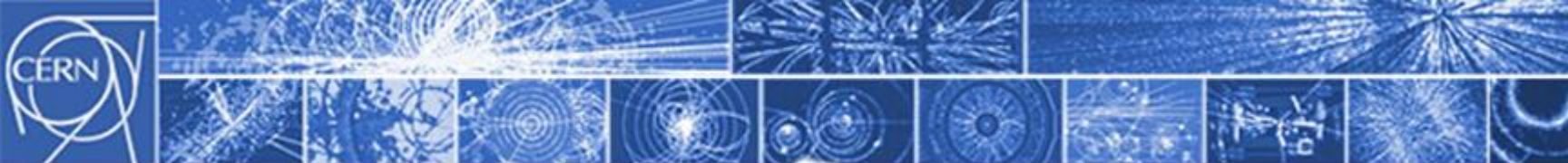


# Beam Interlock System CIBU Connection Review

Christophe Martin  
TE/MPE

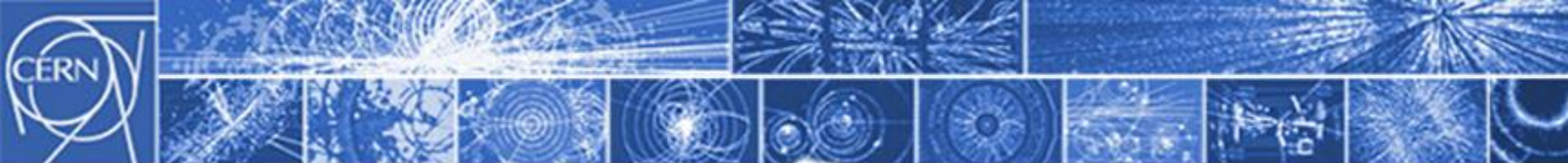
Christophe Martin TE-MPE-EP

30/01/2015



**Outline:**

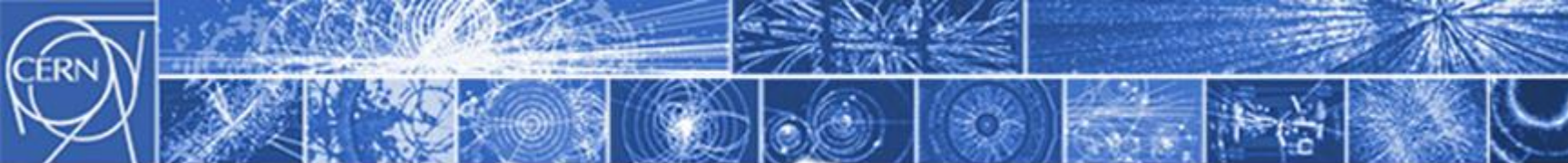
- CIBU distribution
- Commissioning details for :
  - SPS ring
  - Extraction beam 1 & beam 2
  - Injection beam 1 & beam 2
  - LHC ring
- Key points
- Conclusion



**Outline:**



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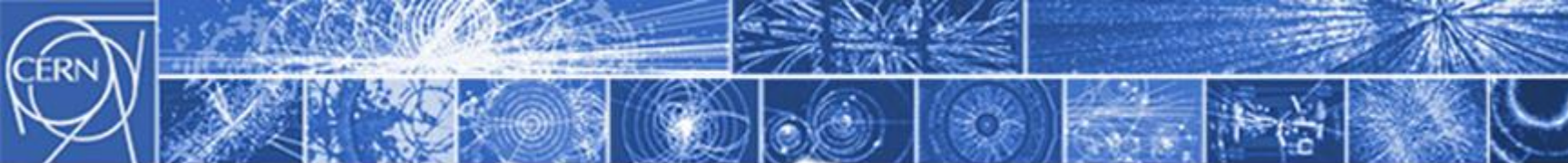
### CIBU distribution

