ATLAS Permits

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CERN/PH-ATLAS

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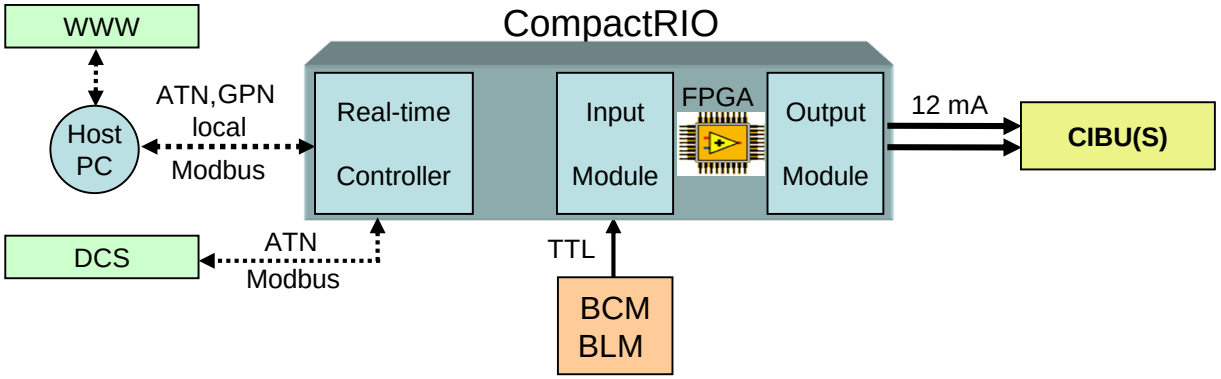
User_Permit and Injection_Permit

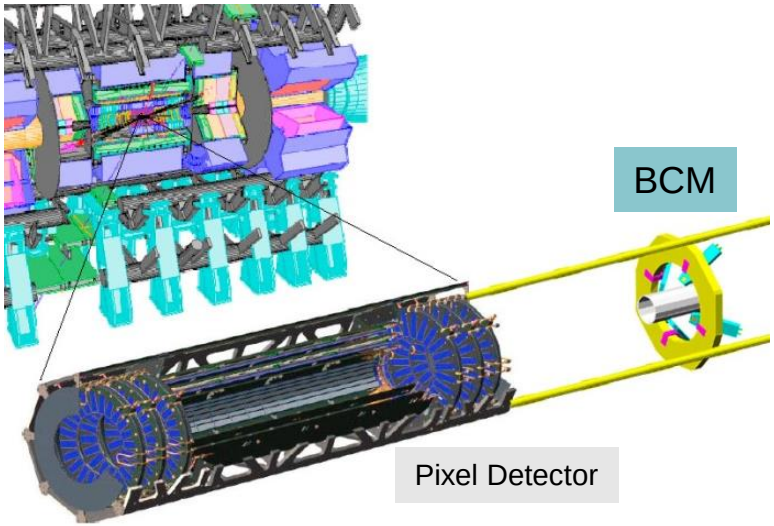
- ATLAS delivers 3 inputs (User_Permit) to LHC BIS
  - Detectors
  - Roman Pots (RP)
  - Magnets
- ATLAS delivers 1 input (Injection_Permit) to LHC Injection Permit/Inhibit System
  - Detectors/RP combined
- Systems fulfil requirements defined by LHC
  - Hardware systems
  - UPS power
  - Redundancy
  - Commissioning mode
  - …

