

Referee report on the project

"Probing the Deuteron short-range Spin Structure in the (d,p) reactions using polarized deuteron beam at Nuclotron-M"

Deuteron spin structure and spin effects with deuterons participation are of great interest for various reasons. Spin 1 corresponds to density matrix containing 8 independent components providing for this reason very sensitive probe of strong interactions dynamics in different kinematical domains. For large energies and momentum transfers the tensor parton distributions (corresponding to tensor structure functions in DIS) are manifested which are one of the objects of investigations in SPD experiment and related, as it is revealed recently. to deuteron's gravitational formfactors. At the same time, at the moderately large energies polarization effects are very sensitive to the details of nuclear forces, including 3-body ones. Yet another important aspect of polarization effects in the reactions with deuteron's participation is the relation to short-range correlations in nuclei, dominating for proton-neutron pairs and related to tensor forces.

The DSS project at ITS is addressing all these issues and is demonstrating clear synergy elements, as the investigation of proton-deuteron scattering is important for its own sake as well as for polarimetry and spin manipulations. The investigations at 2022-2023 included data analysis of vector and tensor analyzing powers, polarization of proton and deuteron beams, setup upgrade for its use as a proton polarimeter, theoretical analysis directly related to the program and obtaining the data on 3-particle correlations in heavy-ion reactions (being also a synergy elements). These investigations are demonstrating the project high level and provide a good starting point for investigations planned for 2025-2029, including the extension of energy domain required for solution of the problems of polarimetry at SPD experiment.

The participation of young JINR physicists, continuing collaboration with member states institutions, adequate estimations of required resources, and of project advantages and problems are the additional moments, allowing me to recommend the project to be accepted for years 2025-2029 with a first priority.

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