

Shift Leader Training

Part 2

v.2.5

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Acknowledgements:
Thilo, Stephanie, Sigi

Outline:

- Beam Protection
- LHC Interaction
- Luminosity

The ATLAS Control Room

Now and when preparing for beam operation

Busy Panel

Useful
information later:
LHC Page 1

DCS FSM

Trigger Rates

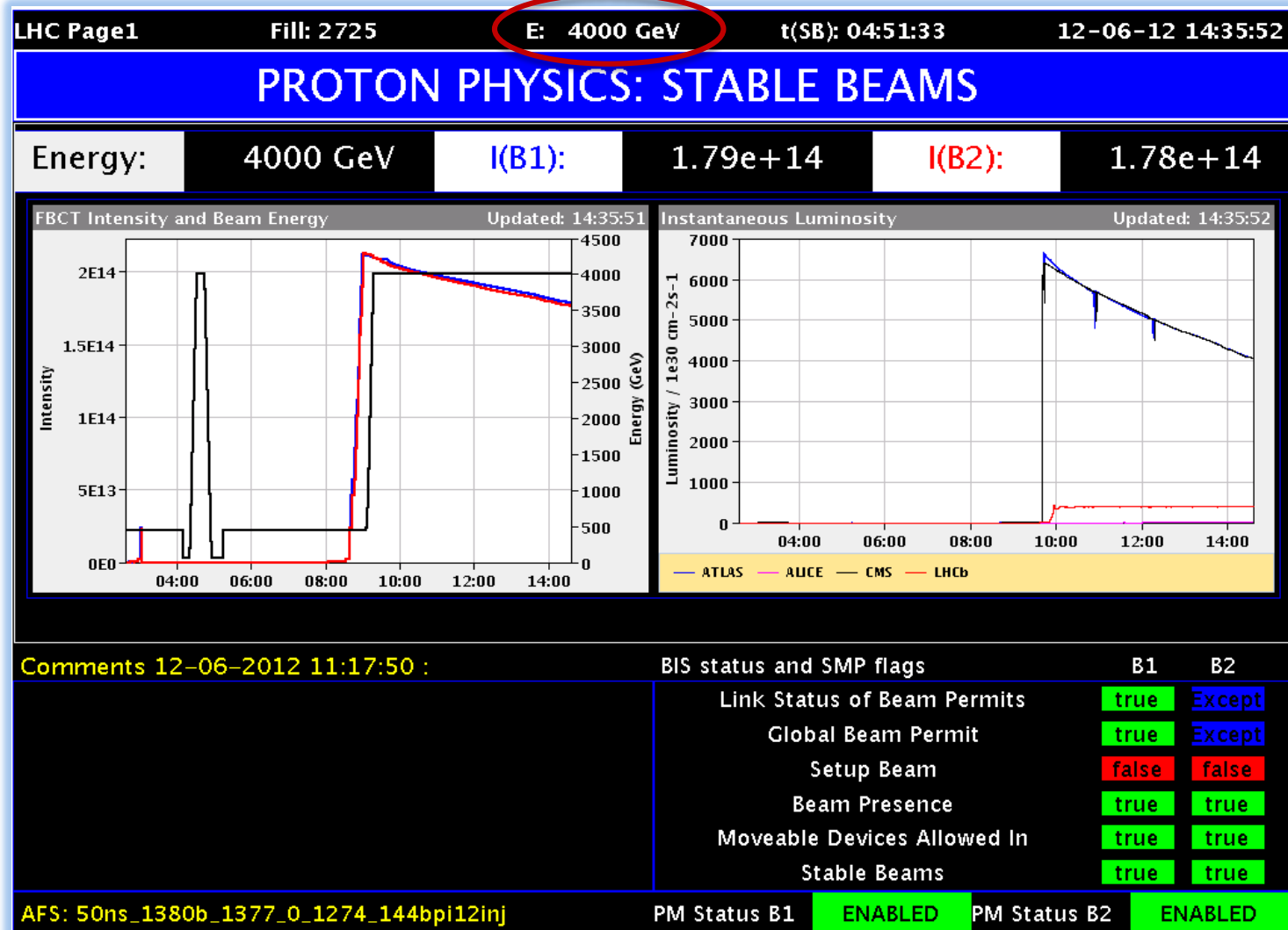
Run Control IGUI
(Rc desk replica)

Plan of the
day

Event Display

LHC Page 1

- LHC Page 1 should always be displayed by one of the projectors. It is your main source of information for what is going on on the machine side



LHC Page 1

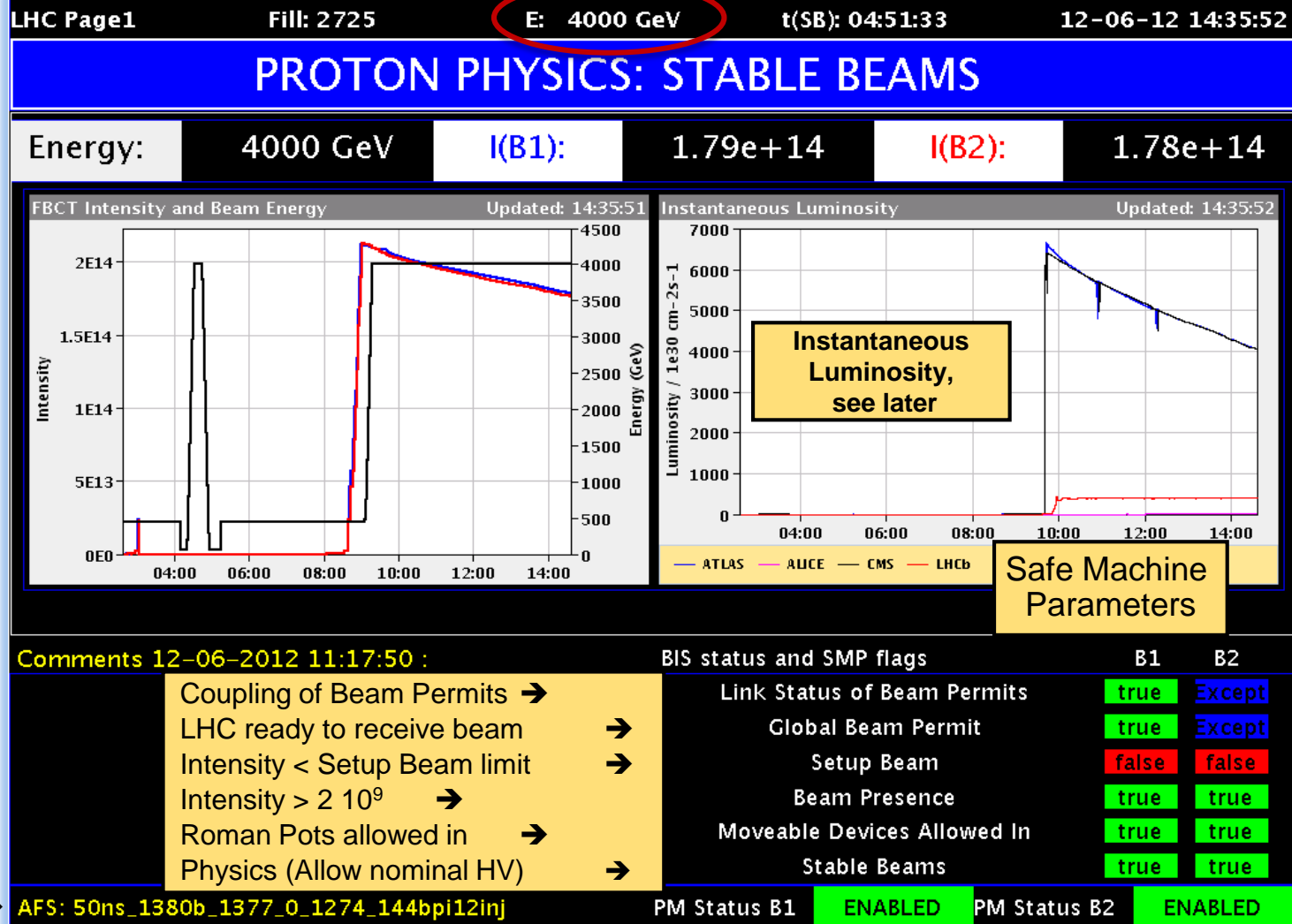
- LHC Page 1 should always be displayed by one of the projectors. It is your main source of information for what is going on on the machine side

Accelerator: Beam Modes

Energy (Magnet current)
(If strange – coded)

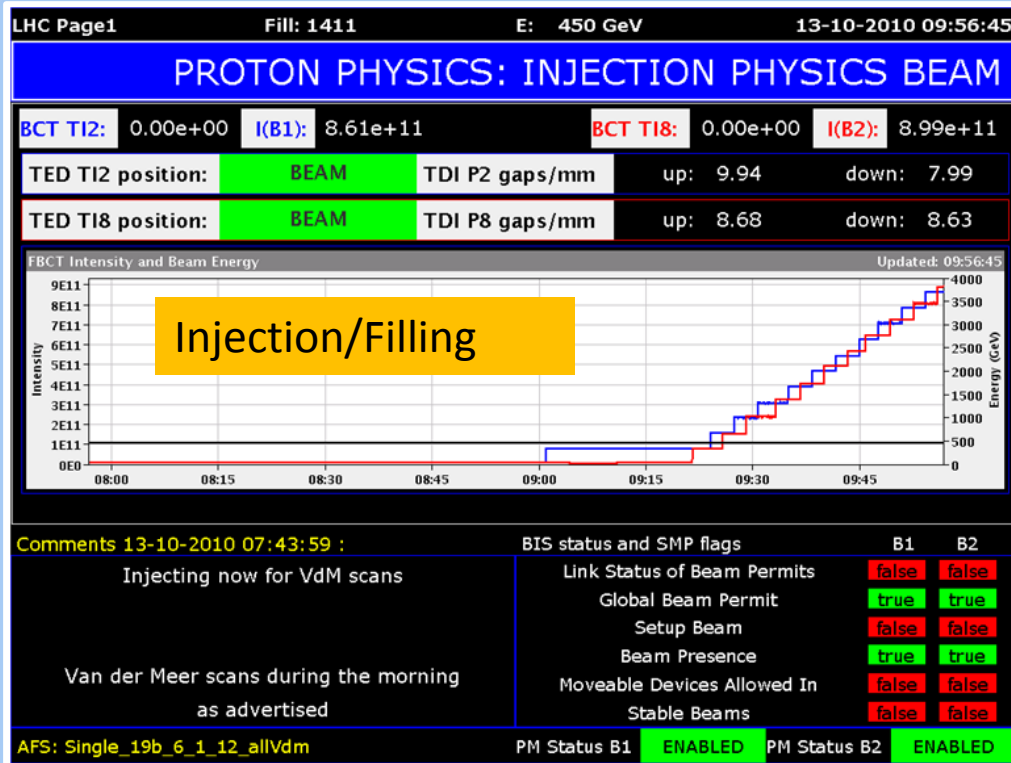
$I(B1) - I(B2)$
TOTAL BEAM INT.
DCCT
DC Current Transf.

