(PS31)

Evidence for Magenetic Order in Filled Skutterudite $YbFe_4Sb_{12}$

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Physical properties of filled-skutterudite compound, $YbFe_4Sb_{12}$, have been investigated by various macroscopic experiments. Some groups reported that $YbFe_4Sb_{12}$ exhibits a ferromagnetic (FM) transition at a low temperature. This FM order, however, still has been controversial, because the unambiguous evidence for the FM ordering has not been put forth yet. In this presentation, in order to investigate magnetic properties in $YbFe_4Sb_{12}$ from microscopic viewpoints, we will report the results of Sb-NQR experiments for plycrystal $YbFe_4Sb_{12}$ at verious temperatures.

In the paramagnetic state, we observed five lines consisted of ^{121}Sb, ^{123}Sb NQR signals and obatained NQR parameters as $^{121}\nu_Q \simeq 38.96$, $^{123}\nu_Q \simeq 23.64$ MHz, and $\eta = 0.373015$. As seen in the Fig. 1, abnormally broadend Sb spectrum accompanied with addtional lines around 3-5 MHz was observed at 1.3 K. It is difficult to ascribe such broadening to only the distribution of the electric field gradient. This is the direct evidence for magnetic order. We estimated the internal magnetic field at Sb site to be $\sim$ 2700 G from the width of the spectrum and some simulations.

Although we tried to calculate dipole field at Sb-site due to magnetic moments on Yb and Fe sites, it is not successful to explain the present broadening. This means that the transfer hyperfine interaction should be taken into account.

We also mesured the temperature dependence of ^{121,123}Sb-NQR for ($\pm 3/2 \leftrightarrow \pm 5/2$) and ($\pm 5/2 \leftrightarrow \pm 7/2$) transitions (see Fig. 2). The spectral broadening was observed below 18 K. Thus we conclude the FM order occurs below $T_c = 18$ K. Details will be presented at poster.

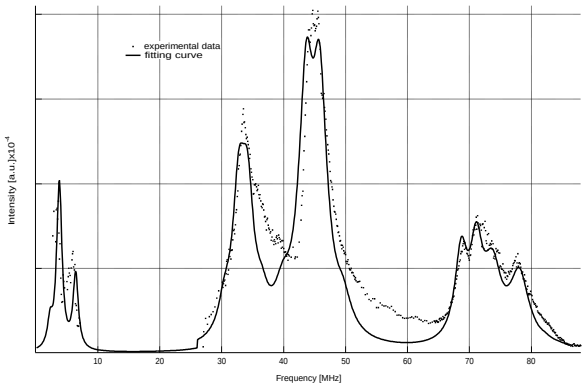

Figure 1: Sb-NQR spectrum at 1.3K and calculation

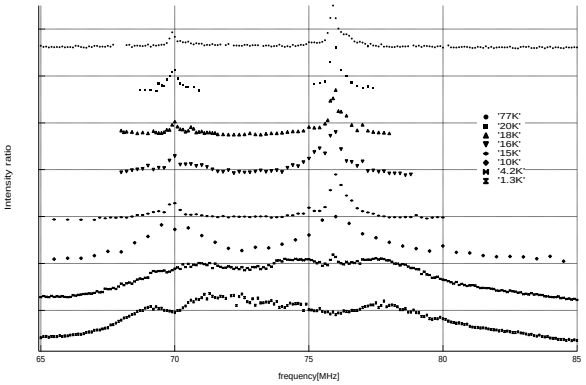

Figure 2: Temperature dependece of Sb-NQR spectrum