<b>Total SPS CIBU:</b>	<b>43</b>	<b>Tested SPS CIBU:</b>	<b>43</b>	<b>Remaining SPS CIBU:</b>	<b>0</b>
<b>Total Extraction 1:</b>	<b>50</b>	<b>Tested Extraction 1:</b>	<b>49</b>	<b>Remaining Extraction 1:</b>	<b>1</b>
<b>Total Extraction 2:</b>	<b>40</b>	<b>Tested Extraction 2:</b>	<b>36</b>	<b>Remaining Extraction 2:</b>	<b>4</b>
<b>Total injection 1:</b>	<b>19</b>	<b>Tested injection 1:</b>	<b>16</b>	<b>Remaining Injection 1:</b>	<b>3</b>
<b>Total injection 2:</b>	<b>18</b>	<b>Tested injection 2:</b>	<b>14</b>	<b>Remaining Injection 2:</b>	<b>4</b>
<b>Total LHC CIBU:</b>	<b>151</b>	<b>Tested LHC CIBU:</b>	<b>72</b>	<b>Remaining LHC CIBU:</b>	<b>79</b>
<b>Total installed:</b>	<b>321</b>	<b>Total Tested</b>	<b>230</b>	<b>Remaining CIBU to tested:</b>	<b>91 (28%)</b>


Total CIBU connection\* : 364

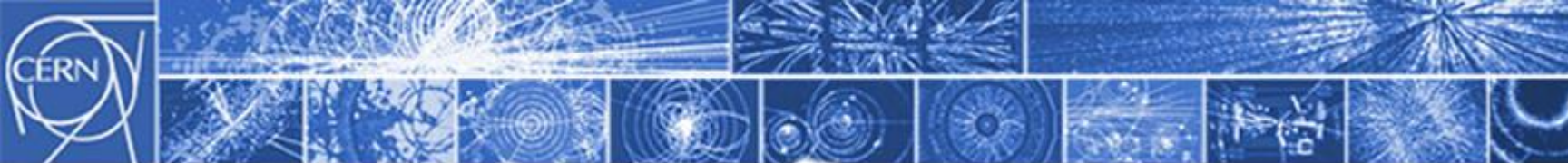
*\*Some LHC users require one connection per Beam, in this case a CIBUD type is used (2 x CIBUS electronics in the same interface)*

Note: "tested CIBU" doesn't mean compliant to BIS connection requirements ...

