

Development of an inelastic neutron scattering spectrometer in inverse geometry at the IBR 2 reactor (DINSS).

The project runs within the current JINR Theme 04-4-1142-2021/2025 “Investigation of functional materials and nanosystems using neutron scattering” at FLNP. Its ultimate goal is creation of the new neutron spectrometer that will allow solidifying position of FLNP within the highly competitive scientific environment in Europe and in the whole world in research of hydrogen containing and other novel materials. Following recommendations of the previous PAC-CMP meeting, steered by the 127th session of the JINR Scientific Council endorsing the preparatory work, this new project was opened for the years 2021-2023.

The PAC-52 heard this project presented by the project leader D.M.Chudoba on the 2nd of July 2020 as well as 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. The PAC stated that “The development of the new inelastic neutron scattering spectrometer in inverse geometry at beamline 2 of IBR-2 is essential for extending the capacities of experiments in studying the dynamics and vibrational properties of condensed matter.”

The new spectrometer with novel primary and secondary spectrometers, each giving a factor more than 10 as compared to the previous design, will outperform the actually operating NERA with a ~200 fold gain factor in luminosity. The chosen original design is approved and validated *in principle* in the already realised instrument projects – in what concerns the focusing guide and the use of space focusing of the scattered neutrons in a large solid angle. Probably it will be the highest solid angle so far achieved in an INS instrument worldwide.

There is no doubt that the new project is technically feasible as documented by the preliminary design and suggested technical solutions. The project team includes highly qualified scientists known in the international community. The science activity in condensed matter physics related to the project and some technical achievements are documented in numerous publications and conference presentations. The new instrument will bring INS capabilities at FNLP JINR back to the row of the best in the world and will give highly competitive or superior means for studies of dynamics in condensed matter.

In their “Questionnaire” the project team presents their plans for the whole period of 3 years and requests a total budget of 3850 kUSD with more than 95% or 3700 kUSD dedicated to design, materials and equipment. It should be noted that the project has to build from ‘zero’ the new 100-meter long focussing guide and the secondary spectrometer with conjugated sample environment. This is a complicated task that may take longer than three years in the current project plan so it may need to be continued for a few more years with additional budget. Such possibility is apparently being considered by the project team.

In view of highly important expected impact of the project for the FLNP 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.

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