

Response to Reviewer's Comments

Date: December 20, 2025

General Response

We thank the Reviewer for the careful reading of our paper and for the constructive comments, which have helped us to improve it. Below we provide point-by-point responses to all remarks.

Main Comments

Comment 1

Explicitly state in the abstract and conclusions that UrQMD in its present form does not provide a satisfactory description of strange hadron observables at these energies.

Response:

- Abstract: We changed the abstract. Please see abstract on page 1.
- Conclusions: We changed conclusions, added sentence on page 6, lines 153-155: "As a result, these observations provide an additional indication of the limitations of the current UrQMD approach in describing strangeness production under extreme density conditions."

Comments 2 and 3

Briefly discuss possible physical mechanisms that are missing or inadequately implemented (e.g., modified string fragmentation, multi-Pomeron interactions, or chiral symmetry restoration effects);

Add one or two sentences comparing the observed discrepancies with findings from other transport approaches (e.g., SMASH, PHSD, or AMPT, if space allows).

Response: In our analysis we used UrQMD Cascade mode with EoS=0 and indicated it in paper, see page 2, lines 40-41. We compared our data with HSD, PHSD, AMPT at NA49/57 energies from papers [16] and [17], please see page 6 lines 128-136. The results shows the importance of medium-induced effects which we indicated on page 6, lines 136-145.

Minor corrections

Comment 1

The first two sentences of the Abstract contain background information that is more appropriate for the Introduction section. They should be removed from the Abstract and, if necessary, incorporated into the Introduction. This will allow the Abstract to focus directly on the aim of the study, the methods used, and the main results.

Response: We removed first two sentences of abstract and changed it according to Main comment 1. Please see Abstract on page 1.

Comment 2

The sentence "These ratios allow us to localize the phase transition energy and it's properties more precisely." on page 1 should be corrected.

Response: We changed it to "These ratios provide a tool for a more precise determination of phase transition energy and its characteristics" on page 2, lines 27-29.

Comment 3

The symbols (data points), numerical labels, and legend entries in Figure 1 are too small, making the figure difficult to read. Please significantly increase the font size of the axis labels, legend, and any text annotations, as well as the size of the markers and lines, to ensure good legibility both in print and on screen.

Response: We changed Figure 1, increased data points, numerical labels, legend entries, and text annotations size. Please see Figure 1 on page 3.

Comment 4

In the captions of Figures 1 and 2, the word 'markers' should be replaced with 'symbols' for consistency with standard terminology in the field.

Response: Caption of Figure 1 changed to "... The solid symbols are UrQMD calculations, and open symbols are BES-I data [7]." and caption of Figure 2 changed to "... The solid symbols are UrQMD data, and open symbols are BES-I data [7]". Please see Figures 1 and 2 on pages 3 and 4.

Comment 5

The sentence "..., are presented **on** Figure 3." on page 3 should be corrected as "..., are presented **in** Figure 3."

Response: We corrected it. Please see lines 88-89 on page 4.

Other changes

Change 1

We corrected the $\langle N_{part} \rangle$ coordinates on Figure 2 (left plot) for UrQMD points. Previously the particle multiplicity were used as horizontal coordinates of UrQMD point, now we changed it to the $\langle N_{part} \rangle$ taken from BES-I data (see Ref. 7 from paper)

Conclusion

All comments have been addressed. We believe the revised manuscript is significantly improved and now meets the journal's standards.