

**Referee report on the project
“Conceptual and technical design of the Spin Physics Detector”**

The NICA (Nuclotron-based Ion Collider fAcility) is aimed to investigate hot and dense baryonic matter in heavy-ion collisions and to study the nucleon spin structure and polarization phenomena. The preparation of the technical design report and the beginning of the creation of this experimental set-up are the main objectives of the given project. The physical program proposed for realization with the Spin Physics Detector (SPD) is quite well developed and is one of the most advanced in comparison with other planned experiments, which should start data taking in 2023-2030.

One of the key points of the SPD program is the measurements of asymmetries in the lepton pair (Drell-Yan) production in collisions of non-polarized, longitudinally and transversally polarized protons and deuterons. These measurements are very important for further studies of the spin structure of nucleons and are one of the parts of the program for the measurement of Drell-Yan processes in other world centers as the kinematic region covering by SPD virtually inaccessible to other planned setups. The proposal on measurements of asymmetries in production of J/Ψ and direct photons are also very attractive. The polarized deuterons beams provide an opportunity to measure the tensor polarized parton distribution first proposed and later related to gravitational form factors of deuteron at BLTP. The tasks contained in the project are very interesting and challenging both from the theoretical and experimental points of view.

It is important to note that the basis of this program is the unique capability of the NICA complex for the formation of polarized protons and deuterons. According the technical design of the collider one can have enough high collision proton (deuteron) energy with the average luminosity up to $10^{32} \text{ cm}^2/\text{s}$.

In the proposed design of the experimental set-up, it is important to note the novelty and literacy of the formation of detector systems, which basically should allow to perform the proposed physical program.

It is clear that in the course of the project implementation, the design and all detector systems will be finalized in the framework of the R&Ds which have to be performed within the Test Zone, which has to be built in 2019-2020.

The financial request is adequate to the project aims, and I propose to support and start the new “Conceptual and technical design of the Spin Physics Detector” project in the framework of theme 1065 for the period 2019-2023 years with the first priority.

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