PROTOCOL

of the V Workshop of the Beam Users of the VBLHEP Accelerator Complex

"Perspectives of Experimental Research at the Nuclotron beams"

October 5-6, 2017, JINR LHEP, Dubna

1. Users congratulate the LHEP Acceleration Division personnel with **successful renewal of polarized deuteron beam from the Nuclotron**, which is now available for users. Now research in the field of spin physics with polarized deuteron beam and beams of quasi-monochromatic protons and neutrons in the multi-GeV energy region can be conducted again in the LHEP of JINR.

   Users congratulate also the LHEP Acceleration Division personnel with **successful acceleration of polarized protons in the Nuclotron up to the few GeV kinetic energy**, what was done at first in the JINR history. It provides a basis for further developments in the spin physics field not only at NICA (with future SPD setup) but at fixed target experiments as well.

   Very good work has been well done in rather short time period!

2. Users support the run schedule proposed for 2017 – 2018.

3. Users are drawing attention of the LHEP Acceleration Division management to necessity of **restoration of the accelerated beams of 4He (and 3He) for physics** of few nucleon systems as well as for study of short range correlations in nuclei.

4. Users confirm their previous suggestions, understanding that the corresponding activities can be realized after completion of the Booster construction (under condition that necessary preparatory works will be done during the Nuclotron shutdown for the Booster construction), namely:

   4.1. taking into account that:

      4.1.1. in order to construct the beam transfer line from the Booster to the Nuclotron, it will be necessary to "open" part of the Nuclotron main Ring;

      4.1.2. in order to construct the beam transfer line from the Nuclotron to the NICA rings (at least the "head" part), it will be necessary to "open" part of the Nuclotron main Ring as well;

      4.1.3. each "opening" of the main Ring causes shutdown of the Nuclotron for a rather long period;

   it is very necessary to optimize corresponding construction plans in such a way, which would guarantee the "opening" of the main Ring only once. Otherwise users will be without any beams for too long period of time.

   4.2. works on the slow extraction system upgrade in order to achieve the best quality of the extracted beams over the total energy range;

   4.3. works on the further improvement of the beam quality including spill structure;

   4.4. in perspective, in order to provide a successful realization of the spin physics research program with other tasks, it is really necessary to find an optimal technical

solution for providing a possibility of quick switches from polarized beams to light ion beams (p, d, Li, C) (and vice versa) during one machine run;

4.5. increase the beam time available for research works being conducted within the approved projects;

4.6. use of the option of user operation mode at two different beam energies as much as possible;

4.7. further intensification of the design proposal preparation for the "applied research area" and extension of the existed extracted beam zone;

4.8. better coordination of the number of changes in modes of operation of the accelerator during a run in order to save the beam time allocated for experiments.

5. Taking into account, that for the study of polarization phenomena at intermediate energies the LHEP has now the necessary beams, users are drawing attention of the LHEP management, that it is right **time for further development of polarized target technics for experiments at extracted beams as well as with internal beams**. Users understand that an **upgrade of the existing program of experiments with polarized deuteron (and proton) beams is necessary as well, and will work on this**.

6. Users recommend to make the following information available:

   6.1. the specifications of the accelerator complex (with consideration of the actually achieved beam parameters and plans on their improvement),

   6.2. the specifications of the extracted beam channels,

   6.3. the perspective long-term run plan (up to 2020) where proposed types of accelerated ions should be indicated.

This PROTOCOL has been accepted and signed by representatives of the JINR Directorate, member states, the LHEP Directorate and current experiment group leaders attending the Workshop.

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