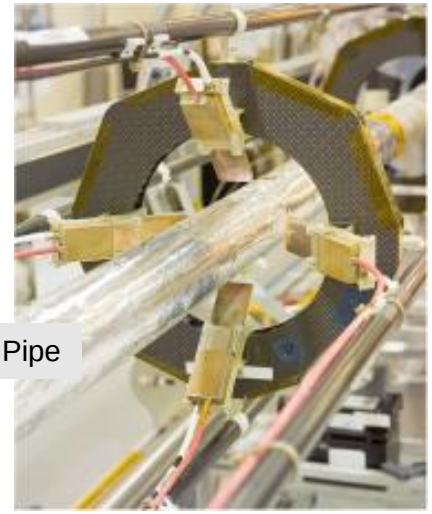
Detector User_Permit



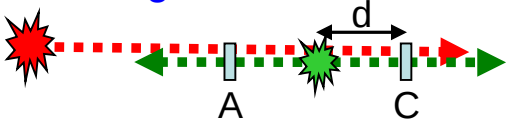
- FPGA based system in RIO technology (NI)
  - Real-time Controller
  - Input/Output Modules
  - CompactRIO bus
- Real-time Controller accessible from
  - ATLAS DCS
  - Host PC
  - WWW
- Delivers signals to LHC Interface CIBU(S)

BCM



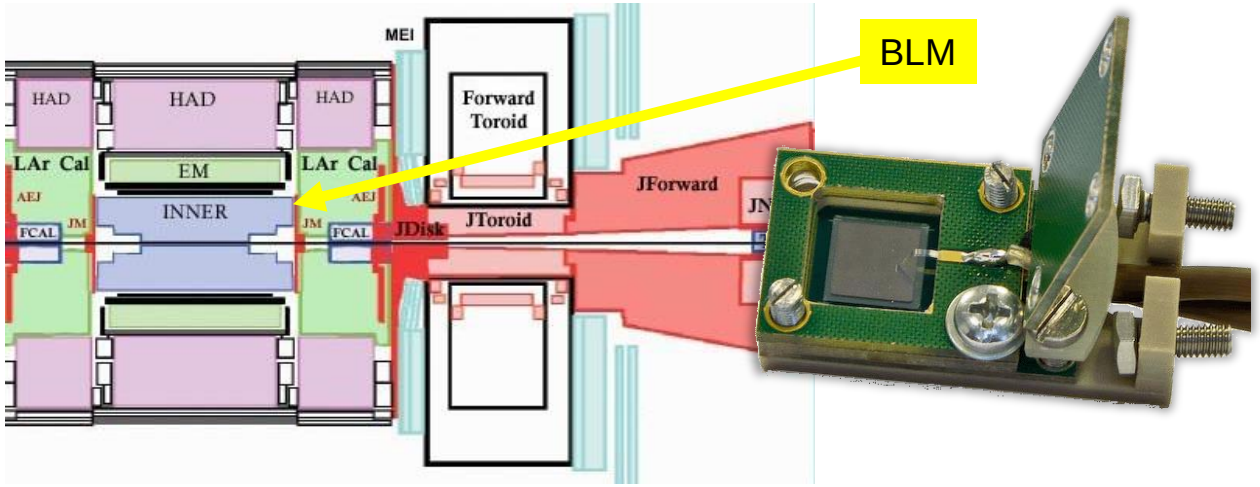


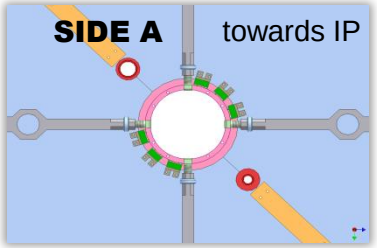
- Beam Condition Monitors (BCM)
  - 2 x 4 pCVD diamond detectors (8 x 8 mm^2)
  - z = ± 184 cm and r = 55 mm
  - Single MIP sensitivity with sub-ns time resolution ➔ Time of flight measurement ➔ distinguish collisions – background (ΔT(A/C) = 2d/c)

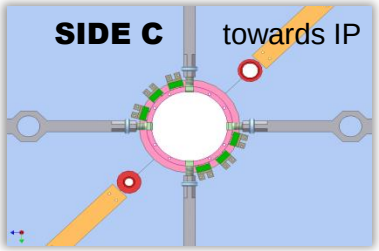


- Beam abort condition
  - 3 sensors above high threshold (5 MIPS) AND
  - 4 sensors above low threshold (0.5 MIPS)
- Possibility to develop “dynamic” beam abort algorithm

