

A DETERMINATION OF THE MASS DISTRIBUTION OF FRAGMENTS ARISING FROM U AND Th FISSION INDUCED BY K^- MESONS OF A MOMENTUM OF 700 MeV/c

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The mass distribution of fission fragments produced in interaction of 700 MeV/c K^- mesons with the U and Th nuclei has been studied using a polycarbonate detector (makrofol) by the sandwich method⁽¹⁾.

For each event recorded in the detector the following unknowns were determined: mass (M_i) in AMU, charge (Z_i), kinetic energy of the fission fragment (E_i) in MeV, and the number of nucleons emitted in the course of evaporation process.

Use was made of the following hypotheses:

- At the instant of fission the nucleus is at rest.
- Only neutrons are emitted in evaporation process.
- $M_i/Z_i = M/Z = r$, where M and Z are respectively the mass and charge of the nucleus before fission, and r is a corresponding constant.

The excitation energy after cascade process was estimated to be $E^* = 240$ MeV.

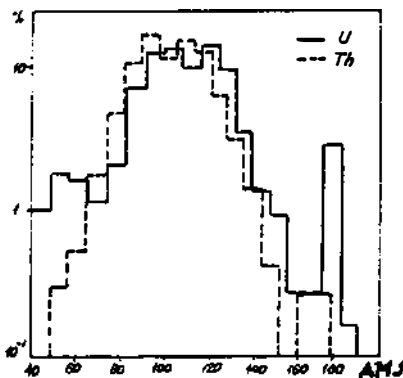


Fig. 1. Mass distribution of fission fragments

The mass distributions of the U and Th fission fragments were obtained on the basis of the above quoted hypotheses, the laws of conservation of charge, mass, momentum and energy, and the empirical relation $P = f(R)$ ⁽²⁾ (where P is the momentum of the fragment in MeV/c, and R is the range of the fragment in μm) (see Fig. 1).

The mean values of kinetic energies, 162 and 155 MeV for U and Th respectively, satisfy the empirical relation $E = 0.121 \cdot Z^2/A^{1/3}$.⁽³⁾

The mass distributions are symmetric within the limits of error, which was to be expected, since

we are dealing with fission at high energies.

References

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