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Data acquisition system in Run0 of the J-PARC E16 experiment

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J-PARC E16 experiment aims to investigate the origin of hadron mass through the systematic measurement of the spectral change of vector mesons in nuclei. The experiment is performed at the high-momentum beam line, which is a newly constructed beam line, at J-PARC Hadron Experimental Facility with a new spectrometer. A 30 GeV proton beam with an intensity of 1×10^{10} protons per pulse (2-seconds spill per 5.2 seconds cycle) irradiates thin targets to produce vector mesons. We focus on the detection of the e^+e^- from the decay of $\rho/\omega/\phi$ mesons. The spectrometer is composed of silicon strip detectors (SSD), GEM trackers (GTR), hadron blind detectors (HBD), and leadglass calorimeters (LG), which are placed in a dipole magnet. These detectors are modularized into 26 modules and the number of readout channels is more than 110,000 in total. To achieve the good discrimination of the background in the offline analysis, waveforms of the readout channels are recorded by using analog memory ASICs of APV25 for SSD, GTR and HBD, and DRS4 for LG, respectively. The data acquisition system is designed to cope with data size of more than 660 MB/spill, where trigger request rate is expected to be 1-2 kHz under the interaction rate of 10-20 MHz.

The spectrometer construction of $\sim 1/4$ of 26 modules (Run0-a) has been completed and we are waiting for the beam commissioning of February 2020. This contribution introduces the DAQ system of E16 and reports the performance obtained in the commissioning.

Minioral

Yes

IEEE Member

No

Are you a student?

No

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