# Nuclear-Resonance Scattering of Ferromagnetic Amorphous Alloy

S. Nasu*[1]/3031, Y. Kobayashi[1]/3028, Y. Yoda[2]/1245, S. Kikuta[2], T. Harami[3]/0273, T. Mitsui[3]/0350, M. Yahashi[4]/0387, M. Seto[5]/0279

1) Fac. of Engineering Science, Osaka Univ., 2) Fac. of Engineering, Univ. of Tokyo, 3) Japan Atomic Energy Research Institute, 4) Japan Synchrotron Radiation Research Institute, 5) Research Reactor Institute, Kyoto Univ.

The nuclear forward scattering (NFS) method using synchrotron radiation (SR) has an advantage over using radioisotope in small beam size, high directivity and its polarization. The observed NFS spectrum is usually time spectrum, which has resonance frequency and phase shift. For the spectral analysis, we usually assume the ideal material without the distribution of the resonance frequency. However, real materials are not so. Especially, the amorphous materials have atomic disorder and various chemical enviroment of the resonance atom, the hyperfine fields have the distribution. We study the influence on the time spectrum by the distribution of hyperfine field using ferromagnetic amorphous ribbon.

The specimen was $(Co_{0.94}Fe_{0.06})_{74.5}Si_{13.5}B_{12}$ amorphous ribbon The direction of the magnetic moment was in plane and the sample was applied small external magnetic field to align the magnetic moments in one direction. Fe was enriched 92% by $^{57}Fe$. The experimental arrangement is showed in Fig. 1. The operation mode was 21 bunch mode and bunch interval was 228 nsec. The energy was monochromatized by the high resolution monochromator to 2.5 meV.

Fig. 2 shows the NFS spectrum of $(Co_{0.94}Fe_{0.06})_{74.5}Si_{13.5}B_{12}$ amorphous. The direction of the magnetic moments was perpendicular to the electric field vector of SR. In this case, the transitions are permitted only to $\Delta M = 0$. Thus the observed time spectrum consists of only one beat. In the case of amorphous, the hyperfine magnetic field has a broad distribution, so there are many beats that have a slightly different frequency. We expect that the beat is attenuated quickly. However, the time spectrum shows clearly resolved quantum beat and speed up. The spectral analysis is in progress.

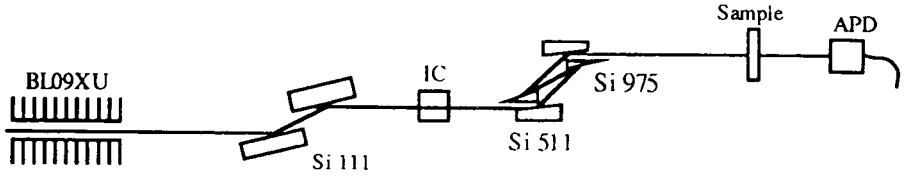


Fig. 1 Schematic drawing of experimental arrangement.

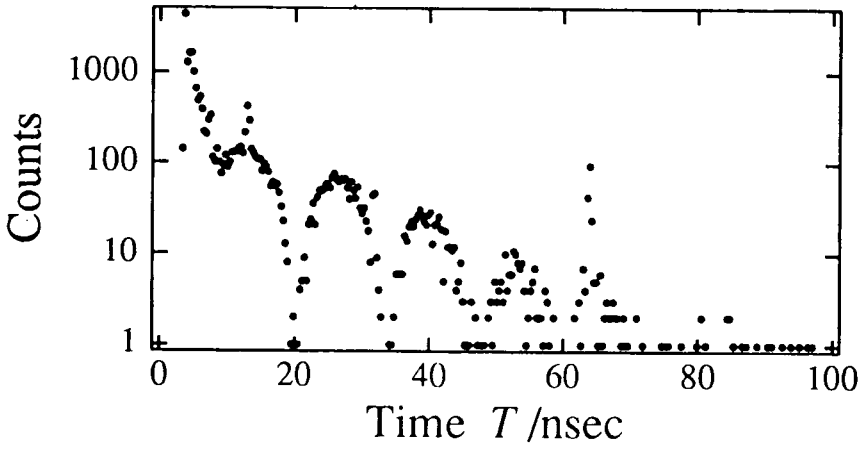


Fig. 2 NFS time spectrum from $(Co_{0.94}Fe_{0.06})_{74.5}Si_{13.5}B_{12}$ amorphous.