

 <b>MLF Experimental Report</b>	提出日 Date of Report
課題番号 Project No. 2013A0065 実験課題名 Title of experiment Study of strain behavior in Rutherford-type A15 superconducting cables for future particle accelerators 実験責任者名 Name of principal investigator 中本 建志 所属 Affiliation 高エネルギー加速器研究機構	装置責任者 Name of responsible person 相澤一也 装置名 Name of Instrument/(BL No.) BL19 匠 実施日 Date of Experiment 2013年5月18日 9:00-5月22日 9:00

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.
CuNb reinforced Nb <sub>3</sub> Sn Rutherford cable

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>Applicants changed the research plan in the 2013A proposal and prioritized the Nb<sub>3</sub>Sn Rutherford cable measurement over the Nb<sub>3</sub>Al strand sample. Because the experiment with the Nb<sub>3</sub>Sn Rutherford cable as reported below will be a good practice for the Nb<sub>3</sub>Al Rutherford cable experiment in our future plan.</p> <p>Nb<sub>3</sub>Sn superconducting strands are used widely for high-field superconducting magnets due to their good superconducting property in high magnetic fields. It is well known that, however, the superconducting properties of Nb<sub>3</sub>Sn strands are very sensitive to stress and strain. Recently, a Nb<sub>3</sub>Sn Rutherford-type cable conductor with a rectangular shape, which consists of sixteen CuNb reinforced Nb<sub>3</sub>Sn strands in diameter of 0.8 mm, is fabricated for a high-field and/or a large scale superconducting magnet. It is expected that there is difference between the internal strain in a strand and macroscopic strain on the cable surface. Therefore, it is very important to evaluate the internal strain of Nb<sub>3</sub>Sn in the Rutherford cable under tensile stress. Neutron diffraction measurements under a tensile load at low temperature were conducted at TAKUMI (BL19) to</p>

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

measurement. As for the other sample, the diffraction for both axial and lateral directions were obtained under a tensile load up to 3400 N (423 MPa) at 11 K. The stress-lattice strain curves were evaluated from several reflections of Nb<sub>3</sub>Sn in the Rutherford cable.