



# TE-MPE-MS Highlights 2015

Markus Zerlauth in the name of the whole team



12/11/2015

Status Report TE-MPE

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# Highlights of 2015 Activities – Magnet Interlocks

Magnet Interlocks and Software (MPE-MS)



12/11/2015

Status Report TE-MPE

# PIC - Powering Interlock System

- Smooth operation after LS1 consolidation
- New Access Powering Interlock ensures safe circuit powering during periods of access. System is fully operational since the start of Run2
- Integration of HWC tests in ACC\_TEST (ongoing) and hopefully ready for recommissioning after YETS
- New configuration data management system based on the CCDB to ensure reliable interlocks' configuration (ongoing)
- Redundant opening of the 13kA EE switches via the SIS deployed since TS2



# FMCM - Fast Magnet Current Change Monitors

- Smooth operation during Run2
- A new control system for SPS machine deployed since beg. Run2 and working without issues (new hardware + FESA class)
- New batch production of some 20+ devices started in collaboration with Betty's team

## UPS network distribution

- Campaign carried out in collaboration with EN-EL to verify the redundant UPS power distribution for LHC equipment systems after LS1
- Important non-conformities on machine protection systems were revealed which confirmed the necessity to repeat the tests on a yearly basis



# Configuration data management system

- Main goal is to improve the long-term maintenance of the system and achieve more self-control over the full configuration process
- Configuration data migrated to the Controls Configuration DB
- New APEX web interface to create/edit configuration data
- Java scripts to extract configuration files for both HW and SCADA



