

	<h1>MLF Experimental Report</h1>	提出日 Date of report
実験装置名/BL番号 Name of Instrument/BL AMATERAS/BL14		
実験装置責任者 Name of the person responsible for the instrument: Kenji Nakajima		
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1. 研究成果概要 (a)装置グループ内の成果、(b)ユーザー課題実装時における特筆すべきサポート、(c)ユーザー課題の執行状況について、まとめてください。A4 サイズ用紙使用のこと。

Outline of your activities. Following results at your instrument should be reported in A4 size papers: (a) results of your instrument group, (b) significant user support works, and (c) statistical summary of user experiments.

AMATERAS (Fig. 1) had five staff members by taking Dr. Chiba-Kamoshida as outsourcing staff in April 2013, which results in more substantial user support after eight months of the beam-off period of J-PARC. For instrumental activities, we have made efforts such as an upgrade of the beam-transport section, on-beam commissioning of several new devices as mentioned below. It should be also reported here that two works related to AMATERAS were awarded by Japanese Society for Neutron Science (JSNS), which are development of a chopper spectrometer with a pulse-shaping chopper at a pulsed source by Dr. Nakajima et al. (Fig. 2) and development of model-free analysis method on quasi-elastic neutron scattering and its application to liquid water by Dr. Kikuchi [1]



Figure 1. Photo of AMATERAS (in September, 2013).

In JFY2013, following items of instrumental activities were carried out: 1) commissioning of sample environment devices, 2) replacement of defected components and 3) upgrade of components. Also, regular maintenance of components and regular performance tests were carried out as routine works. 12 days of instrument-group-use beam-time were spent for on-beam parts of above activities.



Figure 2. Photo of the award ceremony in the JSNS meeting

In the beginning of 2013A, an operation test of a BL-common 7T cryomagnet on AMATERAS was carried out (Fig. 3). Magnetic fields up to 4T were successfully achieved. Since we were afraid that the scattering chamber of AMATERAS, which is made of steel, might cause serious damage on the magnet due to magnetic

## 1. 研究成果概要(つづき) Outline of experimental results (continued).

force, we did not try to apply even higher field. As we expected, huge background from the outer vacuum chamber, radiation shields and a support ring for the magnet was observed. Still we could observe a field dependence of magnetic excitations in a powder sample by subtracting background data obtained from an empty scan.

During the long shutdown period of MLF, the beam-transport section was up-graded (Fig. 4). Discrepancy between the intensity expected from simulation and that observed in real measurements was one of serious problems of AMATERAS. Misalignment of guide tubes and performance of a part of mirrors had been suspected to be sources of this problem. Therefore, we replaced the mirrors (8.6 m in length) and re-aligned full-part of the beam-transport. The performance after this upgrade was checked in the 2013B period. The intensity became 1.2 times larger in a low-energy region ( $E_i < 5$  meV) and nearly twice in a high-energy region ( $E_i > 80$  meV) compared to the previous intensity. However it is still lower than the simulated intensity. We continue investigation including check of validity of the simulation.

As the other major instrumental activities, replacement of a defected detector tube, installing a Cd film attenuator, background reduction study were done in JFY 2013.

Research fields of the proposals on AMATERAS had wide variety. In the 2013A and 2013B periods, 14 general use proposals were accepted, and six proposals were listed on the reserved subjects. We also accepted two project use proposals, which are ‘Study of structure and electronic properties of functional materials at BL14’ (PI: T. Masuda) and ‘Project research on structure and dynamics of protonic, superionic and amorphous functional materials using AMATERAS’ (PI: Y. Inamura), and one element strategy use proposal, ‘Neutron-scattering research on element-strategy project for electronic materials’ (PI: Y. Murakami). Due to the accident at the Hadron Experimental Facility, five general use experiments were cancelled or interrupted. The beamtime for the project use and element strategy use experiments were also reduced.

[1] T. Kikuchi et. al., Phys. Rev. E 87, 062314 (2013).



Figure 3. A BL-common 7T cryomagnet on AMATERAS.



Figure 4. Re-alignment of AMATERAS beam-transport.

必要に応じて、A4 サイズの用紙に続きを記入して下さい。

Please use A4-size papers for further reporting, if necessary.