Review of the new theme *Development of the Conceptual Design of a New Advanced Neutron Source at JINR* for the JINR Topical Plan 2020–2022

Neutron scattering, as well as other neutron-source-based analytical and imaging methods are pre-eminent tools of investigating geometrical, chemical and magnetic structure as well as the dynamics of condensed matter and engineering materials. These techniques are in profound synergy with complementary methods such as those based on synchrotron radiation, electron microscopy, ion-beam physics and others. Therefore, they are indispensable both for basic and applied research as well as for technological development. This is why neutron sources dedicated to scientific research and development including condensed-matter physics had been built all over the word since the 1950-es. Nevertheless, due to the upcoming decommissioning of many neutron sources, the world will see a marked shortfall in research neutrons within the next two decades unless appropriate measures will be taken in due time.

JINR has a long-standing tradition in neutron sources dating back to the early 1960-es. Starting with the first IBR facility, the institute operates now the world's only pulsed reactor, the modernized IBR-2 of 2 MW average and 1.8 GW peak power, i.e. the most brilliant neutron source of the world. The strength of JINR is not only this unique research infrastructure itself but also the exceptional tradition, knowledge and expertise at FLNP which has developed during many decades. Accordingly, it is obvious that, after the decommissioning of IBR-2 in the thirties, a new neutron source should be built and operated at JINR.

The objective of the proposal submitted to the PAC for Condensed Matter Physics is the conceptual design of a new advanced neutron source at JINR to be included in the 2020–2022 Topical Plan of the institute. This includes the feasibility study of the construction of the facility as well as specifying its initial technical parameters. Given the fact that this process is an already ongoing one, the three years' time frame is realistic. Indeed, FLNP has established an intensive cooperation with the reactor designer company NIKIET. The concept of the accelerator-driven neutron source version is being developed in cooperation with the Kurchatov Institute and the Institute for Nuclear Research, RAS. The work is supported by the Working Subgroup for Condensed Matter Physics and Neutron Physics of the Working Group for JINR Strategic Long Range Planning. This subgroup meets regularly and, furthermore, FLNP is organizing a series of specific workshops on various aspects of the future JINR neutron source.

The conceptual design process is fully in line with the overall timing of the preparatory and construction phase of the new facility that is planned to conclude by the mid-thirties, i.e. when the decommissioning of IBR-2 is to be expected. It should be, nevertheless, stressed that the conceptual design and, later, further items of the preparatory phase should be always in accordance with the science case of the new neutron source and its instrumentation that should be elaborated and permanently updated.

The requested financial support of the new theme of 3431 k$ as well as its annual and budgetary breakdown is realistic and well-justified. In view of the extensive national and international collaboration, the human resources allocated by FLNP are adequate.

In conclusion, I strongly recommend opening a new theme "Development of the Conceptual Design of a New Advanced Neutron Source at JINR" for 2020–2022 with first priority.

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