

Low Level RF Workshop 2022



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Fermilab PIP-II Injector Test - LLRF System Design and Performance

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PIP-II IT is a test facility for the PIP-II project where the injector, warm front-end and the first two superconducting cryomodules were tested. The warm front-end consists of an Ion source, an RFQ and three buncher cavities. The superconducting cryomodules consist of an 8-cavity half-wave-resonator(HWR) cryomodule operating at 162.5 MHz followed by an 8-cavity single-spoke resonator(SSR1) cryomodule operating at 325 MHz. The LLRF systems for both cryomodules are based on a common SOC FPGA based hardware platform. Resonance control for the HWR is provided by a pneumatic system based on helium pressure, while the SSR1 cryomodule uses a piezo/stepper motor type control. The data acquisition and control system can support both CW and Pulsed mode operation. Beam loading compensation is available which can be used for both manual/automatic control in the LLRF system. The user interfaces include EPICS, Labview and ACNET. Testing of the RF system with 2 mA beam accelerated to 20 MeV has been completed.. The design and performance of the field control and resonance control system operation with beam are presented in this paper.

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