LHC Collimators low level control rack test experience in CNGS

A. Masi

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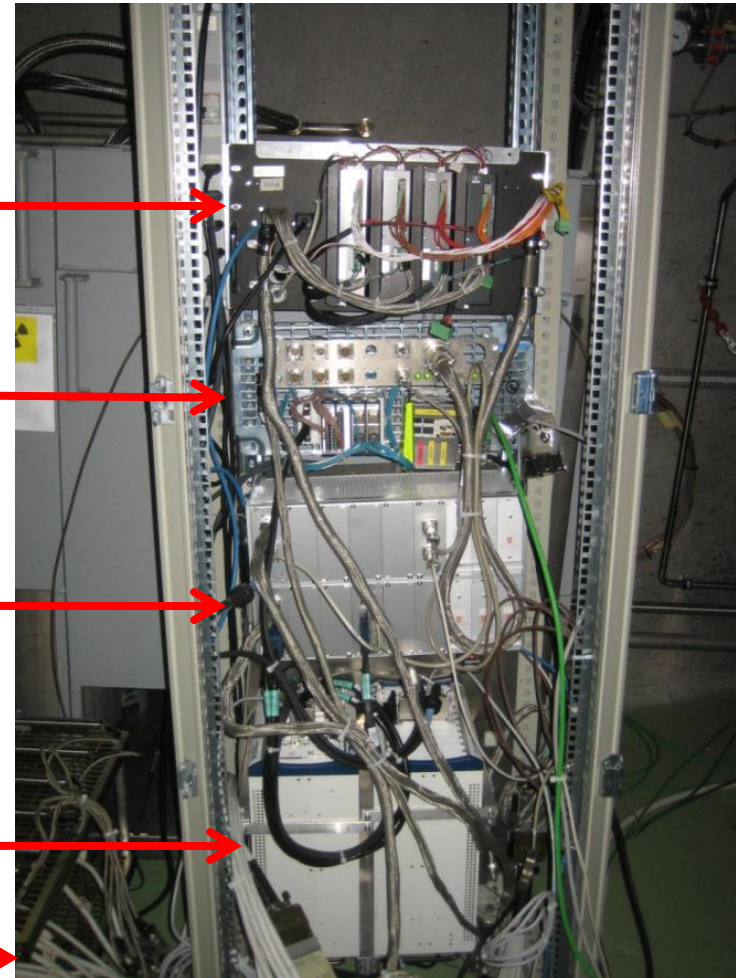# Low level control rack for 1 collimator

Material installed :

Stepper Motor Drivers x4

I/O digital and analog modules compact RIO (End switches Acq, driver control...)

Europa crate (custom electronic for LVDTs and Resolvers excitation/acquisition, power supply)

National instrument PXI MDC + PRS (ADC, DAC, FPGA cards, power supply)

4 Motors + resolvers and 7 LVDTs near the rack to simulate collimator

- **21/04/2010 12:40 : Lost communication with low-level system**
  → **PRS power supply failure, circuit breaker tripped.**
  Recovery Action: (access required) Replaced the power supply of PRS

- **30/04/2010 8:00 : MDC blocked into ARMED state**
  → **Recovery Action: (by remote) MDC FPGA is stuck. Reset the FPGA**

- **30/04/2010 8:15: PRS rebooted by itself.**

- **30/04/2010 10:30 : Lost communication with MDC.**
  → **Recovery Action: (by remote) Hardware reset of MDC**

- **30/04/2010 18:00 : Resolvers steps lost.**
  → **Recovery Action: (by remote) Reset resolvers reading on FPGA**

- **02/05/2010 13:00 : MDC driver reading timeout**
  → **Recovery Action: (access required) Reset drivers. Driver still not OK. Driver failed to be replaced….**

- **02/05/2010 13:00: MDC CPU stuck error**
  - → **Recovery Action: (by remote) MDC FPGA is stuck. Reset the FPGA**

- **This week-end :   Many system instabilities:**
  - **MDC FPGA is stuck**
  - **PXI rebooted itself**
  - **Network communication temporarily lost**

  → **Recovery Action: (by remote) OK after PXI or FPGA reset**

• **The test has been extremely useful to know the problems can affect the operation of the LHC collimators as consequence of the radiations on the low level control electronics**

• **The majority of the problems experienced can be fixed by remote resetting FPGA cards or the entire PXI system**

• **The only critical failures experienced have been:**

- • **PXI power supply failed**

- • **Stepping motor driver dead**

•**These failures requires a tunnel access to recover the correct system operation**

The collimator control electronics is still working right now….. Many problems experienced but the LHC Collimators low level control is hard to die !!!!!!!!!