Dear colleagues,

My comments on the draft are below.

https://indico.jinr.ru/event/5386/attachments/22117/39037/L0_production_22.04.2025_v1.pdf

1) L10-12: It talks about dense nuclear matter in ion beams. However, there is no dense nuclear matter in ion beams. It occurs only as a result of the collision of these beams with the target nuclei.

<mark>The BM@N scientific program comprises studies of dense nuclear matter in heavy ion beams collisions of the intermediate energy range between the SIS-18 and NICA/FAIR facilities.</mark>

2) L20: of density and temperature -> of high density and temperature
<mark>Done!</mark>

3) L21-23: Why first give energy to the lab. system, and then to the CM system? So that people themselves try to convert one into the other?

<mark>As predicted by several models [I.C. Arsene et al., Phys. Rev. C75 (2007) 034902], the optimal conditions for exploring the hadronization phase transition are expected for beam kinetic energies of 5A−20A GeV, corresponding to $\sqrt{s_{NN}} \approx$ 3.6−6.4 GeV.</mark>

4) L23: (multi)-strange ->  (multi-)strange
<mark>Done</mark>

5) L25: Usually, by observables we mean some characteristics of particle ensembles (yields, multiplicities, spectra by rapidity and transverse momentum, etc.), and not the particles themselves.
<mark>Done!</mark>

6) L34: What does "central fast region" mean, why "fast"? Maybe "central rapidity region"?
7) L36: front regions -> foreward regions
8) L47: "riggers." -> "riggers;"
9) L48: "5, 6 and 4" -> "4, 5 and 6"
10) L53: temperature -> inverse slope
11) L69: [11] before that there was [8]
<mark>Done!</mark>

12) L361,362: References [13] and [14] duplicate each other
Need check!
<mark>Done!</mark>

13) L91: nergy beam -> beam energy
<mark>Done!</mark>

14) L92: The figure includes the upper and lower parts. The description

is given only for the upper part. Add a description for the lower part
as well.
<mark>We redo the picture and did few changes in description.</mark>

15) L95: [19,20] before that there was [14]. Further references are also
not ordered
<mark>Done</mark>

16) L108: Dominant source of what?
Using GEANT3 simulation the trigger efficiency $\epsilon_{trig}$ was calculated from
the BD detector multiplicity distributions produced by a convolution of the reconstructed
$\Lambda$ hyperons and delta electrons events, which were found to be the dominant
source for the $C+A$ processes.
<mark>Done!</mark>

17) L109-110: The phrase "It was evaluated..." is unclear. Better to
replace with something like: "Trigger efficiency estimates ranged from
80 ± 2% for C + C to 95 ± 2% for C + Pb minimum bias interactions".
<mark>Done!</mark>

18) L114-115: Trigger efficiency does not apply to Λ-hyperons, but to
events with Λ-hyperons.
<mark>Done!</mark>

19) L125: It might be better to use "positively charged tracks" instead
of "positive tracks" from here on.
<mark>Done</mark>

20) Caption fig.3: violet lines represent -> violet line represents
<mark>Done</mark>

21) Caption fig.3: It should be added here or in the text that the
violet line describes the background under the peak.
<mark>Done</mark>
The violet lines represent the result of the background fit by the sum of the threshold
and exponential functions

22) L146: summ -> sum
<mark>Done!</mark>

23) Fig.4,5,6,7,8,10: Small font size on axes and in legend.
<mark>They are readable.</mark> <mark>We will redo all pictures for journal specific style</mark>

24) L161: Fig. 3 ->  Fig. 4
<mark>Done!</mark>

25) Caption fig.5: "violet line" here and in Fig. 3 denote different
<mark>Here we left violet</mark>


Perhaps in Fig. 3 it is more correct to write magenta or purple.

