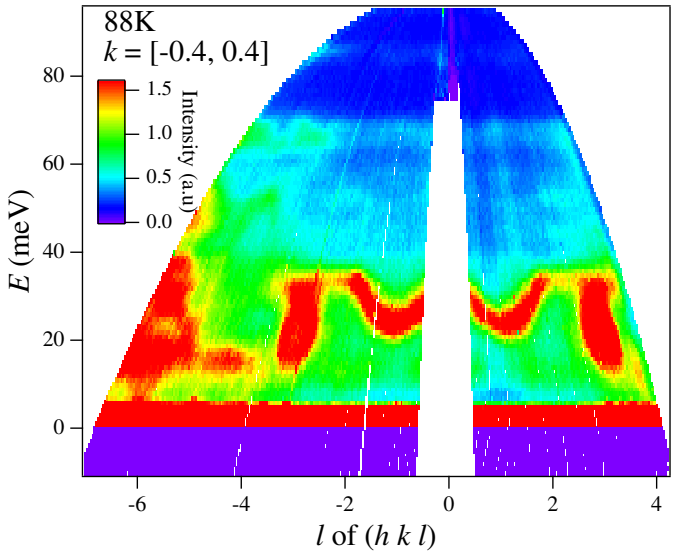
Detection of Orbital Wave in YVO_3

D. Kawana, Y. Murakami, T. Yokoo[1], S. Itoh[1], A.T. Savich[2], G.E. Granroth[2], K. Ikeuchi[3], H. Nakao, K. Iwasa[4], R. Fukuta[5], S. Miyasaka[5], S. Ishihara[4] and Y. Tokura[6,7,8]

CMRC/IMSS/KEK, [1]KENS/IMSS/KEK, [2]NSSD/ORNL, USA, [3]CROSS, [4]Tohoku U., [5]Osaka U., [6]CERG & CMRG/RIKEN, [7]Tokyo U., [8]ERATO/JST

We focus on an orbital excitation in YVO_3, which shows the complex magnetic and orbital orderings in the low temperatures [1]. In the phase where the G-type orbital order accompanied with the C-type spin order (G-OO/C-SO) appears, the existence of the large orbital-fluctuation is suggested [2]. Additionally, a large dispersive orbital-wave along the c-axis, due to the strong one-dimensional spin-orbital correlation, is calculated [3]. In consideration of the neutron scattering cross-section obtained from the correlation function for the orbital angular moment, we have attempted to detect the orbital excitation using the fine-resolution chopper spectrometer SEQUOIA at SNS, ORNL.

Figure shows a contour map of $S(Q,\omega)$ for YVO_3 at T=88 K (G-OO/C-SO phase). A clear dispersion observed up to 35 meV disappears in the paramagnetic phase. This energy range is higher than that reported previously [3]. On the other hand, weak excitations are observed in the range of 40-70 meV. In this poster, we discuss whether these are originated from orbital excitation or not.



References

[1] S. Miyasaka et al., Phys. Rev. B **73**, 224436 (2006).
[2] C. Ulrich et al., Phys. Rev. Lett. **91**, 257202 (2003).
[3] S. Ishihara, Phys. Rev. B **69**, 075118 (2004).