

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。)

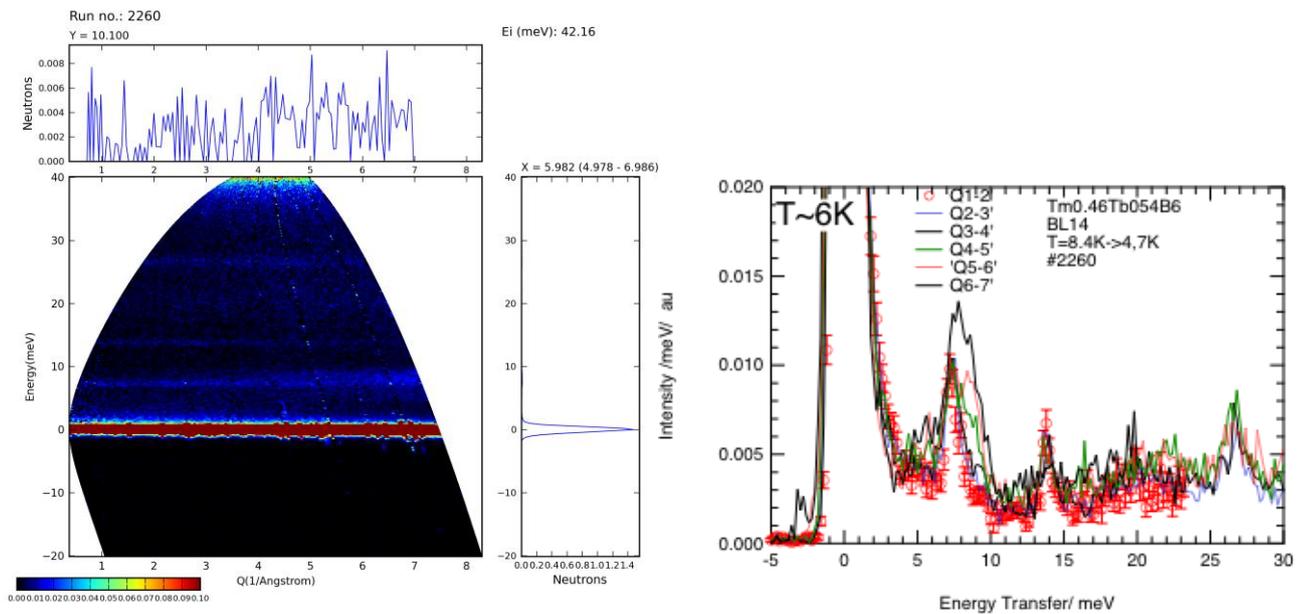
 <b>MLF Experimental Report</b>	提出日 Date of Report 2012.9.20
課題番号 Project No. 2012A0016 実験課題名 Title of experiment Determination of crystalline electric field level of Kondo alloy $Yb_{1-x}Tm_xB_6$ 実験責任者名 Name of principal investigator Fumitoshi Iga 所属 Affiliation Ibaraki University	装置責任者 Name of responsible person Kenji NAKAJIMA 装置名 Name of Instrument/(BL No.) AMATERAS/(BL 14) 実施日 Date of Experiment 2012.06.06-08

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.

<p>1. 試料 Name of sample(s) and chemical formula, or compositions including physical form.</p> <p>Name of sample(s) and chemical formula: <math>Yb_{1-x}Tm_xB_6</math>, <math>x=0.46</math>  <math>a = b = c = 4.11</math> Angstrom, <math>\alpha = \beta = \gamma = 90</math> degree                      CsCl-type (Simple Cubic)                      Space group : Pm3m                      Powder sample, harmless,                      Volume = 3 cc, 8 gram                      They are encapsuled in a Vanadium Cell</p>
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<p>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> <p>Experimental method: Inelastic neutron scattering                  4 kinds of incident energy: 1.688, 3.137, 7.746, 40 in meV                  Temperature: 6-8K, 50K, 100K                  Scanning of scattering wave vector: <math>Q=0.25 - 1.5 \text{ \AA}^{-1}</math>, <math>1.25 - 2 \text{ \AA}^{-1}</math>, etc.                  Some magnetic peaks were observed but the peaks expected in lower energy region were not observed.                  However, most of expected phonon branches and magnetic ones were identified.                  Therefore localized picture expected from the transport, magnetic, and thermal properties measurements were certified in this experiment.                  Kondo effect which should be appeared in Tm trivalent state was unclear.                  Therefore, we have to investigate the another concentration, such as <math>x= 0.35</math>, in 2012B or later period.                  The detailed results are plot in the following figures and captions.</p>
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## 2. 実験方法及び結果(つづき) Experimental method and results (continued)



Energy and Q-dependence at around T=6K in YbTmB6, in Ei=40 meV(Left). Integrated spectra in using Q-vectors.

The crystalline electric field energy level scheme proposed from the physical property measurement was shown in left side of the bottom figure. This neutron scattering experiment clarified some of magnetic peaks which was very closed to the expected ones. However, some peaks were not observed. This may be explained by selection rule and the expected scattering cross sections. Detailed discussion was necessary for this result.

