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Report on the proposal of the new project Hadron physics at the COMPASS experiment

The proposal admitted by group of the JINR physicists comprises a large set of experiments which should be performed with the COMPASS detector. The COMPASS is a fixed-target experiment that has been operating from 2001 at a secondary beam of the Super Proton Synchrotron at CERN. The experiment has a wide set of nuclear targets including polarized ones as well as a sophisticated detector which provides a possibility to detect both charged particles and photons and to measure their momenta with good accuracy. During the long course of experiments the COMPASS obtained many important results on the nuclear physics and light hadron spectroscopy. The JINR group has been actively participating in these experiments. An upgrade of the experimental setup that is discussed at present should seriously improve the detector parameters.

Multiple tasks suggested in this proposal, spanned from nuclear physics to study of the exotic hadrons, can be grouped in three directions.

- Tests of chiral theory predictions by the measurements of the charged pion and kaon polarizability as well as with a study of neutral pion electromagnetic reactions with neutral pions in the final state.
- Study of the exotic charmonia via leptonproduction and pion-induced production of the exotic mesons as well as a search for exclusive leptonproduction of pentaquarks.
- Study of the EMC effect in the pion-induced Drell-Yan process.

All of these studies concern the low energy physics of hadrons where the direct QCD calculations are very difficult or impossible and we have to rely on various models like ChPT. It is clear that the precise experimental data are extremely important both to provide input parameters for these models and to prove the model results. Thus, the results of the listed studies will be very important and highly demanded. Researches with the COMPASS experiment can be further widen and deepen if the future program of the experiments after 2020 will be accepted. The JINR group is involved to the development of the future physics program and plan to continue this work in the frame of this project that is included to the research plan.

Another important part of the proposal is the upgrade of the detector subsystem – Muon Wall 1 which is a key element for the muon identification. JINR group is going to perform the R&D works on both hardware and DAQ parts and then to modify the detector.

Summarizing written above I would like to express my opinion that the considered project promises valuable results and certainly deserves the support. The JINR group is undoubtedly highly qualified and quite experienced to cope with the tasks given in this proposal. The required financial resources are reasonable.

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