



Status of MPE-MI Systems in the LHC

234rd Machine Protection Panel Meeting

Raffaello Secondo
on behalf of TE-MPE-MI

24rd March 2023

- All 8 WIC systems operational
- No changes done on the WIC side
except in P1 and P5 because of BBCW not repairable

The interlock cables of the power converters below were disconnected and replaced by a bridge:

- R.BBCW.L1B1 in P1
- R.BBCW.L5B1 in P5

In order to have a permanent **“PC_Status” at TRUE** (bridge on pair 1-2) to give in turn a **“User_Permit” at TRUE to the BIS**

Remaining **“B2” BBCW in P1 and P5** are protected by the WIC (No changes)



WIC rear patch panel in P1



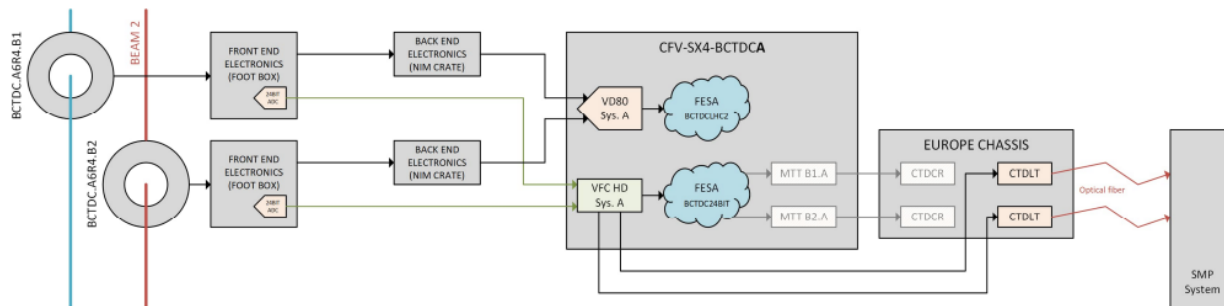
WIC rear patch panel in P5

PIC - FMCM

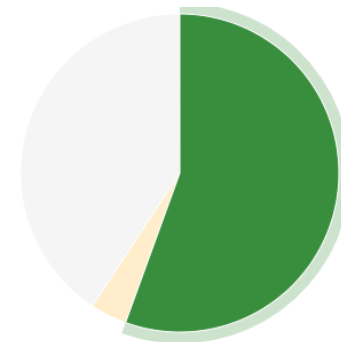
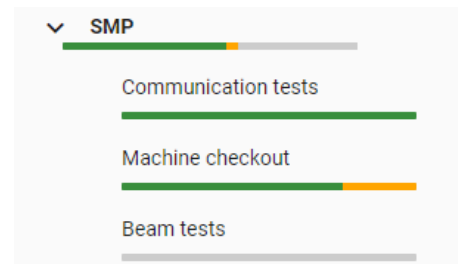
- **PIC Hardware Commissioning:**
 - All **powering PIC tests** done in Acc testing.
 - PIC_TO_BIC tests **ongoing**.
 - **AUG connection to PIC tests** **to be analysed**
- **FMCM** - Waiting operation for LHC and SPS transfer line tests.
- **Boron Carbide (B4C) shielding** installation around **PIC** @point 1 (UL14, UL16) during YETS 22/23:
 - Increasing **PLC CPU failures** **occurring only at point 1** since 2017. **#2 failures in 2022** requiring access.
 - High energy hadrons and **thermal neutrons** fluences measured in 2018 and 2022. **Neutron fluence** suggests large impact on failure rate.
 - Decision to **install a 4pi B4C shielding**, to reduce ThN induced SEEs
 - 4x **BATMONs** installed to monitor fluences.
 - A **thermal study** was carried out to evaluate the impact of potential overheating in the crates → No risk of PLCs malfunctioning (low temperature increase).



- Tests of the **DC-BCT1** and **DC-BCT2**
 - Modification of 24-bit acquisition, (**ECR 2802395**).
 - Test received intensity levels, including negative values.



- SIS/Sequencer tests not repeated
- Moveable Devices Allowed In, Stable Beams Flag tests passed
- SPS Flags – PBF/SBF/TBF tested
 - Validation of **SPS BCT5** connection(**ECR 2822146**)
- TED Beam Flag logic with TEDs in **DUMP** position passed
- Interface with **timing** and **CRC** tested
- Beam Tests to be performed



15
PASSED

0
FAILED

1
WIP

11
TODO

- **BIS Connections**

- BCCM A + B, Beam 1 & Beam 2 in UA47 disabled on input 9

		INPUT	DISABLED	MASKED
9/A	BCCM A + B Beam 1	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
9/B		<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

- **BIS Input Channels Jumpers**

- **Removed Jumpers on Injection BIS – 21st March**
 - **New jumpers placed on LHC TZ76 Channel 1 – 22nd March (vacuum B1 & B2)**

- **BIS Local Loop**

- Local loop removed from point 6 – 21st March

- **IST tests status**

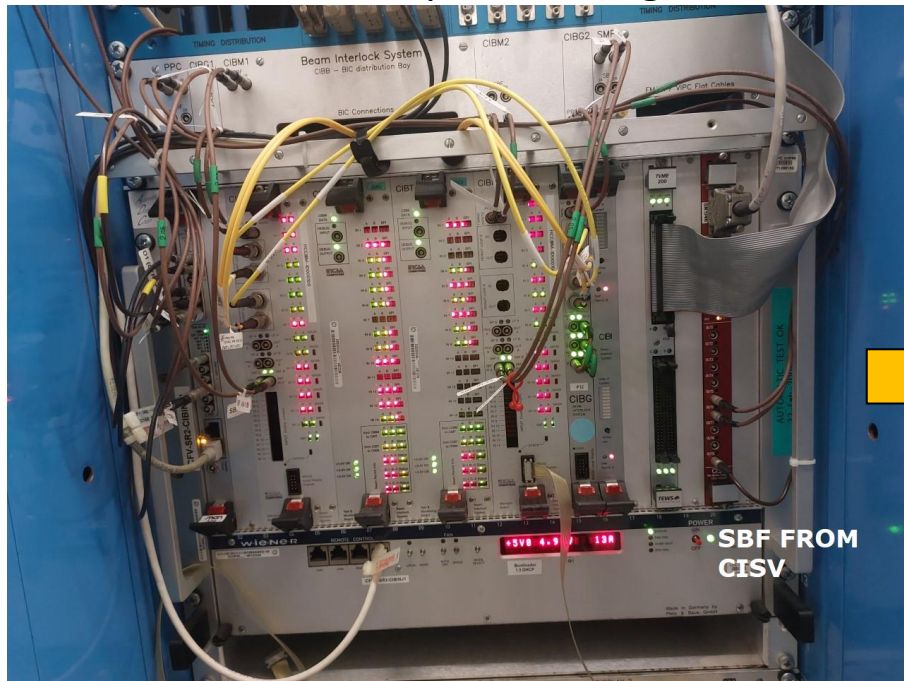
- Injection BIS IST - passed on 23rd March
 - LHC Ring IST passed on all points, IST on point 7 to be repeated after removal of jumpers
 - Jumpers on TZ76 possibly to be removed next **Wednesday** or **Friday**

- **Setup Beam Flag on LHC Injection BIS (SR2 and SR8)**

- Moved from LHC-SBF to **SPS-SBF** – 15th March
 - According to specifications, reduced redundancy of connections

SBF for LHC Injection BIS

Masking with LHC Setup Beam Flag



Masking with SPS Setup Beam Flag