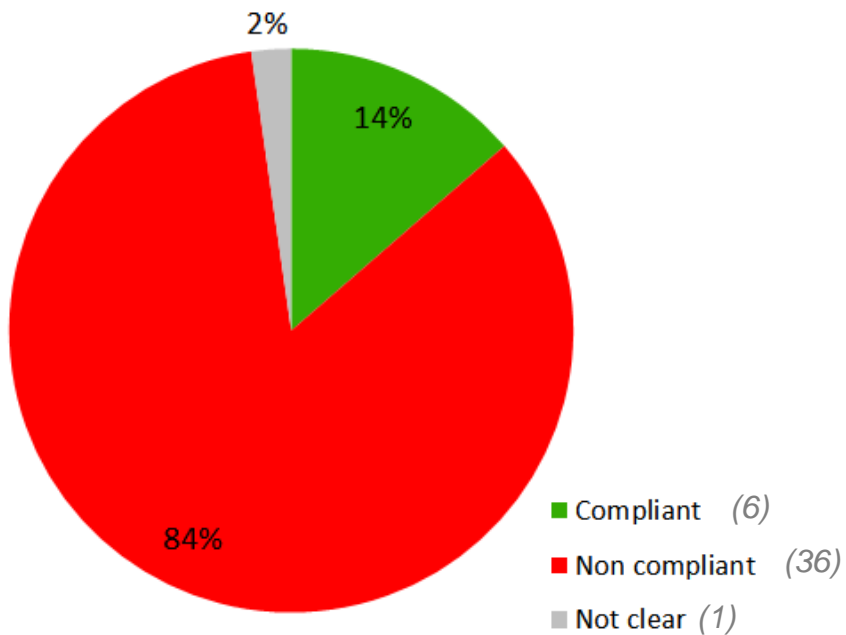


## Outline:

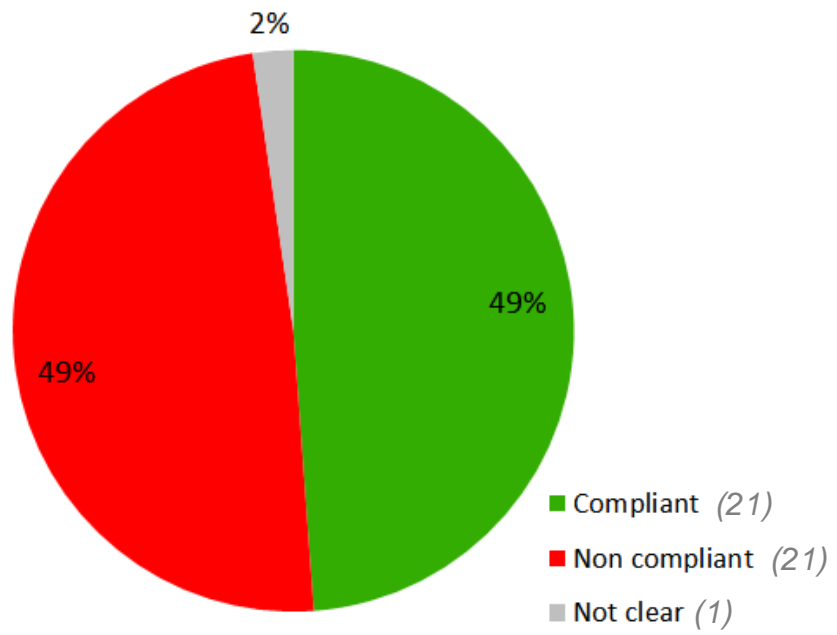
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# SPS CIBU CONNECTION STATUS : 100% OF CIBU TESTED AMONG 43



After the first commissioning campaign

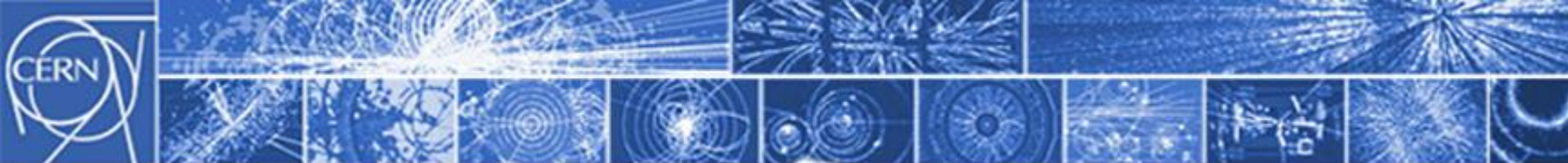


Today, after Users improvement

Not clear :

For some test :

- The user is not present (remote test with the CCC)
- No way to test Permit A & B separately (distinct, parallel, serial ?)
- No schematic
- No GND (commissioning device need a reference point ...)

