Dear Reviewers

Thank you for the very careful reading of the manuscript. Your comments and questions have improved the quality of the manuscript significantly.

Here below the replies/answers to questions and remarks and actions in blue that were taken.

See you Peter Kluit

Reviewer #1: Dear authors, thank you for addressing in detail point by point comments and for improving the manuscript.

Reviewer #2: The first revision of the manuscript has been improved on many points of criticism mentioned in the review. However, there are still some items that should be considered before publication. Some of the points below are actually a repetition of previous comments, which were not addressed, despite the authors claim in their response that they were taken into account. It is needless to say that it is quite tiring having to cross-check and repeat these. Some typos or semantic problems could have been spotted by careful proofreading of the full paper before resubmitting it.

Section 5:

The definition of the residual in line 214f is still not satisfactory. Being a distance, it cannot be the "closest point" as stated here. The authors should be more careful, taking into account that this was already brought up in the first review. Since I want to avoid more iterations on this, I suggest the following (if I have understood the authors' intention correctly):

"The track residual in xy is defined as the closest distance between the hit at the center of the pixel and the xy-projection of the track. The residual in z is calculated at this point of closest approach on the track."

However, this definition of the residuals (which is not standard in my opinion) brings up the following question:

-> Apparently there is still some misunderstanding of the meaning of the words and precise definition.

Section 4.2:

The authors should mention in line 188, which quantity is actually minimized in the track fit. Normally, one would expect that the track fit minimizes the squared 3-D distances from the hits to the track, weighted by the respective uncertainties in xy and z. If this is indeed what has been done, why then are the residuals in Sec. 5 defined as the closest distance of approach in the xy plane? Unless the uncertainties on z are much larger than the ones in xy (which is not the case here), the two quantities are not expected to be the same. Depending on the quantity actually minimized in the fit, it would be more consistent to define the xy residuals as the xy component of the 3D residual, and not the DCA in xy.

Reply: Indeed it is the xy component of the 3D distance that is minimized.

Text was: "The track residual in xy is defined as the closest distance between the hit at the center of the pixel and the xy-projection of the track."

Proposal is: "The track residual in xy is defined as the closest distance - defined as the 2D xy projection of the 3D distance between the hit at the center of the pixel and the track."

Section 5.3, lines 303-322 and 344-357:

The authors did not really attempt to improve this part. The procedure of regrouping and superimposing chips is still not clear. Changing "four 256x256"

to "(4x256)x256" does not change anything. The example is not very helpful either. The authors should explain clearly and unambiguously, HOW they are regrouping and combining chips, and, most of all, WHY they are doing it in this particular way. E.g. investigating deformations along the x or y-axis, etc.

Reply: We did give an intuitive/descriptive picture of the procedure. We understand that for clarity it is useful to give the mathematical procedure.

Proposal to add:

"The original mean residual is given by mean_residual(i,j) where i runs horizontally and j vertically. The regrouped results for mean_residual(4x256,256) is equal to mean_residual(i%1024,j%256) and for the mean_residual(256,4*256)= mean_residual(i%256,j)"

The reason for this procedure is to increase the statistics for the studies, while respecting the overall geometry of the module.

Section 5.4:

The term tracking precision is still not defined. Is it the average track uncertainty propagated to the plane at y=1436? As requested in the first review, the authors should also give the standard deviation of these numbers to quantify the width of the distribution.

Reply: The text reads:

" The tracking precision in the middle of the TPC (at y = 1436 pixels) was derived on a track-by-track basis, by propagating the pixel TPC hit uncertainties."

So yes: the "track uncertainty propagated to the plane at y=1436"

Second point: Indeed, we forgot to give the standard deviation on the uncertainties.

Reply: The rms on the uncertainties in xy is 2.4 microns and in z 2.8 microns.

Section 6:

Ref. [4] is not publicly accessible. Why not show the ToT distributions here, as suggested in the first review? Especially since quantitative results are quoted and discussed for ToT.

Reply: Ref [4] is a publicly available result. In Figure 6 of ref [1] the ToT distribution is also shown.

Proposal: in the text we also cite ref [1]

The term "deposited charge" is misleading. Deposited in the detector or in the pixel? It probably should be the "charge after avalanche multiplication,

Reply: Yes that is clearer.

Old text "The time over threshold is related to the deposited charge."

New: "The time over threshold is related to the charge after avalanche multiplication"

collected by a given pixel". In line 386, it should probably read "the mean collected charge per pixel", contrasting it with "the most probably value" in the next line.

Reply: Yes that is better

Old text "This means that the deposited charge per pixel .."

-> "This means that the mean deposited charge per pixel .."

The reasoning in line 391ff is difficult to follow: For B=0T, the mean number of e-ion pairs predicted by MagBoltz is 106. The mean number of hits is measured to be 124. Should these two numbers be directly compared for the

agreement?

Reply: One could compare the mean and mop values of the B=0 and 1 T data to the Magboltz expectation, taking into account that in the observed mean number of hits there is also a contribution from hits produced by photons in the avalanche process. That process is not included in the Magboltz expectation.