



Contribution ID: 466

Type: **Poster presentation**

Development of a 256-channel Time-of-flight Electronics System For Neutron Beam Profiling

Thursday 14 June 2018 15:50 (15 minutes)

China Spallation Neutron Source is mainly used for nuclear data measurements. In order to achieve the energy of neutron, one method is to measure the time that the neutron spends to travel along a fixed distance. So we developed a time-of-flight electronics system for the experiment. In order to detect the hit position of the neutron for beam profiling, we use a detector with 256 channels, of which the effective area is $49\text{mm} \times 49\text{mm}$. Therefore, the system is expected to deal with 256 channels' output from the detector. The article mainly discusses a 256-channel time-of-flight electronics system. Each channel on the front end board (FEB), utilizing the technology of leading edge timing, can output a LVDS signal which contains the information of the time when neutron hits the channel of the detector. Then time-to-digital converter (TDC) boards, which have 64 channels, achieve the signals from FEB as stop signals. The start signal is provided according to the time when neutron begins to fly. TDC boards measure the time between the leading edge of start signal and stop signals by a method called clock phase separation technology. According to the test result, the TDC board has 6.25ns resolution and 3.5ns precision. The time-of-flight measurement system has already been used in the experiment of China Spallation Neutron Source.

Description

TOF board

Institute

USTC

Speaker

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Country

China

Minioral

Yes

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Session Classification: Poster 2

Track Classification: Front End Electronics and Fast Digitizers