Measurement of Angular Distribution of Prompt Gamma rays from Compound Neutron Resonance

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The weak interaction contained in the nuclear interaction can be observed as the parity violating (P-violating) asymmetry of the capture cross section with respect to the helicity of incident neutrons. The discovery of large enhancement of the P-violating asymmetry in p-wave compound resonances led to a systematic survey in medium-heavy nuclei in 1990's. The largest enhancement is almost 10^6 compared with the nucleon-nucleon P-violating effect and the enhancement is explained as the result of the interference between incident s- and p-wave amplitude [1].

The mechanism of the P-violating effect has been proposed theoretically to be applicable to enhance the experimental sensitivity to breaking of the symmetry under the time-reversal operation [2, 3]. The enhancement of T-violation is given as

$$\Delta\sigma_{cp} = \kappa(j)\frac{\omega}{\upsilon}\Delta\sigma_{p},$$

where $\Delta\sigma_{cp}$ and $\Delta\sigma_{p}$ are the CP violation and P violating cross section, υ and ω are the weak and CP-violating interaction matrix elements between compound resonances with opposite parities, and κ (j) is the ratio of the spin dependent factor of CP- and P-violating effects. The determination of κ (j) is necessary to estimate the experimental sensitivity to T-violation. Therefore we measured the gamma ray angular distribution from compound resonances and evaluated the κ (j) values.

We will report the experiment and analysis of the κ (j) determination.

References

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