

Here I post some comments, suggestions and corrections for the draft of the paper Highlights from the Telescope Array Experiments. Hope they could help to improve the document. I recommend to address these questions before resubmitting the paper.

Regards.

Page 2

- \* Could you add the lower energy threshold of the main TA SD array.
- \* Question in ...rearranged to view  $\sim 120^\circ$ . is this elevation or azimuthal angle?
- \* Question in ... put into the observation  $\rightarrow$  do you mean, installed into the observatory? or put in operation?

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- \* There is too much blank space in this page.
- \* Suggestion: are denoted in red  $\rightarrow$  are displayed with red symbols
- \* Suggestion: denoted in green  $\rightarrow$  denoted by green symbols
- \* In Fig. 1, caption, six TA Communication towers are mentioned (pink diamonds), however, only five of them are shown in the plot.

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- \* four years of data by the TA SD  $\rightarrow$  four years of data from the TA SD
- \* uncertainty of energy determination  $\rightarrow$  uncertainty in the energy determination
- \* Comment: Section 2 starts with the TA spectrum from 2012-2013. Then the text suddenly changes to the recent TA spectrum. Could you please add a small text to explain why did you introduce the text about the previous TA spectrum?
- \* In this regard, one question: did you reduce the systematic uncertainties in the new TA spectrum in comparison with the previous one from 2012-2013?
- \* Suggestion: expected one for the spectral index between  $\rightarrow$  expected one from the extrapolation of the flux with the spectral index between
- \* It is not clear what you mean by "TAx4 result means the result using data of additional SDs for TAx4". Did you mean data from the TAx4 array with 500 SDs? or an upgrade of this array with more stations? Could you please explain that in the text?
- \* Monocular energy spectrum  $\rightarrow$  The monocular energy spectrum
- \* and energy Spectrum  $\rightarrow$  and the energy spectrum
- \* with Auger spectrum in blue and TA SD spectrum in green.  $\rightarrow$  with the Auger spectrum in blue and the TA SD spectrum in green. (Please, also add references to the Auger spectrum and the TA SD spectrum used in Fig. 2b. For the Auger spectrum the reference [17] does not seem to be the right one because of the year.)
- \* Fig 2b: The legends of the axes are too small to be read. Could you please increase the size of the legends?
- \* after the  $\pm 4.5\%$   $\rightarrow$  after a  $\pm 4.5\%$
- \* to get agreement  $\rightarrow$  to get an agreement
- \* for declinations of  $\delta < 24.8^\circ$  and  $\delta > 24.8^\circ \rightarrow$  for declinations of  $-16^\circ < \delta < 24.8^\circ$  and  $24.8^\circ < \delta < 90^\circ$ .

- \* In “TA Fig. 4a shows the TA combined spectrum”, could you please explain what do you mean by combined spectrum?
- \* Suggestion: The range of energies below  $10^{18.2}$  eV is covered by the TALE FD. We see three features: ... The range above  $10^{18.2}$  eV is covered by the TA SD.  
→ The range of energies below  $10^{18.2}$  eV is covered by the TALE FD, while the energy range above  $10^{18.2}$  eV is covered by the TA SD. We see three features: ...
- \* We see three features: → We see three features in the spectrum:
- \* The range → The energy range
- \* within systematic uncertainty → within systematic uncertainties

#### Page 6

- \* Fig. 5: The top titles of the figures can not be read. Please increase the size of the top titles.
- \* Fig 5, captions: The labels (a), (b) and (c) are not indicated in the figure.
- \* Fig. 5: number of events by experiments → number of events observed by the experiments.
- \* Suggestion: Add reference [19] in fig. 5.
- \* depth of maximum → depth of shower maximum
- \* 10 years were shown in Fig. 6 → 10 years are shown in Fig. 6
- \* QGSJET II-04 [24] proton ... [23] → QGSJET II-04 [24] for proton ... primaries [23]
- \* With reference to the sentence “We need more statistics to clarify the feature above  $10^{19}$  eV”, do you mean the feature in the Cosmic ray energy spectrum of figure 5? Please explain.
- \* In “The proton and helium models”, do you mean “The model predictions for proton and helium primaries?”
- \* Fig. 6: Please add the reference of the plots.
- \* Caption of fig. 6: could you please add which figure (left/right) corresponds to (a/b)?
- \* Caption of fig. 6: cosmic-ray energies → cosmic-ray energy
- \* Suggestion: Reconstruction bias of about  $-10$  g/cm<sup>2</sup> is not corrected → The result is not corrected for a bias of about  $-10$  g/cm<sup>2</sup>.
- \* The meaning of the sentence “The mean  $X_{\max}$  from the TALE hybrid data appears to connect the TA mean  $X_{\max}$  smoothly above  $10^{18}$  eV” is not clear. Could you please work out this sentence to clarify its meaning?

#### Page 7

- \* In fig. 7, are you showing results from [25] or [21]?
- \* Suggestion: Add a reference for fig. 7.
- \* Caption of fig. 7: for proton and iron MC primary elements → values for proton and iron MC primary elements, using QGSJET-II-04,
- \* Question for fig. 7: Why do you need the predictions of QGSJET-II-04 for protons for the calibration of the energy of the EAS in the case of the TALE hybrid data? Why do not you use the FD measurements from TALE?
- \* Fig. 8: Is it possible to increase the size of the labels?

#### Pag 8

- \* New excess → A new excess
- \* Fig. 9: Is it possible to increase the size of the labels?
- \* TA confirmed ... eV. → TA confirmed ... eV in the spectrum of UHECRs
- \* shoulder feature → shoulder feature in the spectrum
- \* spectrum measured with the → spectrum with measurements of

- \* consistent with light composition such as the QGSJET II-04 proton and helium. → consistent with a light composition, in particular, with predictions of QGSJET II-04 proton and helium.
- \* In the sentence: “We need more statistics to clarify the feature above  $10^{19}$  eV”, do you mean the feature in the energy spectrum?
- \* data obtained by the TA SD → observation with the TA SD
- \* This sentence is not clear “scanning the sizes of circles for oversampling these events”. Could you please work out this sentence to clarify its meaning?
- \* This sentence is not clear “The significance appearing in an isotropic cosmic-ray sky”. Could you please work out this sentence to clarify its meaning?
- \* Evidence for → Evidences for
- \* is seen such as declination dependence of spectrum cutoff → can be seen, for example, as a declination dependence of the cutoff in the spectrum
- \* and new → and as a new
- \* with a bit lower → using a slightly lower
- \* and add two FD stations → and we also added two FD stations?