Magnetic correlations at the Wannier point in isosceles triangular lattice Ising magnet $CoNb_2O_6$

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An isosceles triangular lattice Ising antiferromagnet is characterized by the ratio of exchange interactions defined as $\gamma = J_1$ (along the base direction) / J_2 (along the equilateral direction), and its magnetic property dramatically changes, depending on whether γ is larger than 1.0 or not. As one of the model materials, we have been studing an Ising magnet $CoNb_2O_6$, where the quasi-1D ferromagnetic zigzag chains along the *c* axis form a frustrated antiferromagnetic isosceles-triangular lattice (ITL) with $\gamma \simeq 1.33$ in the a-b plane. If the exchange ratio γ can be controlled in $CoNb_2O_6$ via anisotropic deformation of ITL by uniaxial pressure, variety of interesting magnetic features intrinsic to γ would be observed. Actually, along this context, in previous neutron diffraction experiments at HZB (Berlin), we have found that the magnetic ground state AF-II magnetic ordering with q=1/2 is switched to AF-I magnetic ordering with q=0 at the Wannier point (γ = 1) with critical pressure $p_c \simeq 700$ MPa, by applying uniaxial pressure *p* up to 1GPa along the *c* axis [1].

In present experiment using 4G GPTAS (k_i=2.57 $Å^{-1}$, 2-axis mode with collimation 40'-40'-40'), we investigated how magnetic correlations develop down to T=1.5K at the critical pressure $p_c \simeq 700$ MPa. As is in Fig.1, magnetic scattering profile with q~1/3 along (3,K,0) scan shows broadening at lower temperature, which is clearly seen in the temperature dependence of FWHM shown in Fig.2. Unfortunately, at lower temperatures below 2.2 K, the Wannier state disappears as the system is pulled into the AF- I ($\gamma \leqq 1$ side) and AF-II ($\gamma \geqq 1$ side) magnetically long-range ordered states due to the inevitable distribution of applied stress. Nevertheless, present results, indicate that magnetic correlation develops toward Wannier state.

[1] S. Mitsuda *et al.*, ISSPNSL_report_1802.

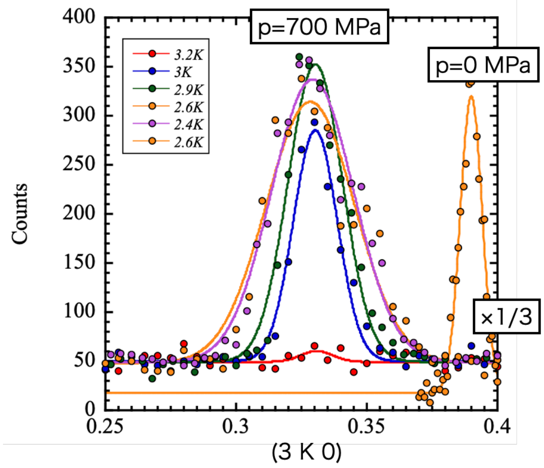

Fig. 1. Temperature dependence of (3,K,0) scan profile.

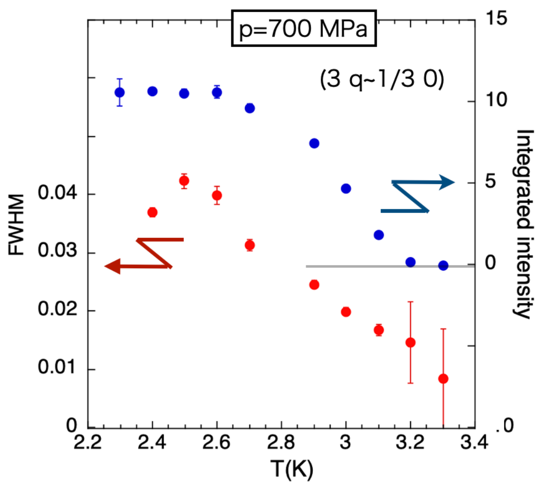

Fig. 2. Temperature dependence of the integrated intensity and FWHM of (3, q~1/3, 0) magnetic peak.