Report on paper titled: "Universal scaling for the ionization of biological molecules by highly charged ions" by A. M. P. Mendez, C. C. Montanari, J. E. Miraglia

This paper tries to obtain a scaling law for ionization of some biological molecules by highly charged ions. As is well known, such processes are quite relevant and important in medical physics. Since the molecules considered are complex, formal theories of ionization are difficult to apply and scaling laws, if found applicable, greatly simplify the process of obtaining reliable cross sections. In this respect the present paper is quite significant.

The authors have proposed a scaling law and have applied it to several bio molecules and have tried to extend and justify the validity of the scaling law by including results for N_2, O_2, CO, CO_2 and CH_4 to show they have the same scaling behaviour. However, there are several aspects of the paper which I either do not understand clearly, or have reservations.

1. The authors mention σ_U to be a function of $E/Z^{2-\alpha}$. But the functional form is nowhere mentioned in the paper. What is the functional dependence on $E/Z^{2-\alpha}$ the authors consider in the work ?

2. I have reservations in calling the scaling law developed a universal scaling law. Not only have the authors considered only 8 molecular targets and five incident ions, the results, as the authors claim, are applicable only around the maximum of the cross sections. Though this may be reasonable for practical purposes, in my opinion, the results are in too narrow range for calling it a universal scaling law. I would recommend dropping the word universal everywhere in the paper.

3. Figure 1 somehow needs to be improved or made larger, because it is very difficult to gauge the deviation of the experimental points from the curves. Is it possible to separate the figure in to two figures (eg. top four Figure 1, bottom four Figure 2) ?

4. Figure captions need to be significantly improved as it is difficult to read and correlate the legend descriptions with those in the figure. For the caption in Figure 2, it is not clear what the CDW-SSM theoretical results represent ? What is the target molecule considered ?

5. The language should be considerably improved as there are many unusual statements. Some examples:

(i) Page 1 Column 2, Lines 40-44: "However, the data of uracil by swift C, O and F ions in [22, 23] are too low compared with our CDW–SSM results, but also as compared with Itoh et al. data [17], and with the CTMC calculations by Sarkadi [34]" Incidentally, the data of Ref. [34] is not shown on the figure.

(ii) Page 2 Line 56 : "In Fig. 2, we test the universal scaling of Eq. (2) for all the theoretical and experimental values displayed in Fig. 1."

6. There are many typographical errors. For example, Page 1, line 26 “continue” should be “continuum”. Page 1, Line 33 “present” should be “follow”. There are also others.

The paper, though quite interesting and contains valuable results, needs to be considerabley revised. I therefore recommend a major revision.