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Design and operation of the new digital LLRF system for CAFe SC linac

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The superconducting radio frequency(SRF) linac of Chinese ADS front-end demo(CAFe) facility was built by Institute of Modern Physics(IMP) to demonstrate the feasibility of a 10-mA high power continuous-wave proton beam for the CiADS project. In order to achieve the strict requirements of the facility, which require extremely low beam loss levels for 10 mA high intensity beam, the phase and amplitude stability of superconducting cavity must be less than ±0.1° and ±0.1% respectively. The new FPGA based digital low-level RF control system (LLRF) was designed to stabilize the RF power and phase in the accelerating cavities of the CAFe linac and compensate the beam loading effects, ultimately maintaining beam stability. The new adaptive learning control function and highly automated operation software were developed, which were the key to the demonstration of the 10 mA CW high power beam. The new digital LLRF system is fully commissioned and transitioned to operation. We will review the update of the LLRF system for CAFe in this talk.

Keyword

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