Referee report on the project "Development of an inelastic neutron scattering spectrometer in inverse geometry at the IBR-2 reactor"

Inelastic neutron scattering (INS) is a method used to study atomic and molecular motion as well as magnetic and crystal-field excitations in condensed matter. INS has a long-standing tradition at IBR-2, however the status of the two INS spectrometers became disquieting both for the user community and the FLNP management. Indeed, these spectrometers no longer satisfy the regional needs either in Eastern Europe or in other JINR Member States. Therefore, a detailed plan including a strong science case to build new INS spectrometers at IBR-2 was elaborated in 2020 by an FLNP team and discussed at the 52th (July 2020) PAC meeting. The plan envisaged building two new INS spectrometers starting with one operating in inverse geometry and later continuing with another spectrometer working in direct geometry. The inverse geometry is especially suited for pulsed sources like IBR-2.

The PAC recommended opening of the new project "Development of inverse geometry inelastic neutron scattering spectrometer at the IBR-2 reactor" within the theme "Investigations of Functional Materials and Nanosystems Using Neutron Scattering" for 2021–2023. At the 127th (September 2020) session of the JINR Scientific Council, the PAC recommendation was implemented by taking note of the PAC's conclusion that the two reviewed spectrometers no longer satisfy the requirements of some users. In this regard, the Scientific Council supported the preparatory work towards opening the new project of developing a new inelastic neutron scattering spectrometer and expected that a detailed proposal for this new project will be presented at a future PAC meeting. This happens right now, in frames of the present project prioritization exercise.

The project report submitted for prioritization contains significantly more technical and personnel details than the version considered by the PAC a year ago. Particularly, the sophisticated neutron optics of the inverse-geometry INS spectrometer will increase the luminosity as compared with the old spectrometers by more than two orders of magnitude, thereby resulting in a cutting-edge instrument worldwide. This will make possible to perform INS experiments on minute samples, opening the way to a new class of studies.

The engaged scientific and technical personnel as well as the involved companies are, in every respect, top-level and guarantee completing the project within the presented timeline. The financial plan is justified and realistic.

In conclusion, the project "Development of an inelastic neutron scattering spectrometer in inverse geometry at the IBR-2 reactor" should be prioritized as one belonging to Category A.

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