Flowchart of Configuration Management System

# Warm Magnet Interlock activities (1/4)

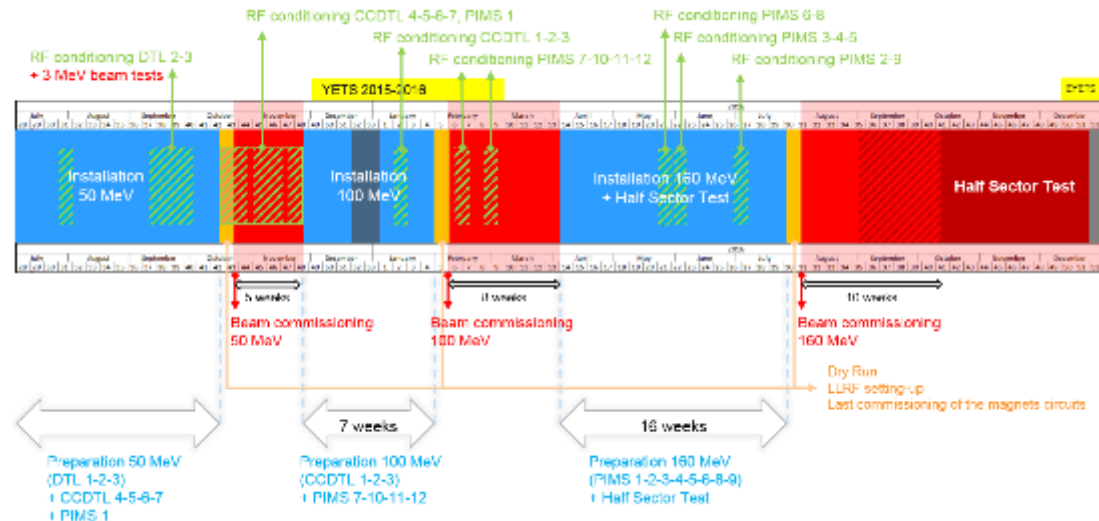
- HIE-ISOLDE Phase 1

2 new WIC in operation since June 2015

- LINAC 4

WIC configured for beam commissioning at 3,12 then 50 MeV

-> Next steps: 100 MeV, 160 MeV and half sector test



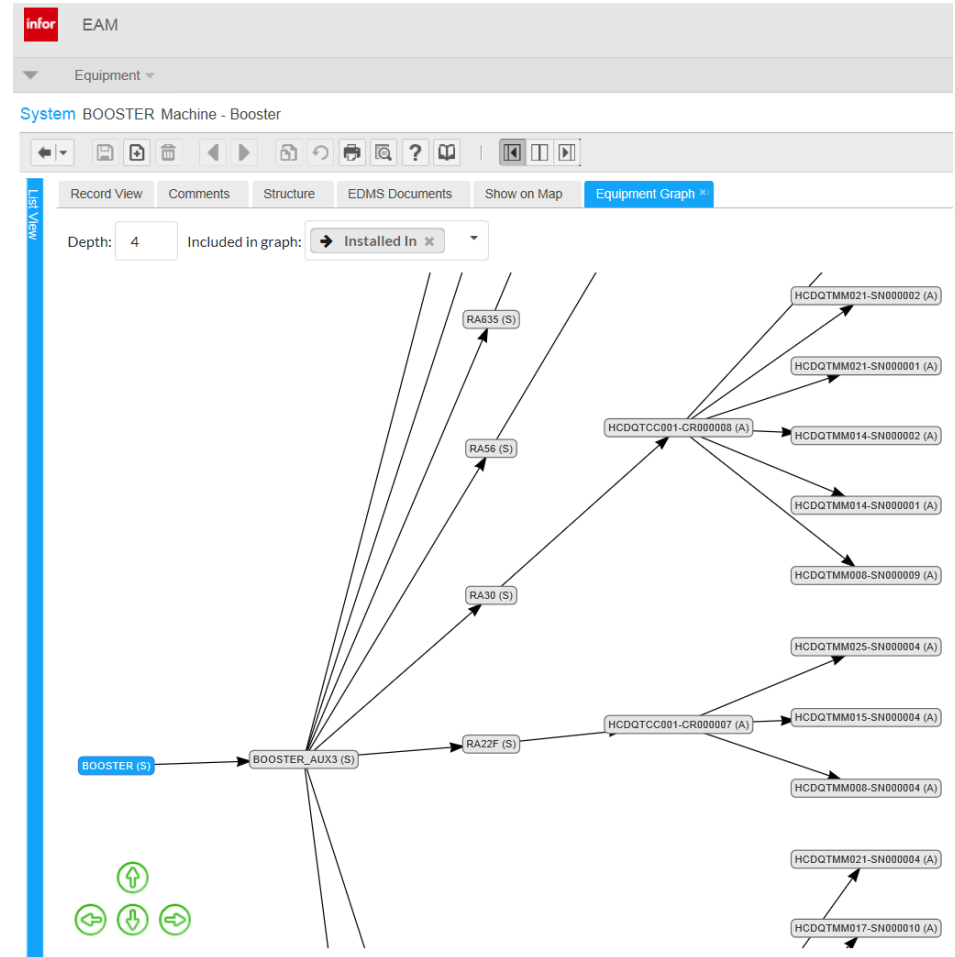
# Warm Magnet Interlock activities (2/4)

- Asset Management
- Preparing migration from private MS Access DB to INFOR/EAM
  - > 300 PLC crates
  - > 1000 PLC modules

**Module details**

Asset: HCDQTM008-SN00008  
 Department: DQ01  
 Class: DQTE2  
 Category: HCDQTM008  
 Commission Date: 03-AUG-2015  
 Equipment Value: [blank]  
 Cost Code: [blank]  
 Production: [checkbox]  
 Safety: [checkbox]  
 Out of Service: [checkbox]  
 Alias: [blank]

