実験報告書様式（一般利用課題・成果公開利用）

（ ※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 2015/6/3 承認者 Approver Ryoichi Kajimoto 提出日 Date of Report 2015/6/2
課題番号 Project No. 2014B0153 実験課題名 Title of experiment Magnetic structure determination in the F-phase of Mn3Pt antiferromagnetic metal by spin wave dispersion study 実験責任者名 Name of principal investigator Soshi Ibuka 所属 Affiliation KEK	装置責任者 Name of Instrument scientist Ryoichi Kajimoto 装置名 Name of Instrument/(BL No.) 4SEASONS/(BL01) 実施日 Date of Experiment 26-28 Mar. 2015

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.

A single crystal of Mn_3Pt

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 aim of the proposed experiment was to determine the magnetic structure of the Mn_3Pt alloy in the magnetically ordered phase between T = 475 and 400 K. Two candidates for the magnetic structure are called triple-***Q*** and single-***Q*** structure, respectively. Although their magnetic diffraction patterns are identical, their spin-wave dispersions are expected to be different. It is theoretically proposed that the dispersions are isotropic for the single-***Q*** structure, while anisotropic along the [111] direction for the triple-***Q*** structure.

We performed inelastic neutron scattering experiments using a single crystal of Mn_3Pt aligned in *hk*0 zone. The single crystal was synthesized by the Bridgeman method. The incident neutron energy was selected to 100 meV, because the maximum energy of the magnetic excitation was reported to be about 30 meV. The crystal was rotated through 90 degrees to measure the whole momentum transfer, ***Q*,** direction. Temperature near the heater position was controlled to T = 430 K. It was confirmed that the sample was in the ordered state by detecting the magnetic Bragg peaks with using white incident neutron beam.

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

Fig. 1 shows *q* // [010] – *E* map around a magnetic Bragg point ***Q*** = (0.5, 1, 0), where *q* and *E* stand for momentum transfer and energy transfer, respectively. The magnetic dispersion curve was steep and did not reach the zone boundary ***Q*** = (0.5 1.25, 0) at 40 meV. The steep curve was similar to those observed for itinerant magnets such as Cr metal. It was inconsistent with the previous report that the maximum energy was more than 40 meV. This may be due to a heavy temperature dependence of the dispersion.

Fig. 2 shows *q*-cut along [010], [110], [111], and [-111] around ***Q*** = (0.5, 1, 0) and *E* = 40 meV. In any direction, the spin wave excitation did not split into two peaks, indicating again that the dispersion is steep. Due to this, it was not obvious whether the dispersion curve is isotropic or not.

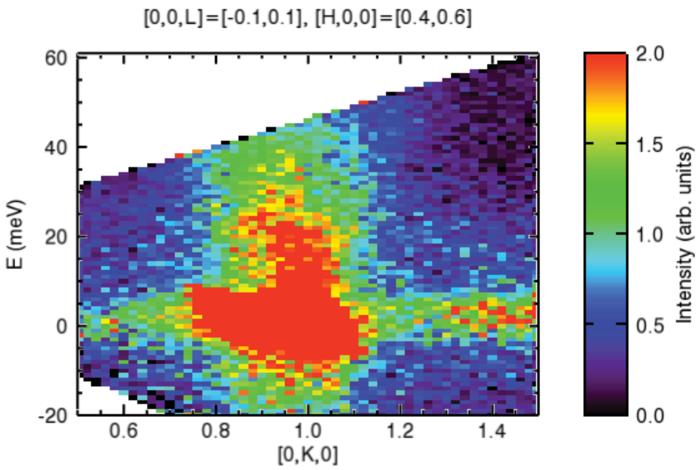

Fig. 1 *q* // [010] – *E* map around ***Q*** = (0.5, 1, 0)

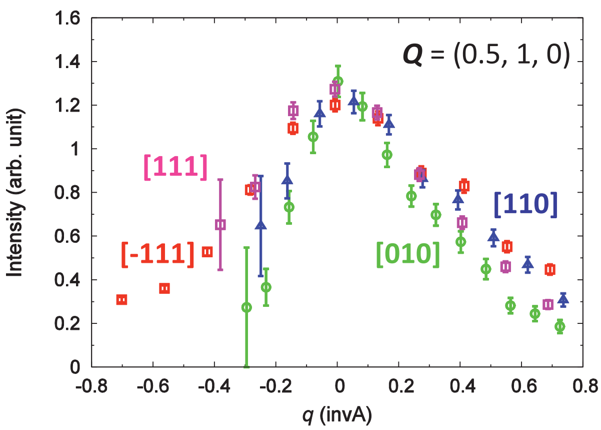

Fig. 2 *q*-cut along [010], [110], [111], [-111] around ***Q*** = (0.5, 1, 0) and *E* = 40 meV.