EMISSION OF HEAVY FRAGMENTS IN INTERACTIONS OF 700 MeV/c K^- MESONS WITH U, Th, Au AND Ag NUCLEI

R. Antanasijević and Ž. Todorović
Institute of Physics, Belgrade, Yugoslavia

ABSTRACT

In this work the emission of heavy fragments produces in the interaction of 700 MeV/c K^- mesons with nuclei of heavy elements has been analyzed. Some characteristics of the fission and fragmentation have been studied as a function of the target element mass number.

* * *

Emission of heavy fragments produced by high-energy mesons has been little investigated so far. Available data refer mainly to the fission of Ag and Br induced by π-mesons and K^- mesons and were obtained using nuclear emulsions[1,2,3]. In order to improve discrimination of fission fragments from the products of nuclear fragmentation and spallation, in the present work use was made of a polycarbonate detector (makrofol) sensitive to fragments with $A \geqslant 16$.

Polycarbonate detectors of a size of $(4\times4\times0.02)cm^3$ with targets of the elements to be investigated, of a thickness of 40 - 50 mg/cm^2, were exposed at CERN to K^- mesons (10^7-$10^8 K^-/cm^2$) the flux of which was perpendicular to the detector surface. After chemical etching[4] the detectors were scanned with an optical microscope at a magnification of 20×15×1.25. The following three kinds of event were found by scanning: single-, two- and three-prong events.

From range distributions it may be concluded that there are two groups of binary events (Fig. 1). The first group comprises events with ranges up to 10μm, while the second consists of events with ranges exceedeng 10μm. Using approximate relations $E = f(R)$ for makrofol it may be shown that events with $R < 10\mu m$ are not due to the fission process. The range distribution of the first group of events is the same as that of single-prong events (Fig. 2). From this it may be concluded that events belonging to the first group of binary events probably are due to the nuclear fragmentation and spallation processes or to coin-

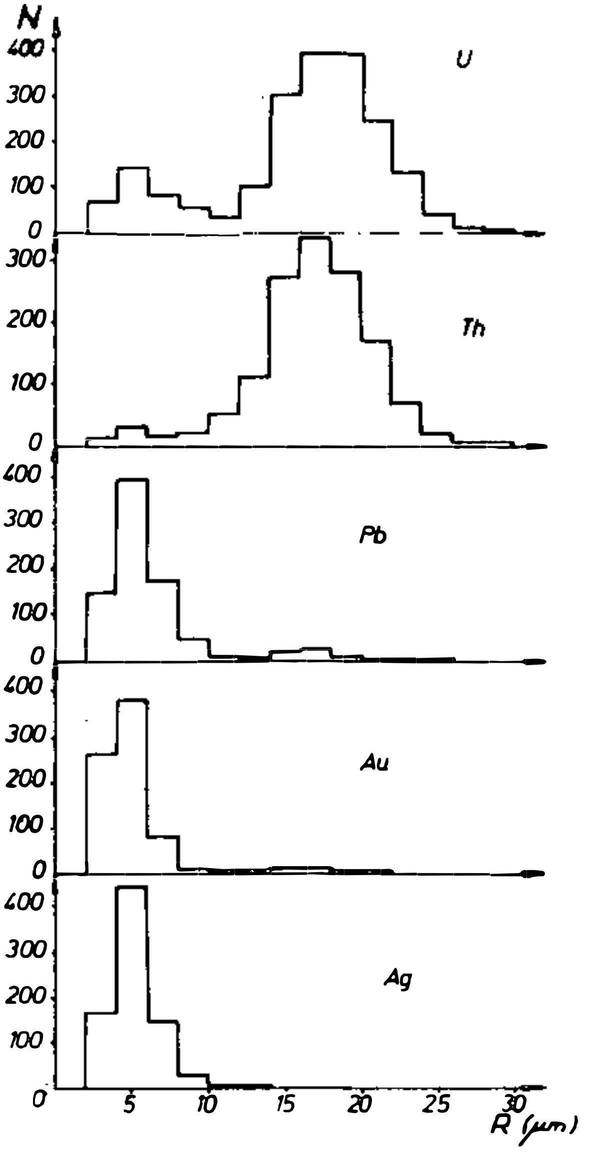

Fig. 1

Range distributions for binary events

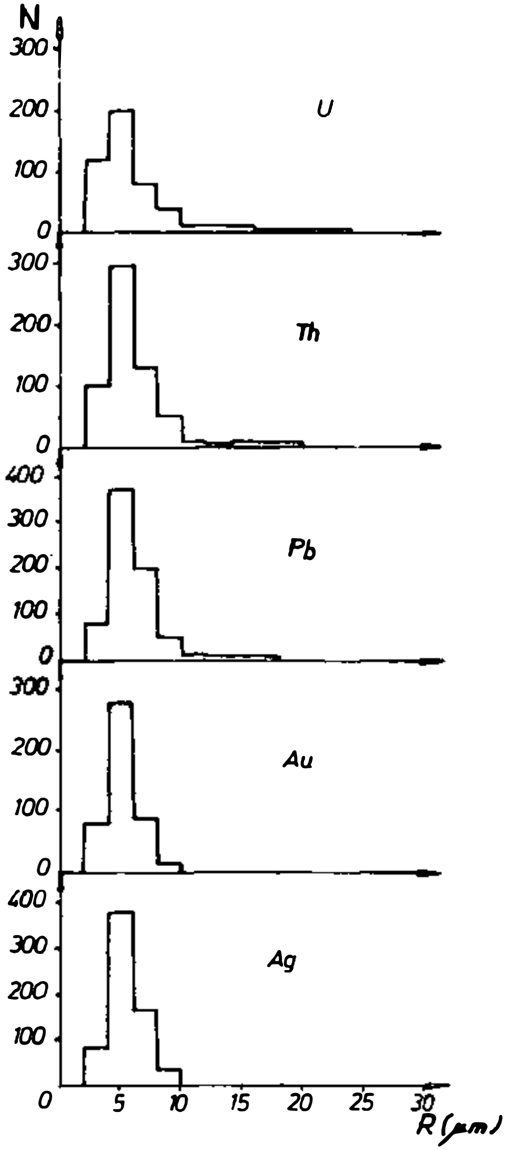

Fig. 2

Range distributions for single events

cidences of single tracks. Binary events with $R > 10\mu m$ represent binary fission events.

TABLE 1

	Rs (μm)	$S/_B$ (%)	N_F/N_B (%)	$T/_B$ (%)
U	6.22±0.15	130	83	0.9
Th	6.01±0.11	120	95	0.4
Pb	5.89±0.07	170	5.3	-
Au	5.17±0.06	160	3.2	-
Ag	5.60±0.06	170	-	-

Table 1 gives the ratio of single to binary events (S/B), the ratio of binary fission events (N_F) to binary events (N/B), and the ratio of ternary to binary events (T/B).

The S/B ratio increases with decreasing mass number of the target, whereas the fraction of fission events in binary events considerably decreases with decreasing target mass number.

REFERENCES

1) N.S. Ivanova, *Sov. Phys. JETP* 7 (1958) 955

2) G.F. Denisenko, N.S. Ivanova, N.A. Perfilov, E.I. Prokoffieva, V.P. Shamov, *Phys. Rev.* 109 (1958) 1779

3) M. Jurić, S. Popov, Ž. Todorović, *Nucl. Phys.* A140 (1970) 154

4) R. Antanasijević, Ž. Todorović, M. Jurić, V. Gerc, *Z. Physik* 254 (1972) 106