Construction of a wide-aperture backscattering detector (BSD) for the HRFD diffractometer.

The project runs within the current JINR Theme 04-4-1143-2021/2025 “Scientific and methodological research and developments for condensed matter investigations with IBR-2 neutron beams”.

The goal is development of the New Wide Aperture Back Scattering Detector based on scintillator ZnS(Ag)/^{6}LiF by FLNP (Department of Spectrometer Complex) with unique characteristics permitting a 10-fold increase in the count rate in the solid angle of Ω = 1.5 Sr with the total ring-shaped surface of S = 13.5 m^2 covered by ≈190 individual elements.

The actual project designed for the years 2021-2023 is a continuation of the previously completed project resulted in manufacturing, assembling and tuning of the first sector of the BSD detector for the HRFD diffractometer initiated in 2018-2020 within the Theme 04-4-1122-2015/2020 “Development of Experimental Facilities for Condensed Matter Investigations with Beams of the IBR-2 Facility”.

The PAC heard this project within the report presented by D.P.Kozlenko “Spectrometer complex of the IBR-2 High-Flux Pulsed Reactor: Development Plans for 2021-2025” in the course of the 53rd meeting of the PAC-CMP on the 25th of January 2021 and supported the suggested modernization. The completion of the new wide aperture detector is expected not only to drastically improve the performance of the HRFD diffractometer in the overall count rate but also open the range of measureable d-spacings in the cold range of the reactor spectrum at λ > 4 A.

In their “Questionnaire” the project presents their plans for the whole period of 3 years and requests a total budget of 645 kUSD for 11 participants with more that 90% or 595 kUSD dedicated to materials and equipment. The project plans include not only completion of all BSD modules and electronics but also a software for the data acquisition system with final testing of the whole detector on HRFD.

In view of important expected effect/output and good acquired results on the foregoing stage of the project I can propose that PAC acknowledges the preceding work of the project team and recommends to support the project ranking it in the category A: an excellent project which should be fully funded with adequate resources and encouraged to continue and expand their impact.

Report prepared by the PAC-CMP member
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