Please see the comments from the reviewer below.

You are kindly requested to respond to the comments and update the paper accordingly. Please send your feedback at your earliest convenience, at the latest, within two weeks from today.

Thank you for writing the paper. I found this study very interesting.

In general, it is better to write the explanation more for the figures, methods, and results. Since you have one more page you can write, I strongly recommend adding the information about the explanation for Figure 1 and the results of the PID method.

**A: To provide a more comprehensive understanding of our results, we have included detailed explanations for the figures, clarified the definitions of the machine learning terminology used, refined the descriptions of the GNN models employed, and expanded the results section.**

In the text, you mention that "the preliminary performance on particle identification (PID) differs for different NNs. While DeepSet struggles with identification, GAT exhibits enhanced performance.", so I expect you have the efficiencies of PID predicted by DeepSet also. To discuss which one has better performance, it's better to have some comparison results between DeepSet PID and GAT PID (or add the same kind of table as Table 1 but predicted by DeepSet. )

**A: We rephrase it in the following way: "While both DeepSet and GAT architectures demonstrate promising results in energy reconstruction, their performance in particle identification (PID) differs. DeepSet exhibits limitations in accurately identifying particle types, a challenge we aim to address in future studies. In contrast, GAT shows significant potential for PID, as demonstrated by its ability to distinguish between neutrons, pions, protons, and kaons. As shown in Table 1, the model assigns higher probabilities to the correct particle type, suggesting strong separation power."**

In the section "Introduction"
Please add the reference paper for PFA if you have one.
What does "RPWELL" stand for? Please explain the first time it appears in the text.

**A: we added the reference and explanations**

In the section "Method"
"After pre-selection for each particle type, the data set contains 600k events that were used for the NN training, 100k events for validation, and another set of 110k shower shapes, not seen by the network, for testing."
This sentence is not clear to me, especially about the meaning of "shower shapes". How about writing "After ~~~ and another set of 110k events, not seen by the network, for shower shape testing." ?

It ingests a point cloud, a set of active cells
→ It ingests a point cloud, which is a set of active cells
incident particle that created the shower
→ incident particle that initiated the shower

**A: we rephrased accordingly**


I think you need more explanations about the general words for ML, such as "point cloud", "node", "edges", "cat", "MLP", "batch size" etc.

**A: we have added the definitions of the machine learning terminology used,**
For example,
"Unlike DeepSets for point clouds, GAT approach leverages edges in addition to nodes. "
→ "Unlike DeepSets, which process point clouds by focusing solely on nodes (individual data points), the GAT approach incorporates both nodes and edges (relationships between data points) to leverage relational information."

**A: we rephrased accordingly**

in the cone of → within a cone of
ADAM optimiser → Adam optimizer

**A: corrected**

With increasing the batch size no instabilities were observed. → No instabilities were observed as the batch size increased.

Why is it OK that several hyper-parameters were not fully optimized? Could you add some explanation for it?

**A: we provided an explanation in the text**

In the Figure 1
What is "MLP"? What does it stand for? There is no explanation for the word "MLP". To use it, please explain more.
Please explain more about Figure 1 in the paper or the figure caption. What do the colors mean? What do these drawings mean?

**A: we added the explanations for MLP**

"We studied the angle dependence of pion showers for uniformly distributed angles in different ranges."
The meaning of the word "different" in this sentence is unclear. How about writing the following?
→We studied the angle dependence of pion showers for uniformly distributed angles in various ranges indicated in Figure 3.

**A: we corrected accordingly**

What is the "good prediction power" in the sentence "Figure 3 depicts a good prediction power for pions traversing at angles uniformly distributed within a 20 ° cone."? If this means that the results of MC within these angle ranges show good resolution but it shows that the out of these ranges give bad resolutions, you should write so like the following,
(Figure 3 depicts a good prediction power for pions traversing at angles uniformly distributed within a 20° cone.
→ Figure 3 indicates that the simulation results for pions traversing at angles uniformly distributed within a 20° cone show good resolution for pions traversing at angles uniformly distributed within a 20° cone. )

**A: we rephrased accordingly**


The dependency of the pion energy resolution is shown for different pad sized in Figure 4.
→ The dependency of the pion energy resolution is shown for various pad sizes in Figure 4.

**A: we rephrased accordingly**

It may be better to write some numbers to have a quantitative comparison here for "GAT NN achieved similar energy resolution to DeepSet, but at a significantly higher computational cost."

**A: we added a quantitative comparison**

If you write "GAT NN", you should write "DeepSet NN". If you use "DeepSet" without NN, you should use "GAT" instead of "GAT NN". Since the NNs mean "GAT NN and DeepSet NN ", the mixture of the uses "GAT NN", "DeepSet" and "NN" are confusing.

**A: we made sure to use uniformly GAT and DeepSets**

It is better to have the results (a figure and/or a table) to write a quantitative discussion for this "While DeepSet struggles with identification, GAT exhibits enhanced performance."

**A: we added the following comment "While both DeepSet and GAT architectures demonstrate promising results in energy reconstruction, their performance in particle identification (PID) differs. DeepSet exhibits limitations in accurately identifying particle types, a challenge we aim to address in future studies."**

For the PID discussion, I strongly suggest including the figures to explain how the PID method works, such as the distribution of the probability, and correlation of the probabilities.

**A: Here is the revised text to emphasize the use of the Softmax function to convert the model's output into a probability distribution and to make the explanation more explicit.: "Two target variables are investigated: energy and particle type. Energy prediction is treated as a regression task and optimized using mean squared error (MSE) loss. For particle identification, a multi-class classification approach is employed. The model outputs a probability distribution over n possible particle types, where n is the number of potential incident particle candidates. The probabilities are obtained by applying the Softmax function 4.1~\cite{softmax} to the model's output. The particle type with the highest probability is selected as the final prediction."**

In the Figures 2, 3, and 4
E_beam' GeV (The label of the x-axis) is better to be " E_beam (GeV)

**A: Done**

In the Figure 2
The green line and Black line are close to each other and the black one is almost invisible. Please make the green and black lines wider.
Please change 0 and L in KOL to subscripts
**A: Done**