Referee report on the project
Measurement of analyzing powers for the reaction p(pol)+CH2
up to 7.5 GeV/c and n(pol)+A up to 6.0 GeV/c at the Nuclotron

The study of the polarization characteristics of protons and neutrons in nuclear reactions is of great interest for determining their electric and magnetic moments and determining charge radii. The problem is that polarization is measured in re-scattering on a selected target. For a sufficiently accurate measurement, careful selection and study of the analyzing reaction is required, which must have a high yield and high analyzing power. Optimization of the choice of material and thickness of the analyzer target, registration detectors to ensure 2π geometry are needed. These studies will be curried out within the framework of the project "Measurement of analyzing powers for the reaction p(pol)+CH2 up to 7.5 GeV/c and n(pol)+A up to 6.0 GeV/c at the Nuclotron" using beams of polarized deuterons with energies up to 13 GeV/c at the Nuclotron accelerator in JINR. One has to emphasize that polarized deuteron beams are currently available only at the Nuclotron accelerator. During the fragmentation of deuterons on a target at a zero angle, beams of polarized neutrons and protons of half the deuteron momentum are formed. The polarization of the formed nucleons coincides with the polarization of the deuteron.

The project involves the simultaneous use of three approaches in polarimetry, namely: 1) using a calorimeter to select high-energy nucleons in the final state, 2) using a charge exchange reaction in which the analyzing power increases with increasing energy, and 3) replacing the hydrogen-rich light target with heavier nuclei targets. All this makes it possible to measure nucleon polarizations in the GeV energy region with higher efficiency. The project intends to measure the analyzing power in the reactions of polarized protons on CH2 at energies of 5.3, 6.5, 7.5 GeV and polarized neutrons on CH at energies of 5 and 6 GeV. Research to measure analysis power will be needed in future experiments at Jefferson Laboratory.

One should emphasize that the expected results will be used as well when conducting polarization experiments at the Nuclotron-NIKA accelerator complex, both to measure the polarization of the proton beam at the collider, and in experiments on nucleon-nucleon interactions on extracted Nuclotron beams.

The previously obtained experimental data and the current state of the detector systems of the ALPOM2 will allow the collaboration to carry out measurements with the allocation of the requested funding and beam time.

I recommend to support the realization of the ALPOM2 project with first priority.

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