**Referee Report on Theme 4**

**“Concepts of new neutron sources at the Frank Laboratory of Neutron Physics and Program of experiments”**

The project proposes to design and create a new pulsed neutron source by the mid-30s as a subcritical core assembly from plutonium dioxide (PLuton project) or neptunium nitride (NEptun project) with generation of primary neutrons on a tungsten or nickel target with pulsed proton beams with energy 1 GeV. To improve the background conditions between pulses of neutrons, the primary target will be replaced by an appropriate absorber.

According to primary estimates, the fluxdensity of thermal neutron on the outer surface of the moderator of the reactor will be 5–20 times greater than for current operating research pulsed reactor IBR-2.

The temporal characteristics of the neutron pulse will be in the range of 20–300 μs with a repeatability of 10–30 pulses per second. This pulse length is on average an order of magnitude 100–10 times smaller than in the European project ESS.The indicated pulse length and an increased neutron flux, new proposed neutron cooling methods will make it possible to prepare beams of very cold neutrons and beams of polarized neutrons with sufficient intensityfor experiments.This will be for research on the fundamental questions of nuclear physics, the dynamics of processes in nanostructures, etc.

At the same time (it’s very important), the research on applied problems of the condensed state of matter, materials science, ecology and other traditional areas will be more effectively continued at the new reactor.

At present, the question about the linear proton accelerator at 1 GeV looks complicated. For my opinion this driver accelerator is the main difference of the new pulsed neutron source from the working IBR-2M.

In general, I support the project“Concepts of new neutrons source at the Frank Laboratory of Neutron Physics and Program of experiments”.

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Vladimir Ostashko,

Department of Nuclear Reactions,

Institute for Nuclear Research, Kiev