BUNCHED BEAM INT.
FBCT
Fast Beam Current Transformer



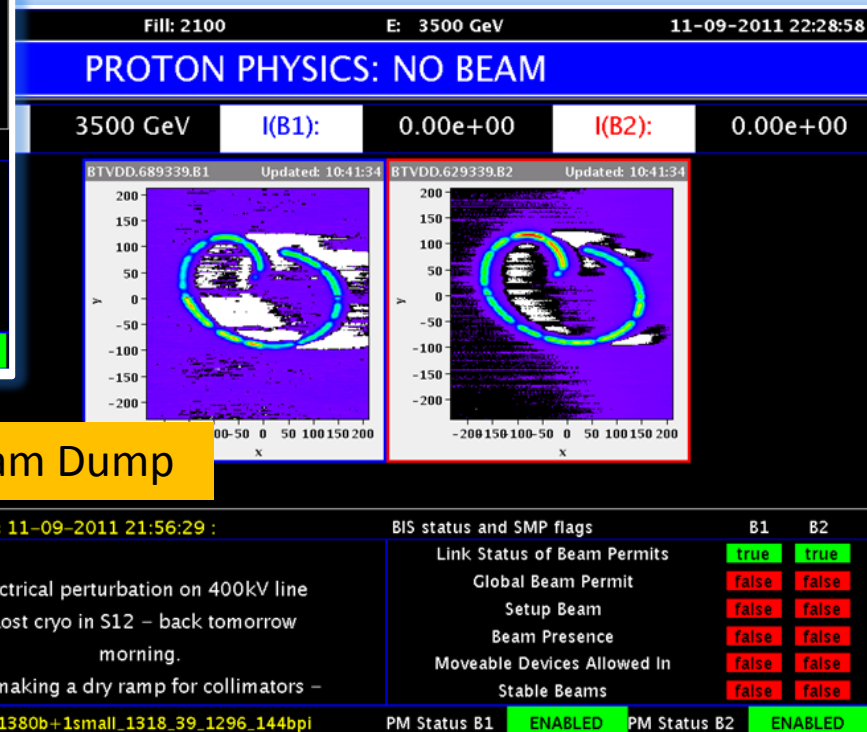
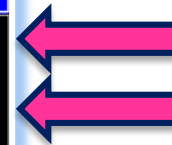
LHC Page 1 (ii)

- Page 1 content changes depending on state of the beam ...



BCT TI2 – BCT TI8
Injected intensity

**Beam Absorbers
for Injection**
TED: Beam Dump
TDI: Protect LHC



Knowing more on what the LHC is doing at a given moment: check the LHC logbook
<http://elogbook.cern.ch/eLogbook/eLogbook.jsp?lgbk=60>

Also available from the LHC menu on the SL desk in the ACR

LHC Page 1 (iii)

More pages and information available
(can be useful during data taking and
calibration/access)

LHC Operation

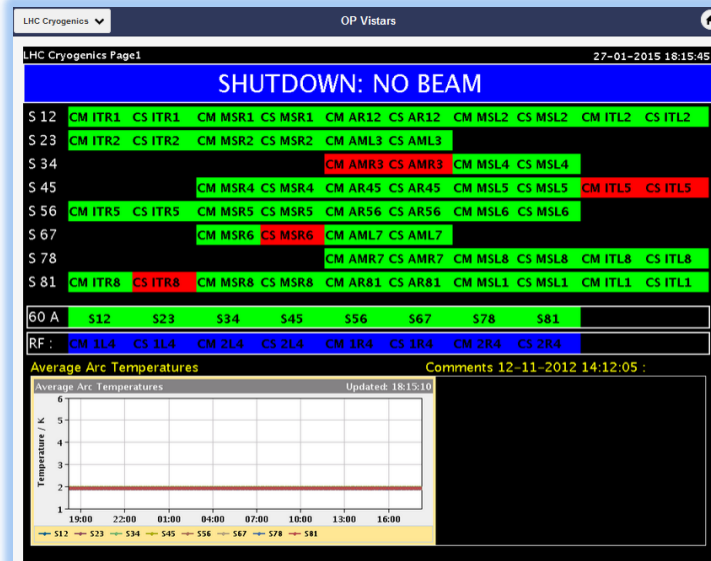
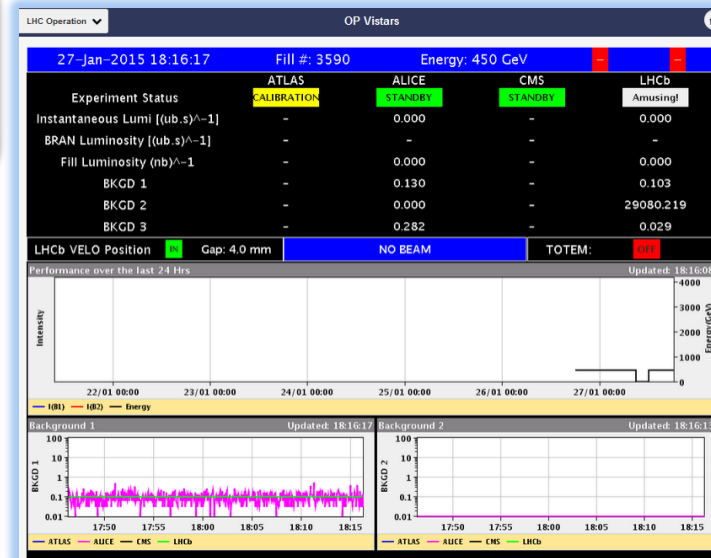
Fill: 3591 450 GeV 27-01-15 18:14:11

SHUTDOWN: NO BEAM

Comments (27-Jan-2015 16:34:55)
No more PM event for today

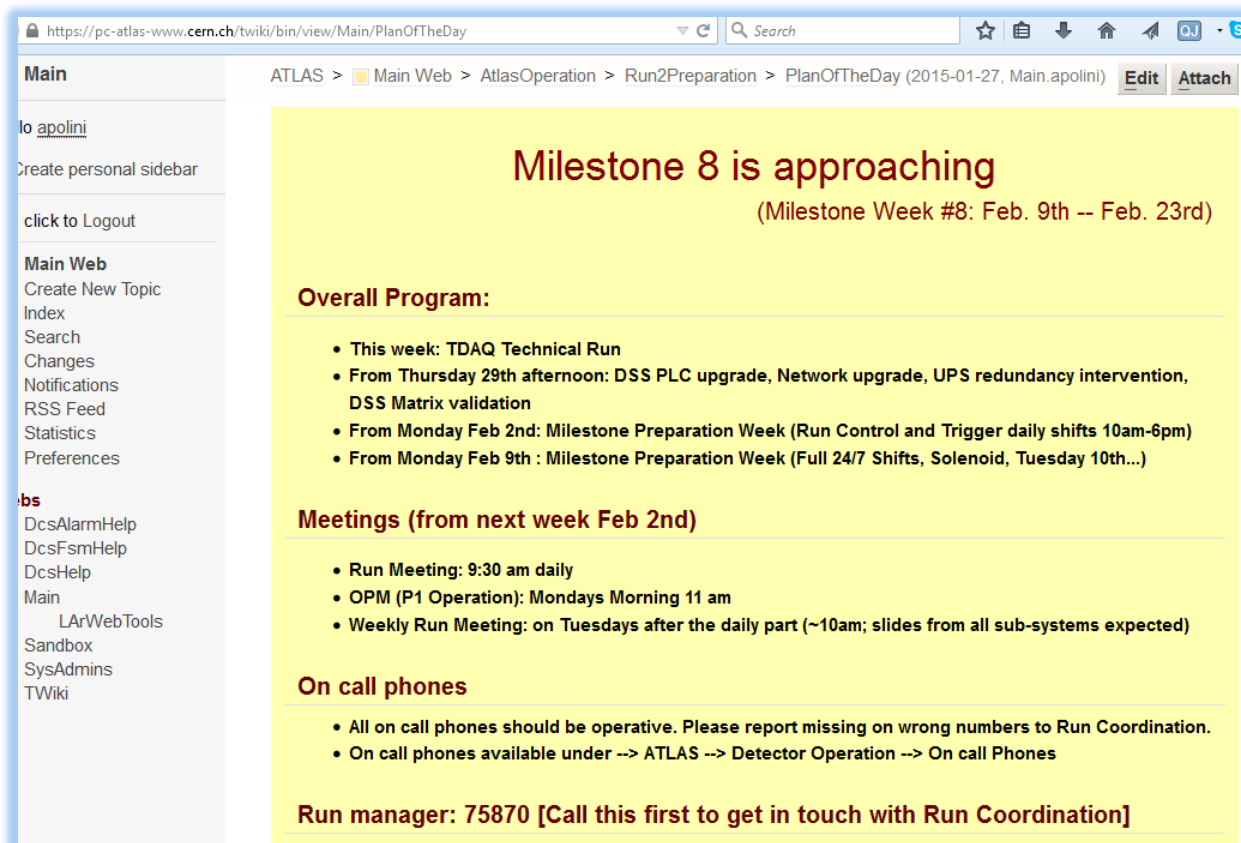
BIS status and SMP flags		B1	B2
Link Status of Beam Permits		false	false
Global Beam Permit		true	false
Setup Beam		false	false
Beam Presence		false	false
Moveable Devices Allowed In		false	false
Stable Beams		false	false

AFS: 150ns_104b_93_8_93_8bpi PM Status B1 **DISABLED** PM Status B2 **DISABLED**



ATLAS: Plan of the Day

- Since RunCom is no longer available and no better option was found:
- The ATLAS plan of the day is now posted on a standard Twiki Page:
- This has been already linked to a number of ATLAS Summary Pages:



https://pc-atlas-www.cern.ch/twiki/bin/view/Main/PlanOfTheDay

ATLAS > Main Web > AtlasOperation > Run2Preparation > PlanOfTheDay (2015-01-27, Main.apolini)

Milestone 8 is approaching

(Milestone Week #8: Feb. 9th -- Feb. 23rd)

Overall Program:

- This week: TDAQ Technical Run
- From Thursday 29th afternoon: DSS PLC upgrade, Network upgrade, UPS redundancy intervention, DSS Matrix validation
- From Monday Feb 2nd: Milestone Preparation Week (Run Control and Trigger daily shifts 10am-6pm)
- From Monday Feb 9th : Milestone Preparation Week (Full 24/7 Shifts, Solenoid, Tuesday 10th...)