BLM

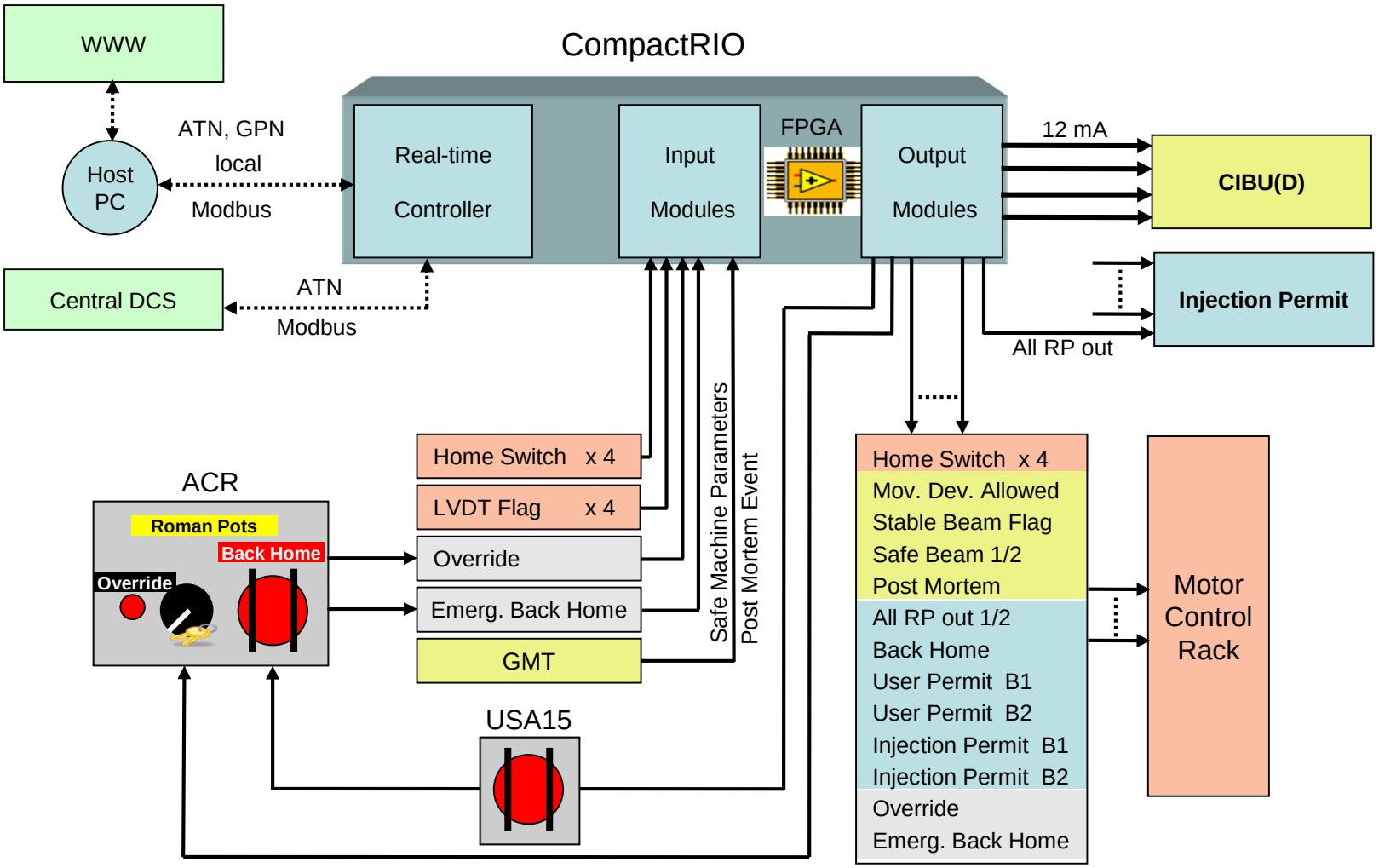




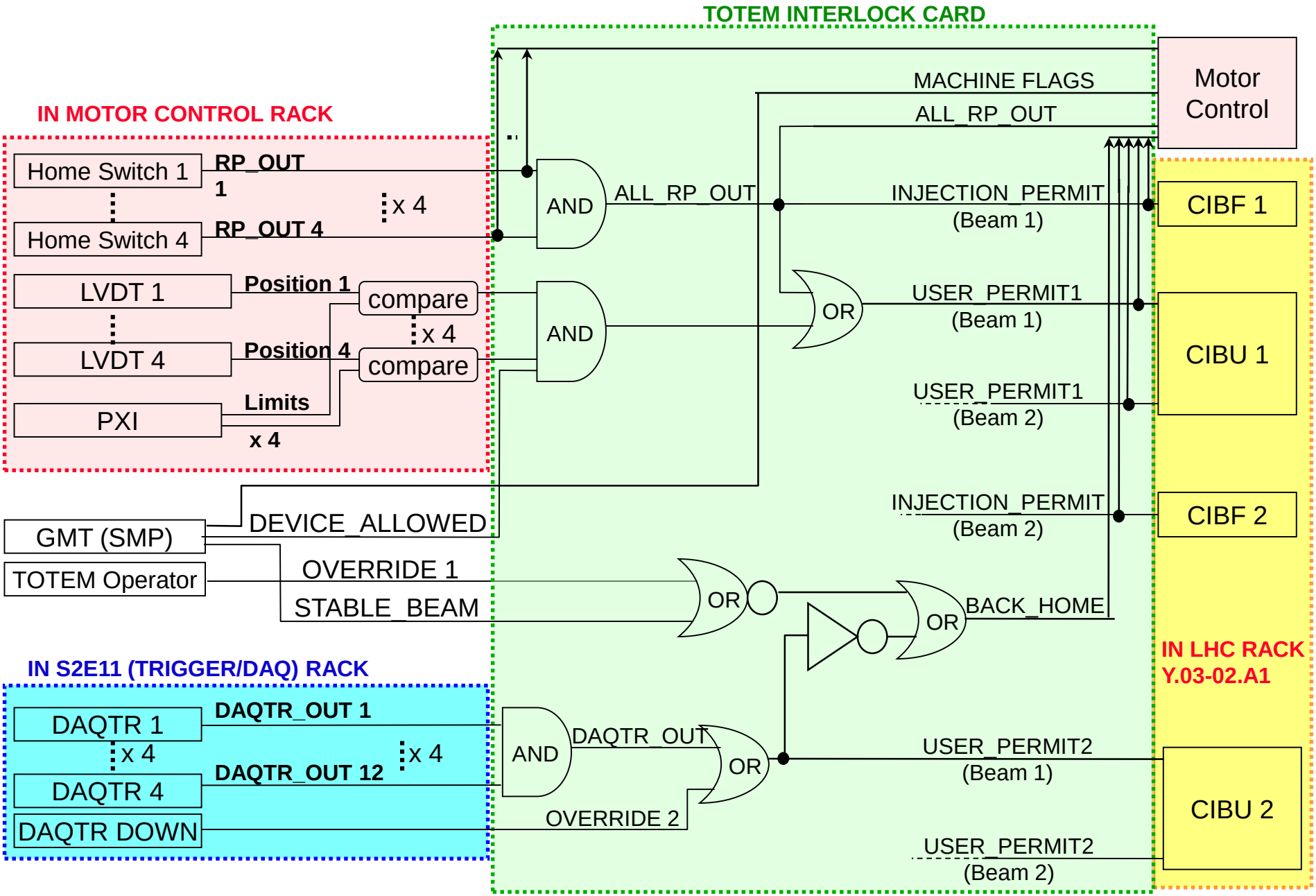


- Beam Loss Monitors (BLMXD.01L1/R1.CH0N_ATLAS)
  - 2 x 6 pCVD diamond detectors (8 x 8 mm^2)
  - z = ± 345 cm and r = 65 mm
  - 40 μs integration time
  - Readout chain of LHC BLM system with modified BLMTC FPGA firmware
    - Abort signal at front panel
    - Receive PM signal
- Beam abort condition
  - 2 in a group of 3 detectors above threshold

