Electrical Engineering Standards
Conclusion Session

JC. Gascon
O. Tison

HL-LHC Standards and Best Practices
Workshop (11-13 June 2014)

The HiLumi LHC Design Study is included in the High Luminosity LHC project and is partly funded by the European Commission within the Framework Programme 7 Capacities Specific Programme, Grant Agreement 284404

Introduction

- 2 sessions, 5 participants each one
- Electrical engineering is strongly ruled but involves several diverse fields (semiconductors, superconductive materials, electrical insulation, power converters, power networks, electronics,…)
- Work packages attending the workshop not much impacted by electrical standards
- At this stage, few electrical may be discussed (cables, EMC, connectors and magnets)
- Excellent participation and constructive discussions among the participants

Discussed Topics (I)

- Magnet Testing procedures for electrical insulation acceptance
  - Voltage ratings
  - Tests conditions (helium, room temperature)
  - Ground references for voltages
  - All Circuits tested at once or separately?
  - Special requirements as part of a system?

- Electromagnetic Compatibility (EMC)
  - EMC standards (IEC-61000) should be accepted by all parties
  - According to the grounding/reference scheme, sensors technology differs
  - Beam emissions are not covered by EMC standards
  - Need to define beam emission and immunity levels for the whole project?

Discussed Topics (II)

- Cables and wiring
  - IS23 safety requirements
  - IEEE cable standards in US
  - Definition of Radiation requirements
- Connectors
  - Some convenient materials in connectors (Teflon) not allowed at CERN
  - Connectors “catalog” is required for project? Use Project connectors
  - From the operation and maintenance side, connector standardization preferred but… technically speaking appropriated?
- Soldering
  - Some requirements? Not considered in any standard
  - Tin-Lead technic is commonly used but other technics allowed? Standards?

Conclusions

- ✓ Electrical tests requirements should be established in the technical specifications particularly for the magnet insulation tests.
- ✓ Guidelines are requested at project level for
  - electrical magnet testing
  - signals wiring convention (grounding) and junction best practices
  - EMC Beam emissions: not covered by EMC standards
- ✓ Connectors standardization may be convenient for the project
- ✓ More electrical issues will come later with electrical systems to be designed in WPs

Thank you for your attention and collaboration!!!!

Questions?