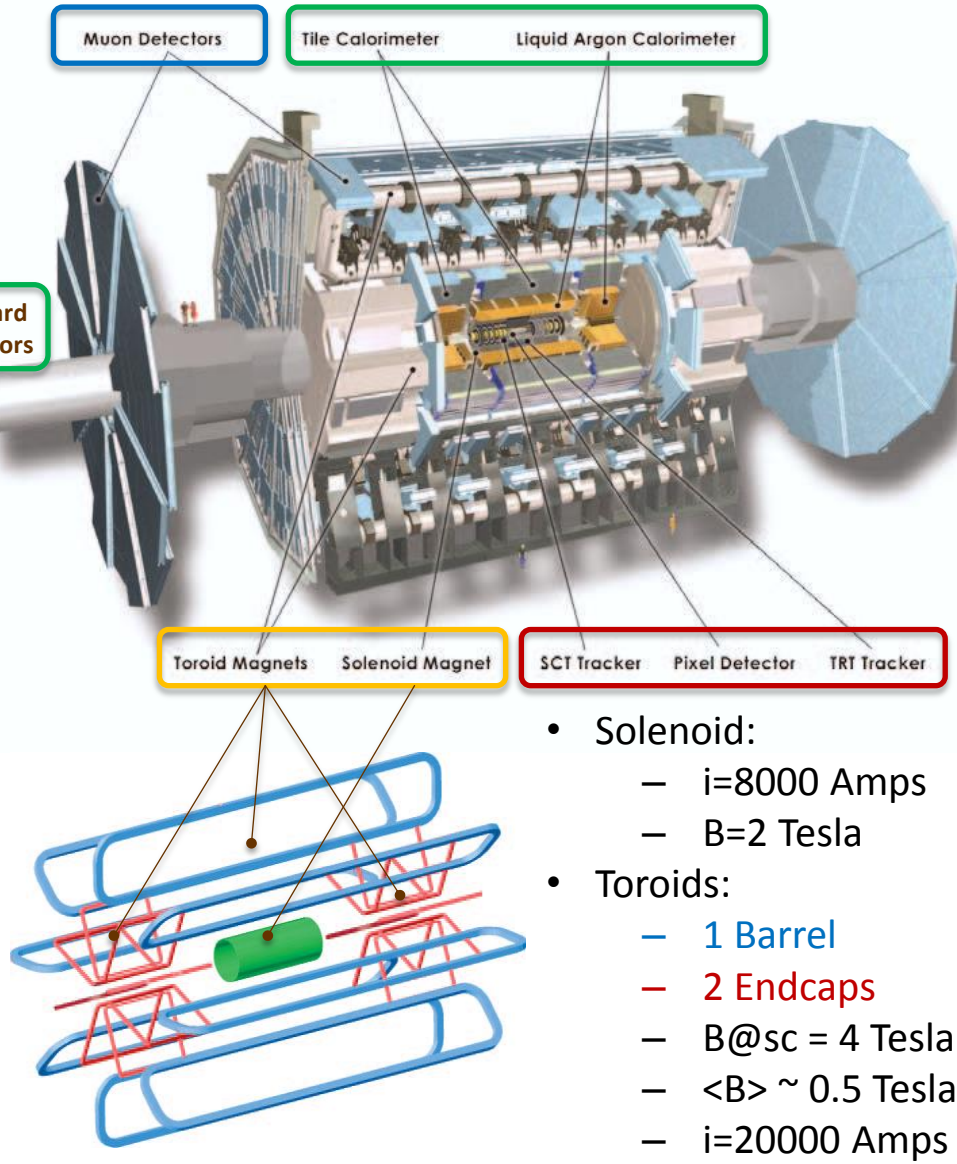
ATLAS

ATLAS (A ToroidaL ApparatuS)

- Diameter 25 m; Length : 46 m
- Barrel toroid length 26 m
- Overall weight 7.000 tonnes
- ~ 100 million electronic channels
- ~ 3.000 km of cables

Several systems needed for coherent operation and physics data taking

- Sub-Detectors
  - Inner Detector, Calorimeters, Muons, Forward detectors
- Trigger and Data Acquisition (TDAQ)
- Detector Control System (DCS)
- Data Quality (DQ)
- Data Storage and Offline Computing
- Services and infrastructure:
  - Power, Gas, Cooling, Cryogenics, … → Safety Operation



- Solenoid:
  - i=8000 Amps
  - B=2 Tesla
- Toroids:
  - 1 Barrel
  - 2 Endcaps
  - B@sc = 4 Tesla
  - <B> ~ 0.5 Tesla
  - i=20000 Amps

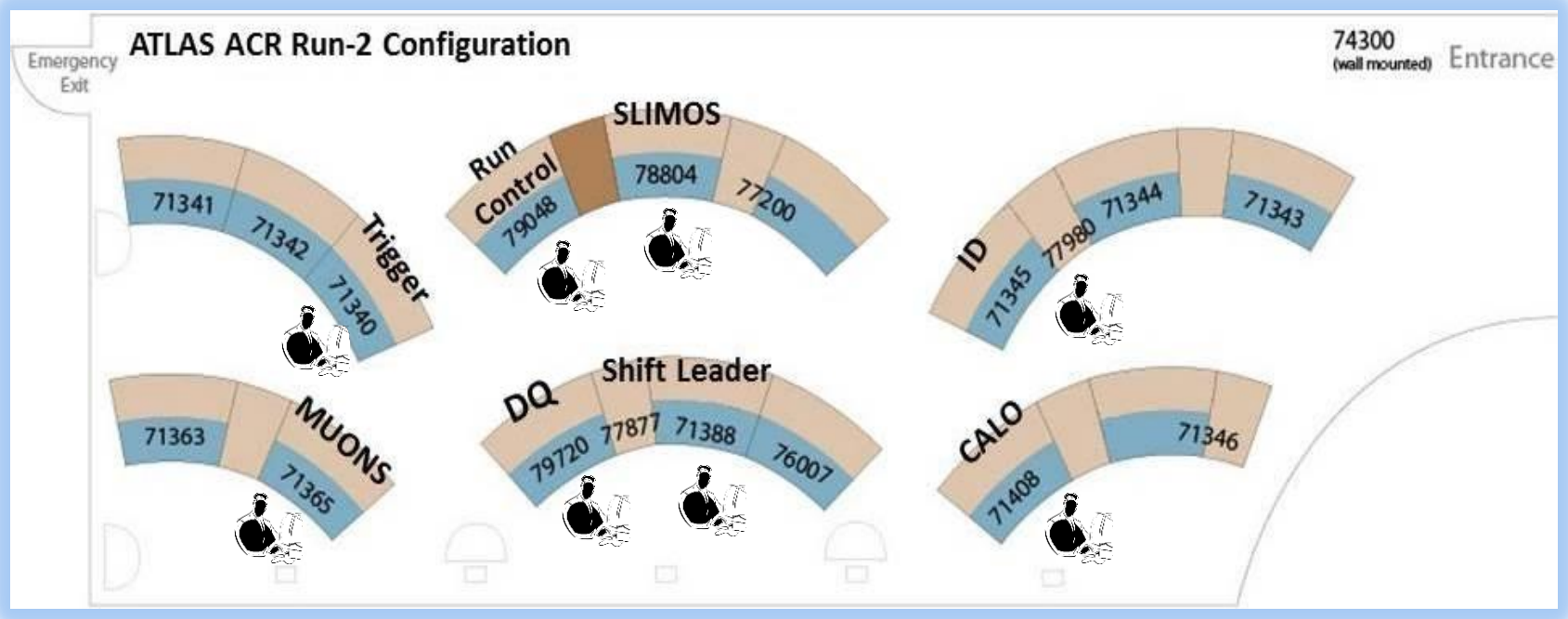
Atlas Control Room Layout

Run-2:
8 Class-1
Shifters

Run-2 Operation: Shift Model

- **3 detector desks** (ID, CALO+FWD, MUONS)
- **3 central tasks** (Run Control, Trigger, Central Data Quality)
- **Shift Leader + SLIMOS**
- **Supporting Doc:**
  - **EDMS Document:** https://edms.cern.ch/document/1348082/1
  - **Twiki:** https://atlasop.cern.ch/twiki/bin/view/Main/Run2Preparation

A. Polini 26 ATLAS Weekly, 22 July 2014



Shift Tasks (i)

Shift Leader

- Main responsible in the ATLAS Control Room (ACR), supervising all experiment activities
- Ensure the run plan is followed (cosmics, physics, calibration)
- Direct contact to CCC (Cern Control Center) for ATLAS-LHC beam handshake, Run Manager/Run Coordinator

Run Control Desk

- Ensure the Experiment is smoothly running (during and before Physics)
- Run Control (Run start/stop , busy monitoring, Removal/Recovery, Shifter Assistant)
- Global TDAQ infrastructure
- Auxiliary partitions:
  OLC (Online Lumi Calculator), L1CT (Central Trigger Processor) etc.