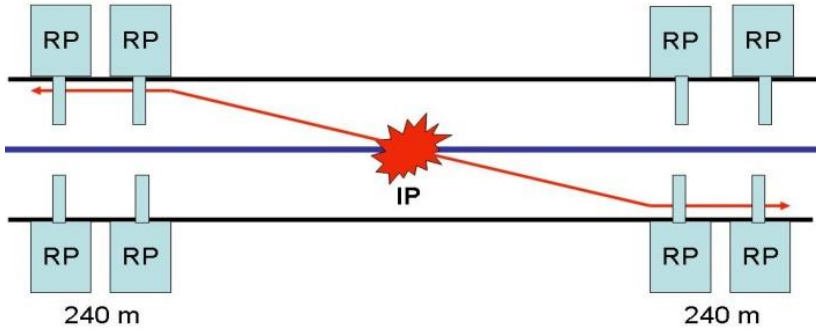
Roman Pot User_Permit

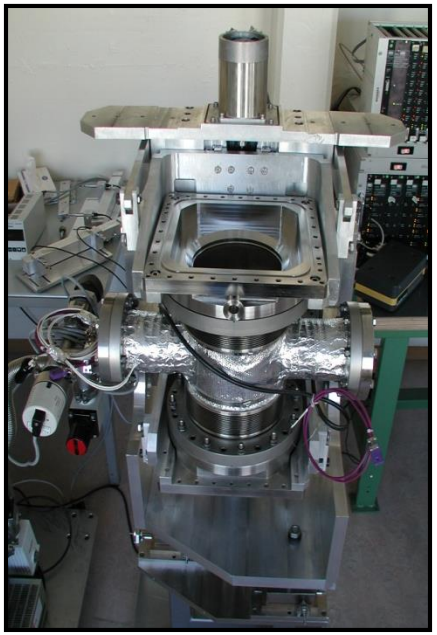


Interlock Block Diagramme – TOTEM MD 11-Jun-09



Roman Pots





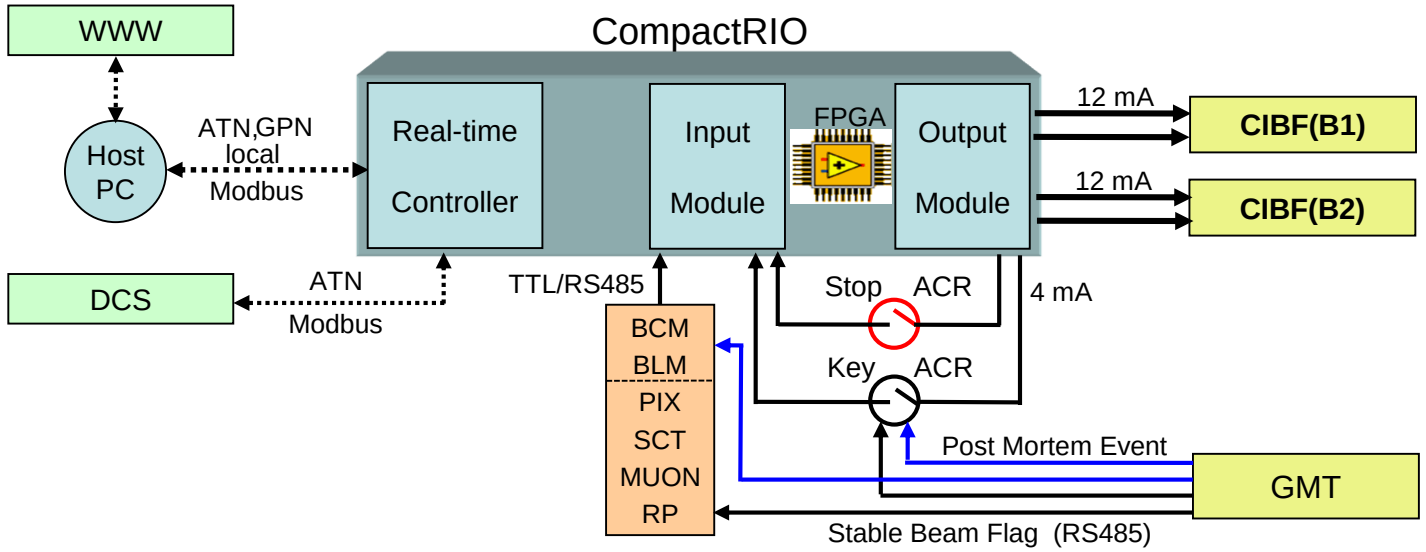
Absolute
Luminosity
For
ATLAS

- RP stations are at 240 m from IP
- RP stations will be installed next week
