MLF Experimental Report	提出日 Date of Report
課題番号 Project No. 2012B0205 実験課題名 Title of experiment Development of neutron spin phase contrast imaging technique at a pulsed neutron source 実験責任者名 Name of principal investigator Hirotoshi Hayashida 所属 Affiliation J-PARC Center	装置責任者 Name of responsible person Kenichi Oikawa 装置名 Name of Instrument/（BL No.） NOBORU / BL10 実施日 Date of Experiment 2013/02/25-2013/03/01

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.

Permalloy film, Ni-Co-Cu-Fe

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 this experiment, we performed a demonstration of a new focusing mirror for neutron spin phase contrast imaging with high special resolution. Figure 1 shows a picture and design of the new focusing mirror named as a multi-channel spheroidal (MCS) focusing mirror. The MCS focusing mirror consists of three spheroidal mirrors fabricated by copper with different diameters; 10 mm, 8 mm and 6 mm as shown in Fig. 1.

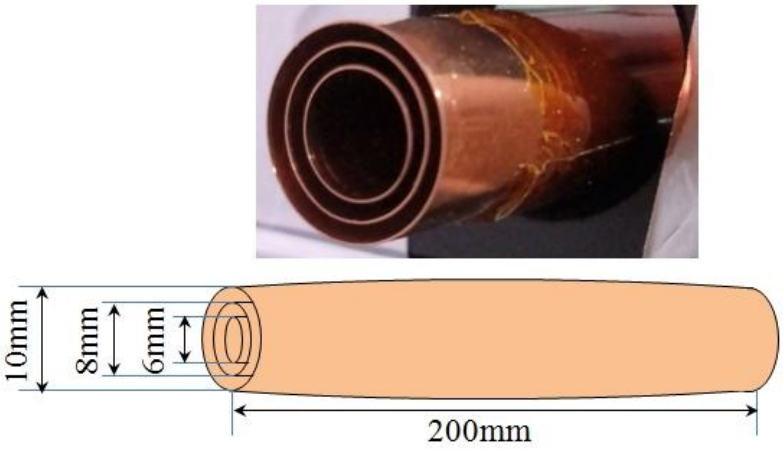

Figure 1. The picture and design of the MCS focusing mirror.

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

Figure 2 shows a schematic diagram of this experiment performed at NOBORU. A pinhole slit with diameter of 0.3 mm was set at z = 12995 mm, where z is the distance from the moderator. The MCS mirror was set at the downstream of the pinhole slit and the distance between the pinhole slit and the center of the MCS mirror L1 was 900 mm. The focal point was 300 mm downstream from the center of the MCS mirror. A 2-dimensional (2D) position sensitive detector RPMT was set at the focal point. An m = 4 supermirror was set between the pinhole slit and the MCS mirror in order to avoid the MCS mirror and the detector from direct beam.

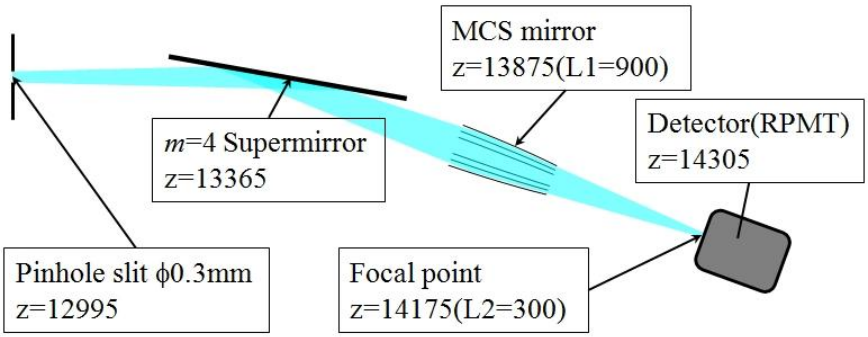

Figure 2. The schematic diagram of the experimental setup.

Figure 3 shows the 2D image of λ = 0.5 nm of focused neutron beam and the line profile. The 2D image shows that the neutron beam was focused successfully. However, FWHM of the focused beam is about 1.5 mm as shown in figure of the line profile, nevertheless we expected that the focal spot size becomes about 0.1 mm. A coaxially accuracy of alignment of three spheroidal mirrors is very sensitive to make a small focal spot size. Inaccuracy of three spheroidal mirrors can be considered the reason of this large focal spot size. However, this is the first test applying the MCS focusing mirror to a neutron beam in the world and focusing ability was successfully shown.

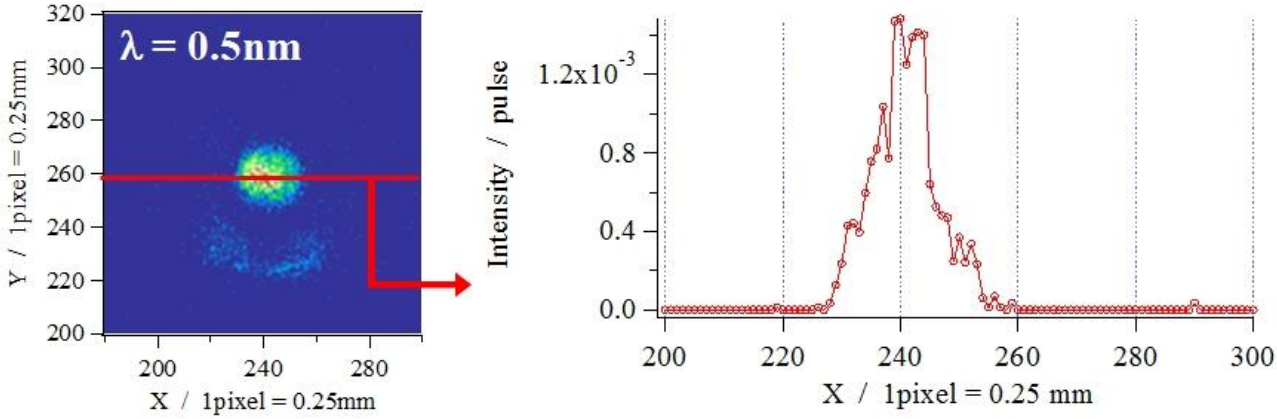

Figure 3. The 2D image of focused neutron beam of λ = 0.5 nm and the line profile.