Meetings (from next week Feb 2nd)

- Run Meeting: 9:30 am daily
- OPM (P1 Operation): Mondays Morning 11 am
- Weekly Run Meeting: on Tuesdays after the daily part (~10am; slides from all sub-systems expected)

On call phones

- All on call phones should be operative. Please report missing on wrong numbers to Run Coordination.
- On call phones available under --> ATLAS --> Detector Operation --> On call Phones

Run manager: 75870 [Call this first to get in touch with Run Coordination]

- <https://atlasop.cern.ch/operation.php>
- <https://atlasop.cern.ch/mobile.php>

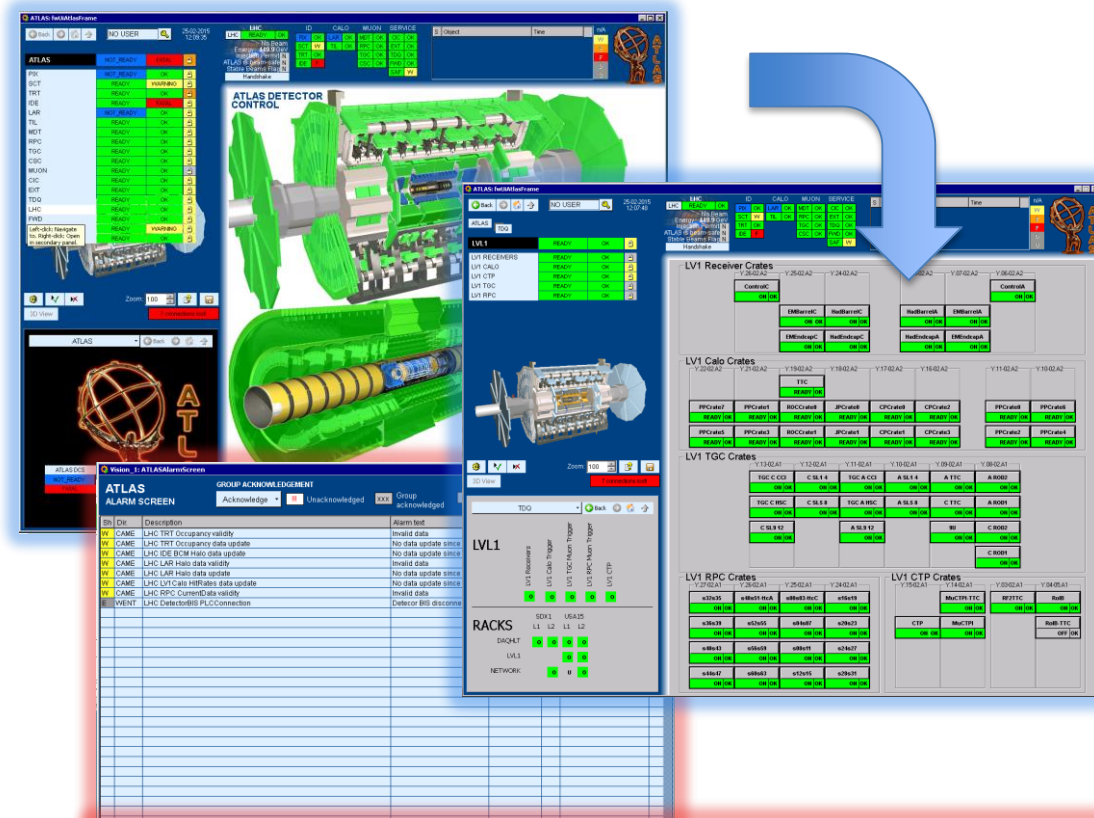


- This Page is kept updated by (Run Coordinator/Run Manager and) Shiftleader
- In particular it's very important to keep this up-to-date to allow experts to follow activities (tests, calibration, accesses, maintenance etc.)

Detector Control System

- One of the main tools for the Shift Leader is the DCS (FSM and Alarm Screen)
- Monitoring of all of ATLAS, FSM and Alarm Screen
- Luminosity, Beam Protection
- React on other aspects which are on the boundaries of sub-systems (TDQ LVL1 crates)

DCS System Assignment

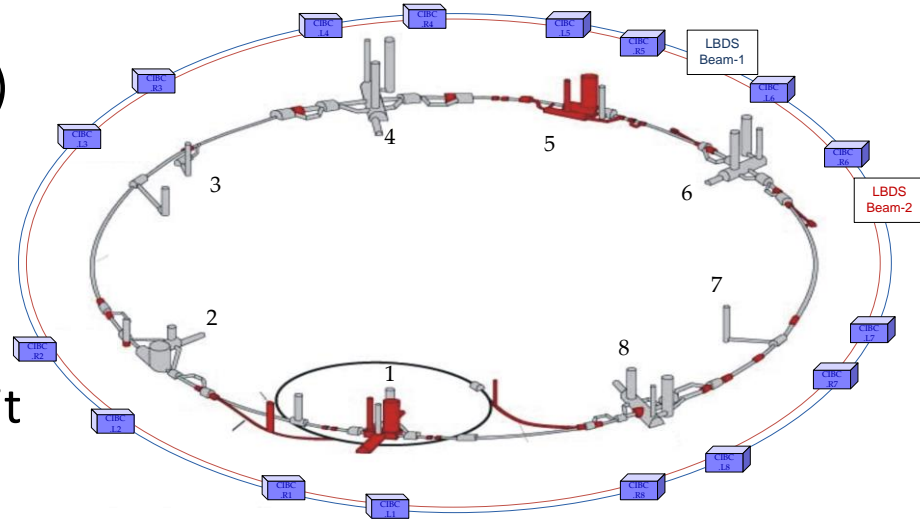


Desk	System Identifiers
ID	PIX, SCT, TRT, IDE
CALO+FWD	LAR, TIL, FWD, LCD, ZDC, RPO
MUON	MDT, CSC, RPC, TGC, MUO
DQ	LHC, LUM
SLIMOS	CIC, EXT, SAF, GCS
SHIFT LEADER	TDQ, GCS

Beam Protection

The LHC Beam Interlock System

- LHC Beam Interlock System (BIS)
 - 16 Beam Interlock Controllers (BIC)
 - More than 4 000 inputs, machine elements, access system, experiments, vacuum, cryo ...
- All inputs TRUE → Global Beam Permit = TRUE → Beam allowed in LHC
- If one input goes FALSE → **Beam is dumped** (beam abort)
- Global Beam Permit is shown on LHC Page 1

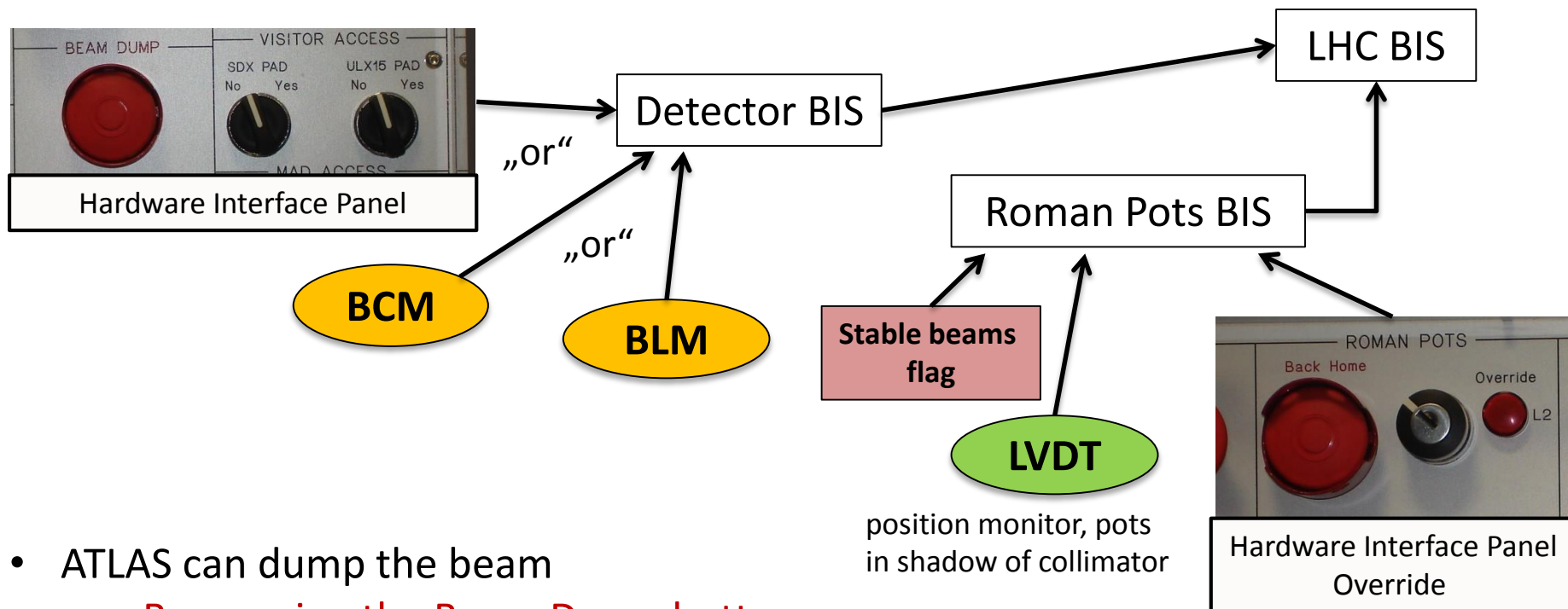


ATLAS --- 3 independent inputs delivered to the LHC Beam Interlock System

1. Detector BIS
2. Roman Pot BIS (ALFA detectors)
3. Magnet BIS – (beam dump if the Solenoid is ramped down **New in Run-2!**)

Detector and Roman Pot BIS are in turn the “logic AND” of several input signals which all must be TRUE ATLAS internal

ATLAS Detector and Roman Pots BIS



- ATLAS can dump the beam
 - By pressing the Beam Dump button
 - By the ATLAS BLM (Beam Loss Monitor) detecting abnormally high rates
 - By the ATLAS BCM (Beam Conditions Monitor) detecting abnormally high rates
- BLM and BCM inputs can be masked – current configuration is BLM and BCM both enabled (check on the shift leader Whiteboard)
- BLM/BCM conditions which (would) dump the beam cause a „BeamConditions“ **DSS alarm** in the control room

ATLAS Aborting the Beam ...

- Pressing the Beam Dump Button never, only case we could imagine is you see somebody moving in the cavern !!!

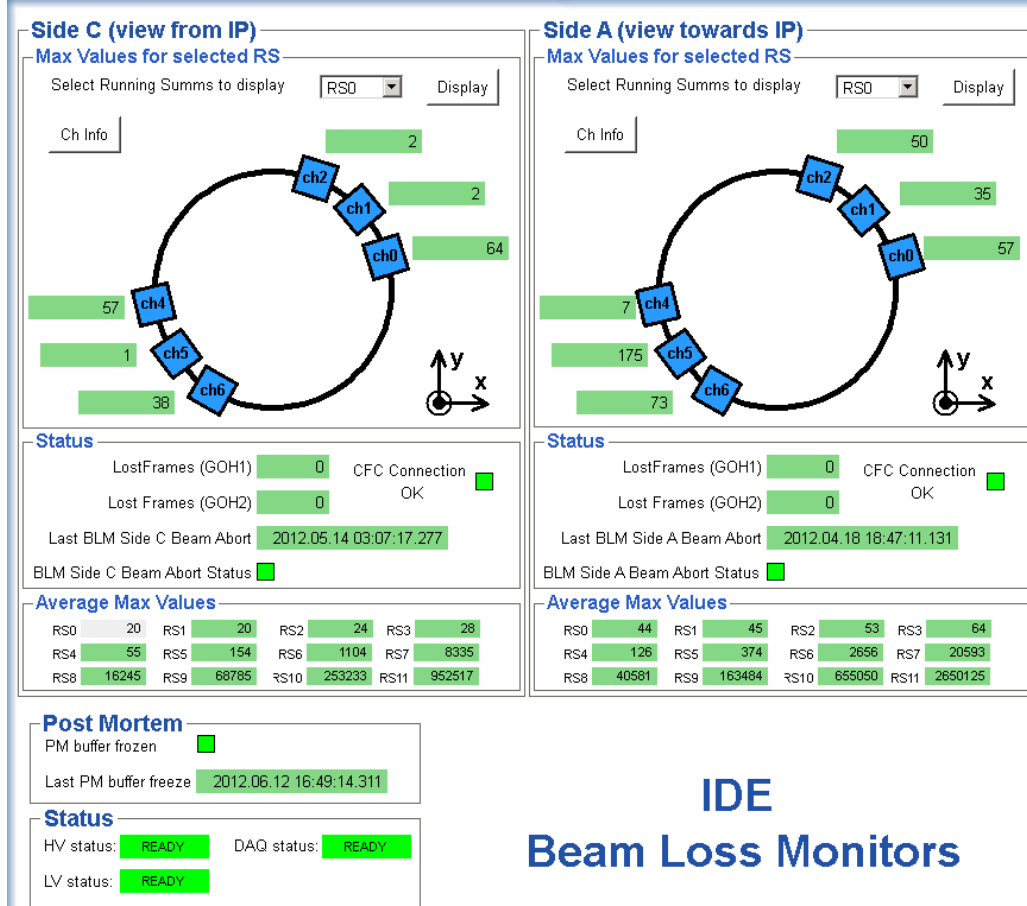
If BLM aborted the beam:

- You'll get a DSS alarm
- In the DCS FSM BLM panel (ATLAS → IDE → ATLIDEBLM) the timestamps for both Side A and Side C are the same and coincide with the beam dump
- Call the BLM/BCM on call for an analysis was happened
- Inform the run manager/coord.