- Detectors (ALFA) will come next year

Magnet User_Permit

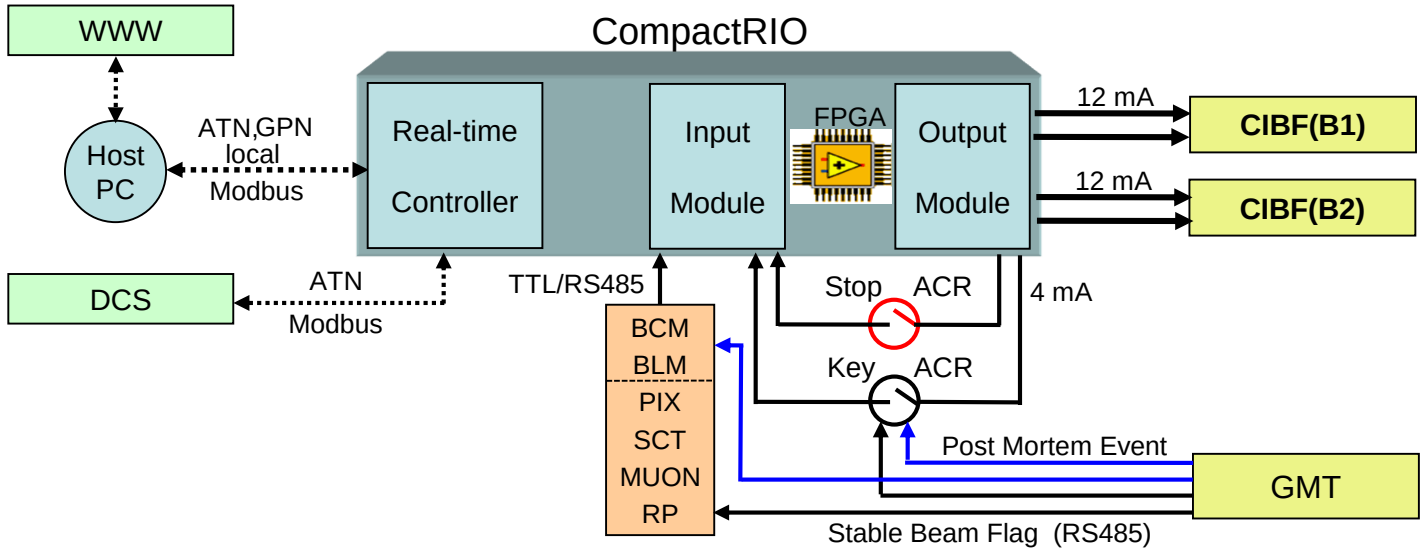
- Taken care of by PH–DT–MSS (L. Deront)
- Hardware installed and operational
- At present permanent User_Permit
  - Possibility to change once influence of ATLAS magnets on beam is fully understood

