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Performance of the Unified Readout System of Belle II

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Belle II experiment at the SuperKEKB collider at KEK, Tsukuba, Japan has successfully started the data taking with the full detector in March 2019, as the luminosity frontier experiment of the new generation to search for physics beyond the Standard Model of elementary particles. In order to read out the events from the seven subdetectors and the trigger system to precisely measure the decay products of B and charm mesons and tau leptons, we adopt a highly unified readout system, including a unified trigger timing distribution (TTD) system for the entire Belle II detector, a unified high speed data link system (Belle2link) which is used by all subdetectors except the pixel detector, and a 9U-VME-based backend system (COPPER) to receive Belle2link. Each subdetector frontend readout system has an FPGA in which the unified firmware components of TTD receiver and Belle2link transmitter are embedded. The system aims for taking data at 30 kHz trigger rate with about 1% deadtime from the frontend readout system. We share the operation time with the accelerator commissioning and physics data taking. The trigger rate is still much lower than our design, but the background level is high as it is one of the limiting factor of the accelerator and detector operation. Hence the occupancy and the stress to the frontend electronics are rather severe, causing various kind of instabilities. We present the performance of the system, including the achieved trigger rate, deadtime, stability, and discuss the experiences gained during the operation.

Minioral

No

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No

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No

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