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1. A Flexible Electronics System for the Readout of CSNS Multi-purpose TPC

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The Back-n White Neutron Source at CSNS (China Spallation Neutron Source) has advantages of high flux and wide energy spectrum, which makes it a powerful facility for nuclear data measurement and neutron resonance transmission imaging. To promote the applications, a project, Multi-purpose Time Projection Chamber (MTPC), was proposed by the CSNS Back-n group. The MTPC, using Micromegas Detector as its readout endcap, is planned mainly for the measurements of neutron-induced charged particle emission reaction and fission reaction, as well as for neutron beam measurement and neutron resonance photography. This presentation will introduce an optical fiber-based flexible electronics system, that is intended to provide a general readout solution for the CSNS MTPC.
The function of its front-end electronics is mainly implemented by low noise pre-Amplifiers (ASICs or discrete components) and multi-channel digitizing modules with the waveform sampling rate of 40 or 80 MSPS, and a 12-bit precision. With the assistance of Giga-bit optical links, data streams from the front-end electronics are collected to the Data Concentration Module (DCM) and afterwards transferred to PC or computer servers. By configuring the number of optical fibers, the readout system can be easily scaled up to thousands of channels. This electronics system has been installed with the prototype MTPC, and several experiments have been successfully conducted. The system can also be extended to the readout of MPGDs in other applications.

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