(※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。)

CROSS TOKAI **Experimental Report** J-PARC	承認日 Date of Approval 承認者 Approver 提出日 Date of Report
課題番号 Project No. 2014A0134 実験課題名 Title of experiment GISANS measurement using precisely figured focusing mirrors 実験責任者名 Name of principal investigator Dai Yamazaki 所属 Affiliation J-PARC Center, JAEA	装置責任者 Name of Instrument scientist Masayasu Takeda 装置名 Name of Instrument/(BL No.) BL17 実施日 Date of Experiment 11/20 – 11/30

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.

PS thin film with Fe nanoparticles on a Si wafer, solid, ϕ 50x0.6 mm^3

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.

In the experiment, we successfully focused neutron beam vertically with a 1-dimensional elliptic supermirror and then observed a pencil beam which was focused and horizontally collimated with a Multi-Wire Proportional Gas Chamber (MWPC) detector. The focusing mirror worked as our expectation and achieved intensity gain of almost 6. We also tried GISANS measurement with a sample of polystyrene thin film which includes iron nanoparticles. But time-of-flight profiles obtained with different conditions showed very strange and abnormal behavior which we suppose are attributed to glitches of detector system including signal-processing circuits. Hence we were not able to obtain GISANS data. Here we discuss only the pencil-beam measurements.

Firstly, we observed a pencil beam which was collimated vertically and horizontally with beam slits not using the elliptic focusing mirror. The beam was collimated with the first slit "S1" and the 6th slit "S6", which is just in front of the sample position, to be of beam size 2.0mm in vertical height and 1.15mm in horizontal width at the MWPC detector. Figure 1 shows the observed 2-dimentional image. The measured spot size was 3.35 mm^H x 3.08 mm^W including the special resolution ~ 1.8 mmm of the MWPC detector. The peak intensities were 0.0132 and 0.0134 c/pulse/3pixels for (B) and (C), respectively. The background shown as an aggregate of black dots are attributed to delayed neutrons of high energy, which can go through beam slits.

Secondary we measured a pencil beam which was vertically focused by the focusing mirror and horizontally collimated by the slits S1 and S6. The beam line configuration has already described in the report of 2013A144. In this configuration, the focusing mirror kicks the beam upwards and the detector is hence positioned 64.8 mm above the direct beam line center. Figure2 shows an image of the pencil beam with vertical

