Measurement of Isomeric Yield Ratios of Fission in the System of Protons on 232Th

I. 8. Measurement of Isomeric Yield Ratios of Fission in the System of Protons on ^{232}Th

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The isomeric yield ratios of fission products were measured in 24 MeV proton-induced fission of ^{232}Th by the use of ion guide isotope separator on line (IGISOL). The yields of fission products were determined by gamma-ray spectrometry. The obtained isomeric yield ratios were converted to the initial angular momenta of fission fragments by assuming a statistical spin distribution:

$$P(J) = P_0 (2J+1) \exp \{-J(J+1) / < J^2 > \}.$$

The J_{rms} ($=< J^2 >^{1/2}$) was taken as an indicator of the fragment angular momentum. The de-excitation process of primary fragment was calculated with GROGI-2 code[1]. The deduced angular momenta (J_{rms}) were compared with those obtained in the proton-induced fission of ^{238}U (E_p=24 MeV) and shown in Fig.1 where the fragment J_{rms} was plotted as a function of fragment mass number. Figure.1 shows that the heavier fragments give the larger J_{rms} and that J_{rms} are almost the same value in the both systems. The J_{rms} of ^{99}Nb is quite small, this is probably because of the fragment shell effect of its complementary fragments (Sn,Te).

In 24 MeV proton-induced fission of ^{238}U, it was found that the magnitude of J_{rms} is well correlated with the fragment excitation energy[2]. Although the fragment excitation energies in Th system are estimated to be 6~8 MeV smaller than those in U system, the values of J_{rms} are almost the same at each fragment mass. Therefore, it is suggested that the fragment angular momentum is strongly affected by the nature of individual fragment.

References

1) Grover J. R., Gilat J., Phy.Rev. 157, 802 (1967) .
2) Tanikawa M., et al. submitted to Z.Phy.A.

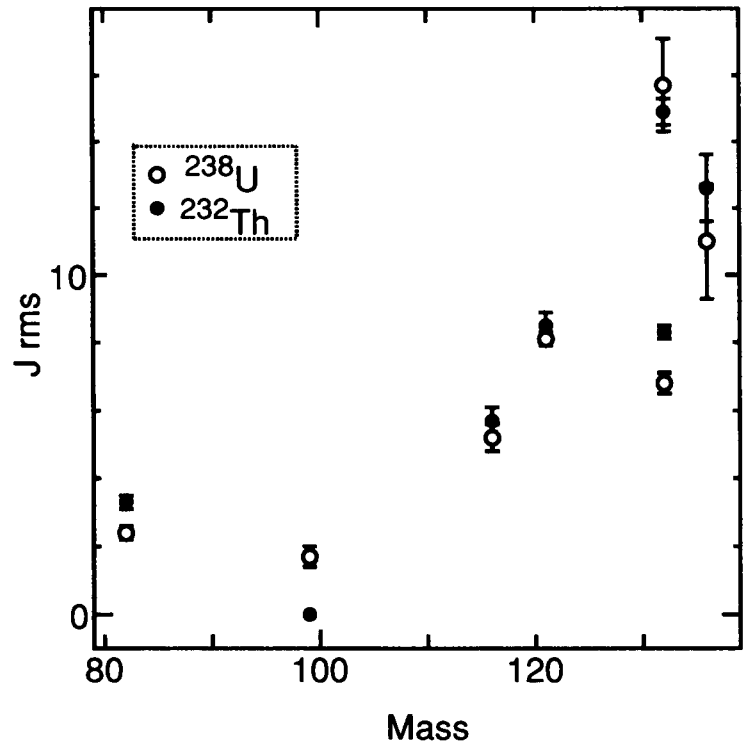

Fig. 1. Deduced J_{rms} of fission products produced in 24 MeV protons on ^{232}Th and ^{238}U.