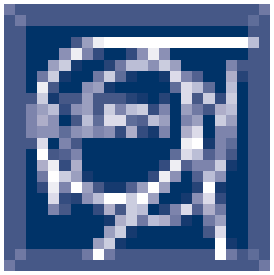

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# Cornell Digital LLRF System

*Monday 10 October 2005 14:00 (30 minutes)*

A new digital LLRF system has been developed recently at Cornell University. The system is suitable for a wide variety of accelerator applications as it provides great flexibility, high computational power and low latency. It features very fast feedback and feed-forward controls, a state machine for automatic start-up, calibration and trip recovery, CW and pulsed modes of operation, quench detection, and cavity frequency control. The system uses in-house developed digital (based on FPGA and DSP) and RF hardware. The first generation system was installed, commissioned and has been in operation at the CESR storage ring for more than a year. The achieved field stability surpasses requirements. The other future application of this system is in the Energy-Recovery Linac presently under development at Cornell. The superconducting cavities in the ERL will operate at a high loaded Q factor and will be required to satisfy very stringent requirements on the cavity field amplitude and phase stability. To prove that the RF field in a high loaded Q cavity can be stabilized, and that Cornell's newly developed digital control system is able to achieve this, the system was connected to a high-loaded-Q cavity at the JLab IR-FEL. Excellent cw field stability was achieved. The operational experience with the digital LLRF system in CESR and results of experiments at JLab are presented. The second generation of the digital LLRF system is under development. It has somewhat different architecture to satisfy requirements of the Cornell ERL. The ERL LLRF system is briefly discussed.

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