**Referee Report:**

**«Design and development of the tagged neutron method for determination of the elemental structure of materials and nuclear reaction studies (project TANGRA)»**

In this project, it is proposed to study the properties of light nuclei, reactions with their participation, and to carry out applied studies on neutron beams from the *D+T*-reaction with the identification of beam neutrons by associated alpha particle.

The project is a logical continuation of the works carried out in 2014-2016. For the previous time, a multi-detector gamma and neutron detection system with a large total angular capture close to 4π has been created. Electronics, a system for identifying-separation signals, selecting events and a system of primary analysis are prepared. A large amount of work was done to create the experimental setup as a whole. The system is tested in real test experiments.

The project for 2017-2019 clearly formulated the tasks of fundamental and applied research, as well as plans for the further development of experimental equipment.

One direction is the experiments on the precise measurement of the circular polarization of gamma transitions in light alpha cluster nuclei in order to verify the presence of weak nuclear states, including close to known states.

Another direction is related to the presence of an effective neutron detection system (and which is planned for further development), including for reactions *(n,2n)*. Here, experiments are planned to investigate the reactions of *7Li(n,2n), 9Be(n,2n), 10B(n,2n)* with the identification of the reaction channel by the *Q-*reaction technique. Such data are important for astrophysical theories.

Estimates of the required exposure time are presented, confirming the reality of the planned experiments.

A large amount of applied research is planned in the project in the framework of methods with labeled neutrons and activation analysis. Here - effective identification of small admixtures of elements by a nondestructive method, obtaining fundamental data on neutron and gamma cross sections for such techniques. The plans for the use of neutron methods for research on the prototype of the Martian soil are original and promising.

I recommend to consider the possibility (in future) of using such a powerful n-, γ-detecting system on more powerful neutron beams – in this case it will be possible to reduce the thickness of the target and carry out experiments with the registration of charged particles in coincidence with *n* and *γ*.

**I strongly support project TANGRA to continue.**

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