Trigger Desk

- Trigger Configuration (set Trigger Keys)
- Trigger and Trigger Detectors Monitoring

Data Quality Desk

- Central Data Quality, Global Monitoring
- General Timing, Trigger vs Lumi, Occupancy
- Luminosity Monitoring
- ADC (Atlas Distributed Computing) Monitoring

Shift Tasks (ii)

3 Detector Desk

1. **Inner Detector Shifter**
   (IBL/PIX, SCT, TRT, BCM, DBM)
2. **CALO Detectors Shifter**
   (LAr, TILE, Fwd)
3. **MUON Detectors Shifter**
   (CSC, MDT, RPC, TGC)

Duties:

- Ensure proper DAQ/DCS detector configuration
- Follow up problems, solving or contacting experts/system coords.
- Monitor Detector DQ aspects
- Take Calibration Runs

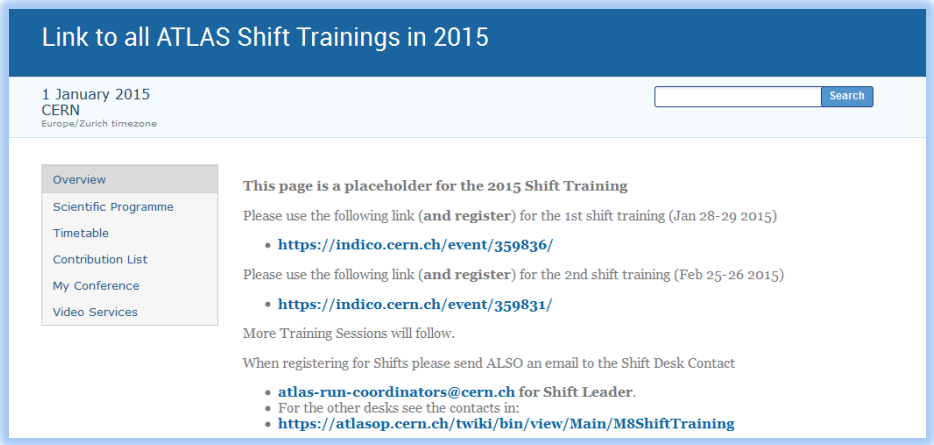
Shift Leader in Matters of Safety (SLIMOS)

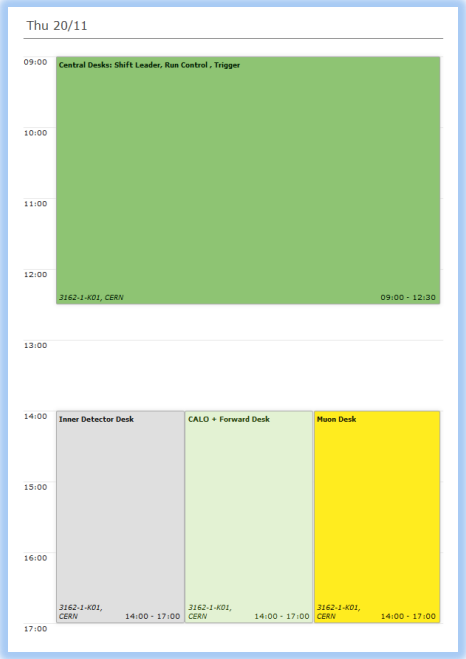
- Safety Aspects
- Cavern Access
- Common Infrastructure (Power, Cooling, Cryo, Gas…)

How the training is organized

- **2 full days here at P1**
- **Today:**
  - General session for all shifters
  - Global concepts ATLAS, LHC, TDAQ, DCS, DQ
  - Shift Leader (4pm)
- **Tomorrow Morning:**
  - Run Control/Trigger in this room
- **Tomorrow Afternoon:**
  - Parallel Sessions:
  - The 3 detector desk and DQ/Lumi
- **Please note:**
  - Material still being developed
  - Experiment commissioning still ongoing
  - Training will cover all aspects, but some parts won't be operational and/or are being commissioned.
  - PLASE NOTE: Your Input is very important to the documentation and the procedures

https://indico.cern.ch/event/359341



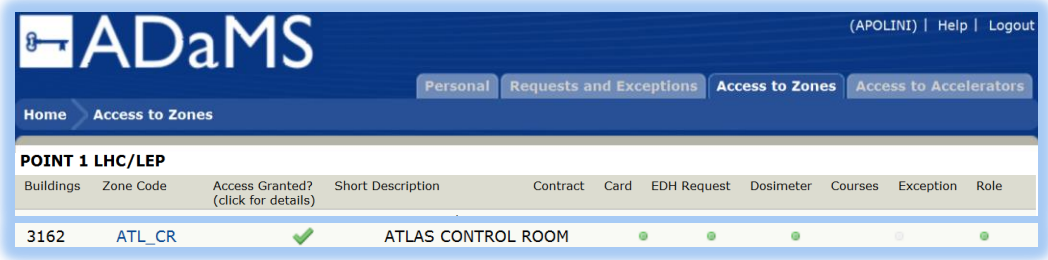


ATLAS Operation
Shift Desk and Tools

P1 Access and Login

To enter the ATLAS control Room:

- You need to have "ATL_CR" access
- You can request it on:
  ➔ http://edh.cern.ch
  (need to attend SIR e-courses) and check it
  ➔ http://adams.web.cern.ch



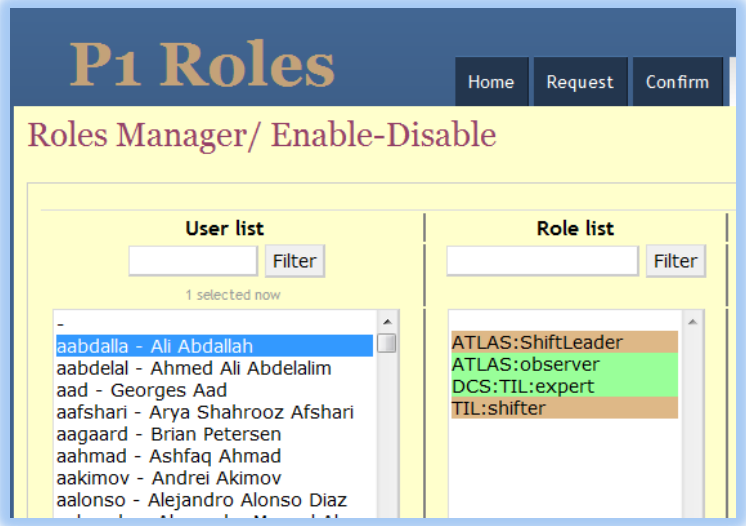
Required Safety Courses

Description	Course Code	Jump
Level 4A (ATLAS)	COURAT	SIR - Follow it here.
CERN Safety Introduction	COURHSE	SIR - Follow it here.
Safety during LS1	COURLS1	SIR - Follow it here.

Point 1 login:

- ACR shift computers have desk logins w/o passwords (see control room desktop)
- Actions/Elog/DCS etc. need a real P1 username though, this normally exists already or is created when shift is booked

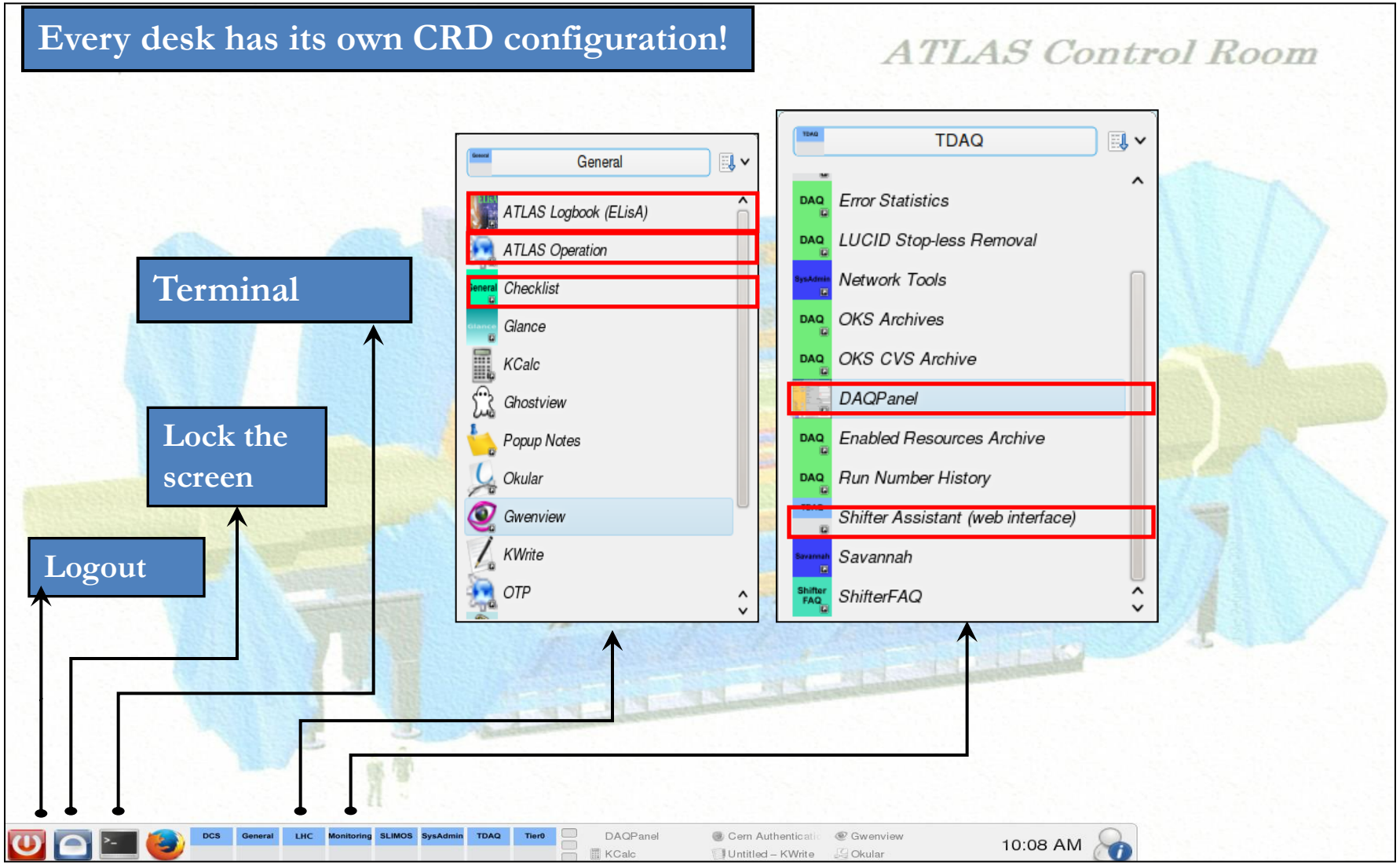
  ➔ https://atlasop.cern.ch/sysadmin/ldap_roles/roles_enable.php
- "Shift Roles" are "assigned" prior to shifts and "enabled" during the shift period.
- P1 network is detached from CERN GPN
  - From P1 to CERN: ssh –XY atlasgw-exp
  - From CERN to P1: ssh –XY atlasgw
- Wifi (for laptops) is connected to CERN GPN



