(※本報告書は英語で記述してください。ただし、産業利用課題として採択されている方は日本語で記述していただいても結構です。)

MLF Experimental Report	提出日 Date of Report
課題番号 Project No. 2013B0141 実験課題名 Title of experiment Development of a micro-cell MWPC for a muon-electron conversion experiment at MFL H-line 実験責任者名 Name of principal investigator Hiroaki Natori 所属 Affiliation KEK	装置責任者 Name of responsible person 装置名 Name of Instrument/(BL No.) 実施日 Date of Experiment 2014/03/18, 19, 20

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.

Micro-cell Multi-wire proportional chamber

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 main purpose of this experiment is to test a newly developed "HV switching". High rate tolerance of gas chamber is limited by space charge effect. We are developing a MWPC so that it can detect a hit position of single electron coming 1 micro-sec after a burs pulse of 10GHz/mm2 with 200ns width. When deposit of the burst pulse is amplified with gas multiplication, many ions are left around wires for a few micro-seconds. It disturbs detection of delayed electron. To make it operational, switching HV and suppressing gas multiplication only during the burst will work. Then we developed a HV switching circuit and performed test experiment.

Experimental set up is shown with Fig. 1. Surface muon beam is used to emulate prompt burst because of its high flux and large energy deposit compared to minimum ionizing particle. Muons penetrate the MWPC and a scintillat- ing fiber read out with a multi-pixel photon counter (MPPC). Constant voltage is applied to anode wires of the MWPC and pulsed voltage controlled by start signal of accelerator's extraction is applied to po- tential wires.

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

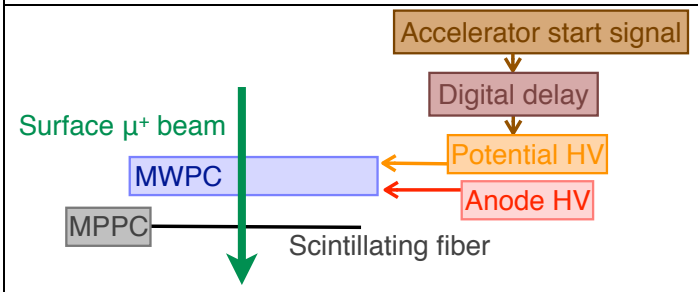

Fig. 1 Schematics of experimental setup. HV switching timing is controlled by digital delay on a signal synchronized to accelerator extraction.

The HV switching was successfully operated without any HV trip. The behavior of the switching was checked changing timing difference between muon pulse and the switching. As shown in Fig. 2, gas gain is sup- pressed during the switching. Fig. 3 shows anode wire current. When the digital delay is set to be between 72 and 74 micro-sec, whole the double pulse is within the switching region. And we can see steps due to double pulse structure. The step size is different probably because of the space-charge effect makes the second pulse to be amplified smaller, which is also observed in Fig.2 by the smaller latter part of the double pulse by the MWPC output. After the switching is finished (64 < Time < 71micor-sec in Fig. 3), the gain recovers to the same level as before the switching, and stays stable for more than 10 micro-seconds.

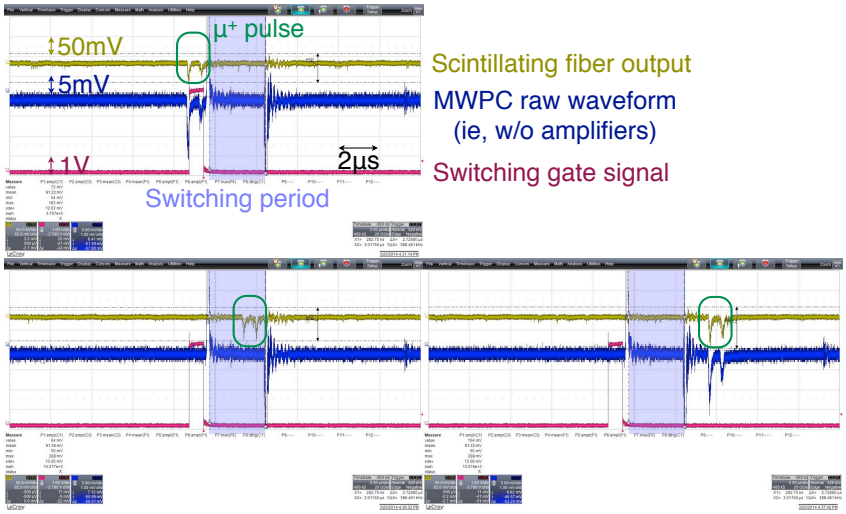

Fig. 2 Oscilloscope screen shot of scintillating fiber (yellow), MWPC raw output (blue), and gate signal to control HV switching (magenta). Switching period (blue shaded region) is set to be after, during and before the surface muon pulse

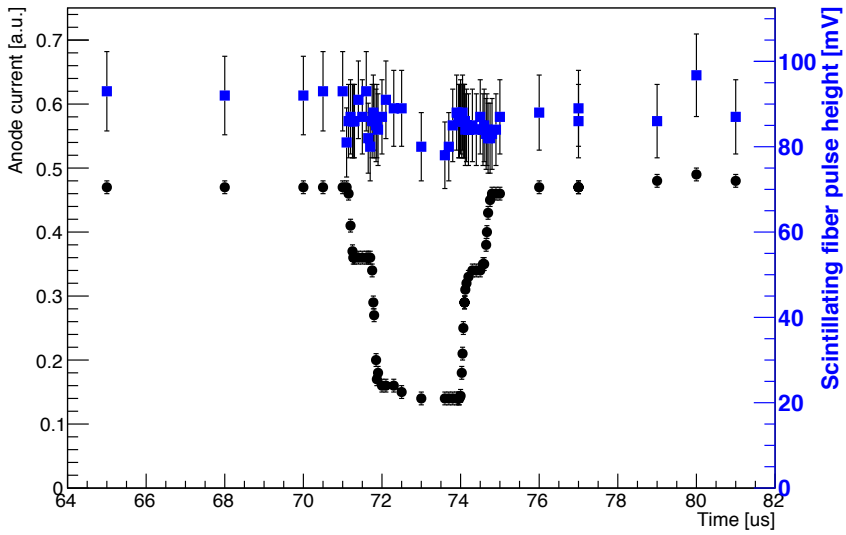

Fig. 3 Current of anode wire HV module (black dot) versus delay time of HV switching gate signal. Beam intensity is monitored by pulse height of scintillating fiber output (blue square). Anode current with beam off is shown by red line.