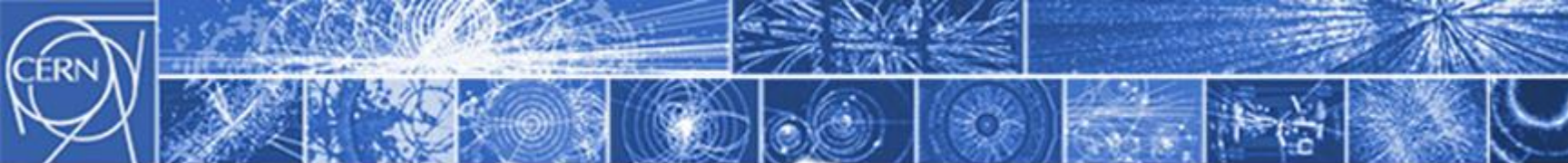


## SPS NON-CONFORMITY DETAILS

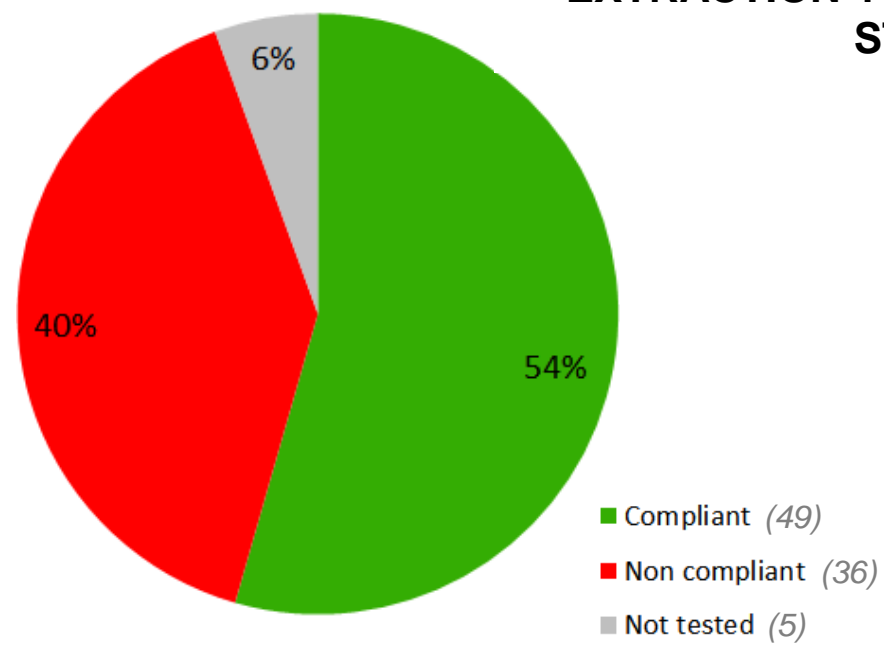
Systems	Number of CIBU	Resistors in series	Seial connection	Parallel connection	Switch on GND	No GND	GND On CIBU connector
BLM	6	X		X		X	
Access Chain 1	1	X			X		
FGC Interlock	1				X	X	
MKD	1		X			X	
MKE6	1		X			X	
Q Kicker	1		X			X	
MKE4	1		X			X	
WIC	7						X
Beam Position	1			X		X	
Vacuum	1			X			
<b>Total non-conformities</b>	<b>21</b>						
ZS Spark	1		?	?			
<b>Total not clear</b>	<b>1</b>						

*Note: During the first test campaign (up to August 2014), if the switches were placed in the ground path, the connection was reported as non compliant unconditionally*

*Now, if the switches are placed on the ground path but the connection is "separate", the connection is considered as compliant (in the case of the incident in SR3 in august 2008 with the vacuum system, the switches were in the Gnd path **and** the connection was in parallel)*



### EXTRACTION 1 & EXTRACTION 2 CIBU CONNECTION STATUS (TOTAL 90 CIBU)



Location	Short Name	Group
TT40	MSE / MST Status	
TT60	MSE / MST Status	TE-ABT-EC
TT40	MKE4 Status	
TT40	TT40 converters currents	TE-EPC-MPC
TI8D	BLM TI8-down	BE-BI-BL

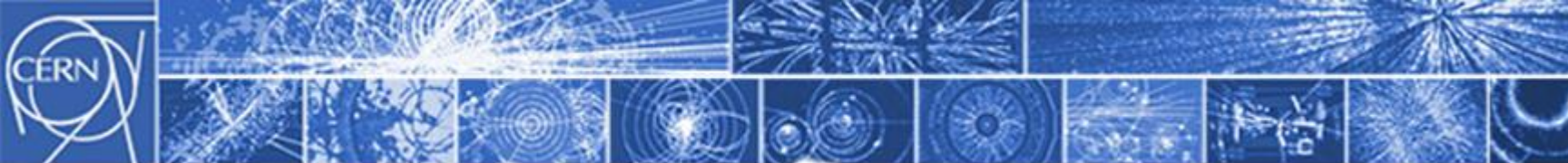
#### STILL NOT TESTED

Systems	Number of CIBU	Resistors in series	Seial connection	Parallel connection	Switch on GND	No GND	CIBU voltage out of spec
BLM	4	?	?	?	?	?	V True < 2.1V
BPM	4			X	X	X	
Converter's	15				X	X	
MSE / MST converter	2		X		X		V True > 26V
MKE6	1		X				
WIC	6					X	
FMCM	2				X	X	V True < 2.8V
Vacuum	2			X			

