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Operational experience of MTCA.4-based BPM electronics for SPring-8

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The single-pass BPM electronics at SPring-8 has been replaced by MTCA.4-based electronics. BPM signals are processed by an RTM and sent to a high-speed digitizer AMC. The BPM signal has an RF component synchronized to the acceleration RF frequency of 508.58 MHz. This component is extracted from the filter on the RTM, the signal level is adjusted, and the RF signal is directly sampled by the digitizer. The sampling rate of the digitizer is 363.27 MHz, which is 5/7 of the RF frequency. The sampling clock is generated by a clock eRTM and distributed through an RF backplane for MTCA.4. The acquired data is processed by an FPGA on the digitizer, and the beam position is calculated. This new readout system provides beam position data of both single-pass and COD (Closed Orbit Distortion) in parallel. The new readout system will be utilized for all the BPMs in the SPring-8-II storage ring, which is a low-emittance upgrade of SPring-8. The position resolution of the new BPM system was confirmed to be less than 100 μm for a single-pass mode with a bunch charge of 100 pC, and less than 1 μm for a fast acquisition (10 kHz) COD mode. In this contribution, we present the operational experience of the new BPM readout electronics.

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