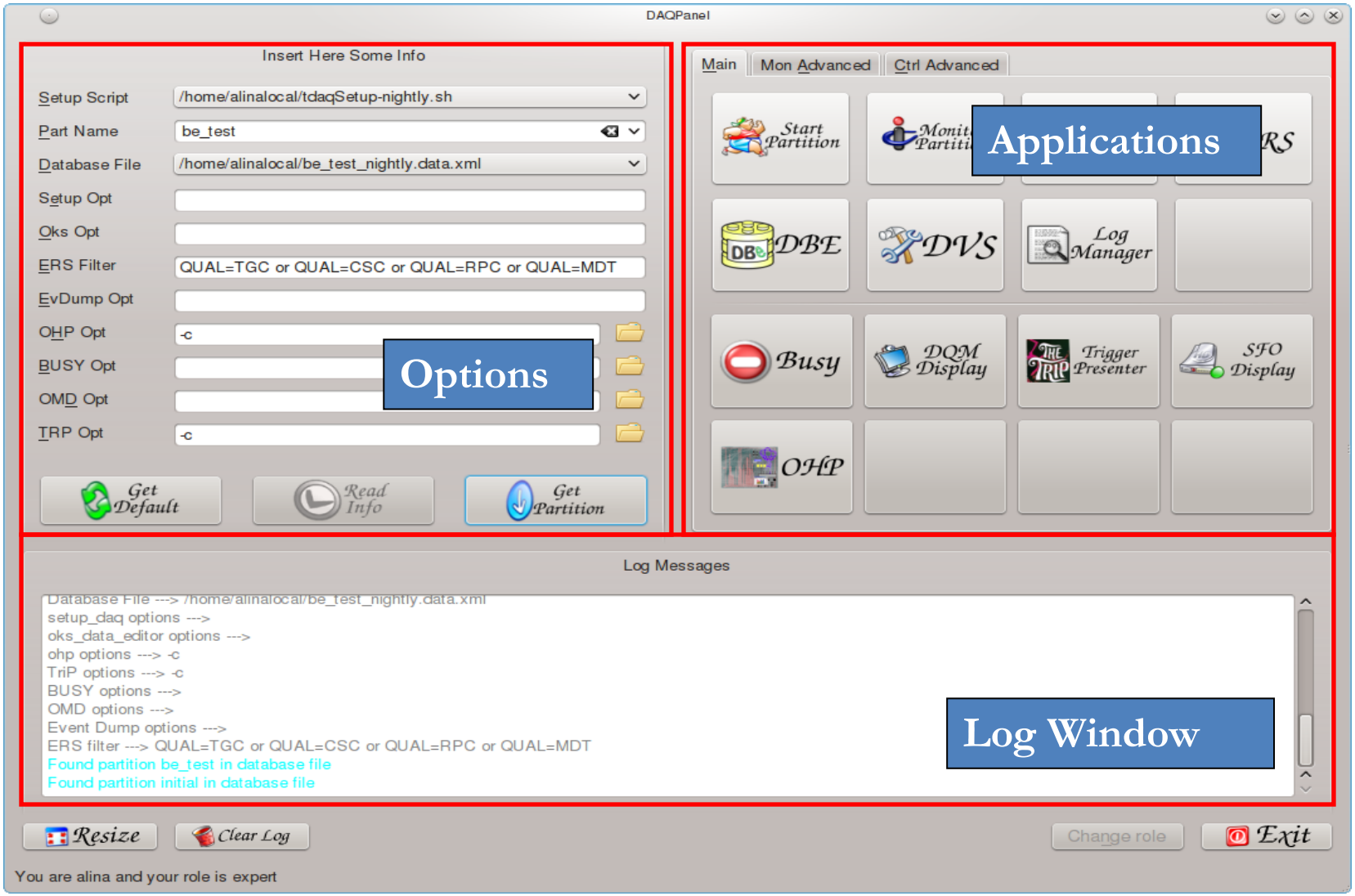
The Control Room Desktop

- The Control Room Desktop (CRD) is the user interface to operate in the ATLAS control rooms
- It gives all the users a *common*, *easy to use* but *controlled* environment
  - The desktop itself is a *guide* for the user offering him all the tools he/she needs
    - No need for the user to know by heart application names, web links, etc.
- User privileges are taken into account
  - The *CRD* takes care of checking user privileges using the access management system in place at P1
    - You may not be allowed to use some tool

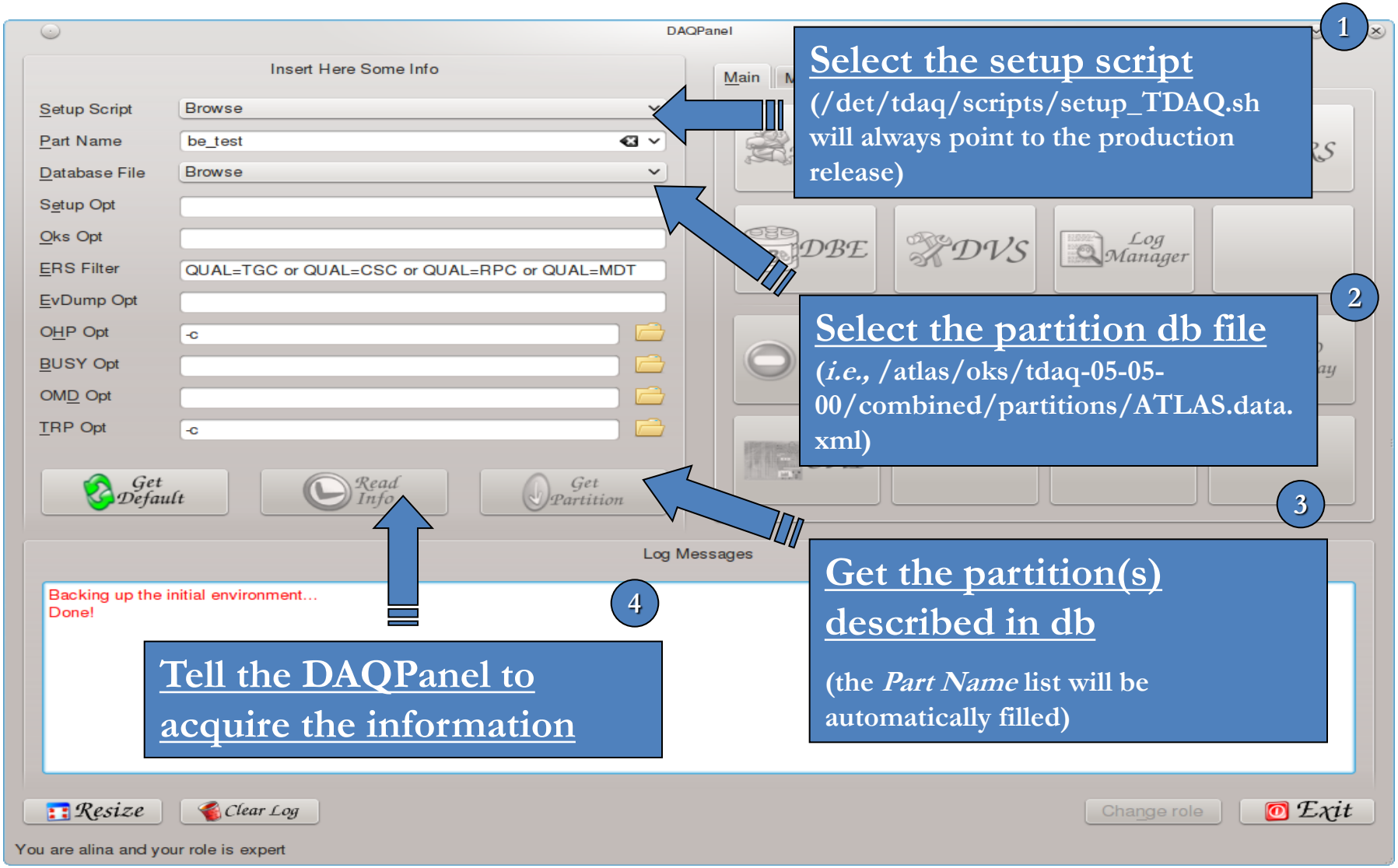
The Control Room Desktop



The DAQ Panel



The DAQPanel



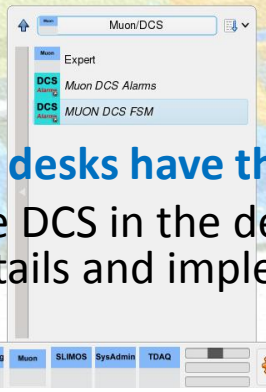
Detector Control System

More later in the DCS tutorial

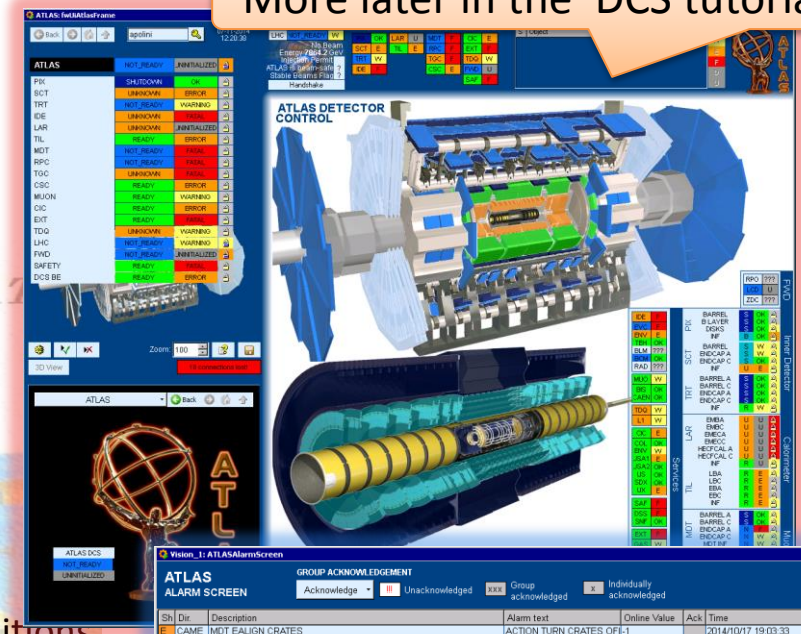
- Monitor and safely operate the experiment by means of an easy and streamlined interface which allows hiding the complexity of the many thousands detector devices