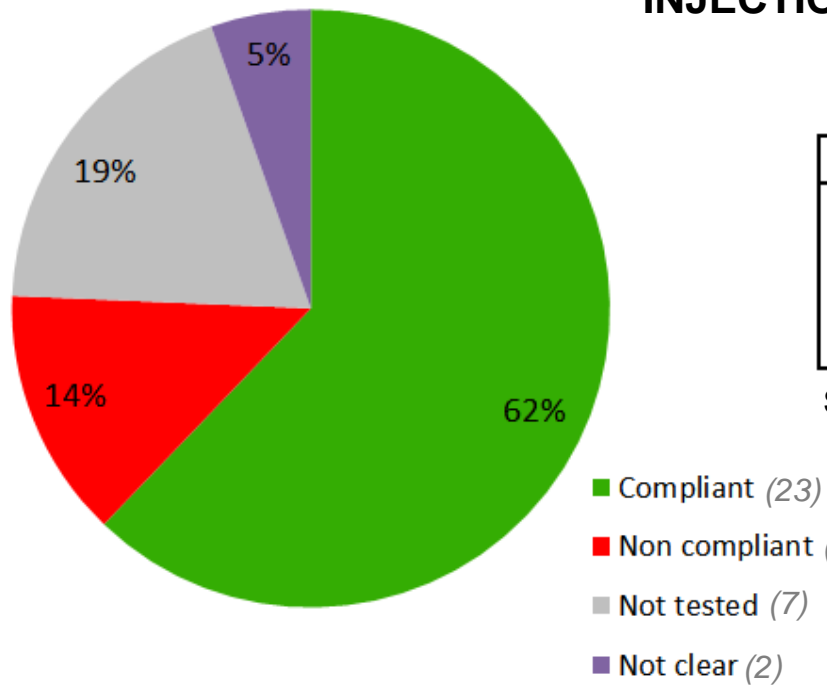
Total non-conformities 36

#### EXTRACTION NON-CONFORMITY DETAILS





### INJECTION 1 & INJECTION 2 CIBU CONNECTION STATUS (TOTAL 37 CIBU)



Location	Short Name	Number	Group
USC55	Totem	2	PH-TOT
UA23/UA87	BETS MSI / TDI	2	TE-ABT-EC
UA23/UA87	MK18 Status / MK12 Status	2	TE-ABT-EC
SR2	MSI Convertor Sum Fault	1	TE-EPC-MPC

#### STILL NOT TESTED

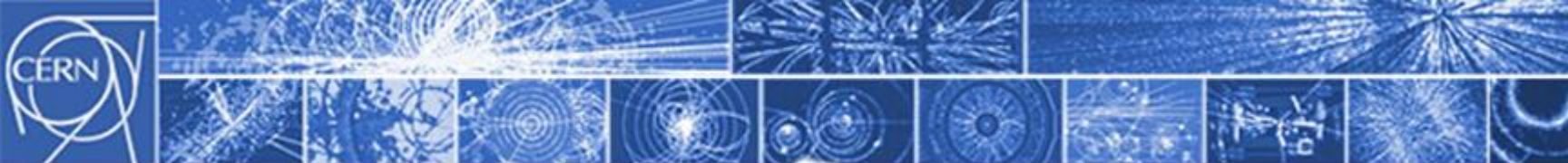
Systems	Number of CIBU	Resistors in series	Seial connection	Parallel connection	Switch on GND	No GND	Remark
MSI Convertor Sum Fault	1	X	X		X		
LBDS	2					X	
CMS	2		?	?		X	

