

SOME CHARACTERISTICS OF THE FISSION OF Bi, Pb AND Au INDUCED BY
HIGH-ENERGY α -PARTICLES

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The subject of this study was fission induced by high-energy α -particles, which has been little investigated so far. The incident particles in this experiment were ${}^4_2\text{He}$ ions of energies of 0.65, 1.74 and 4.12 GeV. A polycarbonate (makrofol) was used as track detector in the standard sandwich technique⁽¹⁾.

The results obtained on the cross-sections for binary fission are given in Table I. A comparison of our results with those obtained using protons^(2,3) and deuterons⁽⁴⁾ as projectiles in the same

E(GeV)	Bi	Pb	Au	energy interval shows that there are differences in absolute values and an analogy in behaviour with varying projectile energy and target mass number.
0.65	437 \pm 138	254 \pm 77	201 \pm 68	The fissionability (σ_F/σ_R), i.e. the ratio of the fission cross-section to the total reaction cross-section, was also calculated. Using our data we have derived a relation giving the maximum value of fissionability as a function of the parameter Z^2/A of the target:
1.74	368 \pm 123	245 \pm 72	188 \pm 54	
4.12	383 \pm 108	270 \pm 78	203 \pm 58	

$$\sigma_F/\sigma_R = \exp 0.66 (Z^2/A - 35.55)$$

A comparison with a corresponding relation for photon-induced fission⁽⁵⁾ shows that there is the same dependence on Z^2/A of the target but that the σ_F/σ_R ratio is somewhat higher.

A certain number of ternary events have also been detected. Data referring to the ratio of the total number of ternary events to that of binary ones (T/B) are given in Table II. From the table it may be seen that in the present experiment, as well as in that with protons⁽⁶⁾, the T/B ratio increases with increasing projectile energy. At an incident particle energy of $E=4.12$ GeV our values of the T/B ratio increase with decreasing target atomic number, which is in agreement with the trend observed in experiments with protons and deuterons⁽⁴⁾.

References

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