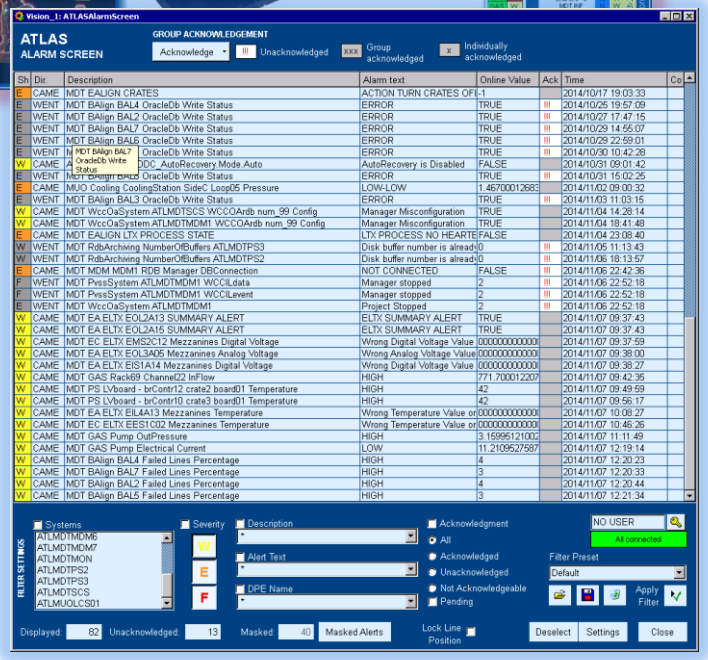
- **Finite State Machine**
  - Inspect and set all detector relevant settings (power, high and low voltages, thresholds, gas, cooling, etc.)
  - Bring the detector from SHUTDOWN to STANDBY to READY state for PHYSICS data taking

- **Alarm Screen**
  - Present all detector and infrastructure severity conditions OK, WARNING, ERROR, FATAL



- **All detector desks have their own DCS view and tools**
- More on the DCS in the dedicated lecture later and detector details and implementation in the detector tutorials

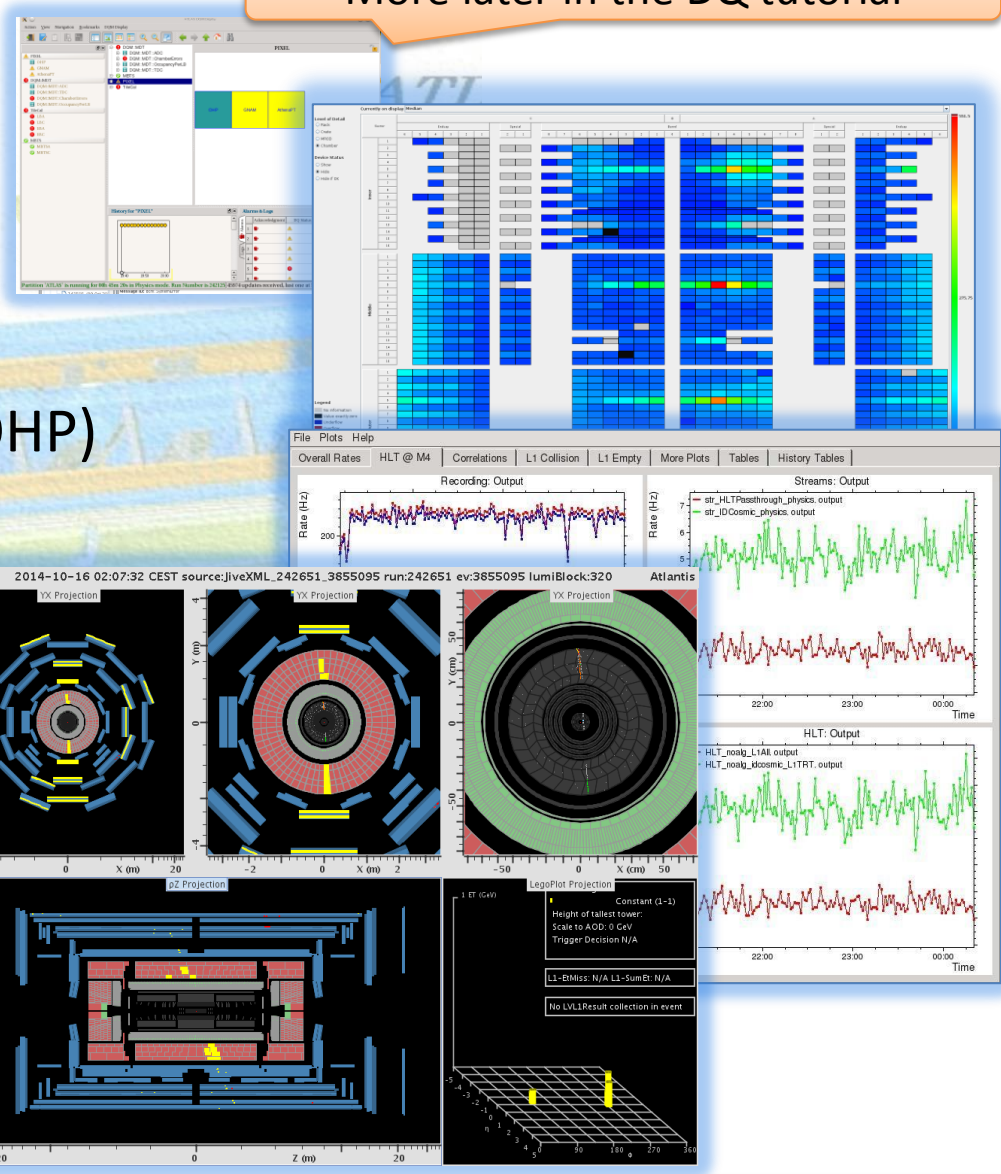




Online Monitoring

More later in the DQ tutorial

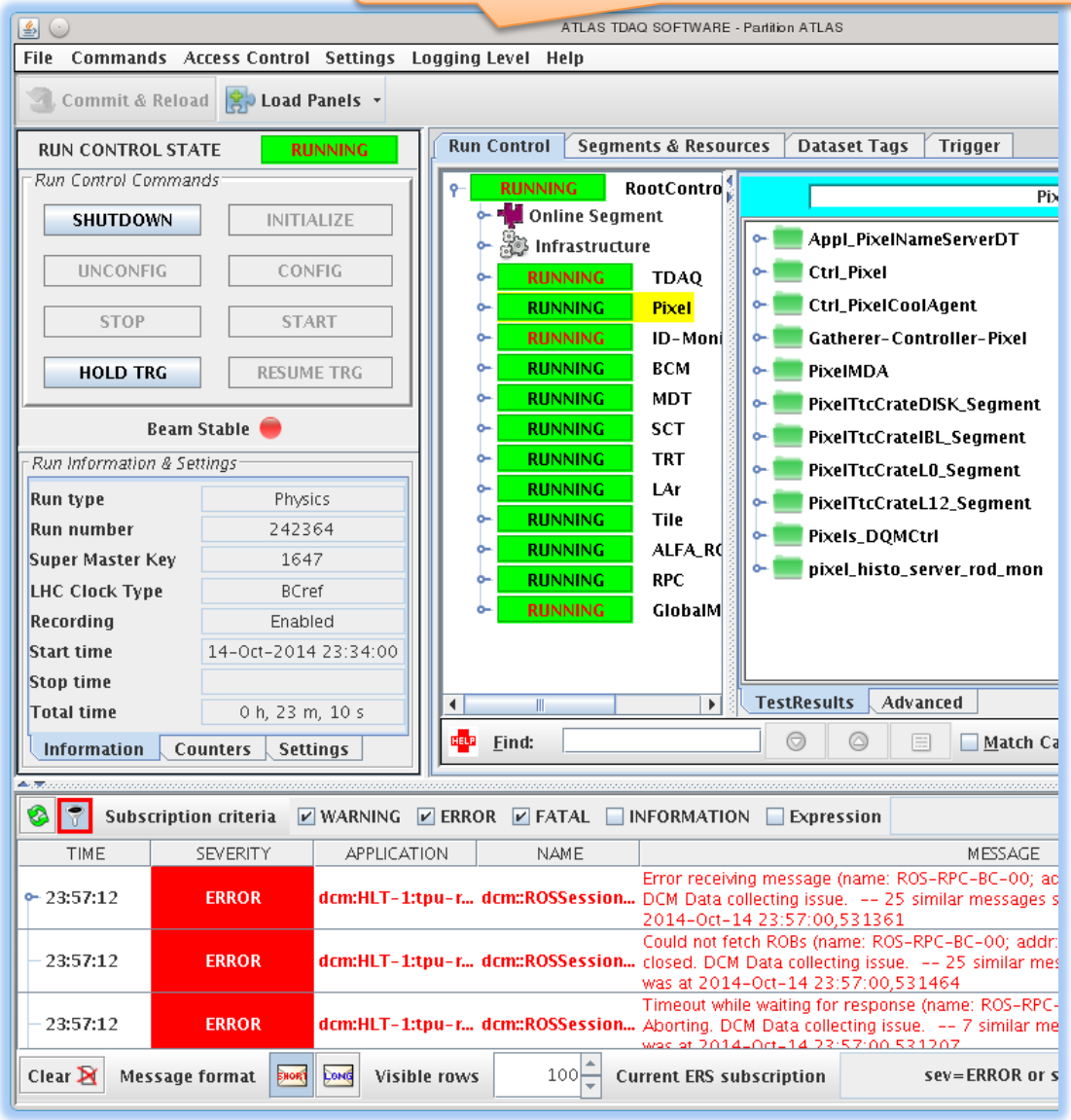
- Online Monitoring
- Global Monitoring
- Trigger Presenter (TrP)
- Online Histogram Presenter (OHP)
- DQM Display | DQM Browser
- Event Display (Atlantis)
- etc. etc.