In case of a **BLM Side A or C Beam Abort Status Flag DCS alarm** without dump:

- Call the BCM/BLM on call
- Do not acknowledge the alarm yourself

ATLAS IDE			
ATLIDEBLM	READY	OK	
HV	READY	OK	
LV	READY	OK	
DAQ	READY	OK	



IDE
Beam Loss Monitors

BCM Beam Conditions Warnings

ATLAS	IDE
ATLIDEBBCM	READY OK
BCM	READY OK
INFRASTR. PRO	READY OK
INFRASTR. DEV	READY OK

- Information on BCM can be found in DCS under ATLAS
→ IDE → ATLIDEBBCM

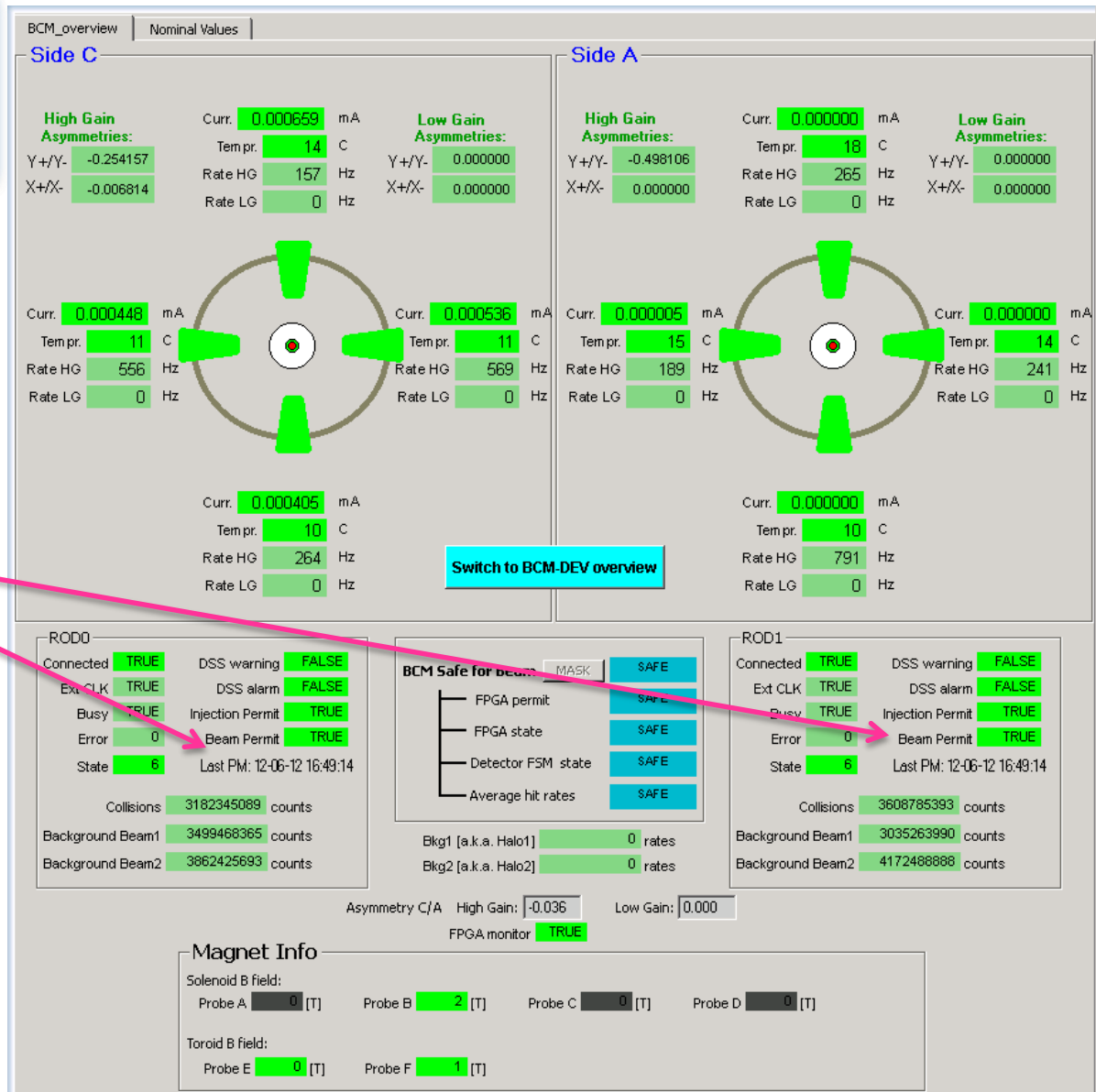
BCM aborted the beam:

- DSS alarm
- Permit = FALSE

BCM DSS alarms:


- Call the BCM/BLM on call
- If asked to acknowledge, since triggered by an intervention, do so via BCM FPGA1/2 node in the FSM

ATLAS	IDE	ATLIDEBBCM	INFRASTR. PRO
FPGA1	READY	OK	✓



Refer to the Beam Protection section of the shift leader manual for more details

LHC Post Mortem (PM) Signal

- For each **non-scheduled** beam dump a Post Mortem (PM) Signal is sent out if PM Status B1/B2 on LHC Page-1 is **ENABLED**
- An audio alert is produced in the control room on a post mortem: “Flushing toilet sound” 
- The PM signal removes Injection Permit
- The PM signal freezes BCM/BLM PM buffer for analysis
 - After a PM, wait until reading out the BCM buffers has completed (few mins), things are finished once the corresponding “BCM reading out buffers” warning is gone from the DCS alarm screen
 - Check with the Inner Detector shifter if the Post Mortem was clean, or if there were high losses.
 - If the PM was clean, the injection permit can be given back
 - Immediately if during injection
 - During the injection handshake once it is initiated by the LHC
 - If the PM was not clean, inform the CCC and call the BCM/BLM on call for further investigations. **Involve the run manager as well.**

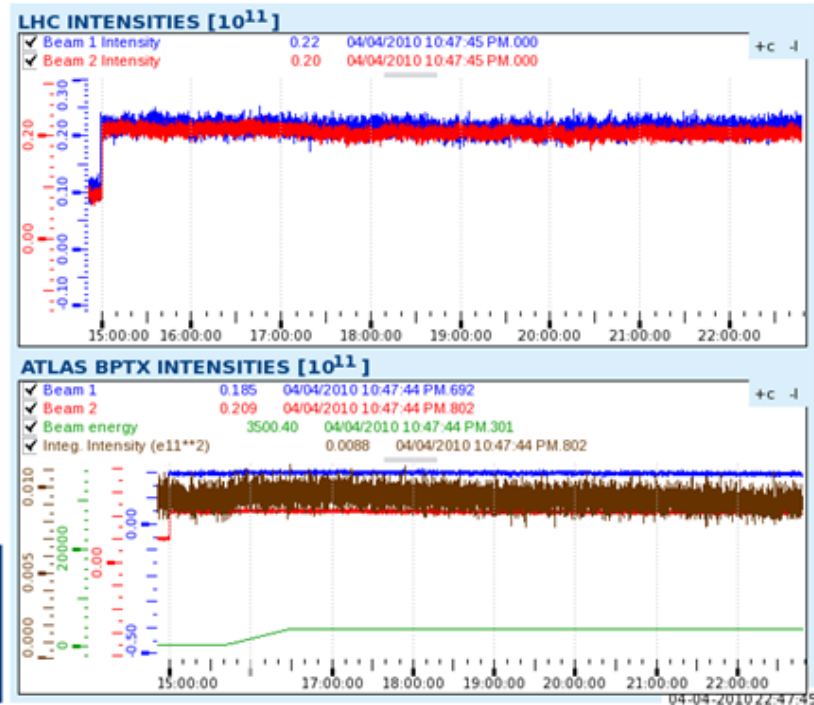
Note: In case of beam mode Inject/Dump (ie no stable beams!), if LHC is in a hurry accommodate them and give the injection permit back immediately, before reading out buffers

LHC Post Mortem ...

ATLAS			
LHC	READY	OK	
LHC INTERFACES	READY	OK	
INSTRUMENTATION	READY	OK	
ATLAS BACKGRDS	READY	OK	
LUMINOSITY	READY	OK	
LUMINOUS REGION	READY	OK	



COLLIMATORS				
	BEAM 1		BEAM 2	
HORIZONTAL	TH 4L1 B1		TH 4R1 B2	
GAP down	19.35		19.29	
GAP up	19.37		19.43	
TOP down	11.01		7.85	
TOP up	10.99		7.88	
BOTTOM down	-8.33		-11.54	
BOTTOM up	-8.36		-11.56	
VERTICAL	TVA 4L1 B1		TVA 4R1 B2	
GAP down	13.67		13.56	
GAP up	13.70		13.62	
LEFT down	8.08		6.69	
LEFT up	8.09		6.71	
RIGHT down	-5.59		-7.00	
RIGHT up	-5.58		-6.97	
POST MORTEM				
Counter		429		
Last update: 04-04-2010 02:49:48				
LHC OPERATOR MESSAGE				
*** Stable Beams ***				
Starting lumi scan for ATLAS.				
Horizontal				



- PM counter and time stamp can be checked in DCS:
- ATLAS → LHC “top” page, look at POST MORTEM

OP Vistars

LHC Page1 Fill: 1410 E: 1805 GeV 12-10-2010 22:57:55

PROTON PHYSICS: RAMP DOWN

Energy: 1805 GeV I(B1): 4.84e+08 I(B2): 0.00e+00

Post Mortem Information

PM event ID: Tue Oct 12 22:40:10 CEST 2010
PM event category: PROTECTION_DUMP
PM event classification: MULTIPLE_SYSTEM_DUMP
PM BIS Analysis result: First USR_PERMIT change: Ch 4-BLM_UNM: A T -> F on CIB.SR7.S7.B2
PM comment: Losses just after beams were put into collisions

