

The study of the Perturbed Nuclear Resonant Scattering

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In the system that the hyperfine field oscillates on the plane perpendicular to the light axis, NFS shows the temporal change of the polarization state. By using this phenomenon, we investigated the magnetically excited state of the $^{57}\text{FeBO}_3$ anti-ferromagnetic single crystal. The experiment was performed at the BL09 undulator beamline of SPing-8. The storage ring was operated in 21-bunch mode at 20mA. A pulse emitted only in 228ns with typically 100ps width. The $^{57}\text{FeBO}_3$ crystal was excited magnetically by the external pulse magnetic field. The magnetic field was phase locked by the SR pulse signal. (Magnetic field parameters: strength 28Oe, pulse width 80ns, and fall off time 7ns, frequency $\sim 400\text{kHz}$) The Mössbauer time spectra were measured with and without the Si(840) polarization analyzer crystal. (This crystal reflect only the σ -polarization.) In this measurement system, at the same time, we could get 11 time spectra in the time range of $2.5 \mu\text{s}$ after the fall off. The

parameter of the specific time region $P(t)$ (depolarization factor) were determined by the obtained time spectra. {The value of $P(t)$ relates the rotation of hyper-fine field in the magnetic easy plane (111) during that time region [2].} As a result, $P(t)_{10-20\text{ns}}$ shows the speedy reduction, on the other hand, $P(t)_{20-60\text{ns}}$ keeps about fixed value. (See Fig.1.) It indicates that the rotation speed of the local hyper-fine field in the $^{57}\text{FeBO}_3$ crystal is decreases by the magnetic relaxation.

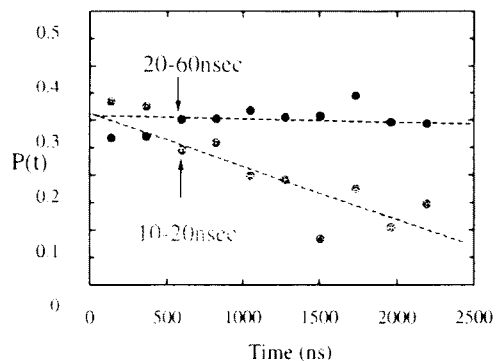


Fig.1. The time dependent depolarization factor

References

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