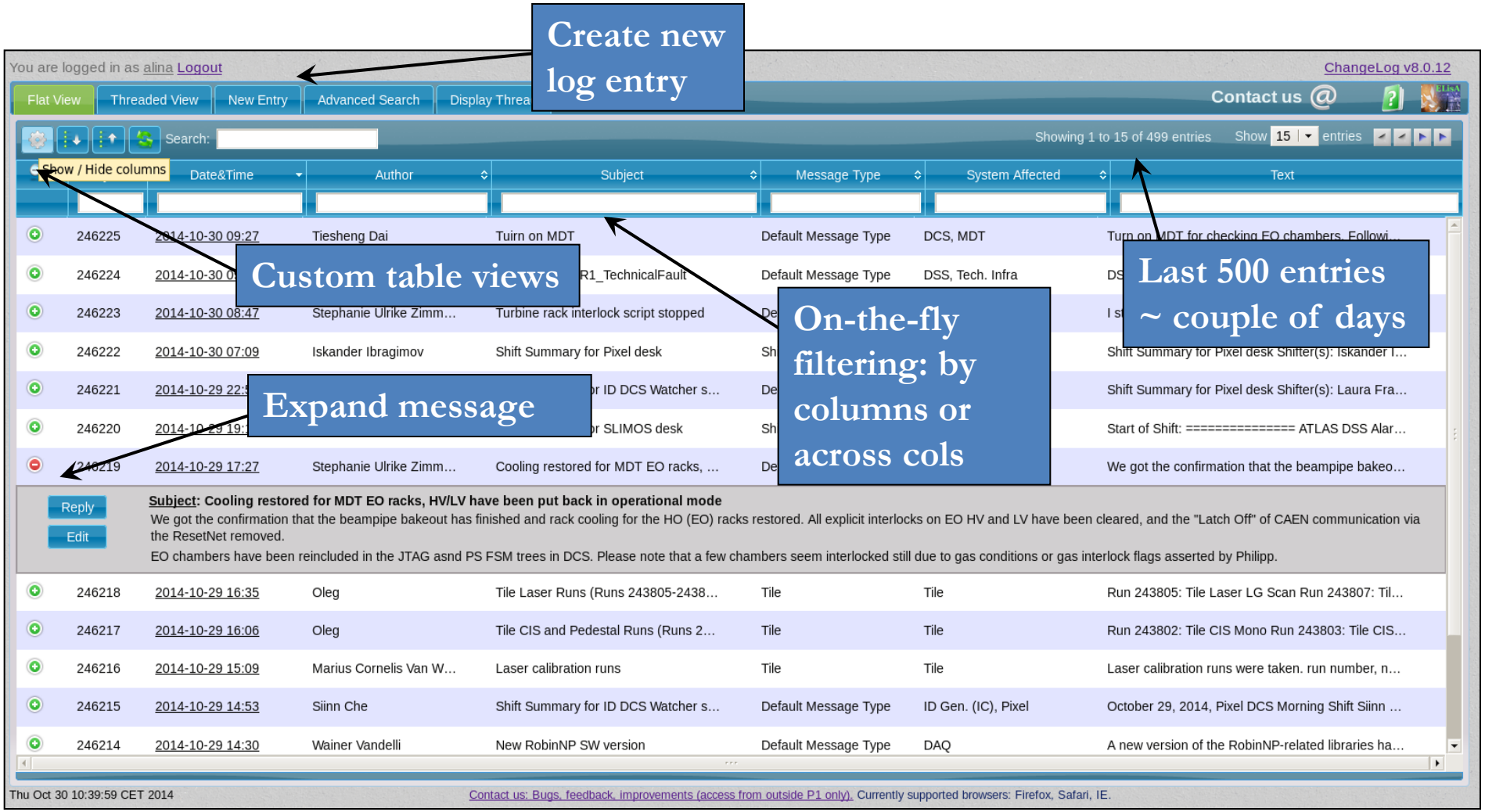
The Run Control Igui

More later in the TDAQ tutorial

- Atlas Trigger and DAQ system is a very large distributed system
- Data taking is controlled/ monitored by means of a Run Control IGUI which operates as a Finite State Machine all the processes needed for taking data.
- This tool is used by the Run control shifter to run ATLAS as a whole
- The same tool is used by the detector desks for monitoring and to perform calibration and test runs of their subdetectors.



The ATLAS Logbook (ELisA)



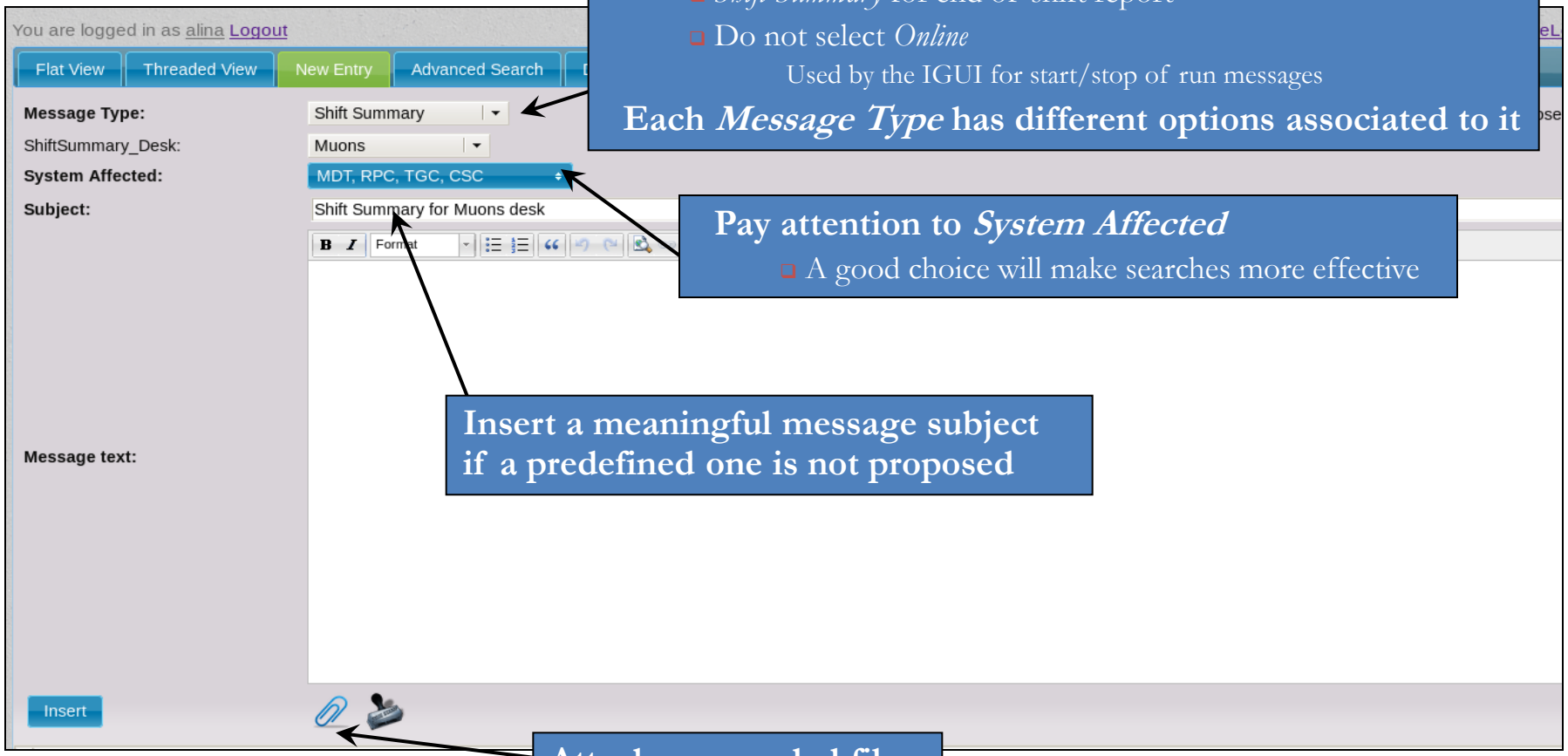
Access ELisA from the CRD General menu

The ATLAS Logbook (ELisA)

Select the appropriate *Message Type*

- Usually *Default Message Type*
- *Shift Summary* for end of shift report
- Do not select *Online*
  - Used by the IGUI for start/stop of run messages

Each *Message Type* has different options associated to it



Pay attention to *System Affected*

- A good choice will make searches more effective

Insert a meaningful message subject if a predefined one is not proposed

Attach any needed files

A Good Log Entry… (i)

- … is never generic…
  - *"something does not work"* does not help people understanding the problems
- … but gives a detailed description of the problem
  - Report the name of the running partition
  - Describe the status of the system before the problem
  - Describe how the problem appeared
    - Report error messages
  - Describe the status of the system after the problem
  - Report any helpful and meaningful information
    - Application name, host name, time
- Do not wait for the end of the shift to report any issue
  - Anyway collect all of them for the shift summary log entry

A Good Log Entry… (ii)

Giovanna Lehmann Miotto: Shift Summary for Run Control desk

Giovanna Lehmann Miotto	Shift Summary for Run	Very quiet shift. Here is the summary, with a few things to be looked at: 8:55 stop of run	2009-07-05 14:44

Info Edit Reply

Very quiet shift.

Here is the summary, with a few things to be looked at:
8:55 stop of run 122096
going down the FSM is a pain mostly because of RPC Gnams.

9:01 Lar, Til, Pixel out
Trigger Keys: 483, 732, 567

9.10 At BOOT discovered that some PT processes were left over. A second shutdown cures the problem.

9:11 BOOT
9.11 INITIALIZE
9:11 CONFIG
error from TRT:
09:12:17 ERROR TRTBarrelA_B-02 TRT::ROD05Module ROD 311a00: Rocketio sync: Lock status = b , buffer status = f

9:15 START
TRT errors:
09:15:35 ERROR TRTBarrelA_B-02 TRT::ChannelDelayModule TTC 350211: ROD: 0x311a00: RocketIOs optical link lost. lock status: 0xb buffer status: 0xf - performed 10 resyncs. This ROD may have shifted straw data or go BUSY.
09:15:32 ERROR TRTBarrelA_B-02 TRT::ChannelDelayModule TTC 350211: ROD: 0x311a00: RocketIOs optical link lost. lock status: 0xb buffer status: 0xf - performed 10 resyncs and still not locked!

BCM: BCID mismatches

EF:
EFD often indicates that a PT is not working correctly (212 times in this run PT did not finish processing within 1 minute!)-> PT restarted by run control

RPC:
still truncated events (ROS-RPC-BA/BC-00/01 report errors at 0.06 % level)
It would be nice if the ROS and rpcgnam could issue specific error types instead of the generic ROS::InterruptSchedulerException and rpcgnam::AnyError

10:45 STOP
10:50 clean shutdown
11:00 START of run 122129 (LAr and Tile in again)
During run rate variations as RPC is performing a HV scan.

