Review

of the project "Complex of cryogenic neutron moderators at the IBR-2 facility", submitted for consideration by the PAC for Condensed Matter Physics.

The proposed Project "Complex of cryogenic neutron moderators at the IBR-2 facility" for 2020-2022 years is aimed at continuation of works on creation, debugging and improvement of moderators at the reactor IBR-2M in the course of implementation of the Theme 1105 "Development of IBR-2M facilities with a complex of cryogenic moderators".

These works, along with a number of tasks ensuring the uninterrupted and efficient operation of the reactor, form the basis of the Theme 1105. The work on the topic is critically important for the implementation of the scientific program of JINR in the part of research in the field of condensed matter physics.

The report on the topic 1105 presents the main results achieved, the analysis of the implementation of the work plan for 2017-2019, formulated the main tasks and presented cost estimates for 2020-2022 years, given the characteristics of the participants and the staff involved. All these positions deserve a positive assessment, despite the existing (but not critical) delays in the implementation of technical developments related to the system of transportation and removal of cryogenic balloons material of the moderator.

The experience of the operation of CM-202 showed the basic correctness of approaches and solutions implemented in the design of the whole complex. Continued work on the creation of a set of moderators is extremely important for the improvement of the neutron source. It provides an opportunity of the solving of scientific problems in researches of magnetism, bio-objects, development of new methods of research of materials, at the expense of enlargement of an available range of neutron wavelengths, as well as significant reduction of time of some number of the experiments – i.e. an increase of efficiency of the use of neutron beam instrumentations. These factors are extremely important in the implementation of the user mode of IBR-2M operation.

It should be emphasized that the work of the complex of cryogenic moderators is based on unique scientific and technical solutions, first realized at its creation. JINR is a pioneer in the application of cryogenic neutron moderators in the form of array of the solid beads of a millimeters size. Moreover this is currently the only active and developing cryogenic neutron source in Russia. The provided parameters of neutron flux from this facility confirm the high level of scientific research and engineering developments and endorse high qualification and compliance of the team of the work participants with the immediate and perspective tasks of the Project.

Under the theme of 1105, the authors received encouraging results on the sufficient stability of the organic components of the moderator to radiation exposure, practically within the entire reactor cycle. The method allowing independently to change an effective temperature of elements of a complex of moderator in a wide range from 20K to 150K is developed that actually leads to further optimization of experimental conditions for concrete works on neutron instruments.

Based on the experience of operation of the cryogenic complex and the first, of the three planned for installation, the moderator of CM-202, the authors of the project

developed a well-grounded plan of further work, covering the whole set of tasks to improve the neutron source based on the reactor IBR-2M. From what is important for researchers working with neutrons, it should be noted the launch of another cryogenic source of neutrons CM-201, which will provide cold neutrons to 5 channels additionally. It is planned to optimize cryogenic equipment for flexible control of the spectrum of each source, which will also increase the consumer characteristics of the entire neutron complex.

Overall, the Project implementation for the period 2020-2022 years is certainly important and necessary to ensure the world level of the condensed matter physics research by neutron scattering methods in JINR.

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