Review of the project **MONUMENT**.

"Muon ordinary capture for the nuclear matrix elements in ββ decays".

The proposed project MONUMENT is aimed at research muon capture on nuclei: ^{136}Ba, ^{76}Se, ^{96}Mo, ^{100}Mo and natural mixtures that include the nuclei under study, as well as on lighter nuclei (^{40}Ca, ^{56}Fe, ^{32}S). The relevance of the topic studied in the project is related to the ability of apply the obtained results by extracting the muon capture rates for solving the fundamental problem of modern particle physics: search for neutrinoless double β-decay (0νββ). This problem is directly related to the questions about the nature of the neutrino and its masses which are beyond the Standard Model.

The main interest in these studies is caused by measurements with ^{136}Ba, ^{76}Se and ^{96}Mo, which are the daughter isotopes for ^{136}Xe, ^{76}Ge, and ^{96}Zr, on which a large number of experiments are being conducted to find neutrinoless double β-decay. Measurements at ^{76}Se should be highlighted, in connection with the beginning of an international experiment of a new generation on ^{76}Ge, namely LEGEND.

The importance of the results that are to be expected in the considered project is related not only to the solution of the main task of the project – determination of the partial μ-capture rates for the nuclei that have of decisive importance for theoretical calculations of probabilities of neutrinoless double β-decay, but also with extracting an information required for testing nuclear models. So, for example, the results of measurements of the muon capture at ^{40}Ca, ^{56}Fe, ^{32}S allow one to estimate quenching of the axial-vector coupling constant g_A, which affects the determination of the decay rate is 0νββ. From the astrophysical point of view, the results are of interest for the development of the theory of nucleosynthesis, that would take into account the astro-neutrino component (for example, in the case of ^{100}Mo).

It should also be noted that there is an applied part of the MONUMENT project. It is the possibility of widening an interactive atlas of mesoroentgen radiation spectra created by the authors, which is a unique set of experimental information of such kind in the world.

An important advantage of the project is that a group of authors from DLNP JINR is a pioneer in such muon capture studies and have extensive experience in conducting experiments at the psi meson factory. In these studies, several daughter nuclei for the double beta decay (^{48}Ti, ^{150}Sm, ^{106}Cd, and ^{82}Kr) have already been studied and priority results have been obtained, published in leading peer-reviewed journals and presented at major international conferences. It also should be noted that the comparison of the experimental results derived by the team of authors on muon capture with the modern theoretical calculations of L. Jokiniemi and J. Suhonen showed a good agreement. All this gives a strong argument to continue the experimental program on a new set of nuclei.

At the same time, I would like to make two critical remarks about the content of the proposed project:

1. the need for measurements on a ^{100}Mo target is not clearly justified, especially given the planned measurements on a natural mixture of molybdenum isotopes, which contains 9.62% ^{100}Mo.
2. the project does not fully describe a comparison of the experimental results with the predictions of various theoretical models used for calculating nuclear matrix elements (NME).

In my opinion, these remarks can be taken into account in the future work of the DLNP JINR group. I believe that the project **MONUMENT** "Muon ordinary capture for the nuclear matrix elements in ββ decays" contains all signs of relevance, allow the group to obtain priority results that are important for fundamental physics, in particular for the search for neutrinoless double beta decay, and deserves support.

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