

Resume of the NICA Machine Advisory Committee at JINR (Dubna)

November 15, 2018

Video-conference Dedicated to the Problem of Polarized Beams in NICA

The session of the NICA MAC was performed in video conference mode at VBLHEP JINR. The following MAC members attended via tele-communication:

M.Steck (GSI) – Chairman of NICA MAC, A.Feshchenko (INR RAS)

V.Lebedev (FNAL), R.Scrivens (CERN), A.Seryi (JLab), R.Stassen (FZJ).

The conference was chaired by the MAC member Yu. Senichev (INR RAS), who attended the conference at VBLHEP JINR.

The following members of the NICA project team attended also the session at VBLHEP JINR:

A.Butenko, A.Kostromin, A.Kovalenko, O.Kozlov, I.Meshkov, E.Syresin, A.Philppov.

Two proposals of polarized beams in NICA were presented in advance and reviewed:

Proposal I. Polarized ions in NICA complex, Yu.Filatov (MPTU, Moscow),

A.Kovalenko (JINR), A. Kondratenko (Novosibirsk)

Proposal II. Polarized colliding beams in NICA storage ring, I. Koop A.Otbojev,

S.Mane, P.Shatunov, Yu.Shatunov (Budker INP)

At the session both proposals were presented also with transmission via tele-communication: the Proposal I was presented by Yu.Shatunov via tele-communication, the Proposal II by A.Kovalenko and Yu.Filatov, who attended the conference. All of them could answer questions and participate in discussions.

Three reviewers, Ya.Derbenev (JLab), V.Lebedev and Yu.Senichev, submitted extended reviews (see attached). S.Nagaitsev (FNAL) has sent his comments (attached). Two MAC members, A.Seryi and R.Stassen, have sent their post-session remarks (attached).

Summarizing all reviewers' comments and notes and discussion remarks at the session one can write:

1. First step should be done is the choice of the scheme of injection and storage of the polarized particles. Both options – fixed injection energy and acceleration in the Collider – are to be analyzed and compared.
2. The spin preservation at acceleration in Nuclotron has to be analyzed using numerical simulation and tested experimentally a.s.a.p.
3. Process of particle storage and bunched beam formation in the Collider was not presented properly in both proposals that is a weak point of both of them. This should be investigated.
4. Comparison of two proposed modes of spin preservation in the Collider – the Spin Transparency and the Spin Flipper driving the polarization direction – has to be done in details and a choice has to be made. The effect of high field solenoids on particle dynamics in the Collider rings when strong snakes are used to support spin transparency requires a detailed analysis.
5. Application of the cooling methods is mandatory, however they lose efficiency with increase of the beam intensity (stochastic cooling) and particle energy (electron cooling).

6. Analysis of the Collider luminosity with polarized proton and deuteron beams was not considered sufficiently at this session by mutual agreement. However, it should be done in the nearest future.

7. One should consider also the idea outspoken in the Proposal II (Yu. Shatunov et al.) “*to operate the coasting beams that would be an essentially advancing approach for NICA case due to the space charge and synchronization problems of the bunch – bunch collisions regime*”.

Conclusion:

Both proposals show the good perspectives of the polarization program at the accelerator complex with the NICA collider.

The agreed proposal for concept of polarized beams in NICA has to be presented at the next session of NICA MAC. This should be accompanied by a draft of the technical planning of the additional installations, the proposed time schedule and the required additional resources.

The existing collaboration JLab- Budker INP - BNL should be extended by the alliance with the NICA accelerator research group – in favor of the related projects with polarized colliding beams.



Prof. Yuri Senichev
Chairman of the NICA MAC session