

REVIEW

of foreign scientific consultant Doctor of Physical and Mathematical Sciences, Melezhik Vladimir Stepanovich on the dissertation work of Valiolda Dinara Salavatkyzy "Coulomb breakup of exotic nuclei by quantum-mechanical approach", presented for the degree of Doctor of Philosophy PhD in the specialty "6D060500 - Nuclear Physics"

PhD applicant Valiolda Dinara Salavatkyzy entered the PhD doctoral program in Nuclear Physics of the al-Farabi Kazakh National University in 2015. Since 2016 Valiolda Dinara has taken a scientific internship at the Laboratory of Theoretical Physics of Joint Institute for Nuclear Research. From that time to this day she continues to collaborate in theoretical studying the Coulomb breakup of the ^{11}Be halo nucleus, which is included in her PhD thesis.

Her dissertation work is devoted to the investigation of the breakup of ^{11}Be halo nuclei within the time-dependent quantum-mechanical approach. In particular, quantitative analysis of the breakup reaction of ^{11}Be on a heavy target (^{208}Pb) at a wide range of beam energy (5–70 MeV/nucleon) taking into account Coulomb and nuclear interactions between the projectile and the target have been performed. The influence of the resonant states of ^{11}Be on the breakup cross section, which clearly showed the contribution of the $5/2^+$ resonance at low energies (30–5 MeV/nucleon) was firstly calculated in the framework of the dissertation task. This is undoubtedly useful for astrophysical applications and experimental studies of the characteristics of light exotic nuclei.

During the work on the dissertation, Dinara Valiolda proved to be a highly qualified specialist in the field of theoretical physics. Her knowledge of the mathematical apparatus and numerical methods used in modern theoretical research helps her efficiently realize the research objectives. D.S. Valiolda showed hard work, perseverance in achieving the goal, the ability to organize her work. In general, D.S. Valiolda can be described as a well-formed researcher, capable of solving assigned tasks on topical problems of nuclear physics, worthy of a PhD degree.

The results of the research have been published in highly rated journals, in particular in European Physical Journal A (Q1, percentile 74%), Physics of Particles and Nuclei letters (Q3, percentile 25%), Acta Physica Polonica B (Q3, percentile 14%), Eurasian Journal of Physics and Functional Materials (Q4, percentile 20%) and others.

The materials of the dissertation work were presented at prestigious International conferences, such as: "IV International Scientific Forum-Nuclear Science and Technology" and The International Workshop on Elementary

Particles and Nuclear Physics, (Almaty, Kazakhstan, 2022), The LXXI International conference "NUCLEUS - 2022. Nuclear physics and elementary particle physics (Moscow, Russia, 2022), XXIII International School on Nuclear Physics, Neutron Physics and Applications (Varna, Bulgaria, 2019), European Nuclear Physics Conference EuNPC, (Bologna, Italy, 2018). The results of the research were reported at the scientific seminar of the Laboratory of Theoretical Physics of the Joint Institute for Nuclear Research in 2020.

Presented in the dissertation work results are reliable and of scientific interest. Their relevance and novelty are beyond doubt. I believe that the dissertation of Valiolda D.S. fulfills all requirements of the Committee for Quality Assurance in the Sphere of Education of the Ministry of Education of the Republic of Kazakhstan for a PhD thesis, and could be recommended for the defense of the PhD degree in the specialty "6D060500 - Nuclear Physics".

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