

Progress report on developing a concept for a new neutron source at FLNP

V.N. SHVETSOV

FLNP, JINR

Systematic shortage of the neutron beam time in Europe and in the world raises demand in construction of new neutron sources. We propose to build a new advanced neutron source, DNS-IV (Dubna Neutron Source IV-th generation), at JINR. To be constructed in the combination with modern moderators, neutron guides and neutron scattering instruments (DNS-IV) promises to become one of the best neutron sources in the world and will open unprecedented possibilities for scientists from JINR member states and worldwide for research in condensed matter physics, fundamental physics, chemistry, material and life science.

DNS-IV will provide shorter neutron pulses, however containing the same number of neutrons as at European Spallation Source (ESS, to be operational in 2024). Indeed, it will be as good as ESS for low-resolution experiments and significantly outperform it for high-resolution experiments.

Two alternative concepts of DNS-IV were considered: the pulsed neutron reactor IBR-3 with Np-237 core and the accelerator-driven spallation neutron source with PuO₂ core providing neutron multiplication factor of about 20-50. Both options have been under the feasibility study in N.A. Dollezhal Research and Development Institute of Power Engineering (NIKIET, Moscow). The final recommendation is based on such criteria as achievable neutron characteristics, nuclear safety, engineering complexity, timeline and expected costs. It was found that the engineering complexity of 2nd option makes its realization rather uncertain, both in time and costs. Therefore, the pulsed neutron reactor IBR-3 with NpN fuel currently became the working project with the planned start of the DNS-IV operation is 2036-2037.

First meetings with the specialists from A. A. Bochvar All-Russian Scientific Research Institute for Inorganic Materials (VNIINM) starts JINR-VNIINM cooperation aimed to the development of the roadmap for NpN reactor fuel fabrication detailed Roadmap of the DNS-IV implementation will be presented.