MLF Experimental Report	提出日 Date of report Jan. 2, 2015
実験課題番号 Project No. 2008A0048 実験課題名 Title of experiment Development and Application of Neutron Optical and Detection Systems 実験責任者名 Name of principal investigator Jun-ichi Suzuki 所属 Affiliation J-PARC Center, Japan Atomic Energy Agency	装置責任者 Name of responsible person Kenichi Oikawa 装置名 Name of Instrument/（BL No.） BL10 利用期間 Dates of experiments Jan. 22-23, 2009 Feb. 12-13, 2009 Feb. 24-26, 2009

1．研究成果概要（試料の名称、組成、物理的・化学的性状を明記するとともに、実験方法、利用の結果得られた主なデータ、考察、結論、図表等を記述してください。

Outline of experimental results (experimental method and results should be reported including sample information such as composition, physical and/or chemical characteristics.

The 1 MW spallation neutron source of the materials and life science experimental facility (MLF) is a world-class neutron source. Therefore, the scattering instruments to be constructed at the facility will be also world-class instruments and it is expected that the instruments will lead frontier sciences. However, there remain additional possibilities of making their performances higher and giving them functional capabilities by adopting novel neutron optical and detection systems. In order to realize this idea, we have developed neutron optical and detection systems and carried out experiments to evaluate them. In JFY2008, we evaluated a neutron beam monitoring system.

It is required for a monitoring system of the MLF to give lower detection efficiency applicable even for intense pulsed neutron beams comparing with that of a ^{3}He neutron beam monitor, homogeneous detection efficiency, and low gamma-ray background. We then carried out the evaluation of nitrogen monitors in the term of commissioning of the NOBORU.

At first, we tried to evaluate a beam monitor purchased from the ILL. The active volume is 220 mm×75 mm ×10 mm. The partial gas pressure of N_2 is 700 mbar and the efficiency is 5×10^{-5}. However, we could not get effective data because a DAQ system of the monitor did not work at the MLF well.

Next, we evaluated a prototype of a beam monitor made with TOSHIBA Electron Tubes & Devices Co., Ltd. The active volume is 100 mm×50 mm×20 mm. The partial gas pressure of N_2 is 600 mbar. We evaluated the monitor at BL10 and also at CHOP in JRR-3 and could obtain the positional dependence of the pulse height distribution as shown in Fig. 1. The detection efficiency was almost constant along the direction parallel to the anode lines. On the contrary, A drop of the detection efficiency was observed along the direction perpendicular to the anode lines and between the two anode lines. Considering the experimental results, we changed a design of the monitor container and anode and cathode lines in the container and made a new prototype as shown in Fig. 2.

1．研究成果概要（つづき） Outline of experimental results (continued).

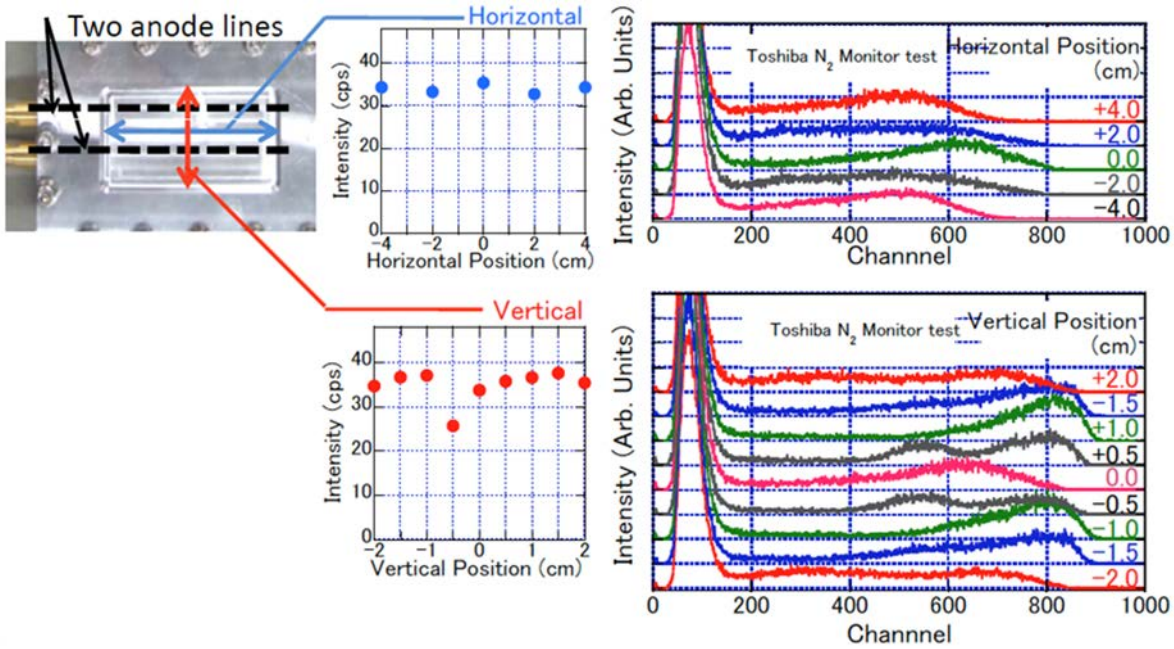

Fig. 1 A photo of a prototype of a beam monitor and the positional dependence of the pulse height distribution of the beam monitor measured at CHOP in JRR-3 and at BL10.

Fig. 2 The second prototype of a beam monitor.

Standard design of the monitoring system will be determined with the second prototype and the parameters of the beam monitor will be optimized by the experiments planned in JFY2009. Those results will be applied to the monitoring systems of various scattering instruments.

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