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First application of a streaming-readout data-acquisition system, products of SPADI Alliance, to physics experiments at RCNP towards the standardization

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A new streaming-readout data acquisition system (S-DAQ) developed by SPADI Alliance has been employed in the physics experiment for the first time, which has been performed using the Grand Raiden magnetic spectrograph at RCNP. Signals from two vertical drift chambers and three plastic scintillators are processed by using amplifier-shaper-discriminator boards and charge-to-time converter, respectively. The timing signal with width corresponding to the charge information is digitized by hi- and low-resolution TDCs equipped in AMANEQ streaming-readout front-end electronics. Nine AMANEQ boards are clock-synchronized using MIKUMARI protocol. The data is continuously readout and processed by a data acquisition software NestDAQ. The data is analyzed by using a root-based software ARTEMIS. The total data rate achieved 0.2 Gbps and corresponding event rate achieved 100 kcps, which is ten times faster than the existing trigger-based VME based data acquisition system. Such a high throughput readout enabled us to perform the physics experiments to measure rare events with S/N < 0.1%. The achieved data rate is too high to write all the data and the online filtering process to reduce unphysical or unusable data. The development of this filter is ongoing by using the data simultaneously accumulated during the physics run. In this paper, the setup of the first application of S-DAQ and the performance optimization during the run will be reported and the possible filtering process and its performance will be discussed.

Minioral

Yes

IEEE Member

No

Are you a student?

No

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