Summary of the BM@N-DAC Meeting on 23.01.2019

present:
Hans Gutbrod, Itzhak Tserruya, Peter Hirstov, Hans Rudolf Schmidt (via Vidyo), & JINR participants; Karl-Heinz Hiller (remotely, sent his comments)

Prof. V.Kekelidze gave a short overview of the status of the BM@N/MPD Collaborations

The BM@N-DAC took note of the slight delay in the overall planning of NICA and the Booster. This delay is due to civil construction issues, as explained by V. Kekelidze. BM@N-DAC appreciates the growing international collaboration in BM@N and is looking forward to the signing of the GSI-NICA agreement, which is the base for members of CBM joining the BM@N collaboration with a substantial German contribution.

S.Sedykh (JINR) presented the status of BM@N trigger and beam detectors upgrade for heavy ion program.

The BM@N-DAC takes note of work in progress, but urges the team to plan for higher beam intensities of up to $5x10^7$ particles per second in the design and construction of the beam detectors, this in view of the BM@N physics potential.
In addition, the BM@N-DAC urges the rapid closure of the air gaps in the present beam line and installation of retractable beam position monitoring systems. Au beams should see no window coming out of the nuclotron going to the target. Discussions about safety of the machine vacuum need to be initiated with the nuclotron team.
In addition, the design of the vacuum beam pipe through the detector set-up should be finalized.
The Pb shield around the barrel detector was shown to considerably reduce the delta electrons. This study should be complemented by investigating whether this shield has any effect on the trigger efficiency.
The target wheel mechanism was shown and questions were raised about the shadow of the structure towards the barrel trigger detector. This may cause trigger patterns one may not want. Existence of such effects must be studied in simulations with relativistic heavy ion models, which describe well the slow particles in the backward hemisphere of the center of mass. Alternative target wheel systems should be looked at, e.g., from the Plastic Ball.

A.Maksymchuk (JINR) reviewed the upgrade of other BM@N detectors for heavy ion runs.

The BM@N-DAC appreciates the work on these topics, but points out to the long integration time of the detectors that limits the usable beam intensities available from the Nuclotron.
Furthermore, the BM@N-DAC requests realistic simulations with relativistic heavy ion collision models with cluster production, at least up to ^{4}He.
The BM@N-DAC expressed its worries about the actual planning and requests the team to do its utmost to be ready when the Nuclotron Au-beam is available.
The BM@N-DAC takes note that the TOF calibration is not finished yet due to lack of statistics. The BM@N-DAC wonders why there is no laser calibration, which would assure a proper relative timing among the modules ahead of data taking. The TOF efficiency needs to be shown as soon as possible.
As to the Forward detectors downstream of the target, the BM@N-DAC advices to go for as big coverage of phase space as possible.

P. Senger (GSI) presented his point of view on the* BM@N physics case: EOS and hypernuclei, *gave an overview of upgrading the BM@N experiment for high-rate Au+Au collisions, and the status of the large aperture silicon tracking system (STS) and showed the results of the beam pipe simulation

The BM@N-DAC appreciates the collaboration between CBM and BM@N. The physics goals are clearly identified. Strangeness and hypernuclei, as well as EOS studies. The importance of the silicon stations has been

shown, as well as some coverage problems of the last GEM stations and TOF. The BM@N-DAC asks for an optimized tracking set-up, if possible with increased coverage of phase space. However, the priority should be in the speedy construction of the proposed detector set-up.
The FLUKA simulations of the background and beam quality with and without vacuum in the beam line shows clearly that the beam quality has to be substantially improved by removing the air gaps, the windows and the beam monitors from the beam line. An improvement by a factor of 3 in beam quality should convince the last person about the immediate need of a vacuum beam line from Nuclotron to BM@N. Retractable beam position monitoring is a must. The BM@N-DAC requests a speedy installation of the full vacuum system to the target.
It was also shown that vacuum is needed downstream of the target. The BM@N-DAC requests again the design of the beam pipe after the target up to the last in-beam detector, with proper FLUKA simulations.
The possible trigger-bias by the proposed target wheel should be analyzed and alternative target mechanisms discussed.

A.Zinchenko (JINR) presented the current status of event reconstruction and data analysis in Carbon and Argon runs.
The BM@N-DAC appreciates the progress in the analysis of the data and wishes to see the group strengthened.

V.Panin (CEA) presented the status of the analysis of the Exclusive Measurement of Short-Range Correlated Nucleons in Inverse Kinematics performed in Carbon beam at BM@N

The BM@N-DAC took note of the presentation and appreciates the effort to make sense of the data which show that even with Carbon ion the present BM@N system is not adequate. The group presents an "Incoming Z calibration (using N and O impurities in the beam)", which is hard to understand how a carbon beam could have Oxygen impurities, clearly not from fragmentation. This puzzling effect needs immediate confirmation by the data in the ZDC (measuring the energy of the particles with good enough resolution to identify even ^{12}C from ^{11}C) in order to find if the Nuclotron accelerated ions with the same momentum/charge. Possible pile-up should also be looked at.

V.Plotnikov (JINR) showed the status of particle identification and K+/pi+ ratio in Argon run.

The BM@N-DAC acknowledges the progress made on the way to upgrade the BM@N setup for future heavy ion program and appreciates the efforts with the analysis of the experimental data collected with argon, krypton beams and in the SRC run. The BM@N-DAC recommends the team to focus efforts on the study of reconstruction efficiency of one particle type of one data set, as opposed to study all particles in parallel and in all data sets. The first physics results from the collected experimental data have the highest priority.