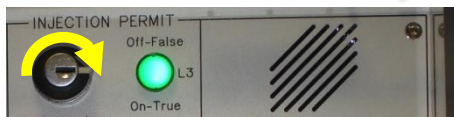
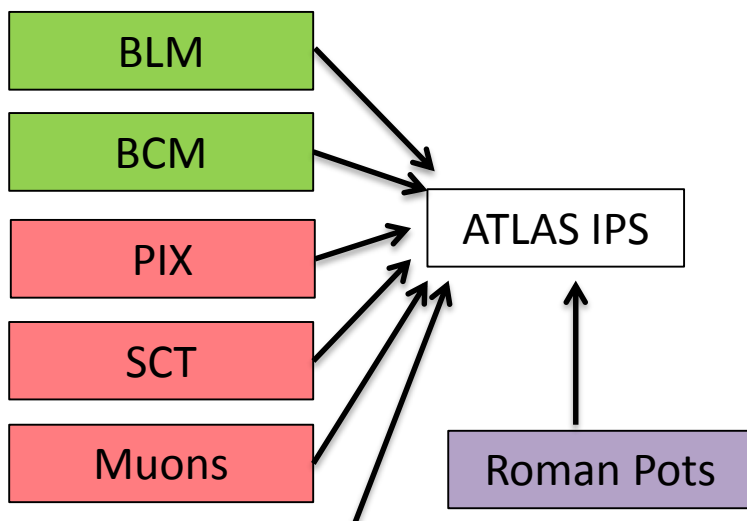
- LHC Page 1 shows further post mortem information, including cause of dump and comments by the operators

LHC Injection Permit System IPS

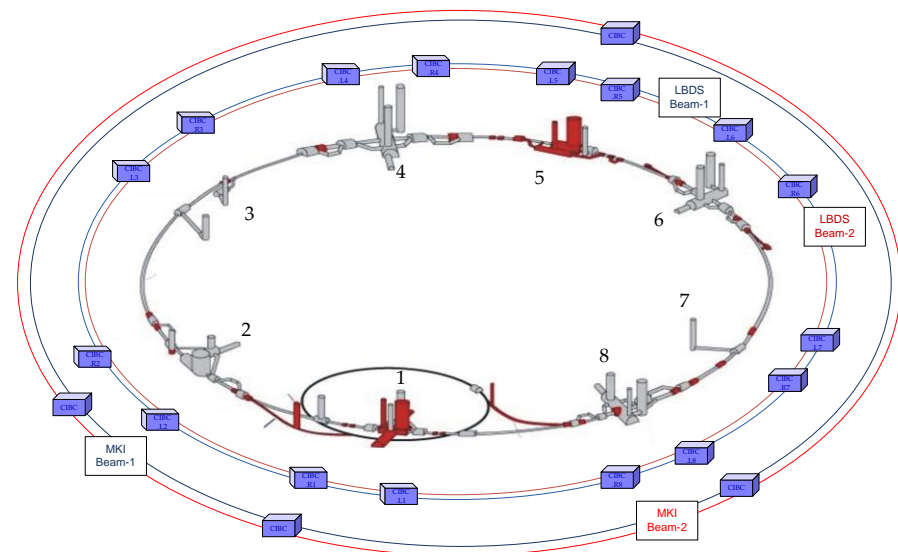
In addition to the Beam Interlock System (BIS):

Injection Permit System, with much less inputs than the BIS

- ATLAS delivers 1 injection permit signal to the LHC IPS
- ATLAS injection permit signal is the “**AND**” of a number of hardware signals



Injection key



- Without the injection permit, no further bunches can be injected into the LHC
- Beam already in the machine is kept (**IPS ≠ BIS**)
- ATLAS injection permit requires
 - BCM and BLM operational, (if BCM not masked) BCM buffers readout
 - Muons, PIX, SCT HV at safe value (Standby)
 - Roman Pots in HOME position
 - Injection key turned
 - BCM currently is unmasked from injection permit logic

The Injection Key

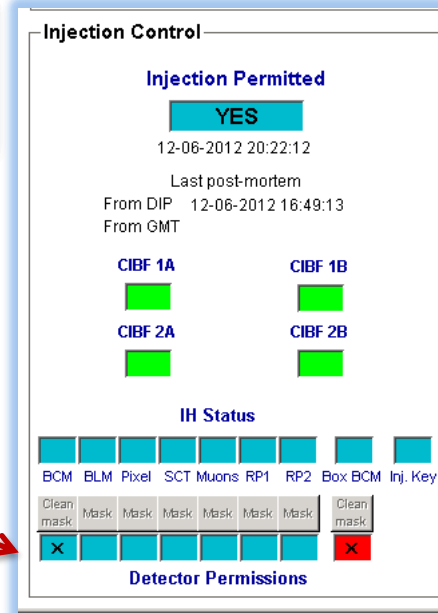
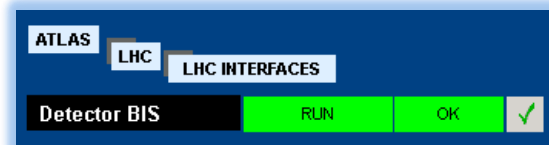


- Injection Key is turned by the shift leader as last step in the injection handshake sequence (see later) injection permit is given and green light lits up.
- Injection permit is removed (and the light goes off) automatically by key returning to idle position in case
 - Stable Beams Flag is asserted
 - A Post Mortem Signal is received
- Injection permit can be removed manually, by pressing the „Stop Injection“ button. **Note:** The button has to be pulled out again afterwards before being able to turn the injection key

- Press Stop Injection button to
 - Interrupt the injection sequence after READY was published in the injection handshake
 - If beam conditions appear highly abnormal during injection
- Remove the injection permit if CCC anounces there is no beam for a longer period (> 2h)
- Remove the injection permit if either Muons, or SCT or PIX announce they want to put nominal HV for tests when there is no beam
- Before turning the injection key, shift leader must check with the SLIMOS that it is ok, especially after an access to the cavern

Masking Injection Permits

- The injection permit signal of a sub-detector to the ATLAS IPS system can be masked (faked to TRUE)
 - If there is a temporary problem preventing the system to provide the permit, while at the same time being sure the system is in safe state
 - In case of very special tests or runs, eg „**Splash Events**“ (expected in March)
 - If a system being in a specific state no longer is deemed required for injection
- **Masking/unmasking any injection permit can only be done by the ATLAS run coordinator and deputy, in agreement with the sub-system run coordinator !**
- The default injection permit mask is specified on the shift leader whiteboard
- The injection permit mask can be checked from DCS under ATLAS → LHC → LHC Interfaces → Detector BIS




Handshake between ATLAS and LHC



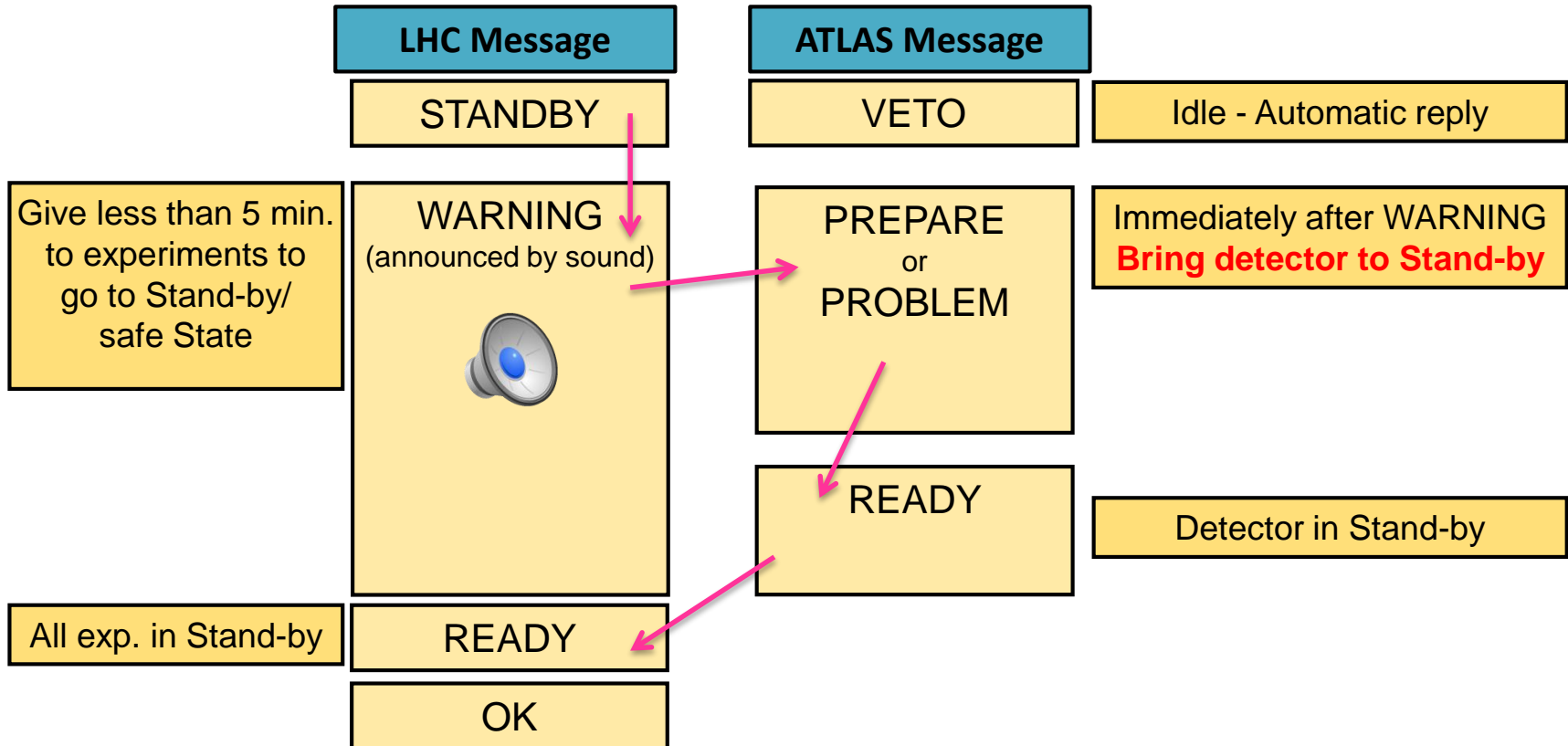
LHC Handshakes: Basics

- Before LHC can
 - Start injecting beam into the machine
 - Leave Stable Beams and go to Adjust Mode for beam manipulations
 - Carry out a planned (scheduled) beam dump

a handshake with the 4 experiments must take place.
 - In more abstract terms, the Handshake was introduced to prepare certain Beam Mode transitions
 - **SETUP** → **INJECTION** ...
 - **STABLE BEAMS / UNSTABLE BEAMS** → **ADJUST**
 - **STABLE BEAMS / UNSTABLE BEAMS** → **BEAM DUMP**
- 
- 3 types of handshakes
- The handshake is an exchange of a series of pre-defined messages between the CCC and the experiments, ensuring experiments are in a safe state and ready for **Injection, Dump, Adjust**.
 - Messages are exchanged via DIP (Data Interchange Protocol)
 - On ATLAS side, the handshake is controlled from DCS

Handshake Sequence and Messages

General handshake sequence and possible messages:



DCS Handshake Panel

ATLAS **LHC** **LHC INTERFACES**

Handshake **STANDBY** **OK**

LHC - ATLAS HANDSHAKE

State: **STANDBY** Status: **OK** [Show Legend](#)

LHC INJECTION

STANDBY

12-06-2012 21:24:56

LHC ADJUST

STANDBY

08-06-2012 10:10:28

LHC BEAMDUMP

STANDBY

10-06-2012 23:44:39

HSK Type	Source	Message	Timestamp	Reason of ATLAS message
INJECTION	LHC	OK	12-06-2012 03:10:57.629	
INJECTION	LHC	STANDBY	12-06-2012 03:10:57.633	
INJECTION	ATLAS	VETO	12-06-2012 03:10:58.477	Reply on STANDBY
INJECTION	LHC	WARNING	12-06-2012 05:12:14.195	
INJECTION	ATLAS	READY	12-06-2012 05:12:14.635	Automatically, as Injection permit given
INJECTION	LHC	READY	12-06-2012 05:14:36.851	
INJECTION	LHC	OK	12-06-2012 09:01:01.853	
INJECTION	LHC	STANDBY	12-06-2012 09:01:01.861	
INJECTION	ATLAS	VETO	12-06-2012 09:01:02.713	Reply on STANDBY
INJECTION	LHC	WARNING	12-06-2012 20:21:28.245	
INJECTION	ATLAS	READY	12-06-2012 20:22:12.949	Automatically, as Injection permit given
INJECTION	LHC	READY	12-06-2012 20:25:12.645	
INJECTION	LHC	OK	12-06-2012 21:24:56.217	
INJECTION	LHC	STANDBY	12-06-2012 21:24:56.221	
INJECTION	ATLAS	VETO	12-06-2012 21:24:57.082	Reply on STANDBY

ATLAS INJECTION

Published: **VETO**

Publish Message: **READY** **PROBLEM**

ATLAS ADJUST

Published: **VETO**

Publish Message: **PREPARE** **READY** **PROBLEM**

ATLAS BEAMDUMP

Published: **VETO**

Publish Message: **PREPARE** **READY** **PROBLEM**

ATLAS Injection Permit = **YES**

PERMIT from BIS HARDWARE

X = MASKED

X							X		
BCM	BLM	Pixel	SCT	Muons	RP1	RP2	Box BCM	Inj.Key	Global Permit

Permit without masking:

BCM	BLM	Pixel	SCT	Muons	RP1	RP2	Box BCM
yes	yes	yes	yes	yes	yes	yes	no

PLC Connection **1**

ATLAS Safe for Beam = **YES**

SAFE FOR BEAM from DCS

= UNKNOWN

PIX	SCT	BCM	MDT	TGC	CSC	RPO

DCS FSM Consistency

PIX	SCT	MDT	TGC	CSC

ATLAS

STANDBY

Handshake: ☐ ☐ ☐ ☐

ALICE

STANDBY

Handshake: ☐ ☐ ☐ ☐

CMS

STANDBY

Handshake: ☐ ☐ ☐ ☐

LHCb

STANDBY

Handshake: ☐ ☐ ☐ ☐

History,
Logging

Shift Leader
Action Buttons

Injection Permit
Status

DCS Safe
For Beam
Evaluation
Status

DCS Handshake Panel

FSM_ATLAS_OBSERVER: fwAtlasFrame -<@pcntgse23.cern.ch>

18-02-2015 11:19:57

apolini

ATLAS LHC LHC INTERFACES

HANDSHAKE PREPARE OK

Stable Beams Energy: 448.9 GeV Injection Permit ATLAS is beam-safe ? Stable Beams Flag ? blue: online: WARNING

LHC READY OK ID CALO MUON SERVICE S Object Time

PIX OK LAR W MDT OK CFC W W EXT: EXT 2015.02.18 11:13:00

SCT W TIL OK RPC W EXT W W SCT: B503 US 2015.02.18 11:19:20

TFT OK TGC OK TDO OK W SCT: BARREL 2015.02.18 11:19:20

IDE W CSC OK FWD OK W GCS: LAR SYSTEMS 2015.02.18 11:19:47

SAFE W W SCT: ENDCAP C 2015.02.18 11:19:48

W IDE: DIST RACKS:PIXEL 2015.02.18 11:19:55

16 W E F D U

LHC - ATLAS HANDSHAKE

State Status

PREPARE OK Show Legend

LHC Messages

LHC INJECTION LHC ADJUST LHC BEAMDUMP

STANDBY STANDBY WARNING

18-02-2015 09:42:28 18-02-2015 11:07:50 18-02-2015 11:19:12

Handshake Log

HSK Type	Source	Message	Timestamp	Reason of ATLAS message
DUMP	ATLAS	READY	18-02-2015 10:28:27.734	Shift Leader command
DUMP	LHC	OK	18-02-2015 10:39:11.912	
DUMP	LHC	STANDBY	18-02-2015 10:39:11.916	
DUMP	ATLAS	VETO	18-02-2015 10:39:11.931	Reply on STANDBY
ADJUST	LHC	WARNING	18-02-2015 10:41:11.978	
ADJUST	ATLAS	PREPARE	18-02-2015 10:41:41.071	Shift Leader command
ADJUST	ATLAS	PROBLEM	18-02-2015 10:46:12.015	Automatically: not READY for 5 min after WA
ADJUST	ATLAS	PREPARE	18-02-2015 10:52:11.146	Shift Leader command
ADJUST	ATLAS	READY	18-02-2015 10:52:13.986	Shift Leader command
ADJUST	LHC	READY	18-02-2015 10:54:13.222	
ADJUST	LHC	OK	18-02-2015 11:07:42.486	
ADJUST	LHC	STANDBY	18-02-2015 11:07:50.508	
ADJUST	ATLAS	VETO	18-02-2015 11:07:50.518	Reply on STANDBY
DUMP	LHC	WARNING	18-02-2015 11:19:12.798	
DUMP	ATLAS	PREPARE	18-02-2015 11:19:12.801	Automatically on WARNING

ATLAS Messages

ATLAS INJECTION ATLAS ADJUST ATLAS BEAMDUMP

Published: VETO Published: VETO Published: PREPARE

Publish Message: Publish Message: Publish Message:

READY PROBLEM PREPARE READY PROBLEM PREPARE READY PROBLEM

ATLAS Injection Permit = NO ATLAS Safe for Beam = NO

PERMIT from BIS HARDWARE = INJECTION PERMIT NO PERMIT, ACTION REQUIRED X = MASKED NO PERMIT, OK

SAFE FOR BEAM from DCS = SAFE FOR BEAM NOT SAFE, ACTION REQUIRED = UNKNOWN NOT SAFE, OK

PIX SCT BCM MDT TGC CSC RPO

BCM BLM Pixel SCT Muons RP1 RP2 Box BCM Inj.Key Global Permit

Permit without masking: BCM BLM Pixel SCT Muons RP1 RP2 Box BCM

yes yes no no no yes yes no PLC Connection 1

DCS FSM Consistency = STANDBY

PIX SCT MDT TGC CSC

ATLAS DCS NOT_READY WARNING

ATLAS

Handshake buttons became enabled when some action is requested or available

(1) Injection Handshake

LHC

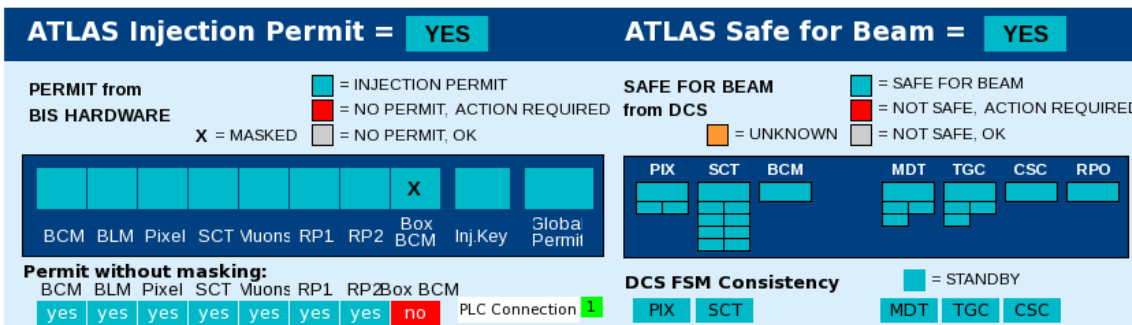
- Handshake starts, LHC publishes WARNING



- Injection warning is acknowledged automatically by DCS by publishing PREPARE
- Shift leader asks/checks with sub-detector shifters that Muons (MDT, TGC, CSC), PIX and SCT are in safe state (i.e. STANDBY) see also [ATLAS Safe for Beam Flag](#).
- Shift leader checks all sub-detector hardware injection permits are TRUE
- Shift Leader turns the injection key
- READY is published automatically once key is turned

- Once all experiments have published READY, LHC goes for injection

ATLAS



Problems:

- Publish PROBLEM if a sub-det can not go to safe state, inform the CCC and run manager
- If READY is not published within 5 mins after PREPARE, PROBLEM is published automatically
- Once injection key is turned, PROBLEM → READY is automatically published

(2) Adjust Handshake

- Handshake starts, LHC publishes WARNING



- Adjust warning is acknowledged by the shift leader by publishing PREPARE
- Shift leader asks/checks with sub-detector shifters that Muons (MDT, TGC, CSC), PIX and SCT go to safe state (STANDBY), and waits until this is the case – check DCS Safe for Beam flags
- Shift leader checks **hardware injection permits are TRUE** for PIX, Muons, SCT
- Shift leader publishes READY

- Once all experiments have published READY, LHC goes to Adjust mode

ATLAS

ATLAS Injection Permit = YES

ATLAS Safe for Beam = YES

PERMIT from BIS HARDWARE
X = MASKED

BCM	BLM	Pixel	SCT	Muons	RP1	RP2	Box BCM	Inj.Key	Globo Permit
							X		

Permit without masking:
BCM BLM Pixel SCT Muons RP1 RP2 Box BCM
yes yes yes yes yes yes yes no PLC Connection

SAFE FOR BEAM from DCS
= UNKNOWN

PIX	SCT	BCM	MDT	TGC	CSC	RPO

DCS FSM Consistency
PIX SCT MDT TGC CSC

Problems:

- Publish PROBLEM if a sub-det can not go to safe state, inform the CCC and run manager
- If READY is not published within 5 mins after PREPARE, PROBLEM is published automatically

Note: READY can not be published if subdet injection permits are false!

