Working Group III

Rings with focus on LHC

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Low-Level RF Workshop - 2007

Outline

1. Noise and Interference
2. Life Cycle of LLRF Hardware
3. DSP versus FPGA
4. Standard Ring LLRF?
5. Operation

Noise and Interference

- Experience of people with cohabitation of analog and digital electronics on the same board versus separate boards.
- Protection against interference and noise (crate and power supply standards).
- ADCs/DACs: real performance of 14–16 bit ADCs / 14 bit DACs (clock rate 40–80+ MHz), how many "valid bits"?
- Problems encountered achieving the best performance of ADCs/DACs.
- Performance of DACs: analog smoothing filters versus running at higher clock rate and interpolating digitally.
  - Slides from Daniel Valuch.

Life Cycle of LLRF Hardware

How do people handle obsolescence of components with 10+ years system life spans?

- Slides from John Dusatko.

DSP versus FPGA

- With more and more powerful FPGAs, how much room is there for DSPs in LLRF in the future?
- Should one design future systems with mixed boards FPGA/DSP or as pure FPGA systems?
- Is this a "holy war"?

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Standard Ring LLRF?

- Standardized LLRF system for rings, is it possible?
- Standardizing FPGA code: management of versions, libraries for standard entities.
- Synchronization between rings, robust techniques.
  - Slides from Phillip Baudrenghien.
  - Slides from John Molendijk

Operation

- Experience with remotely operating LLRF systems (LHC RF stations are underground, a lot of the equipment) will be never accessible with beam.
- Postmortem systems: on board monitoring versus independent systems, to diagnose faults in a complex digital LLRF system in a collider when you can only have one fill every few hours.
  - Slides from Dan Van Winkle.
- Correlating abort data from multiple RF stations, separating global and local problems.
- RF system configuration management: the best ways to handle changes in the complement of running stations, gap voltage changes, cavity voltage balancing, exchange of LLRF boards, how to handle board specific calibration data.

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