# Magnetic Diffuse Scattering of LuBaCo4O7 with kagome and triangular lattices

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Spin systems on the pyrochlore, triangular and kagome lattices are well-known examples of geometrically frustrated systems and expected to exhibit various interesting properties induced by strong magnetic fluctuations. RBaCo4O7 (R=Ca, Y, and rare-earth elements) is one of typical examples of such systems, because it has both triangular and kagome lattices formed by CoO4 tetrahedra.

Previously we have carried out the neutron scattering measurement on the single crystals of YBaCo4O7[1] and LuBaCo4O7[2]. In the study of YBaCo4O7, the magnetic transitions were found at two temperatures 70 and 105 K. At 10 K, superlattice reflections were observed at the Q-points (h/2,k/2,0) and (h/3,k/3,0). At 110 K, the line-shape-diffuse scattering connecting (h/2,k/2,0) and (h/3,k/3,0) was observed. The line-shape-diffuse scattering has the maximum intensity at around 105 K, and the superlattice reflections and the line-shape-diffuse scattering coexist below 105 K. The temperature dependence of the line-shape-diffuse scattering connecting the magnetic Bragg points indicates the possibility of the Z2 vortex (topological) transition which is characterized by its parity.[3]

In the isostructural LuBaCo4O7, the magnetic transition has been observed at 105 K. In order to clarify the existence of Z2 vortex order, we measured the detailed temperature dependence and the shape of the magnetic diffuse scattering in LuBaCo4O7 by using CORELLI installed at SNS.

Figures 1(a) and 1(b) show the neutron intensity measured at 6 K for Q=(H,K,0) and Q=(H,K,2), respectively. The characteristic diffuse scattering and the superlattice reflections were obserbed at low temperature. With increasing temperature, the intensities of the line-shape-diffuse scattering and the superlattice reflections decrease. The line-shape-diffuse scattering in LuBaCo4O7 has the maximum intensity at the low temperature. The temperature dependence of the line-shape-diffuse scattering in LuBaCo4O7 is different from that in YBaCo4O7. At this moment, we try to analyse the neutron results of both LuBaCo4O7 and YBaCo4O7 in consideration of the Z2-vortex transition.

References

[1] M. Soda, et al., JPSJ. 75, 054707 (2006) and M. Soda, et al.,in preparation
[2] M. Soda, et al., JPSJ. 76, 084701 (2007).
[3] T. Okubo and H. Kawamura, JPSJ. 79, 084706 (2010).

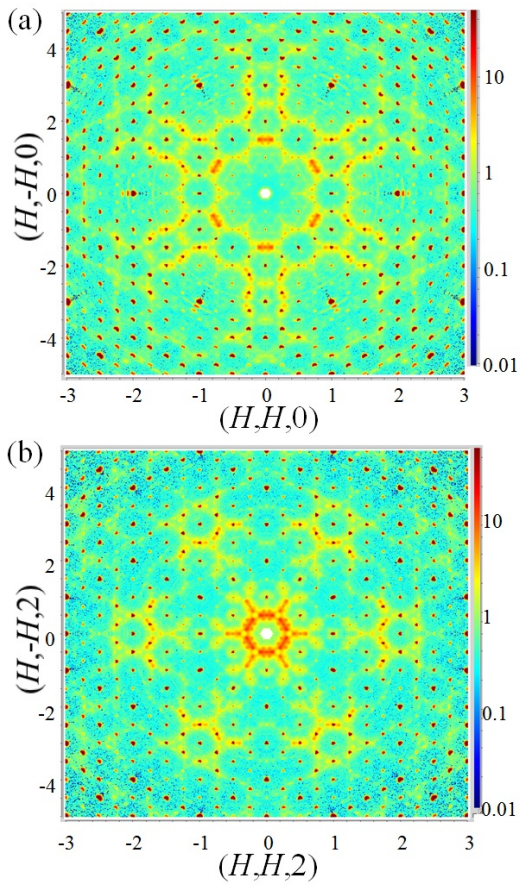


Fig. 1. Elastic neutron intensities measured at 6 K for (a) Q=(H,K,0) and (b) Q=(H,K,2).