(3) Dump Handshake

- Handshake starts, LHC publishes WARNING



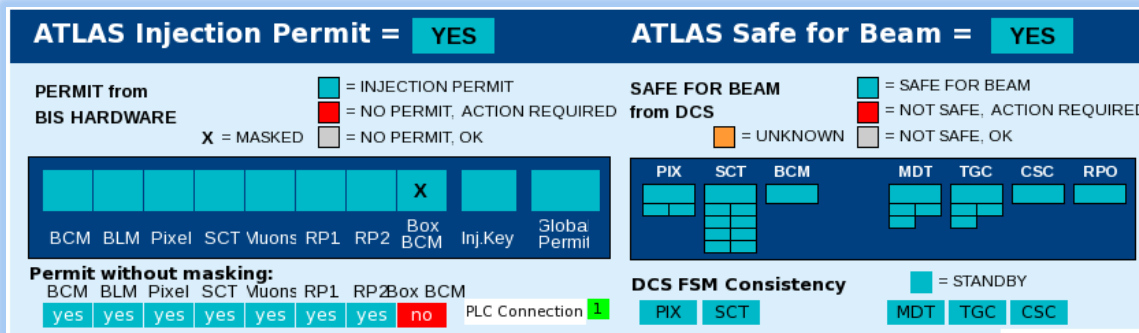
- Dump warning is acknowledged automatically by DCS by publishing PREPARE
- Shift leader checks PIX and SCT go to safe state (STANDBY) -- **Muons stay ON until stable beams flag is lost !**
- If PIX and SCT are in safe state, publish READY
- Beams are dumped anyway after 5mins except PROBLEM is explicitly published, by the shift leader or by DCS (only due to PIX problems to ramp down)
- Once beams are dumped and stable beams flag is gone, muons ramp automatically to STANDBY

- Once all experiments have published READY, sequence continues

Problems:

- If „PIX ramp down to safe state/switch off of pre-amps“ does not work (PROBLEM is published), call the CCC and run manager to explain the problems, make sure experts are called

What is the relevant info that a det. is safe !



ATLAS	READY	OK	
PIX	READY	OK	
SCT	READY	OK	
TRT	READY	OK	
IDE	READY	OK	
LAR	READY	OK	
TIL	READY	OK	
MDT	READY	OK	
RPC	READY	OK	
TGC	READY	OK	
CSC	READY	OK	
CIC	READY	OK	
EXT	READY	OK	
TDQ	READY	OK	
LHC	READY	OK	
FWD	READY	OK	
SAFETY	READY	OK	
DCS BE	READY	OK	

- The relevant information that a detector is in safe state is
 - The hardware injection permit state for Injection and Adjust Handshake
 - The DCS „Safe for Beam“ flags

To be checked on the **Handshake Panel !!**

The Handshake panel „DCS FSM consistency“ info is for information

- Normally, you expect **STANDBY** during Inject, Adjust, Dump
- Don't worry on a **NOT_READY** when checking if things are safe for injection, Adjust, Dump. It may come from something completely else, eg the infrastructure
- Do worry if the FSM state says **READY**, check/ask !!

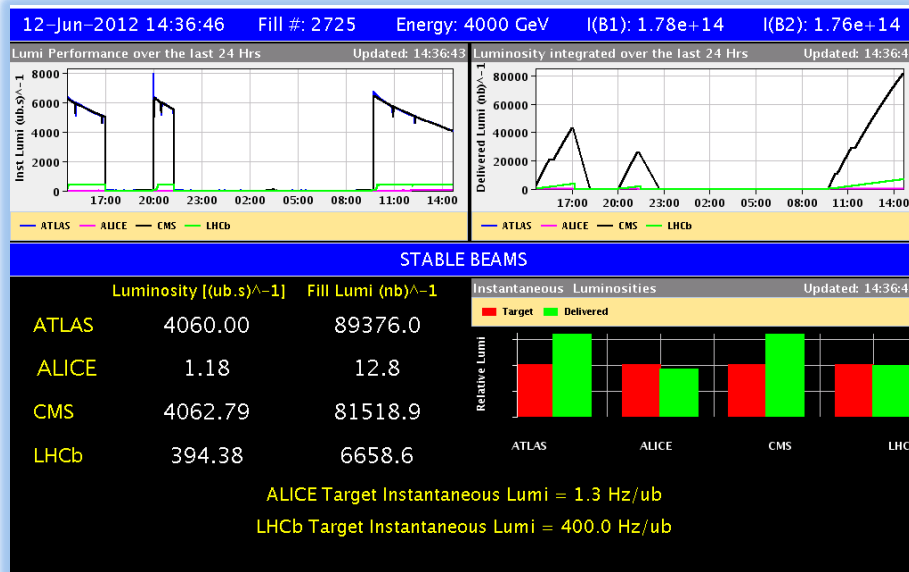
Do not judge whether a sub-det is in safe state from the FSM state, nodes may be disabled ..

Luminosity Information

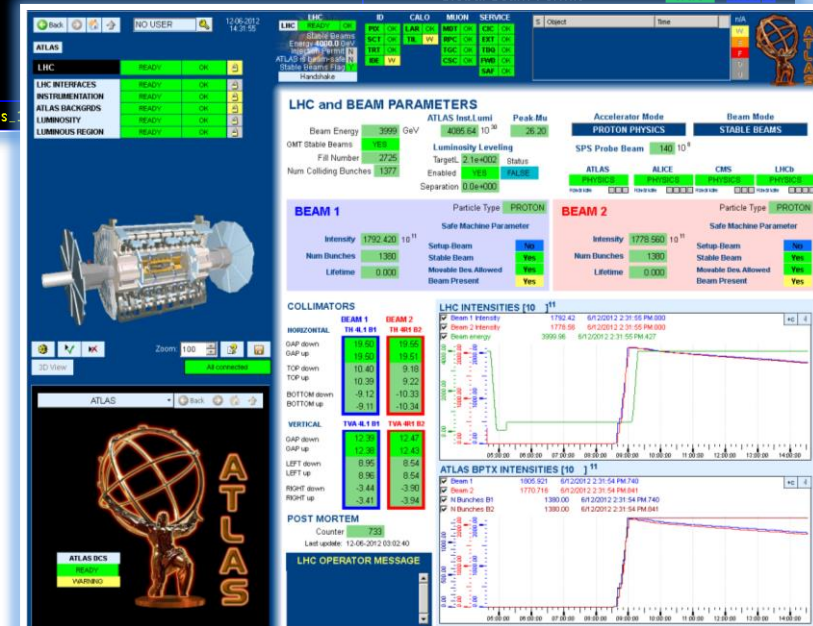
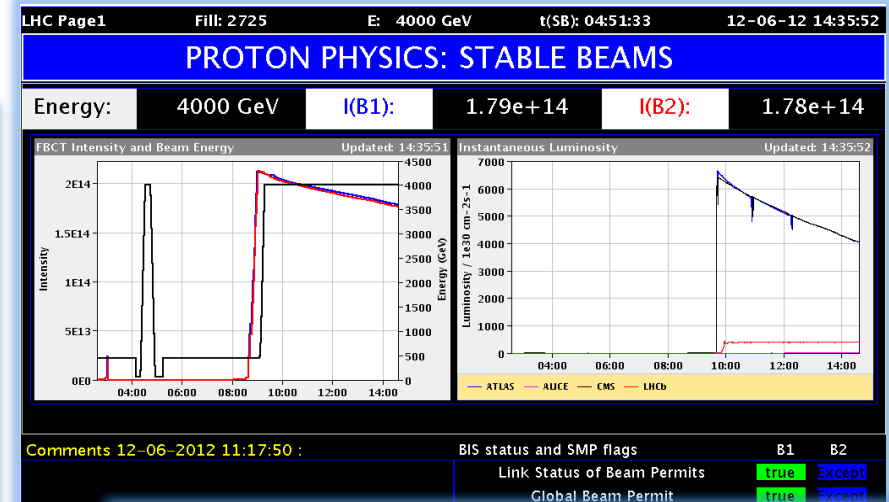
Where to find luminosity information

2 main places for luminosity related information

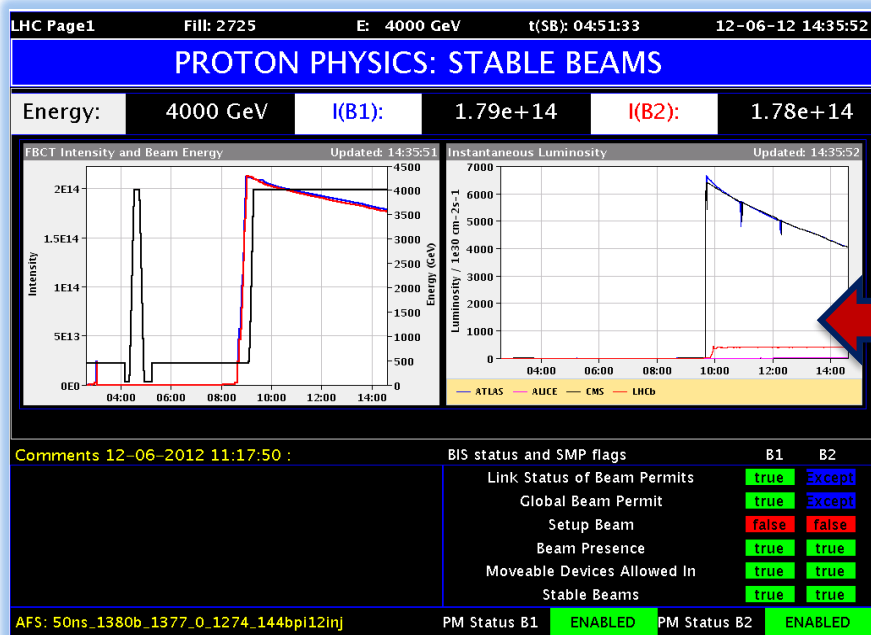
- LHC Luminosity page, LHC page 1



- ATLAS Luminosity information in DCS
ATLAS → LHC → LUMINOSITY

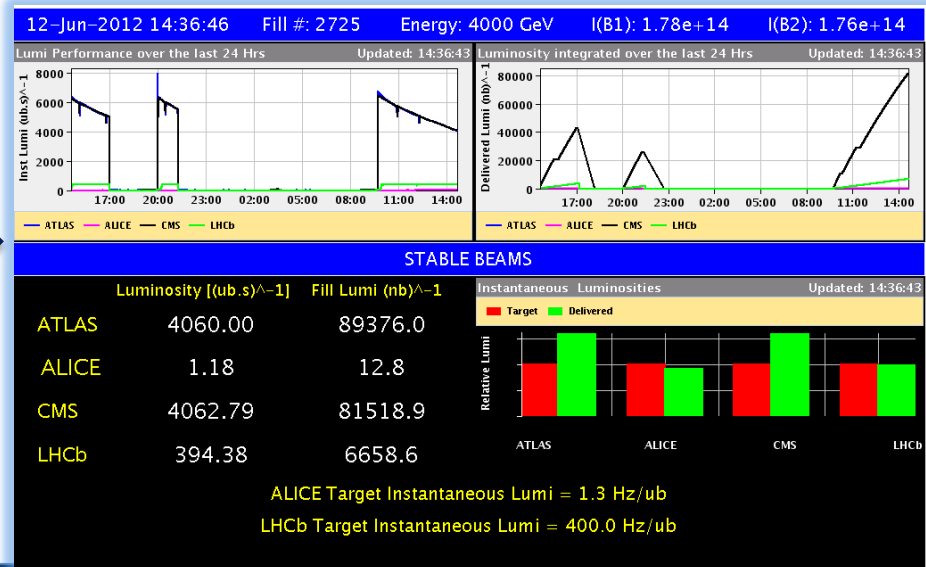


What to find on LHC page 1/lumi page



- Instantaneous total luminosity of the 4 LHC experiments, as transmitted to the CCC
- Little dips indicate a luminosity optimization or mini lumi scan
- ATLAS and CMS lumi **should be equal within +- 2%**
- If ATLAS lumi is significantly lower than CMS, call the CCC and **request a lumi optimization at both IP1 and IP5**
- Request a lumi optimization every ~2hours (both IP1 and 5) if not done anyway by the CCC

- ATLAS and CMS instantaneous and fill luminosity in numbers
- Useful in particular for comparison ...



