



Contribution ID: 417

Type: Oral presentation

DREAM Based DAQ system for the BONuS12 Experiment at Jefferson Lab

Thursday, 14 June 2018 09:00 (20 minutes)

The BONuS experiment has been designed to study the free neutron structure at Jefferson Lab using spectator tagging technique in $d(e, ep)X$ inelastic scattering. We detect the scattered electrons by the standard CLAS12 detector, but backscattered low momentum spectator protons in this experiment are detected installing a new RTPC detector. Signals on the RTPC readout are directly sent to the DREAM electronics which pre-processes those signals and buffers them in 512 cell circular memory. While processing signals, DREAM chip performs the amplification, filtering, shaping, discrimination and sampling. A FEU is used to assemble eight DREAM chips along with ADCs for getting digitized output data coherently. Each compact chip contains 64 channels, so we easily handle total 17280 readout pads of our detector using 34 FEUs. Gigabit Ethernet link are used to send out data from FEU to the backend unit, whereas a USB cable is used for the slow control of the FEUs and DREAMs. Slow-control allows to configure various parameters such as gain of the amplifier, shaping parameters, discrimination in the trigger building process and many more. We can also fix event-size from the slow-control, which qualifies DREAM for dead-timeless readout of upto 20MHz with a trigger rate upto 20KHz. During the last year, we performed a detailed study of DREAM performance with a prototype RTPC which provided some promising results. These results are very significant for BONuS12, and we believe it would be notable to other physics experiments as well.

Minioral

Yes

Description

chip use DREAM

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Session Classification: DAQ 2