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

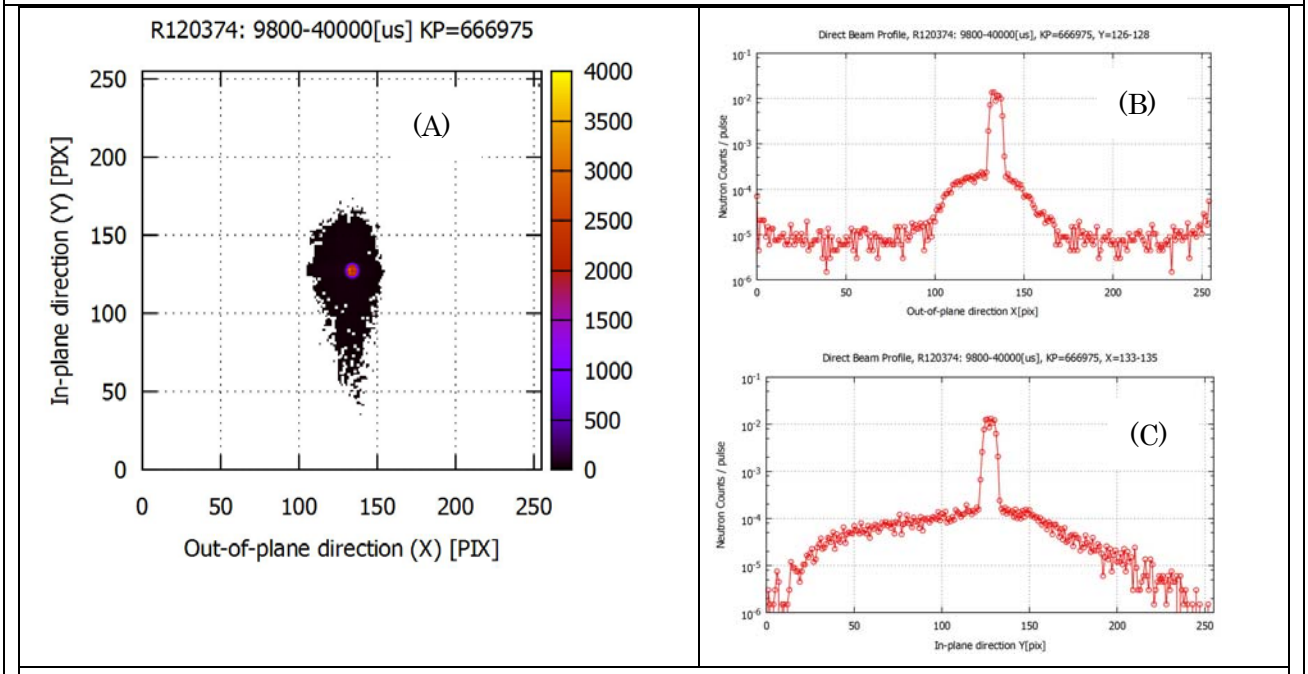

Figure.1: Image of a pencil beam which was collimated vertically and horizontally measured with a 2-dimensional MWPC detector. Size of the detector pixel is 0.5 mm. Neutrons with wavelength of 2.2-8.8 Å were counted. (A) 2D-image, (B) Horizontal intensity profile cut out at the spot center, (C) Vertical profile at the spot center.

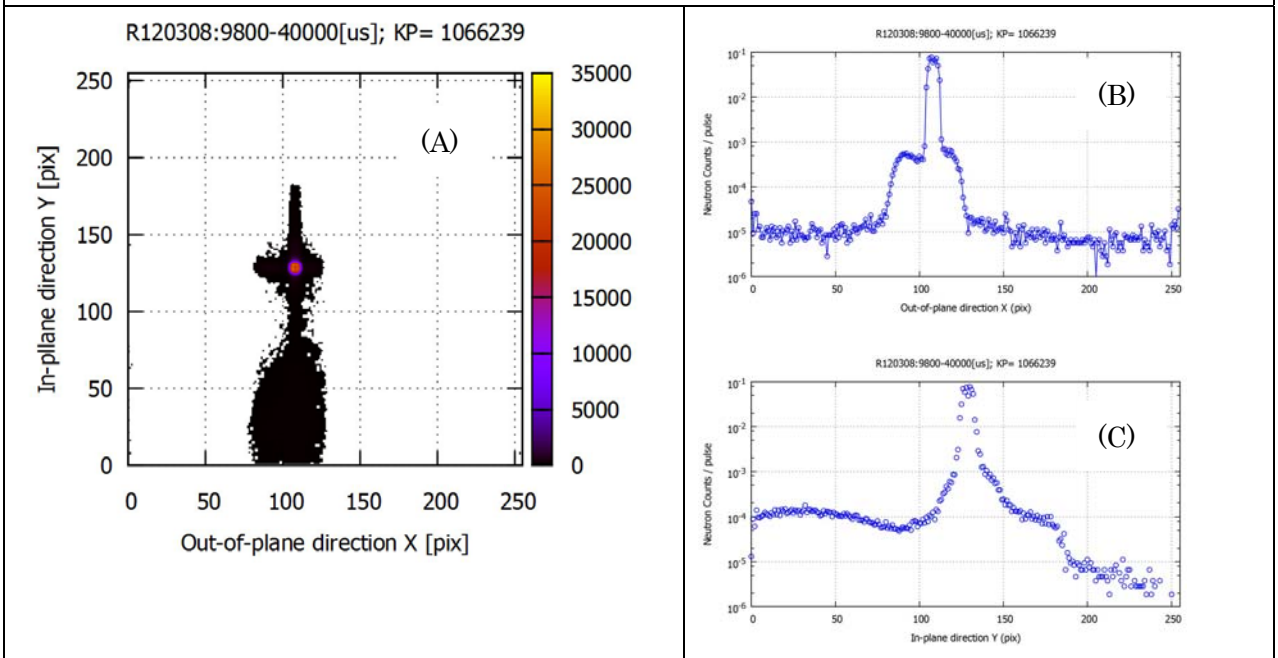

Fig.ure.2: Vertically focused and horizontally collimated neutron beam measured with a MWPC detector. Size of the detector pixel is 0.5 mm. Neutrons with wavelength of 2.2-8.8 Å were counted. (A) 2D-image, (B) Horizontal intensity profile cut out at the spot center, (C) Vertical intensity profile at the spot center.

and horizontal cutouts at the center of beam spot. The spot size was 3.44mmH x 3.04mmW including the detector resolution. We can say that the vertical focusing reproduced the spot size of the collimated beam in Fig.1. The peak intensities of the focused beam was 0.078 and 0.075 c/pulse/3pixels in Fig.2 (B) and (C), respectively, that is almost 6 times higher than that of the collimated beam. The cross-shaped background is attributed to the detector noise in counting that should be removed by a “direct beam stopper” or a “specular beam stopper” in GISANS measurements. The shade below the “cross” is due to delayed neutrons.