Luminosity Information in DCS (i)

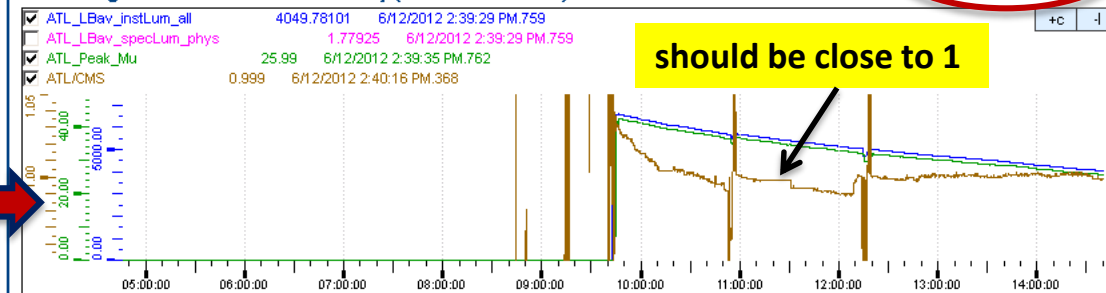
ATLAS	LHC
LUMINOSITY	READY OK
ATLAS LUMINOSITY	READY OK
LHC LUMINOSITY	READY OK

„Top“ Luminosity panel:

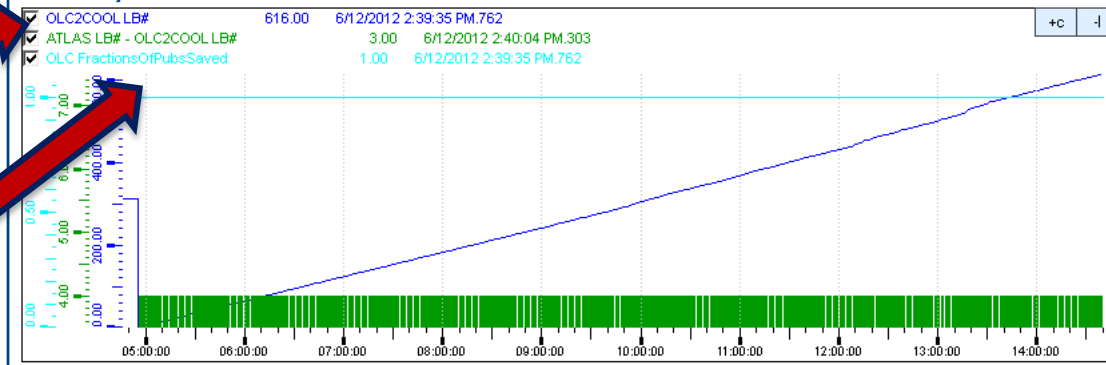
- Instantaneous lumi, averaged over BCIDs
- Ratio between ATLAS and CMS
- Lumi Infrastructure:
- OLC2COOL LB number, must continuously increase during a fill, if not lumi on call must be alerted immediately
- OLC FractionOfPubsSaved, must be 1 during stable beams, otherwise one or the other lumi data does not make it into the database
- “SwitchToATLAStoLHC”: shows data we transmit to LHC for page 1 etc, in particular integrated lumi per fill

LUMINOSITY

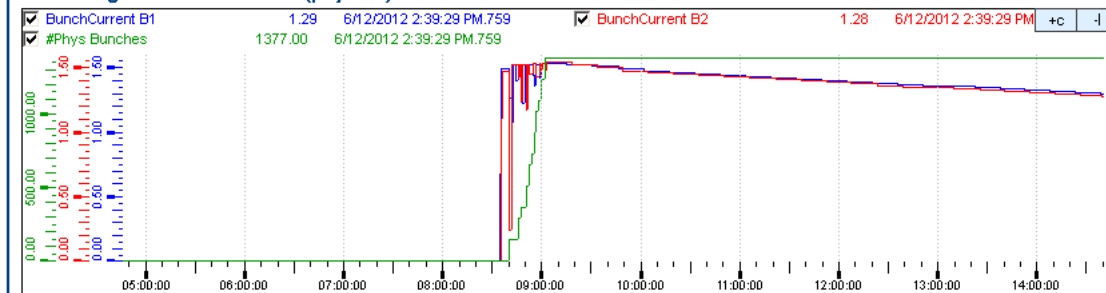
LB Averaged Instantaneous Luminosity ($10^{30} \text{ cm}^{-2} \text{ s}^{-1}$)



Luminosity infrastructure



LB Averaged Bunch Currents (physBG)

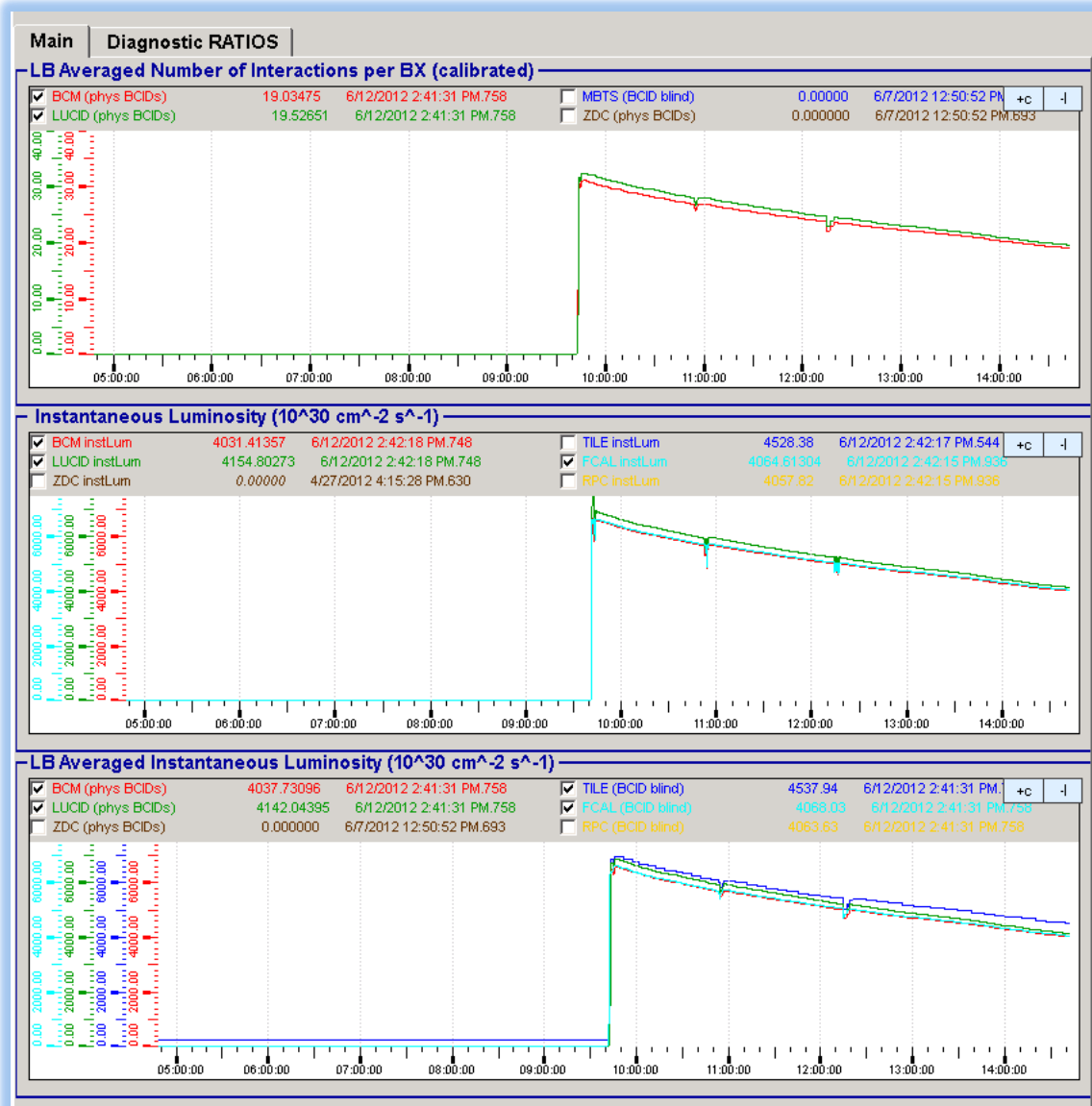


Luminosity Information in DCS (ii)

ATLAS			
LHC			
LUMINOSITY			
ATLAS LUMINOSITY	READY	OK	
ALFA	READY	OK	
LUCID	READY	OK	
ZDC	READY	OK	
BCM	READY	OK	
FCAL	READY	OK	
MBTS	READY	OK	

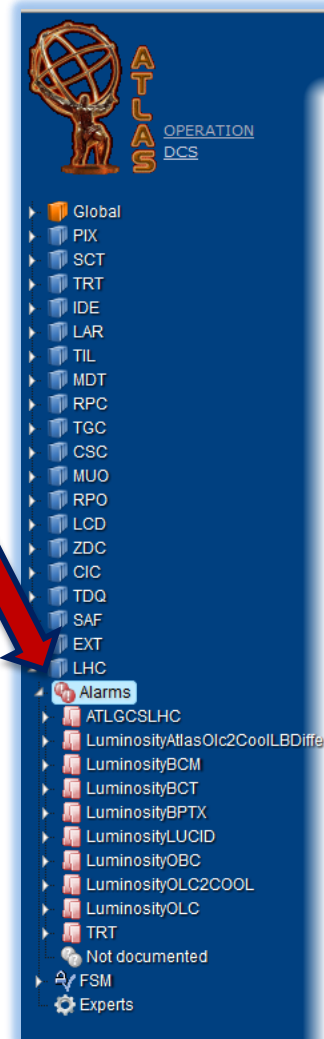
„ATLAS Luminosity“ panel

- Instantaneous luminosity for the various ATLAS lumi detectors
- Dedicated ATLAS Lumi detectors are BCM and LUCID
- At the moment, „preferred“ lumi send to LHC and used for data summary page etc. is from new (DEV) BCM
- Doubts about LUCID or BCM lumi → **immediate follow-up!**



Luminosity Alarms

- Problems with the luminosity infrastructure are signalled by DCS alarms – follow up any **ERRORs** immediately if during physics
- Alarms are explained under <https://atlasop.cern.ch/dcs/doc/> selecting LHC → Alarms, or directly via the right click AlarmHelp feature from the DCS alarm screen
- Luminosity infrastructure monitoring is the responsibility of the DQ shifter**, in case there is no DQ shifter, you will be asked to keep an eye on it.
- In case of any lumi related problems, ask the DQ shifter to investigate, if in doubt make sure the lumi on call is called.
- Detailed instructions and further information on luminosity monitoring can be found under [https://atlasop.cern.ch/twiki/bin/view/Main/DQManualShifterOnline#Luminosity and beam conditions m](https://atlasop.cern.ch/twiki/bin/view/Main/DQManualShifterOnline#Luminosity_and_beam_conditions_m)



Thank You!