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Target dependence of fragmentation reaction cross-sections at intermediate energies and its calculation in the relativistic and low-energies oriented models.

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In the year 1971 the pioneering works on fragmentation reactions in the collisions at relativistic energies began. At the same time in experiments at low energies deep- inelastic mechanism was discovered. To describe the fragmentation reactions at relativistic energies different models such as the EPAX and the Abrasion–Ablation models were developed. As the experiments on projectile fragmentations at low-energy were continued it was observed that beginning from the energies of about 30 MeV per nucleon direct processes began to prevail. Due to this to plan the experiments at low and intermediate energies the EPAX, the Abrasion–Ablation models and other models common in describing relativistic nuclear collisions were used. It was shown that these models describe quite well the cross-sections of fragments not far from the stability-line also at low energies.
But what these models cannot predict is the ratio of fragments cross-sections produced in the reactions with the same projectile but different targets, called target ratio. In this report we analyze the target ratio values in the reactions with different projectiles from 18O to 48Ca with energies from 35 to 140 MeV per nucleon on two targets : 181Ta and 9Be. The results of calculations in the modified transport-statistical approach, developed by our group, the EPAX, Abrasion–Ablation and the FRACS models and comparison to the experimental data are presented. The hyperbolic shape of the envelope of target ratio values is explained as manifestation of the different range of impact parameters involved in reactions on heavy and light targets.

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