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Alpha decay characteristics of superheavy elements

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Superheavy elements are of great interest from the point of view of fundamental nuclear physics. The most important task of this direction is not only the discovery of new elements, but also the synthesis of the maximum number of isotopes of each element, which makes it possible to consider the change in the physical properties of heavy nuclei both with a change in the number of protons and with an increase in the number of neutrons. An important feature of the region of superheavy nuclei is the predominant decay with the emission of an alpha particle. This feature is at the heart of modern methods for registration of new elements, so prediction of the alpha decay characteristics of unknown elements is very important [1].

The alpha decay energy of an unknown nucleus can be obtained by evaluating the binding energies of the corresponding nuclei. Successful phenomenological approach application to binding energy predictions for nuclei with a proton number Z up to 106 based on the residual np-interaction formula was demonstrated in our previous work [2]. The report presents the further development of the approach. The prediction method is expanded by taking into account experimental alpha decay energy. This modification made it possible to overcome the limitations and carry out calculations in the field of heavier nuclei. New results obtained using the latest experimental data compilation AME2020 [3]. Comparison with other model predictions is presented.

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