Injection_Permit (I)



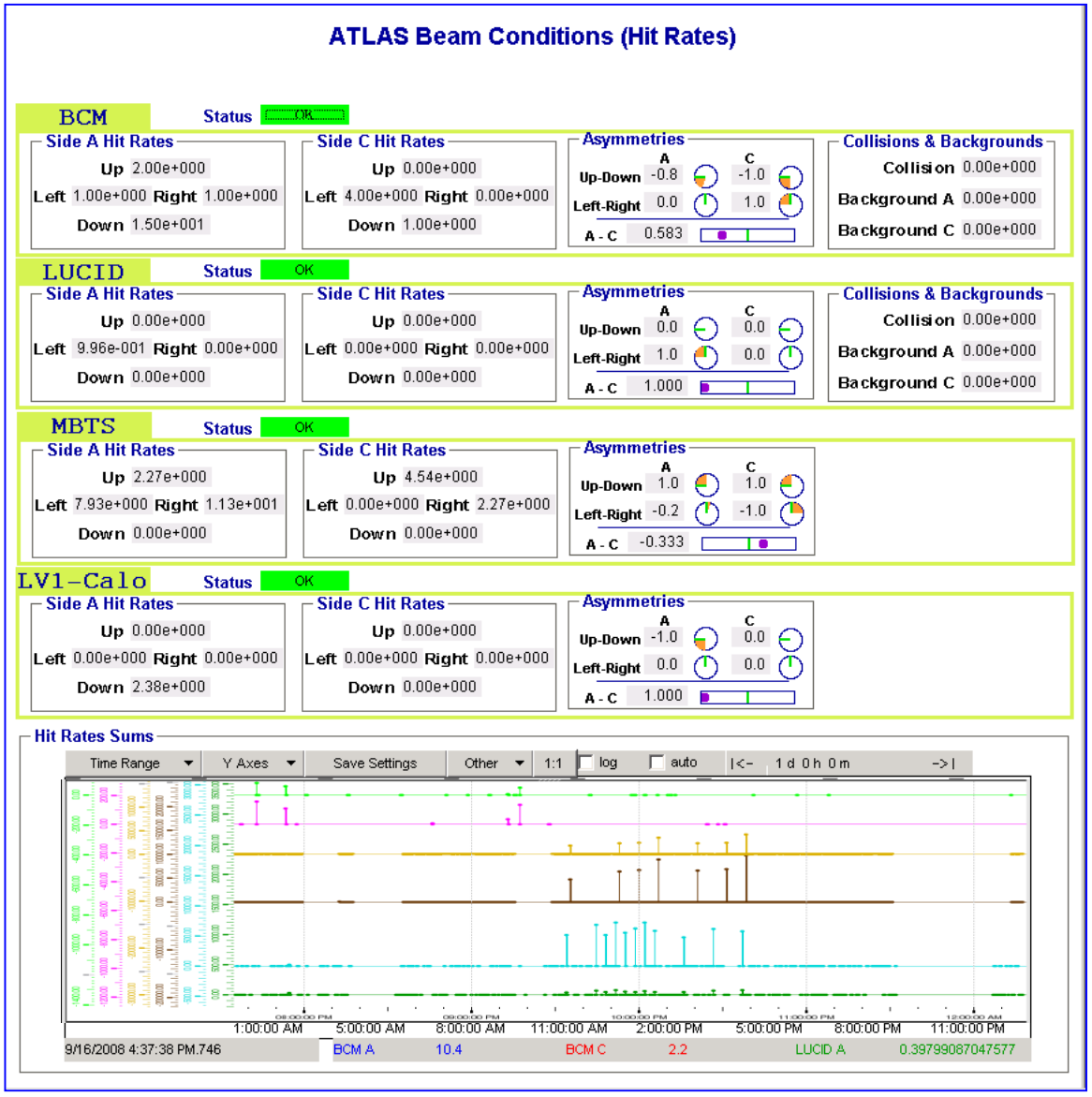
- Injection_Permit is <u>independent</u> of User_Permit
  - Permits injection in empty machine after handshake procedure
  - Allows stopping injection after “bad” injection cycle (without dumping beam)
- Necessary conditions for Injection_Permit
  - BCM and BLM operational
  - Pixel, SCT, Muon on stand-by voltage
  - All Roman Pots out
- Final injection permit given by shift leader in ACR via key (last action of Injection Handshake)