Fig3->Purple
==**done**==

26) L186,187: What is ε_rec and how is it related to ω_acc?
==It is the same parameters. I change parameter in the formulaes==
==Done!==

27) L379: What article, what journal, its volume, issue, series, etc.
==E.Bratkovskaya {\it et al.}, PHQMD Model for the Formation of Nuclear Clusters and==
==Hypernuclei in Heavy Ion Collisions. Bull.Russ.Acad.Sci.Phys. 84 (2020) 8, 957-961,==
==Izv.Ross.Akad.Nauk Ser.Fiz. 84 (2020) 8, 1161-1166. https://arxiv.org/abs/1911.09496==

28) Why is there a column with C+Pb in Table 1 if it does not contain a
single measured BM@N value?
==Because we are present the model prediction value as extrap_factor (for 4.5AGeV==
==comparison) for this target at 4.0AGeV and common values for the calculations (Npart &==
==sigma_inelactic). For this energy we have low statistics and had large fluctuation of the==
==signal in data analysis. So, we exclude result for this target from the common analysis.==

29) L245: Why is it said about y* while Fig. 6 shows the spectrum for y
in the lab system?
==This is mistake==
==Done!==

30) L263-266: The phrase is confusing. It should be written more
clearly.

The $\Lambda$ hyperon yields and production cross sections in C + C interactions can
be compared with the BM@N result 47.3±5.8mb and 24.0±6.0mb measured in the
carbon beam interactions with the momentum of 4.2~GeV/c per nucleon (the beam
kinetic energy of 3.36~AGeV) in the Propane Chamber experiment.

==The obtained $\Lambda$ hyperon cross section at BM@N in $C+C$ interactions were==
==compared with the Propane Chamber experiment result (Fig.~\ref{yields_energy40} (top==
==left) which was measured in the carbon beam interactions at the 4.2~GeV/c per nucleon==
==momentum (3.36~AGeV beam kinetic energy)==

31) L280: It is interesting to see the numerical values of the
fractions f_ij
==You can see table for C+A reactions, and for c+c they are equal to  0.25 for f_pp, 0.25==
==for f_nn and 0.5 for f_np & f_pn, we will add this table to the AN Run6==

| | $f_{pp}$ | $f_{nn}$ | $f_{np(pn)}$ | $k_{iso}$ | $N_{part}$(DCM QGSM) | $N_{part}$(Glauber) |
|---|---|---|---|---|---|---|
| $C_6^{12} + C_6^{12}$ | 0.25 | 0.25 | 0.5 | 0.81 | 9.0 | 6.0 |
| $C_6^{12} + Al_{13}^{27}$ | 0.24 | 0.26 | 0.5 | 0.81 | 13.4 | 9.2 |
| $C_6^{12} + Cu_{29}^{63}$ | 0.23 | 0.27 | 0.5 | 0.81 | 23.0 | 14.0 |
| $C_6^{12} + Pb_{82}^{207}$ | 0.197 | 0.303 | 0.5 | 0.779 | 50.5 | 23.0 |

32) L289-290: And what is the N_part estimate from the Propane Chamber experiment?
They are not mentioned values and I didn't find in articles this value. They are use model, but in papers with model I also didn't find numbers. But author of the DCM_SMM model says that the model based according experimental data from Propane Chamber. Currently this model is being modified according to new experimental data from another experiments.

33) L308-309: What other experiments are you writing about? The paper only shows a comparison with the results from the Propane Chamber. The FOPI and HADES experiments are mentioned in the introduction. But no comparison with their results is presented.

These experiments were mentioned as "same experiments" at +- same energies. Before (in previous versions) we are show results also for HADES. Now we don't show results from HADES in this paper because they are nor published yet.

Changed to:
The results are compared with DCM-SMM, UrQMD, PHSD models of nucleus-nucleus interactions and with the Propane Chamber results of which studied carbon-carbon interactions at lower energies.

34) L323-326: temperature -> inverse slope parameter. T0 - it is not a temperature!
Ok!