Same warnings/errors as previous run +
MDT:
11:28:10 WARNING MDT-BA3-RCD ROS::CoreException The size of the ROD fragment does not match the information in the ROD trailer: L1ID = 520093811, received size = 23900, expected size = 3221225608
11:33:20 WARNING MDT-BA3-RCD MDT-message MROD-BA3-09-T05 Input 2 BIR2A11: 1 CSM Link errors (Parity/LDOWN)
11:33:18 WARNING ROS-MDT-BA-00 ROS::CoreException Timeout: in request for fragment with L1 ID 1543504258

IDG monitoring PTs dying regularly.

For several TRT ROS:
11:30:39 WARNING ROS-TRT-ECA-04 ROS::ModulesException Error in the status word in the ROB header: RobinDataChannel: Lost fragment detected. The L1ID is 0x3600012f. The ROB Source ID is 0x331502

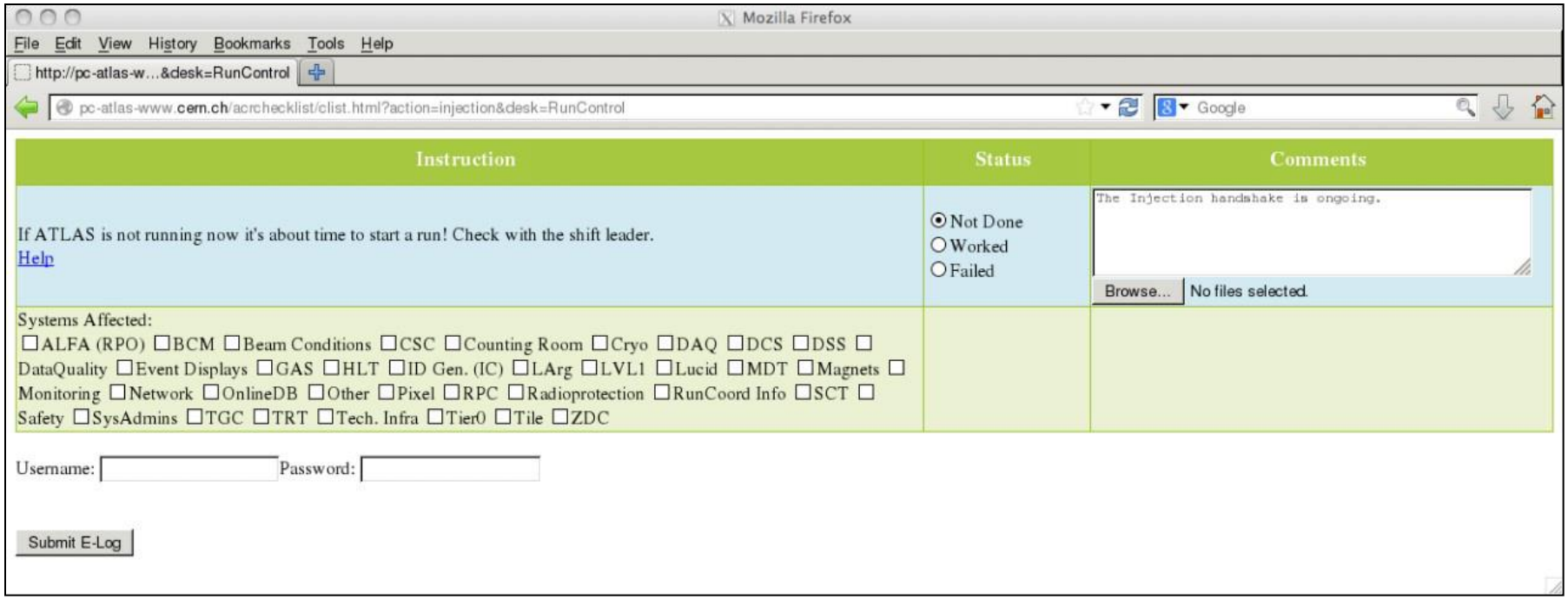
14:42 Leaving run to next shifter.

Shift Summary Recommendations

- Example of a good summary outline
  - Goal of the shift
  - List of detectors and/or systems participating to the runs
  - Chronological summary
  - Possibly links to other entries for details
- Hint
  - Give a look at the *Kwrite* item in the *General* menu
    - You can use the editor to take notes for the end-of-shift summary
  - Use ELisA *Edit entry* functionality: insert Shift Summary entry at the beginning of your shift and update this entry each time there is anything to mention (time will be added automatically for each update).

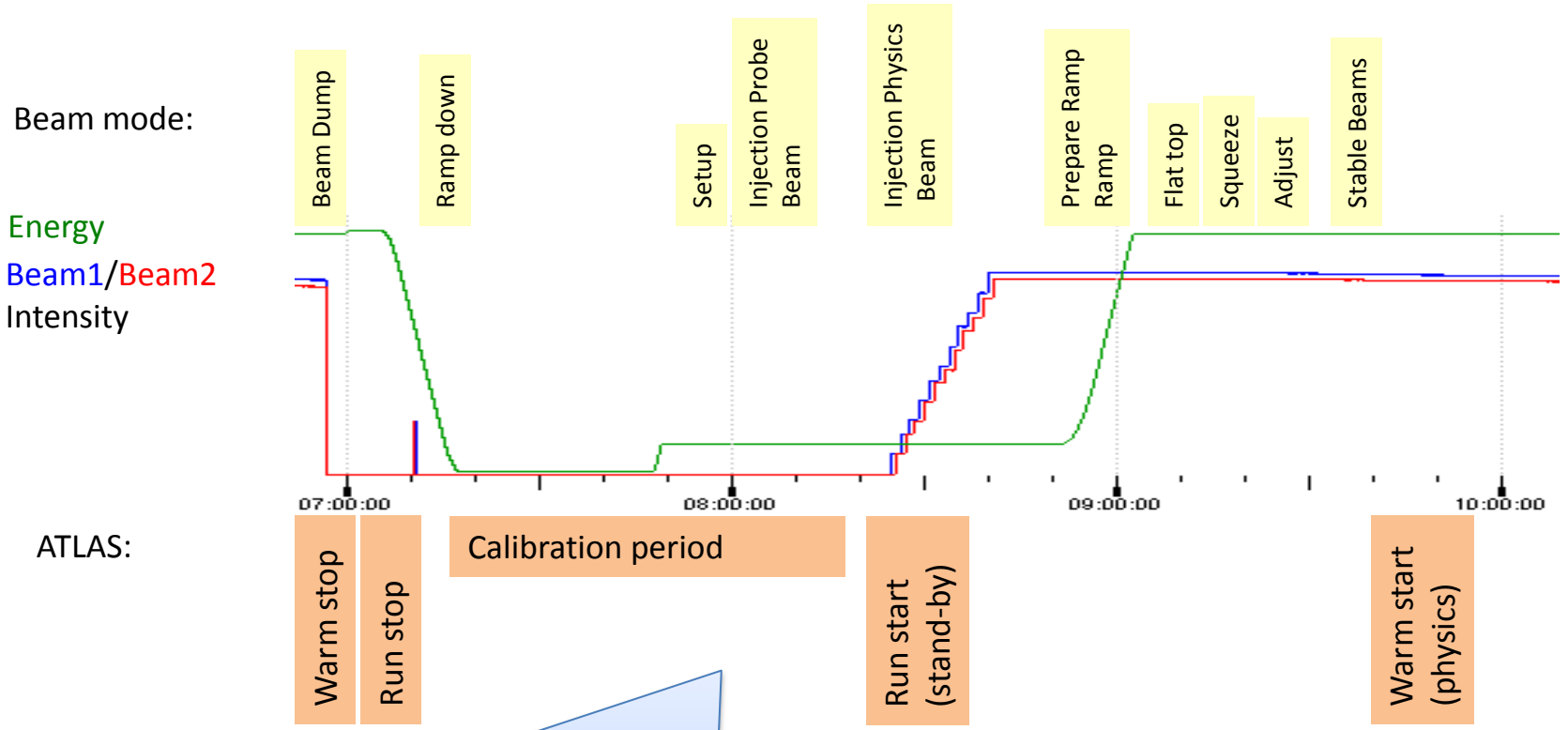
Checklist

- Web based solution, replacement of the RunCom tool
- Access it from CRD General Menu



ATLAS and LHC

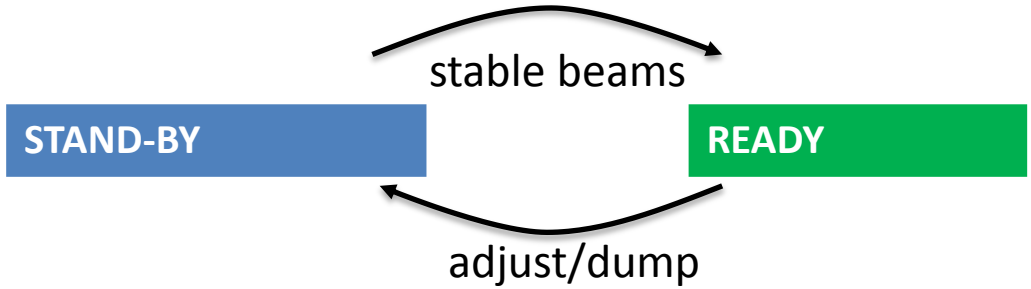
LHC cycle and ATLAS Run



Please note that although we are in preparation and have no beam, we will test and try all of these procedures few times during M8 and beyond

Typical 2011-2012 time estimates	
Injection	>20 minutes
Ramp	~20 minutes
Squeeze	>10 minutes
Adjust	>7 minutes
Pre-cycle	~45 minutes
Dump to stable beams	>127 minutes

