

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
課題番号 Project No. 2012B0096 実験課題名 Title of experiment High-energy inelastic neutron scattering on NiGa ₂ S ₄ 実験責任者名 Name of principal investigator Yusuke Nambu 所属 Affiliation Tohoku University	装置責任者 Name of responsible person Shinichi Itoh 装置名 Name of Instrument/(BL No.) BL12 実施日 Date of Experiment March 16 – 25, 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.
147 co-aligned single crystals of NiGa ₂ S ₄ (total mass: ~ 2.6 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>Inelastic neutron scattering measurements on the triangular antiferromagnet NiGa₂S₄ were performed at BL12-HRC spectrometer. The sample is co-aligned on the (HHL) scattering plane. Scans were carried out at two angles; $\psi = 0$ and 30 deg., where the c-axis is set to be parallel to the incident neutron beam in the $\psi = 0$ deg condition. The energy of the incident neutron was chosen to be 82 meV, and the second E_i of 14 meV was also collected. The measured temperatures were base (~4 K), 8, 10, 12, 15 and 100 K.</p> <p>We successfully observed gapless magnetic excitations from the elastic diffuse scattering at (0.155, 0.155, 0). The observed magnetic excitations qualitatively differ from the simple spin wave excitation, but contains continuum-like excitation at higher energy regime. The nature of the excitations is not clear at this stage, but would suggest the possible presence of disorder in the material, or multi-particle mechanism such as spin nematic state. In addition, we saw some anomaly in phonon spectrum as a function of temperature. The detailed analyses are now under way.</p>

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

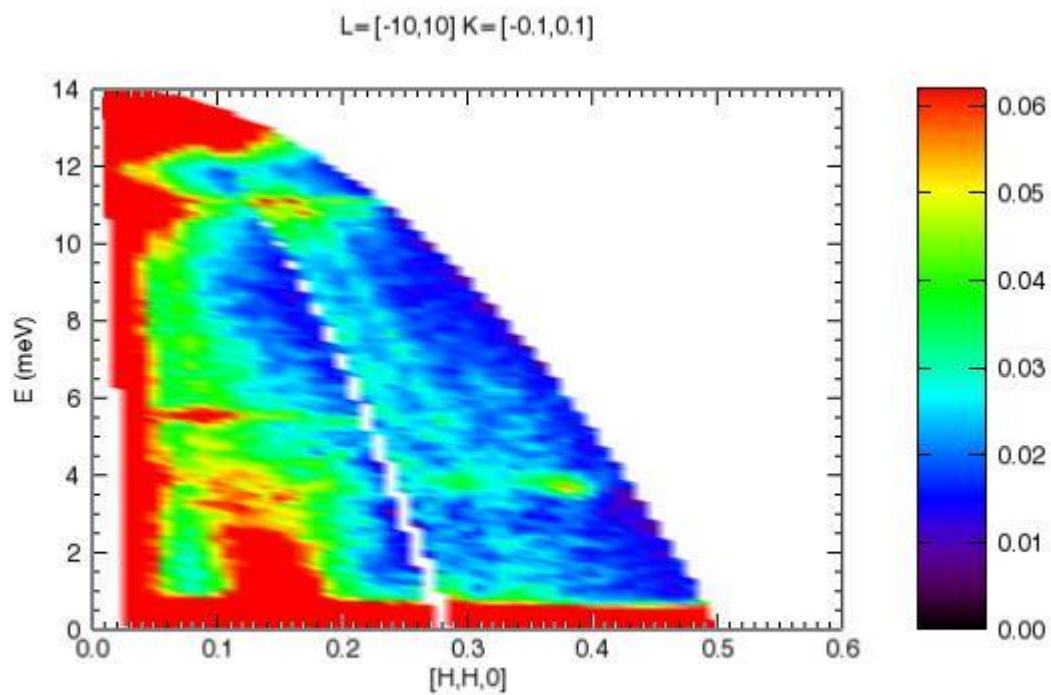


Fig. 1: Contour map of excitations of NiGa₂S₄ at $T = 4$ K.