

Development of M-PSD system by using MPPC

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KEK KENS-DAQ group is developing several detectors and readout systems. One of them is one-dimensional neutron detector system which is developed by using MPPC (Multi Pixel Photon Counter: a semiconductor light sensor). The MPPC detector is hoped to use for neutron experiment instead of the ^3He -PSD [1,2]. The detector is named M-PSD (MPPC position-sensitive detector), and its principle is shown in Fig. 1. Because the M-PSD uses charge-division method like the ^3He -PSD, a NEUNET system [1] which is widely used in the J-PARC (Japan Proton Accelerator Research Complex) can be used for its readout system.

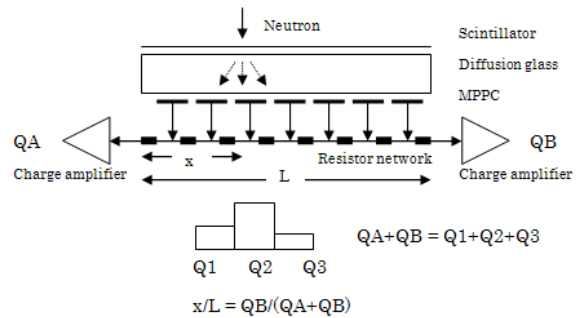


Fig. 1 Principle of the M-PSD.

The detection area of the current M-PSD is 32 cm length in the width of 5 mm. As a positional resolution, 2.8 mm has been obtained. As a neutron detection-efficiency, 29 % has been obtained compared with the ^3He -PSD. It depends on the neutron scintillator, ZnS/ ^6Li . The M-PSD uses 64 MPPCs, and each MPPC has 3 mm square sensitive-area.

Two-dimensional data in Fig. 2 has been obtained by combining seven M-PSDs. Shadows of several cadmium pieces are shown in the data. We will present the latest development of the detector system.

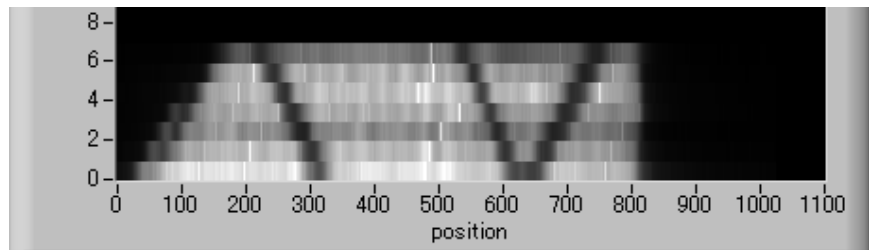


Fig. 2 Two-dimensional data of seven M-PSDs.

References

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- [2] S. Satoh, T. Ino, and M. Furusaka, Y. Kiyonagi, N. Sakamoto, K. Sakai, NIMA529(2004) 421-424.