Total non-conformities 5

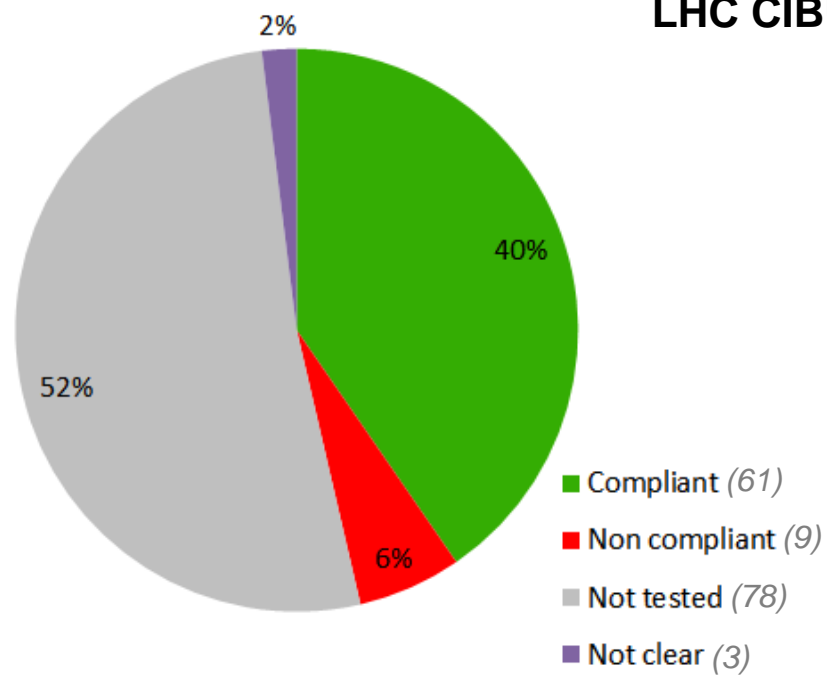
MK12 Erratic	1		?	?			False for only 160 ms !
MK18 Erratic	1		?	?			

Total not clear 2

#### INJECTION NON-CONFORMITY DETAILS



### LHC CIBU CONNECTION STATUS (TOTAL 151 CIBU)



Short Name	Number	Group
BLM	16	BE-BI-BL
PIC	32	TE-MPE-MS
CIBDS	2	TE-MPE-EP
TCDQ	2	TE-ABT-EC
BETS TCDQ	2	
MKQA-b1	1	
MKI8	1	
ACCESS_ES-R4	4	GS-ASE-SSE

#### STILL NOT TESTED (PARTIAL LIST ...)

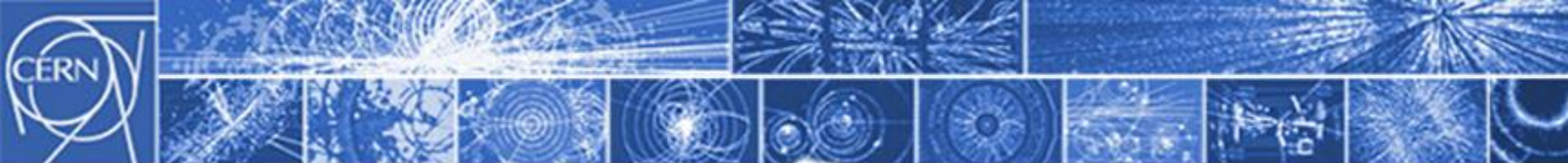
Systems	Number of CIBU	Seial connection	Parallel connection	Switch on GND	No GND	Remark
WIC	7				X	
MKI2	1		?		X	
CMS_Operator-switch	1	?	?	X		

Total non-conformities **9**

LBDS (B1 + B2)	2				?	Security PLC
CMS_BCM2	1	?	?			