Warm Start, Warm Stop

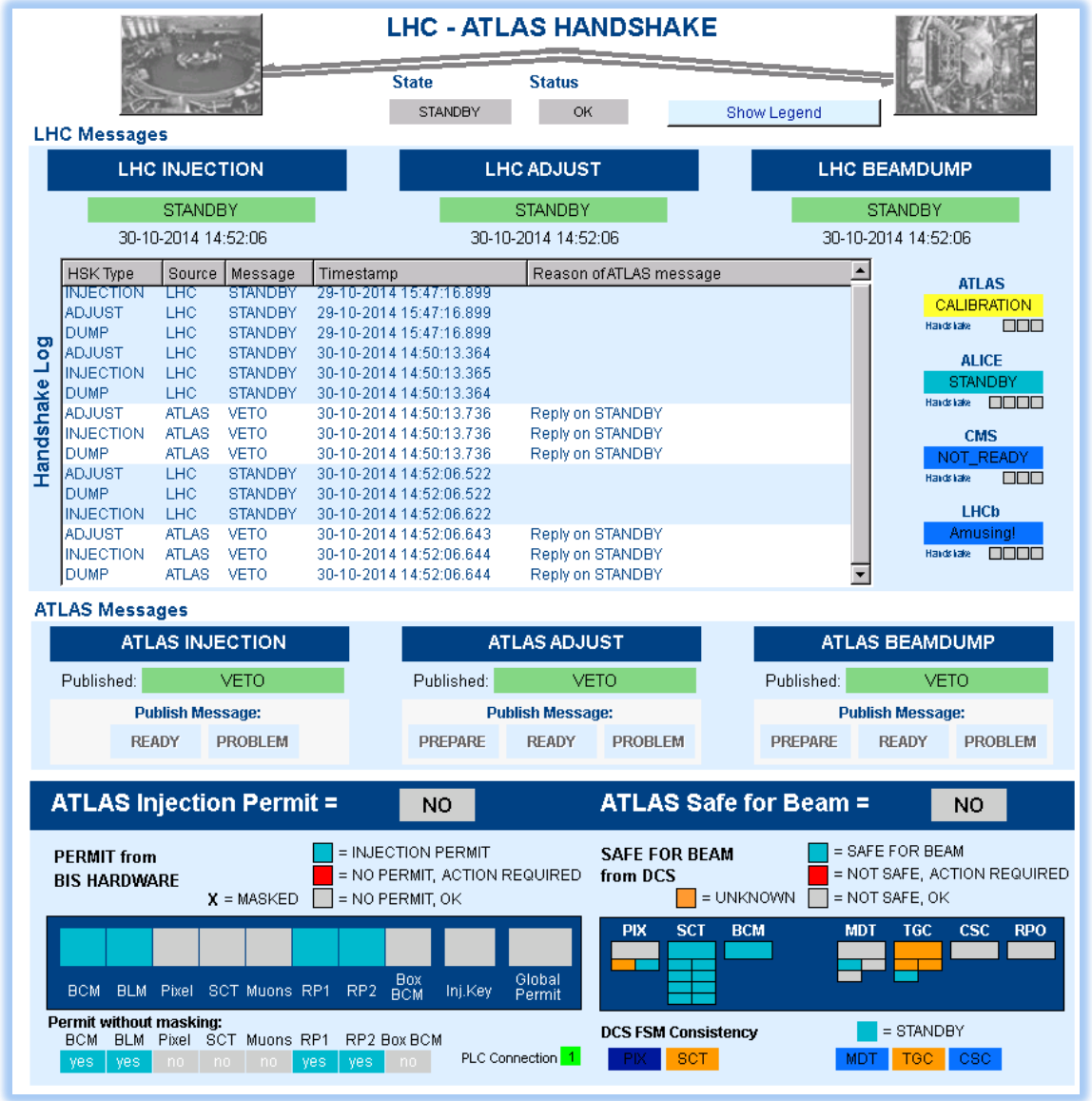


Pixel/IBL	No HV, pre-amps off to reduce occupancy		HV on, pre-amps on
SCT	lowered HV (50V instead of 150V), larger noise occupancy		physics HV
Muons (RPC, TGC, MDT, CSC)	lower HV, lower efficiency		physics HV
Trigger	standby menu		physics menu, new lumiblock

- On reaching stable beams, check PIX HV ramps and PIX pre-amps get on (both is normally automatic). PIX READY in DCS → Automatic warm-start done by DAQ. **Check it happens !!**
- After warm start check muons and SCT get to READY as well (do not wait for them !)

Beam Interlock System (BIS)

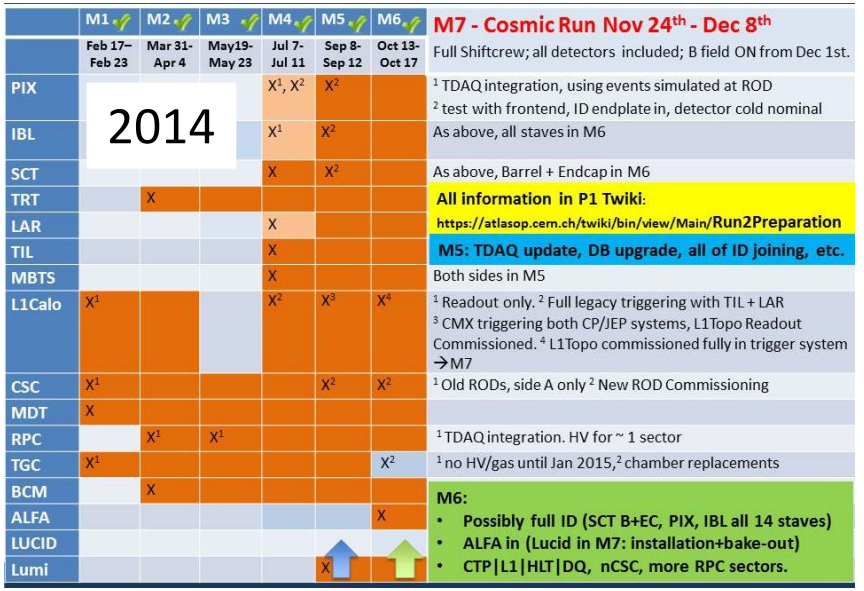
- For safe detector operation a handshake protocol (with hardware and software signals is defined between ATLAS and LHC
- Detectors participating to BIS:
  - Inner Detector
    - IBL/PIX, SCT, BCM
  - Muons
    - TGC, MDT, CSC
  - Beam Loss Monitors
  - Roman Pots
- Detector desks have to make sure their detectors are in safe state to allow LHC injection/beam adjust
- The Shift Leader supervises the overall handshake process between LHC and ATLAS

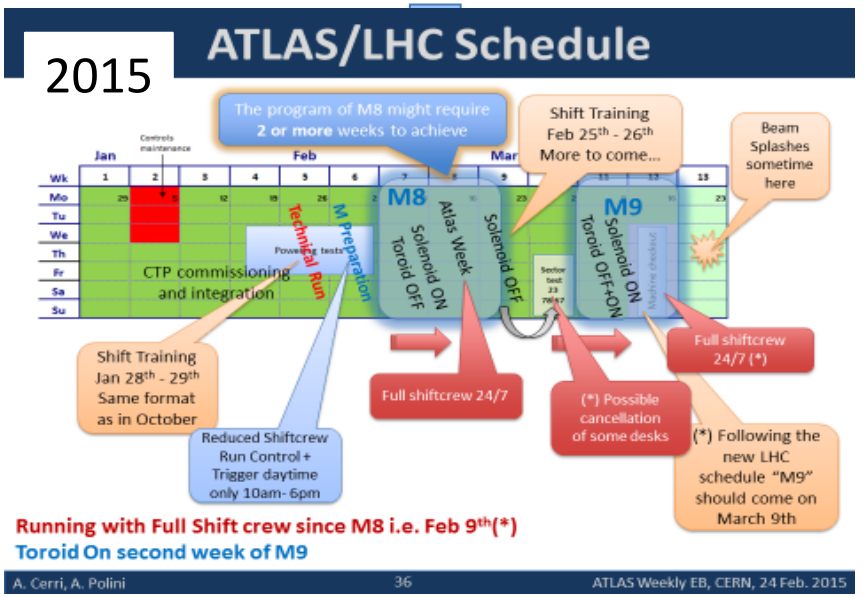


Final Remarks

What we expect being on Shift

- ATLAS is coming out of a Long Shutdown LS-1
- New detectors (IBL …), several upgrades and refurbishments (all detectors, etc.)
- Totally new TDAQ scheme:
  - 2 trigger level (L1 + HLT)
  - new ROS, new HLT farm organization, new network
  - New CTP (+L1topo)
- LHC is starting up, but most of the operations among ATLAS and LHC are still detached (LHC clock, injection inhibit, stable beams handshake)
- We had 7 milestone weeks in 2014 with more and more detectors being integrated.
- In 2015 several new systems joining the first time (New CTP, L1topo, Run-2 Trigger menu)
- M9 is needed to validate ATLAS as a whole experiment, take cosmic calibration data and prepare for Run-2
- Many things still to be tested… documentation unfortunately always comes last (if ever)





About Shift

- Shifters are expected to communicate. In particular it's important that the links between the detectors and the shift leader and the other central desks is kept up-to-date for possible problems or to allow following the program of the day.
- When coming on shift check the daily program and get an from your predecessor.
- Verify your system is in the expected state (combined running, ready for combined running, calibration, maintenance).
- Constantly monitor the ongoing activities, the Run Control, your detector getting busy, the DCS, DQ.
- During M8 and beyond we might be still far from routine running and there won't be strict time limitations of following the LHC cycle and data taking but all aspects will need to be tests.
- In addition M8/M9 will be used to take important data (cosmics), perform several tests for validation, calibration and alignment of the detectors.
- The use of the logbook by all shifters will be extremely important to log problems, progress, and the data taken

Next Week's Program

- Overall system and operation consolidation:
  - Verify TDAQ chain and central services
    - Level 1 trigger, Central Trigger Processor, High Level Trigger, Online and Offline Data Quality, Luminosity, Data Preparation
  - Test system by system:
    - verify high rate performance, stopless removal - recovery
    - TDAQ status, Monitoring, calibration procedures, etc.
    - DCS: FSM state & status, Alarm Screen (alarm help…)
    - beam handshake, injection permit, warm start
    - Automated/manual actions "goto ready" (functionality and speed)
    - Beam Splashes (March 23rd)
- Magnets:
  - Solenoid planned to be mostly ON
  - Toroid likely ramping up ~ mid of March
- Data taking:
  - Combined data taking from beginning (in particular overnight), given the statistics needed, priority to ID but not only.
  - Present Special Run requests collected by DP: https://twiki.cern.ch/twiki/bin/viewauth/Atlas/CosmicData2014
- Validate central and detector shift operation

