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Project progress of LLRF for the Superconducting RF system of Hefei Advanced Light Facility (HALF)

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The Superconducting RF system of Hefei Advanced Light Facility (HALF) can provide an accelerating electric field for the beam, and its stability is required to be of $\text{RMS} \leq 0.1\%$ in amplitude and $\text{RMS} \leq 0.1^\circ$ in phase. To achieve this, a LLRF controller is being prepared for the control of the HALF Superconducting RF system. This LLRF controller mainly consists of three modules of RF front-end, signal processing and the motor drive. The RF front-end downconverts the RF signal to the IF of 31.2375MHz (499.8/16), and then up converts the IF to the RF after being processed by the digital board. The LLRF includes four channels of down conversion (cavity sampling signal Pt, forward power signal Pf, reflected signal Pr and the reference signal Pref) and one channel of up conversion (power source drive signal). LLRF can realize three control loops and one interlock protection, namely cavity frequency tuning loop, cavity field amplitude control loop and cavity field phase control loop. The project progress of the HALF LLRF system will be introduced in this manuscript in detail.

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Footnotes

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