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EVIDENCE FOR PEAR SHAPE IN THE FISSION OF ^{231,233}Th

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Both, neutron and deuteron induced fission reactions on ^{230,232}Th can lead to the same excited compound nucleus ^{231,233}Th. However, in the former (n,f) reaction one is limited to rather small angular momentum transfers, $\ell \lesssim 3$, near the fission threshold, whereas in the latter (d,pf) case ℓ values of about 6 can be attained. In this paper we present results for the ^{230}Th (d,pf) reaction, around 5.9 MeV excitation energy, obtained with an appropriate proton-fission time coincidence an an overall proton energy resolution of FWHM $\simeq$ 6 keV. The resulting data, given in fig.1 shows, the very same fine structure previously observed for the lower ℓ values in the corresponding ^{230}Th(n,f) reaction (1,2), but an additional set of higher spin states, not accessible with (n,f) reaction also appears. These new results support and confirm our previous interpretation of the (n,f) data, namely that we are again observing two close-lying rotational bands with opposite parities but this time for ℓ values up till 5 (at least), a fact which can best be understood in terms of a "triple humped potential barrier", theoretically expected for an asymmetric, pearlike deformation of the excited compound nucleus.

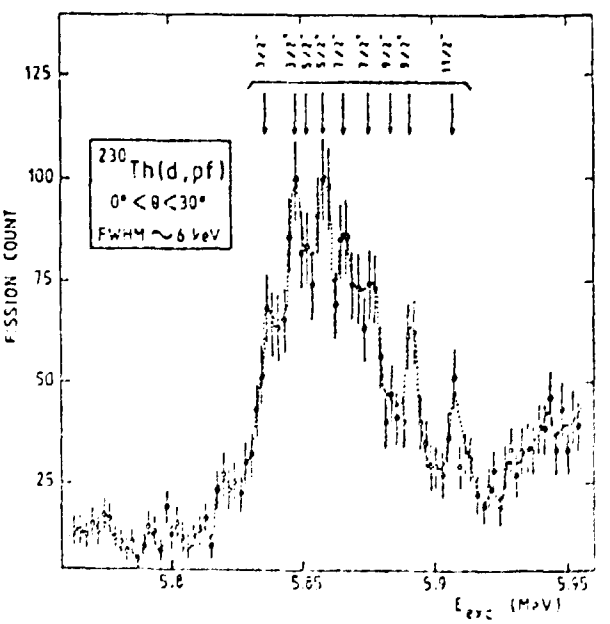

Fig.1 - ^{230}Th(d,pf) fission events, ϕ for 0° < θ < 30°, the dashed line result from the smoothing of the data by a 1 keV width gaussian function. θ is the detection angle of the fission fragment with respect to the recoil axis of the compound nucleus.

REFERENCES

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