**Model Version S/N Installation date...**



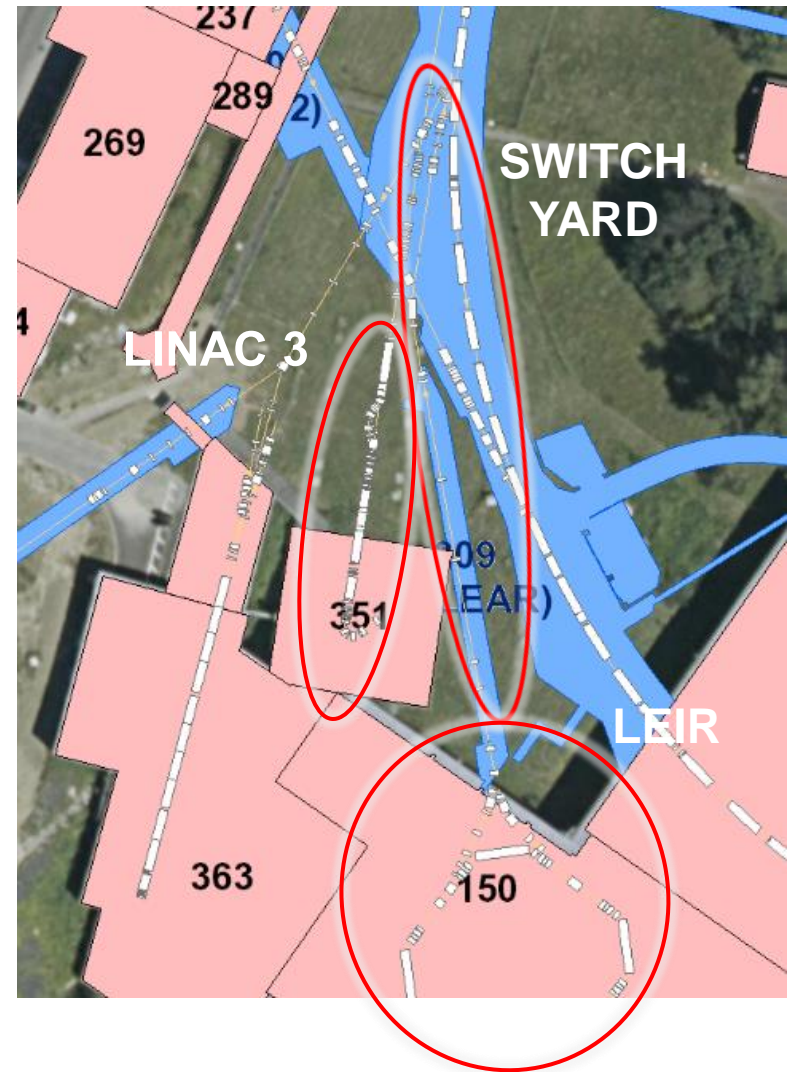
Machine System Rack Crate Module





# Warm Magnet Interlock activities (3/4)

- YETS 2015-16 preparation (LIU project: Increase of repetition rate on pulsed magnets requires to implement active protection on former non-protected magnets)
- LINAC3: Full renovation of the WIC  
30 % more magnets to be protected
- LEIR: Upgrade of the WIC  
HW and SW upgrade
- PS:  
Add an active protection on a selection of “low quads” and “skew quadrupoles” magnets following an upgrade of some 40 power converters by TE-EPC



# Warm Magnet Interlock activities (4/4)

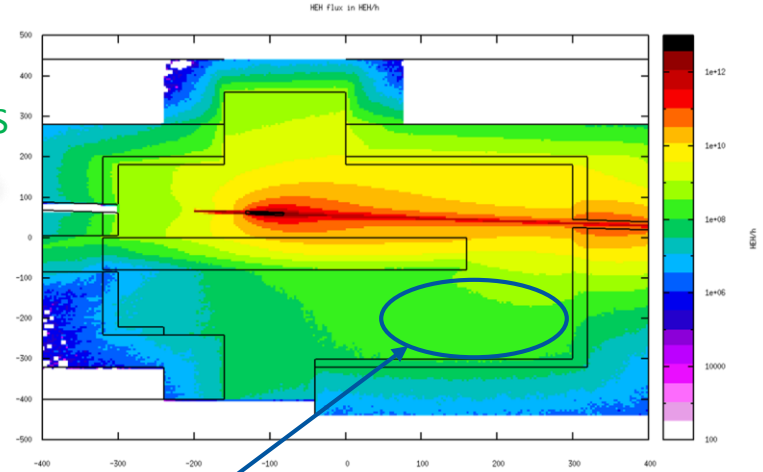
## CHARM irradiation tests

Objectives:

Test COTS I/O modules under radiation

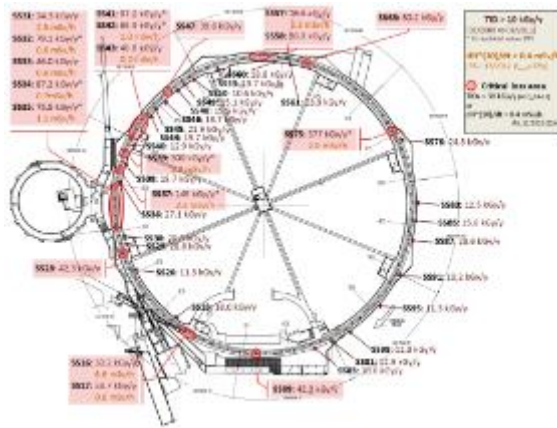
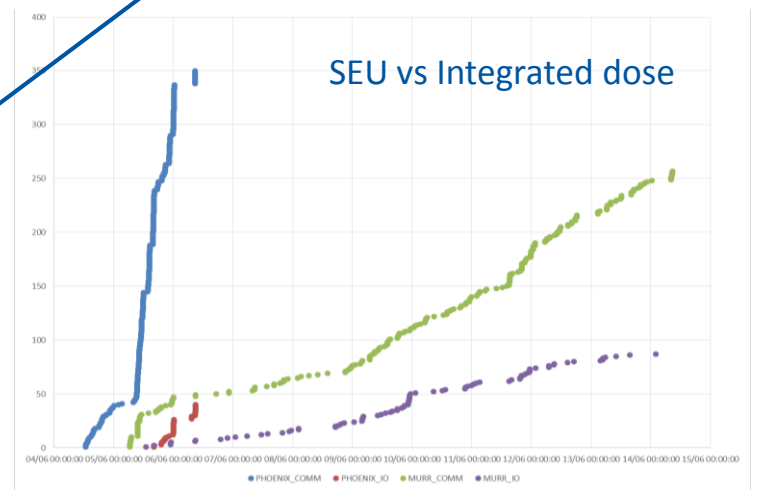
Explore possible use of novel remote I/O modules in the PS or its alcoves?

Beam from PS



CRATE LOCATION RUN 1 & 2

SEU vs Integrated dose



PS radiation levels



# Highlights of 2015 Activities – Software (for protection)

Magnet Interlocks and Software (MPE-MS)



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The SCRUM team...



# Integration of MPE systems in Standard Controls Environment

- Integration of QPS into LSA for Configuration Management
- QPS Swiss Tool extensions
  - Configuration Management report
  - SPI Bus Reset
- Smarter RBAC configuration to protect machine availability
- Provided support for commissioning and start-up
- In progress: exposing all decoded data from the BIS to any user for logging and commissioning

The screenshot displays the RBA Swiss Tool software interface. The main window is titled 'RBA: garnier' and shows a list of devices under the heading 'Fesa device name'. The list includes various device identifiers such as 'DQAMGNRQ.RB.A23.B9R2' and 'DQAMGNRQ.RB.L5'. A 'Consistency' column shows status indicators for each device.

On the right side, the 'Selected device name: DQAMGNRQ.RB.A23.B9R2' parameters are displayed in a table format:

