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Atmospheric Measurement Techniques Discussions

Interactive comment on "HOM cluster decomposition in APi-TOF mass spectrometers" *by* Tommaso Zanca et al.

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Dear Referee #1,

thank you for your comments. Here are our answers:

Q: p. 5, line 87: The term "RRKM theory" is not explained. Please add a brief explanation.

A: The RRKM theory was mentioned in the text because it presents some similarities with the actual approach of this manuscript for the derivation of the fragmentation rate. Nevertheless, in the present work we are using a different method, so we decided to avoid mentioning RRKM theory in order to avoid confusion among the readers.

Q: p. 5, Figure 4: In my opinion, Figure 4 is not necessary. Please consider removing Figure 4.

A: As suggested by the Referee, we understand Figure 4 is not essential, and we decided to remove it.

Q: p. 7/8: Lines 148-156 might be more clearly arranged in a table.

A: The list of physical quantities are now arranged in a table.

Q: p. 10, Figure 8: Please explain in slightly more detail what you mean by '10 different sets of "noisy" input frequencies'.

A: With "noisy" frequencies we mean random frequencies built on top of the original frequencies used in the simulations. The purpose is to generate frequencies which are affected by error, in order to check how the final results of the simulations are affected by the errors in the input data. In order to do that, we draw random numbers from normal (gaussian) distributions, each of them having as mean the original frequency and with a standard deviation equal to 20% of its mean. The definition has been clarified in the manuscript.

Q: p. 10/11, Figure 9a: I don't fully understand the dark bars presented in Figure 9a. While the figure caption suggests that these indicate the average number of fatal collisions, the main text (line 212) suggests that these are the "normalized number of fatal collisions". Please clarify.

A: The dark bars represent the average number of fatal collisions per single realization, which is computed dividing the total number of fatal collisions by the number of realizations. This numbers (dark bars) are between 0 and 1, since a cluster has some finite probability to decompose in each region of the APi, and it cannot decompose more than once. The term "normalized" was used to express that the total number of fatal collisions is divided by the total number of realizations. The text in the manuscript has been clarified.

Q: p. 12, Figure 10: In the figure legend, change "Fragmentation probability" to "Decomposition probability".

A: The figure has been corrected.

Q: p. 13, Figure 11a: What is represented by the different curves shown in Figure 11a? The colors 'blue' and 'orange' indicate the presence or absence of the quadrupole electric field but what is represented by the set of curves?

A: The set of curves represent decomposition probabilities for different kinds of clusters. We understand that representing these results for all the kinds of clusters is redundant and not necessary for the scope of the figure (which is used to distinguish between presence and absence of quadrupole electric field), so only the results for one kind of cluster have been plotted now.

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