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On the role of neutron and proton nuclear shells in formation of mass and energy distributions of fission fragments of 237Pu*, 240Pu* and 242Pu* compound nuclei with excitation energy of around 23 MeV.

Mass and energy distributions of fission fragments are formed under the influence of different proton and neutron nuclear shells. These shells manifest differently depending on nucleon composition and excitation energy of the fissile nucleus. Up to this day the discussions about the role of neutron nuclear shells in formation of mass and energy distributions of fission fragments in comparison to the role of proton nuclear shells are taking place. To clarify said roles we have measured mass and energy distributions of fission fragments of 237Pu, *240Pu* and 242Pu* compound nuclei formed in 233U(α,f), 236U(α,f), 238U(α,f) reactions at incident alpha particle energy of 29 MeV which resulted in all compound nuclei having almost the same excitation energy of around 23 MeV. All reactions have been measured at U-150M cyclotron of Institute of Nuclear Physics, Almaty by 2E method. Large statistics of coinciding fission fragments have been acquired. That gave an opportunity to study not just mass distributions, but also distribution of average of total kinetic energy and distribution of variance of average of total kinetic energy. From measured mass distributions it is possible to conclude that nuclear shell Z54 is present. However nuclear shells are characterized by, first of all, reduction in potential energy owed to their formation. That is why it is important to also study energy distributions in order to definitely state the presence of nuclear shell. From measured data for studied compound nuclei it is possible to state that the influences from deformed nuclear shells Z52 and N88 are present in energy distributions, however such effects are not present in mass distributions. In contrast to mass distributions for studied compound nuclei, in energy distributions it is not possible to observe clear signs of effects of nuclear shell Z54.

Section

Nuclear physics (Section 1)

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