Shift Booking and Docs

- Contacts for shifts (booking and info)
  - Booking: http://atlas-otp.cern.ch/

OTP id	Shift tasks	E-mail contact:
531450	ATLAS Shift Leader (ACR)	atlas-run-coordinators@cern.ch
10213	ATLAS Run Control Shifter (ACR)	Andrei.Kazarov@cern.ch
531452	ATLAS Trigger Shifter (ACR)	alexander.oh@cern.ch , martin.erik.gerd.zur.nedden@cern.ch
531453	ATLAS Data Quality Shifter (ACR)	Elizaveta.Shabalina@cern.ch
531454	ATLAS ID Shifter (ACR)	Kerstin.Lantzsch@cern.ch , Per.Johansson@cern.ch , Andrey.Loginov@cern.ch
531455	ATLAS Calo+Fwd Shifter (ACR)	Emmanuel Monnier < monnier@in2p3.fr >
531456	ATLAS Muon Shifter (ACR)	Philipp.Fleischmann@cern.ch

- Documentation and links
  - Run 2 Preparation Page:

    https://atlasop.cern.ch/twiki/bin/view/Main/Run2Preparation
  - Shift Training:

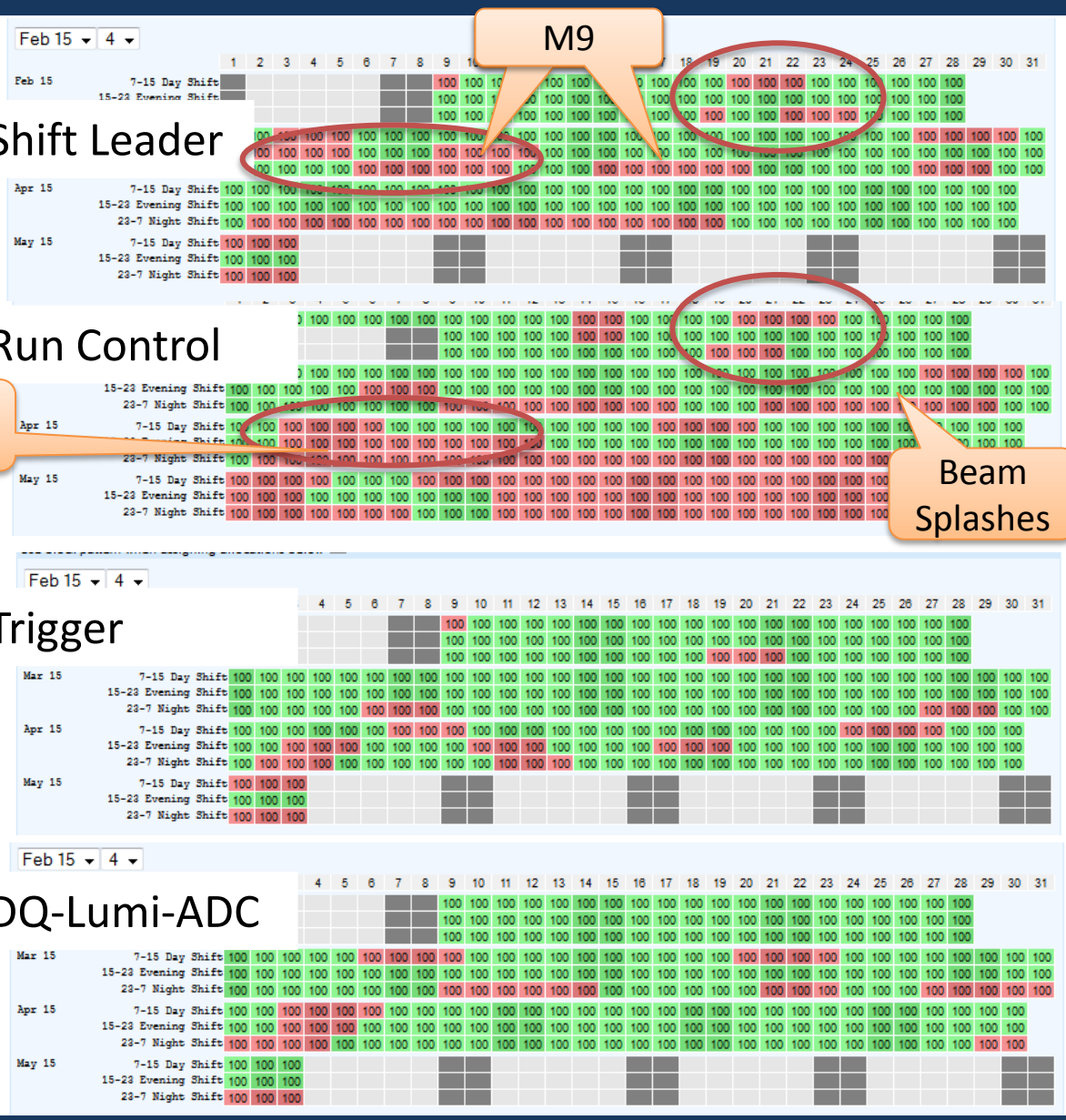
    https://atlasop.cern.ch/twiki/bin/view/Main/M8ShiftTraining

Shift Booking

We have serious problems already filling central shifts – especially Shift leader and Run Control

We also have comments that there are “not enough” system shifts in the ACR

PLEASE encourage your colleagues and yourselves to take central shifts!



Thank You!

Reminder:

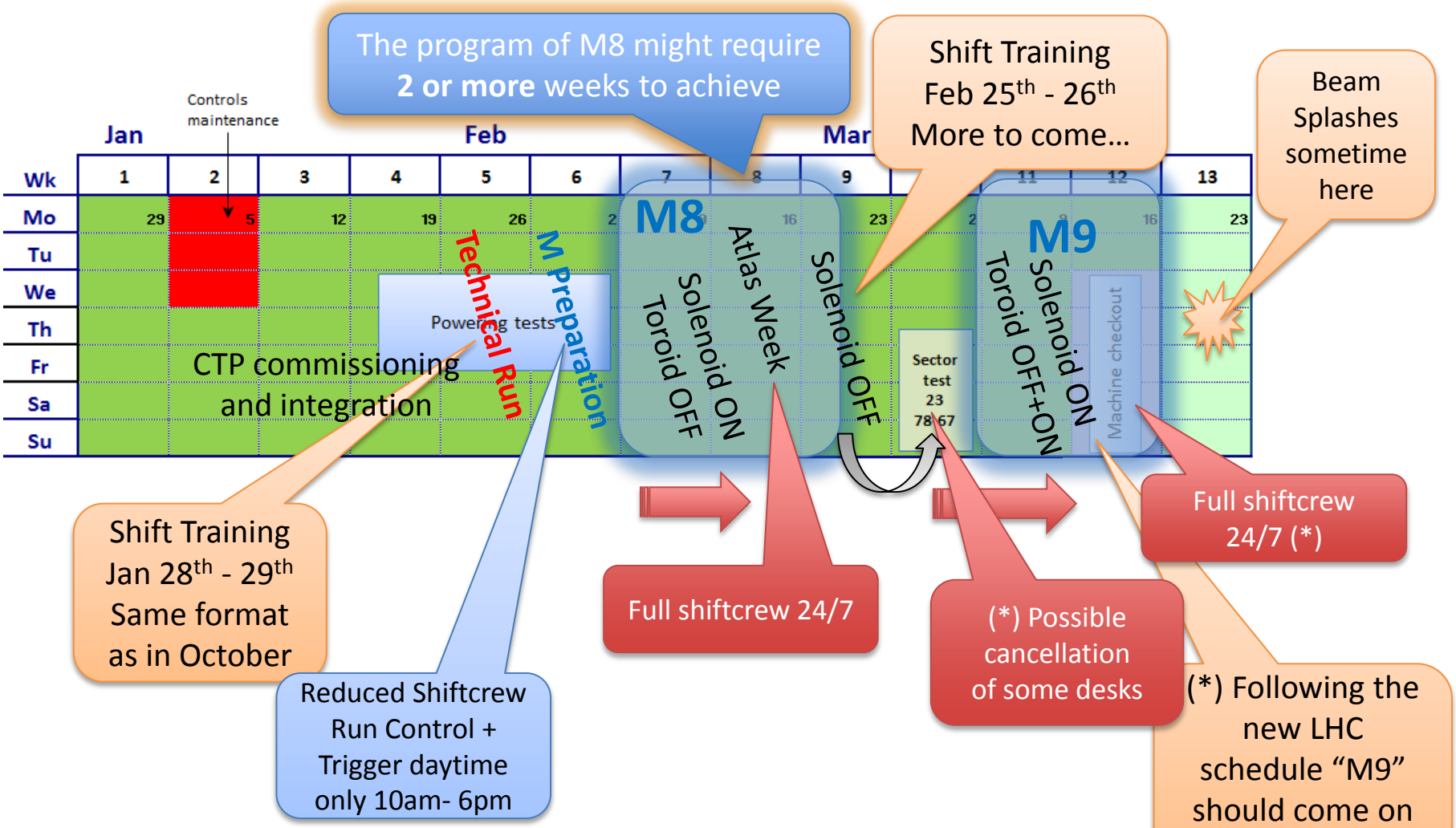
- please sign the attendance sheet (once per session).
- If you didn't register please add name and E-mail

- For Run Control and Trigger, attendance to both trainings Run Control and Trigger of tomorrow morning are required

- Next Training Sessions:
  - Mar 25th-26th; confirmed
  - New dates (to be confirmed within this week):
    - April 29th - 30th; June 3rd - 4th; July 8th - 9th

Backup

ATLAS/LHC Schedule



Running with Full Shift crew since M8 i.e. Feb 9th(*)

Toroid On second week of M9

Afternoon Parallel Session

Thursday 2pm

- **Inner Detector:**
  6-2-004 (Meyrin)
- **Calo+Fwd:**
  3162-1-K01 (this room@P1)
- **Muons:**
  61-1-009 - Room C (Meyrin)
- **Data Quality:**
  222-R-003 (Meyrin)