Total not clear **3**

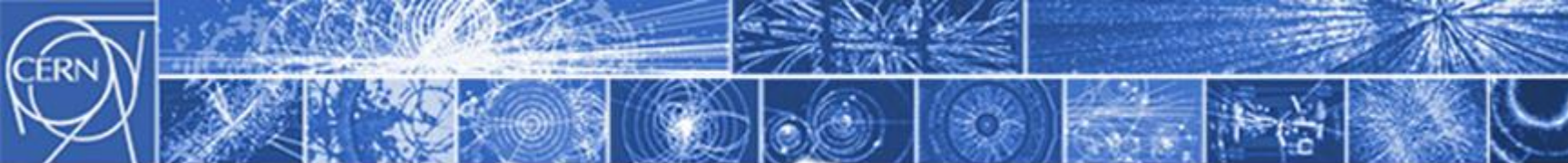
### LHC NON-CONFORMITY DETAILS



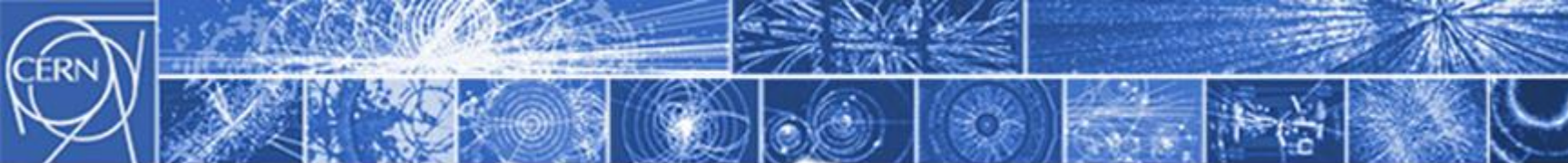
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- In regards to the huge number of “non-compliant” connections, making a sample to qualify the remaining CIBU is not a secure solution (for the MPE/EP section point of view)
- For the connections reported as “Not clear” we need to recommission them. It’s particularly true for the critical systems such as LBDS. We need to discuss with the system expert to set-up an appropriate procedure
- As discussed in the past, we need now to encourage the User to implement a test mode in their system, but in the same time we need to ensure that the test mode is implemented in a very safe way
- **REMINDER : if a user system is modified (even refurbished...) the interlock team must be always informed in order to take the relevant actions (partial or full recommissioning)**

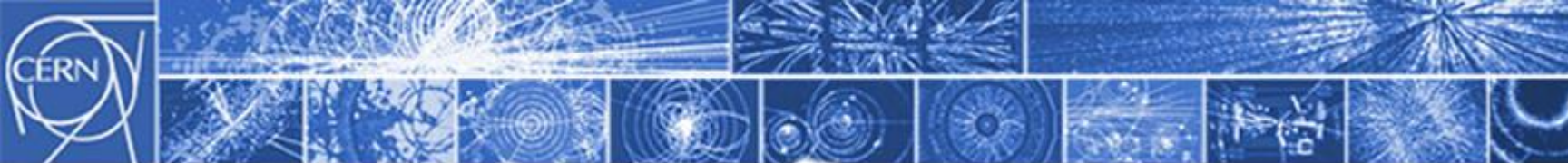


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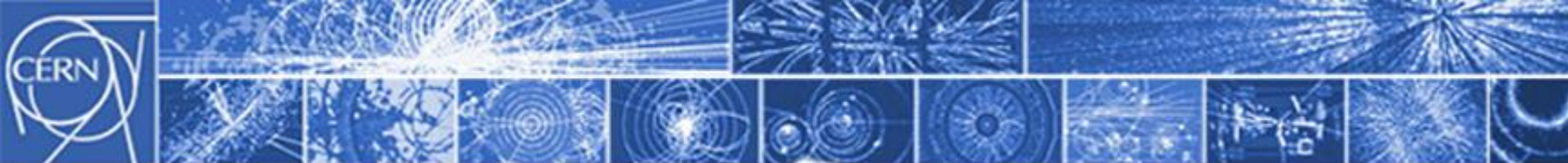
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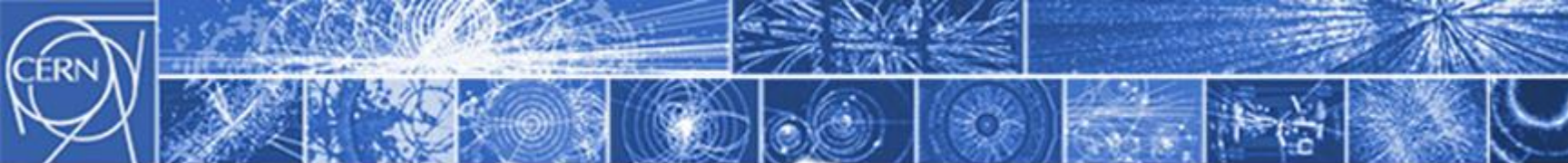
I would like to thanks all colleagues for their effort to modify (redesign) their system after the first commissioning campaign in order to fulfill the BIS requirement, particularly to the people in charge of :

- Vacuum system
- Collimator system
- WIC system

Thanks for your attention



# Spare slides



# GND ON CIBU CONNECTOR

