MLF Experimental Report	提出日 Date of Report 08/04/2010
課題番号 Project No. 2009B0034 実験課題名 Title of experiment Internal magnetic field in SDW state of $EuFe_2As_2$ (mother compound for punictide superconductivity) 実験責任者名 Name of principal investigator Shinsaku KAMBE 所属 Affiliation JAEA/ASRC	装置責任者 Name of responsible person Yasuhiro MIYAKE 装置名 Name of Instrument/(BL No.) D1/MLF 実施日 Date of Experiment 20/01/2010-23/01/2010

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.

$EuFe_2As_2$ single crystal

$CeRu_2Al_{10}$ single crystal

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.

1） $EuFe_2As_2$ single crystal

In zero-field μ+ measurements, we have observed almost no change at the ferromagnetic transition. Since the magnetic moment at Eu and Fe sites are rather large, the μ+ relaxation is rapid. Because of the rapid relaxation, the μ+ is already relaxed at the initial time of D1 port even in the paramagnetic state at high temperatures.

2） $CeRu_2Al_{10}$ single crystal

In the paramagnetic state above T_0=27K, clear Kobo-Toyabe type relaxations are observed in zero-field μ+ measurements. In contrast, in the ordered state below T_0, a clear modulation due to an appearance of internal field H_{int} is observed (Fig. 1). This result clearly indicates that the phase transition is a magnetic one. Since the origin of phase transition in this compound was not clear, this result is important. We have estimated the T-dependence of internal field (Fig. 2). A peculiar decrease of internal field is observed below 20K, which may indicate an exixtence of accmpaning ordering such as lattice distortion, although the orgin for it is still unclear.

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

In conclusion, this measurement is quite successful since the origin of phase transition is determined.

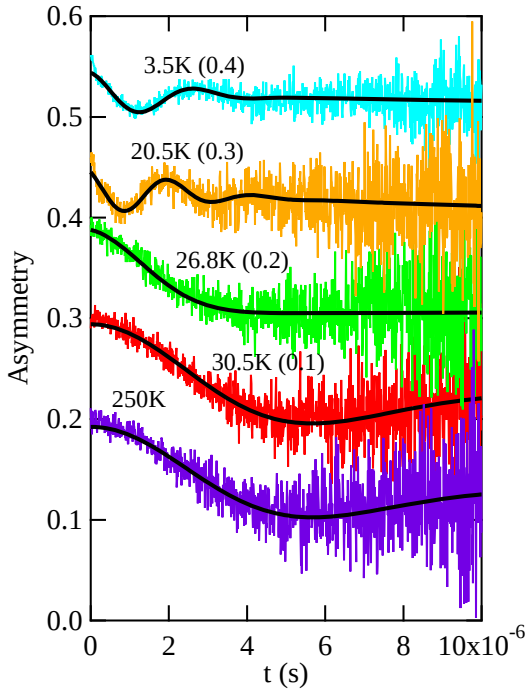

Fig. 1 μ+SR spectra under zero field in $CeRu_2Al_{10}$.

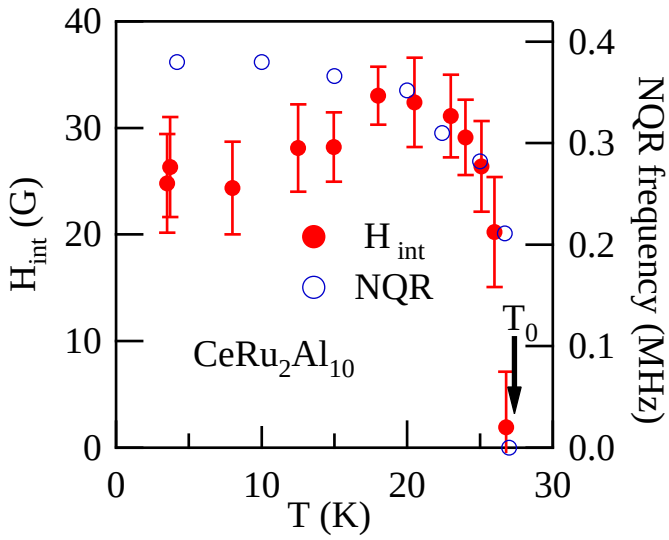

Fig. 2 T-dependence of internal field Hint. For comparison, NQR data is also presented.