Brief information about the project

Title	AP22683187 «Structure of the light nuclei and hypernuclei in multi-channel and multi-cluster models»
Relevance	The conducted research and the results on them are of great importance for the theoretical description of processes involving light nuclei and hypernuclei, since they take into account a realistic picture of the studied nuclear reactions and their processes. The approach used in the conducted research allows us to obtain a more detailed picture and the opportunity to even see new patterns in the studied nuclei and hypernuclei.
Goal	Improve existing cluster models and apply them to study the structure and dynamics of nuclear reactions in nuclear and hypernuclear systems that are relevant in our time.
Tasks	Study of the spectrum of bound and resonant states of the hypernuclei ${}^{6}_{\Lambda}$He and ${}^{6}_{\Lambda}$Li. These nuclei will be considered as three-cluster structures ^{4}He+n+Λ and ^{4}He+p+Λ, respectively. The scattering phases of ${}^{5}_{\Lambda}$He+n and ${}^{5}_{\Lambda}$Li+n, ${}^{2}_{\Lambda}$H+^{4}He will be calculated, the parameters of the resonance states of the hypernuclei ${}^{6}_{\Lambda}$He and ${}^{6}_{\Lambda}$Li and the probability of their decay through the available binary channels. Research will be carried out on the reaction ^{6}He+p=^{6}Li+n, in which ^{6}Li nuclei are synthesized. The research will be carried out in a cluster model, in which two three-cluster configurations ^{4}He+d+n and ^{4}He+nn+p will be taken into account, and as a result, all binary channels of the ^{7}Li nucleus will be taken into account. Analysis of this reaction will help explain the distribution of light atomic nuclei at various stages of the development of our Universe (astrophysical lithium problem). Highly excited states of the ^{7}Li nucleus will also be studied. Within the framework of the three-cluster microscopic model, a theoretical analysis of the fusion reactions ^{3}He+^{3}H=^{4}He+d, ^{3}He+^{3}H=^{5}Li+n, ^{3}He+^{3}H =^{5}He+p, as well as fusion reactions of the ^{6}Li nucleus, namely the radiative capture reactions ^{4}He+d=^{6}Li+γ and ^{3}He+^{3}H=^{6}Li+γ, will be carried out. Astrophysical S factors and the rates of these reactions will be determined.
Expected and Achieved Results	Based on the results of the implementation of the goals and objectives of the research work of the project, upon its completion, the following is expected to be published: at least 2 (two) articles in journals from the first three quartiles of the impact factor in the Web of Science database or having a percentile according to CiteScore in the Scopus database of at least 50. Currently, active work is underway to prepare articles for publication.

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Publications list with links to them	Kalzhigitov N, Amangeldinova S, Vasilevsky V.S. Discrete and continuous spectrum of the lightest hypernuclei // International Conference of Students and Young Scientists in Theoretical and Experimental Physics «HEUREKA-2025». – Lviv, Ukraine. – 2025. – P. D7. https://physics.lnu.edu.ua/conferences/heureka2025/files/Heureka2025.pdf
Patent information	-