Injection_Permit (II)

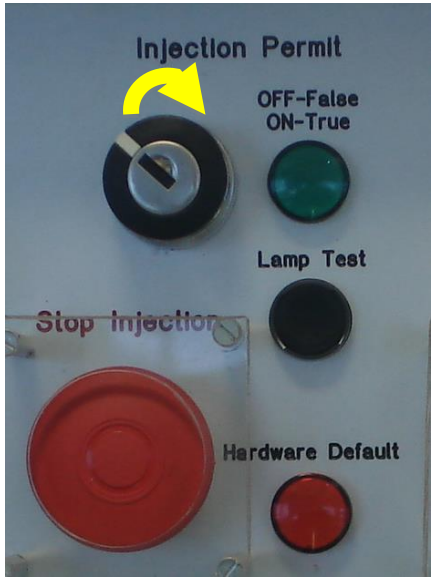


- Injection_Permit removed <u>automatically</u> if
  - BCM/BLM not operational
  - Pixel/SCT/Muon on running voltage
  - RP in
  - Stable beam flag “TRUE”
  - Post Mortem Event emitted
- Injection_Permit can be removed <u>manually</u> via emergency button in ACR if “abnormal “ beam condition are observed after injection cycle
  - Experience will tell how useful and whether possible to make automatic

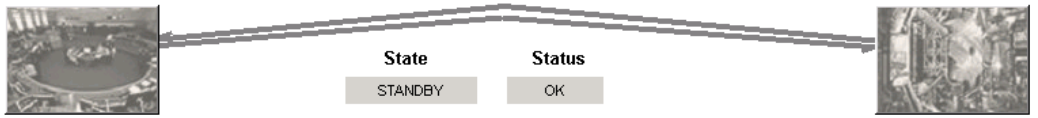
Injection_Permit (III) – Beam Conditions



Injection_Permit (IV) – Handshake



LHC - ATLAS Handshake



LHC Messages

LHC INJECTION	LHC ADJUST	LHC BEAMDUMP
STANDBY	STANDBY	STANDBY
28-07-2009 12:03:38	28-07-2009 12:03:27	28-07-2009 12:03:47

Legend

Machine	Experiment	Comment
STANDBY	VETO	Default when nothing happens
WARNING	Replies PREPARE reasonably quickly	10 min. warning. Experiment publishes PREPARE so that machine knows it's message got, starts preparing
IMMINENT		2 min. warning
READY		Machine is ready for injection, adjust or dump. Waiting for experiments to be READY
	READY	Experiment is ready for the action. When ALL 6 exp. replied READY, machine performs the action
OK		Successful completion of the action

ATLAS Messages

ATLAS INJECTION	ATLAS ADJUST	ATLAS BEAMDUMP
VETO	VETO	VETO
Publish for LHC	Publish for LHC	Publish for LHC
Published: VETO	Published: VETO	Published: VETO

ATLAS Injection Permit = NO **ATLAS Safe for Beam = NO**

PERMIT from BIS HARDWARE

X = MASKED

= INJECTION PERMIT
= NO PERMIT
= STABLE BEAMS / NO BEAM

BCM	BLM	Pixel	SCT	Muons	RP	Injection Key	Global Permit
	X	X	X	X			

SAFE FOR BEAM from DCS

= SAFE FOR BEAM
= NOT SAFE & UNSTABLE
= STABLE BEAMS / NO BEAM

PIX	SCT	TRT	LAR	MDT	RPC	TGC	CSC