


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。)

 MLF Experimental Report	提出日 Date of Report June 21, 2013
課題番号 Project No. 2012B0124 実験課題名 Title of experiment Investigation on magnetic ground state of frustrated spin system $\text{RbCu}_2\text{Mo}_3\text{O}_{12}$ 実験責任者名 Name of principal investigator Seiko Kawamura 所属 Affiliation MLF, J-PARC	装置責任者 Name of responsible person Yasuhiro Miyake 装置名 Name of Instrument/(BL No.) D1 実施日 Date of Experiment March 13-15, 2013

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.
$\text{RbCu}_2\text{Mo}_3\text{O}_{12}$ powder sample, 3 g

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.
<p>Experimental setup</p> <p>About 3 g powder sample of $\text{RbCu}_2\text{Mo}_3\text{O}_{12}$ was wrapped with an aluminum foil to make a disk. The sample was mounted onto a sample holder of a mini cryostat, and cooled down to ~3 K. The longitudinal field up to 100 G was applied. Single-pulse was used during the measurements.</p> <p>Results</p> <p>This system is a frustrated spin system having one-dimensional (1D) zig-zag chains of Cu^{2+} ions, where the first and second neighbor interactions compete. It has been expected that the magnetic ground state of this system is an incommensurate spin-singlet state. Though we proposed the low-temperature measurements using a ^3He-^4He dilution refrigerator to bare an evidence of the nonmagnetic ground state, it could not be done because of some problem of the cryostat. Thus we carried out ZF- and LF-μSR measurements from 3 K to 150K.</p> <p>In the whole measured temperature region, the ZF-μSR time spectra showed slow muon spin depolarization</p>

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

due to a nuclear dipole field. Figure 1 shows the time spectra observed at 3 K under ZF and LF 30 G. Similar spectra were observed at temperatures up to 150 K. As the nuclear dipole of this system is very small, the muon spin is decoupled by LF of ~ 30 G. We fitted the ZF time spectra with a simple stretched exponential function. The obtained temperature dependences of the muon spin relaxation rate and index are shown in Figs. 2(a) and 2(b), respectively. Any magnetic anomaly is not observed as far as in the measured temperature range. We will propose more study at low temperatures using a dilution refrigerator.

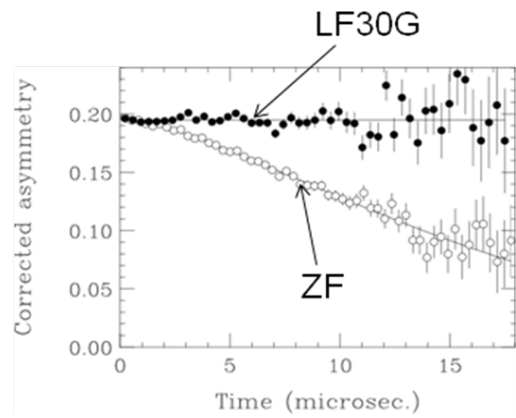


Fig. 1 ZF- and LF- μ SR time spectra at 3 K.

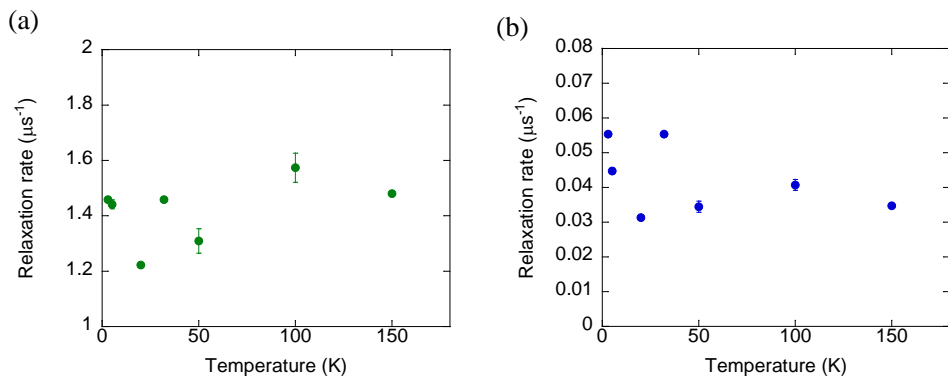


Fig. 2 Temperature dependences of (a) the muon spin relaxation rate and (b) index obtained from the ZF measurements.