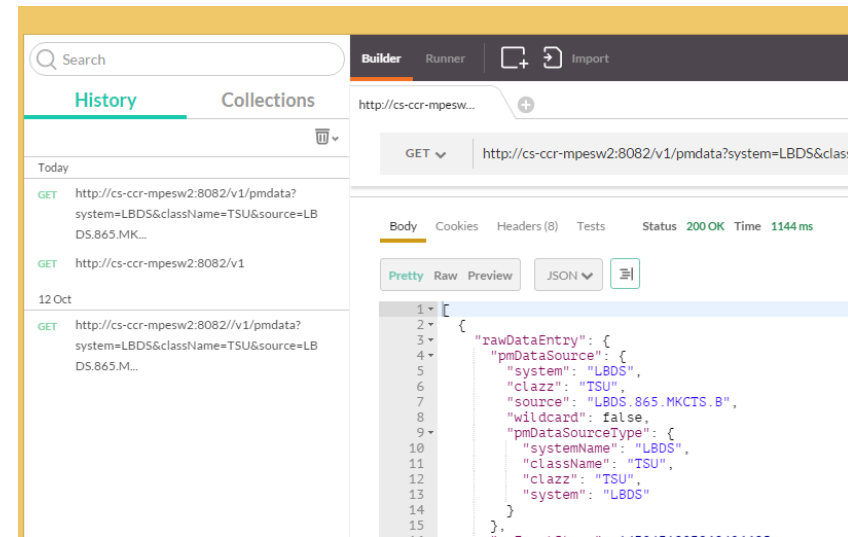
Name	Units	Format	Offset	Scale	Significant Bit
MB.BR2.U.DIODE...	V	00.0000	-15.52	0.00047380	16
PLUG.U.DIODE_RB	V	00.0000	-15.52	0.00047380	16
PLUG.U.DIODE_RB	V	00.0000	-15.52	0.00047380	16
DOOS.BR2.RB...	V	00.0000	-15.52	0.00047380	16
MB.BR2.U.EART...	V	0000.00	-2057.00	0.00024521	24
DCBA.BR2.R.U.RES	V	0.000000000	-0.01	0.00000000	24
DCBA.BR2.R.U.MAG	V	0.000000000	-15.90	0.00000190	24
DCBA.BR2.R.U.RES	V	0.000000000	-0.01	0.00000000	24
DCBA.BR2.R.U.MAG	V	0.000000000	-15.90	0.00000190	24
PLUG.U.RES	V	0.000000000	-0.01	0.00000000	24
PLUG.U.MAG	V	0.000000000	-15.90	0.00000190	24

Below the table, the 'Hardware configuration' section shows the last reading from hardware and the time set in hardware. The bottom right corner features buttons for 'Refresh data' and 'Acquire settings for this device'.



# Post Mortem – growing even bigger

- Multiple improvements in analysis modules and storage layer
- Integration of client API into FESA
- RDA3 implementation to be qualified for production
- New REST API for data access
  - Single entry point for all PM Data access
  - Supports LabVIEW, Python, Java, MatLAB, etc.
  - Paving the way for the storage upgrade
  - Term: remove direct storage access
- PM architecture scaled up to accommodate SPS Quality Check use case

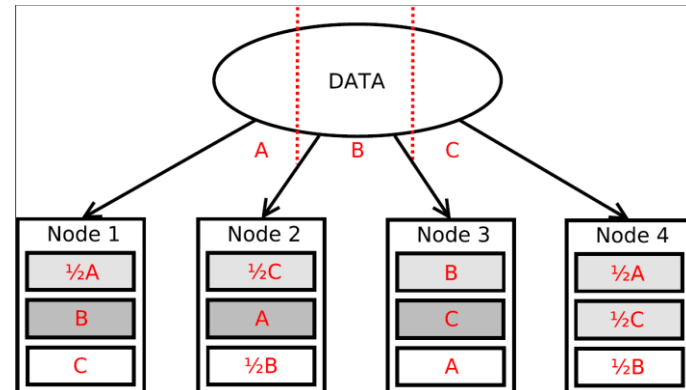


PM Data Collection and Storage Toolkit					
PM-SPS Status Monitor	PM-SPS Server Console	PM-SPS Data Monitor	SPS Event Data Monitor	SPS Event Data Browser	SPS Analysis Data Monitor
Data server PM BE-SPS is up since 17:42:14 24 Sep 2015 on cs-ccr-pmsps.cern.ch					
FE Server Name	Status	First Connection Time	Last Status Change	Last Dump	N Dumps
PM.SPS-MAIN	connected	24/09/15 17:42:14.091	11/11/15 11:53:58.268	10/12/15 09:06:34.736	597054
PM.SPS-SPARE	connected	24/09/15 17:42:24.096	11/11/15 11:54:18.339	24/09/15 17:42:43.073	4



# Data Analysis and R&D

- eDSL extensions to cover more use cases
  - PIC analysis: more than 3000 powering tests
  - Prepare MPS commissioning providing access to all Post Mortem Data
- PhD study into novel techniques of data partitioning for Logging and PM analysis use cases



TE-MPE-TM#68

Thanks a lot for a great year 2015!  
Merry X-mas and a Happy New year 2016 to  
all of you !!!







THANK YOU!

