MLF Experimental Report	提出日 Date of Report
課題番号 Project No. 2014A0229 実験課題名 Title of experiment Development of Silicon-strip detector for the muon g-2/EDM experiment at J-PARC 実験責任者名 Name of principal investigator 三部 勉 所属 Affiliation 高エネルギー加速器研究機構 素粒子原子核研究所	装置責任者 Name of responsible person 三宅 康博 装置名 Name of Instrument/(BL No.) D2 ミュオン基礎科学実験装置 実施日 Date of Experiment 2014/6/14-2014/6/15

試料、実験方法、利用の結果得られた主なデータ、考察、結論等を、記述して下さい。(適宜、図表添付のこと)
Please report your samples, experimental method and results, discussion and conclusions. Please add figures and tables for better explanation.

1. 試料 Name of sample(s) and chemical formula, or compositions including physical form.

Plastic scintillating plate

2. 実験方法及び結果 (実験がうまくいかなかった場合、その理由を記述してください。)
Experimental method and results. If you failed to conduct experiment as planned, please describe reasons.

The experiment utilized the surface muon beam at the MUSE D2 port where surface muon beam is available at the intensity 6×10^6 /sec (300 kW proton beam power) with a 5% momentum bite. The experimental setup is shown in Fig. 1. The surface muon beam at momentum 27.4 MeV/*c* was used. After muon stops in the target scintillator, muon decay into a positron and two neutrinos. The detector test equipment was placed at downstream of the beam line consisting of four layers of silicon-strip sensors, two layers of plastic scintillating fiber hodoscopes, followed by a pair of time-defining plastic scintillators. The signal of silicon strip sensor generated by decay e+ was measured by using a custum-made analog amplifer integrated circuit called SlitA. Low noise level in the analog circuit line is critical in order to make this detector working. After identifying proper grounding scheme, the observed noise level was

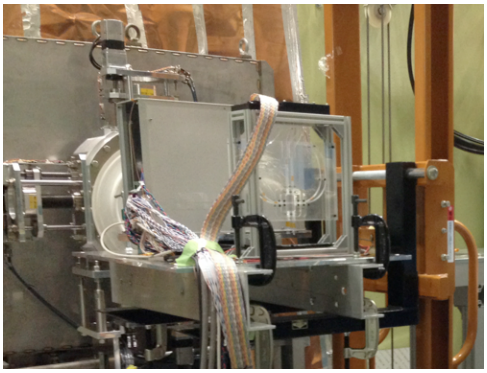

Figure 1: experimental setup

2. 実験方法及び結果（つづき） Experimental method and results (continued)

about 5 mV(RMS) corresponding to ~1500 ENC as shown in Fig.2(left). This noise level was similar to what was obtained in the offline test at a laboratory test bench.No significant issue was identified on noise environment at MLF.

The instantaneous rate of the sensor was changed by moving sensors with respect to the muon stopping target to check performance change under large amount of rate change. Data collection was successfully completed with anticipated statistics. Typical waveform of the analog output signal for the selected strip (27um width, 100um pitch) of the silicon-strip sensor is shown in Fig.2 (right). Following the data taking of analog waveform, threshold was set to about 50% of the minimum-ionization particles to test discriminator function on SlitA readout chip. The output binary signal of the discriminator was recorded by TDC. Time spectrum of muon decay was reconstructed successfully. Detail analysis of pulse height and timing response are under way to characterize the peformance of the sensor and readout electronics. Results of the analysis will be presented in Fall JPS meeting by S. Nishimura (U. Tokyo) and S. Shirabe (Kyushu-U).

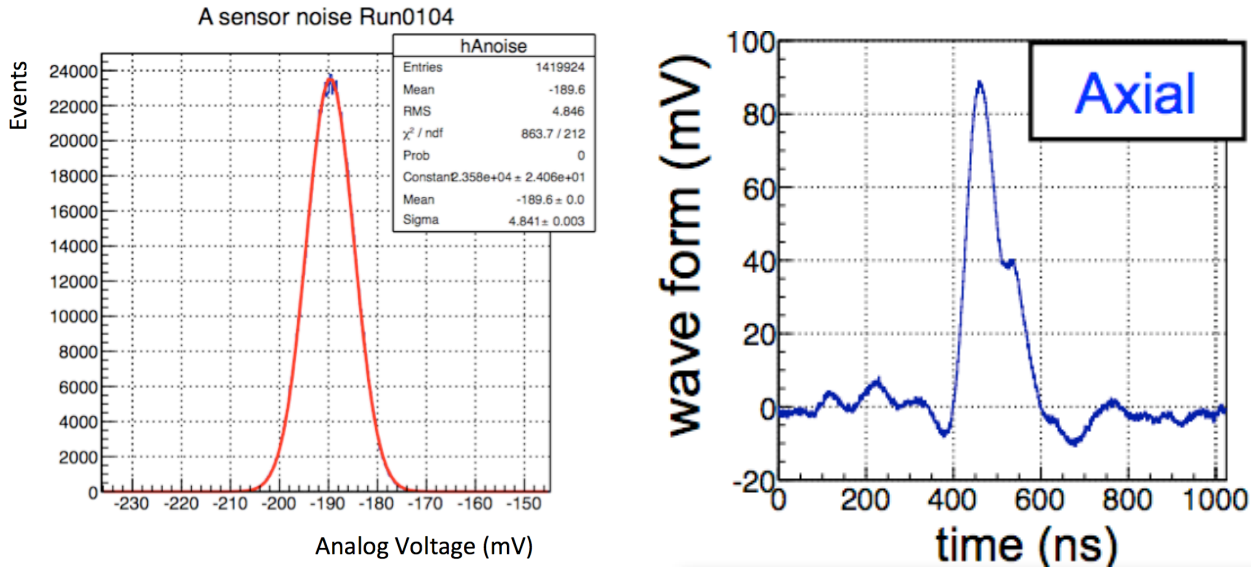

Figure 2：(left) distribution of analog signal when there is no beam indicating noise distribution of the system, (right) typical distribution of the analog output of the readout electronics (SlitA) connected to the silicon-strip sensor when a positron hit the silicon-strip sensor