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The design of the readout system of two-dimensional position-sensitive GEM detector

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In the Chinese Spallation Neutron Source (CSNS) which constructed by IHEP, the performance of neutron detector and its readout system was related to whether the high neutron flux is fully utilized. So it has a very important significance in the large area position sensitive neutron detector. This paper introduced a neutron detection readout system based on GEM detector. GEM gas detector is always used in neutron detection, the detector used to achieve conversion of the Neutron signal which used GEM detectors, and the CIPIX CHIP is used as a preliminary amplifier, and discriminator. Then used a FPGA based system to readout the electrical signal and process the data that acquire by CIPIX chip. Gigabit Ethernet is used as control interface and readout interface. The control command is received and the position information of the Neutron is send out through TCP/IP protocol. Event selection, data compress is implemented on FPGA. The host computer received the position information of The Neutron and then plotted the location map of the Neutron signal. At the same time it also can control the neutron detector system such as the mode of Event filter, the compress mode of the data. In our experimental environment, successfully detected the position of the neutron signal and analyzed the location map. The maximum event Rate is more than 4M with 32x32 resolution.

Primary author: YICHAO, Ma

Co-authors: ZHOU, Jianrong (IHEP, CAS); YI, Liang (GDWave); SUN, Zhijia (Institute of High Energy Physics, CAS)

Presenter: YI, Liang (GDWave)

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