Referee's report
on the project: "Measurement of analyzing powers for the reaction $\vec{p}+CH_2$ up to 7.5 GeV/c and $\vec{n}+A$ up to 6 GeV/c at the NUCLOTRON (ALPOM2 proposal).

By the original idea of Akhiezer and Rekalo

A.I.Akhiezer, M.P.Rekalo: DAN USSR 180 (1968) 1081

it has been possible in JLab (Virginia) with the CEBAF facility to measure simultaneously transverse P_t and longitudinal P_l components of the recoil nucleon's polarization in the electron scattering plane of the polarization transfer process $\vec{e^-}N \to e^-\vec{N}$ and to determine the ratio $\mu_N G_{EN}(Q^2)/G_{MN}(Q^2)$ by means of the evaluation of P_t/P_l.

This totally different approach, especially of G_{Ep}, G_{Mp} measurements, revealed behavior of G_{Ep} to be in complete disagreement with its behavior evaluated by the old fashioned Rosenbluth technique from measured cross-section of elastic *ep*-scattering of unpolarized particles. In fact the new and more precise approach now clearly demonstrates up to $Q^2 = 8.5GeV^2$ the non-dipole behavior of G_{Ep}.

Moreover, the 10-resonance Unitary and Analytic nucleon electromagnetic structure model

C.Adamuscin, S.Dubnicka, A.Z.Dubnickova, P.Weisenpacher: Prog. Part. Nucl. Phys. 55 (2005)228

and also the improved 9-resonance version of it

C.Adamuscin, E.Bartos, S.Dubnicka, A.Z.Dubnickova: Phys. Rev. C93 (2016) 055208

predict an existence of the zero of G_{Ep} around the value $Q^2 = 13GeV^2$ in the simultaneous analysis of all existing space-like and time-like proton and neutron electromagnetic form factor data.

All above mentioned indicates that the approved $GEp(5)$ JLab experiment, in which one expects measurement of the $\mu_p G_{Ep}/G_{Mp}$ ratio up to $Q^2 = 12 - 15GeV^2$, is very important.

However, such experiment in JLab with enlarged energies up to $Q^2 = 12-15GeV^2$ can be realized only after the analyzing power measurements in JINR with NUCLOTRON in the framework of the ALPOM2 project will be completely finished, which already partially has been realized in the years 2016-2018. During these years the ALPOM2 set up with various polarimeter targets was upgraded and a collection of data on the azimuthal asymmetries with polarized proton and neutron beams on four polarimeter analyzing targets CH2, CH, C and Cu has been carried out.

In the year 2019 a modification of neutron channel up to 6GeV/c is planned to be realized and in the year 2020 and partly also 2021 is planned data taking on the measurement of the analyzing power A_y at proton momenta 6.5 and 7.5 GeV/c and at neutron momenta 5.0 and 6.0 GeV/c. The rest of the year 2021 is reserved for data analyzes and publication of the results.

Therefore realization of the APLOM2 project is highly desirable and we fully support it.

The planned works for the years 2019-2021 are adequate to the asked 42 000.-USD from the budget of JINR, which are on 15 000.- USD lower in comparison with the years 2016-2019, and therefore this funding seems to be reasonable for the realization of the APLOM2 Proposal.

Finally, taking into account all mentioned above I strongly recommend to approve a realization of the APLOM2 project for another three years 2019-2021 with the first priority.

Bratislave, May 16-th, 2018.

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