

Reference on the ALPOM2 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

Main goal of the ALPOM2 project is measurements of analysing powers for nucleon (proton and neutron) scattering on different targets at polarized nucleon momentum up to 7.5 GeV/c at the JINR VBLHE accelerating complex. These investigations became available after completion of construction of the new polarized ions source, modernization of the LINAC and energy increasing of slow extraction beam.

Upgrade of the setup includes replacement of proportional chambers by drift chambers in a head part of a track system and modernisation of registration electronics and data acquisition system. The new track detectors allow improving accuracy of scattered angle measurements. In order to reject low energy hadrons scattered from the target the hadron calorimeter is integrated in the experimental setup.

During beam runs in 2016-2017 years new experimental data of the analysing powers at neutron momentum 3.0, 3.75 and 4.2 GeV/c were obtained with different targets by registration a charged particle in forward direction. Unexpected significant asymmetries in np charge-exchange reaction on Cu that increase two times when the hadron calorimeter response applied are observed. The experimental results were published as a Special Article - New Tools and Techniques in Eur.Phys.J.A 56 (2020) 26 which is a recognition of the relevance and importance of the results obtained. Taking into account this result a new proposal "Measurement of the Ratio G_{En}/G_{Mn} by the Double-polarized ^2H (e(pol), e' n(pol)) Reaction" has been approved.

The authors plan to equip the setup with new drift chambers in order to improve the efficiency of track registration and replace the hadron calorimeter ALPOM2 with the ZDC calorimeter in order to increase the acceptance of scattered particles and improve the angular resolution for particles scattered at small angles

It is planned to measure the vector analysing power of reaction p+CH2 at polarized proton momentum of 7.5 GeV/c which was postponed by low intensity and polarization of primary deuteron beam and to get a new data with the highest possible neutron analysing powers up to momentum of 6 GeV/c.

The funding required from JINR (42 k\$) for modernization of the setup (drift chambers and ZDC calorimeter) and support of collaboration contacts should be considered as feasible.

I would recommend this proposal for prolongation for 2022-2023 years with the 1st priority.



Anatoli V. Zarubin, PhD, VBLHEP JINR

Anatoli.Zaroubin@cern.ch

March 16, 2021