Effective Opacity of the Intergalactic Medium from Galaxy Spectra Analysis

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Response to the Referee Report

5/4/20

We thank the referee for a second careful reading of our manuscript and their comments and criticisms. We have made modifications to the text and analysis in response and resubmit another revised version. Below we provide the detailed list of comments from the referee in bold text. Our responses are below each comment. If they are concise, it means we have agreed and fixed the text accordingly.

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General comments: some sections are in fact a list of actions that were performed. Even though I appreciate to see the method that was employed, I would suggest remove these (first, second, third, last) and make better transition between the sentences. If you want to keep the 'list' format maybe you can change the formatting of the text creating a list with the itemize block in Latex.

Reorganized list of actions using itemize tool in latex. Sentences are no longer strung together with “first, second, third …”

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-Introduction

3rd paragraph: -'almost no flux is observed in the Lyman alpha forest' --> See Fig4 of Thomas et al 2020, there is still flux at z>5. I propose to rephrase 'more than 70% of the flux is absorbed'.

Rephrased

-The transition from '....almost no flux is observed in the Lya forest' to 'One can directly measure...' is not clear. This sentence comes a bit out of nowhere. I would merge it with the next paragraph.

Sentence merged with next paragraph

4th paragraph: (Lee et al (2018), hereafter L18) --> remove parenthesis in 2018

Parenthesis removed

footnote 1 --> I think the end of the sentence is missing.

Footnote added to main text

5th paragraph: Don't stop the paragraph at (Shapley et al 2003), instead stop it after '...associated with normal quasar spectra'.

Paragraph extended

last paragraph: spell out LCDM.

Done

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-Section 2.1

Paragraph 2: -667 sources: I believe this is 677 (240+437)

Corrected, thanks for catching that

Paragraph 3:-To select targets L18m, fed'-->'To select targets, L18 fed' (coma in the wrong position)

Coma moved

-'In the redshift range z~2.3' --> That is not a range. Give two boundaries and adjust the sentence

2.25 < z < 2.45 range added

last pargraph: '0 being no attempt all'--> missing word?

Fixed to read: “0 being no attempt at all”

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-Section 2.2:

1st paragraph: 'There are two main justifications for why chose' --> missing word at the end?

Fixed to read: “for why we chose to average..”

last part: -'with values outside of a +/- 0.2'. +/- 0.2 what?

Rewritten as: “exclude those with values outside of the +/-0.2 median flux interval.”

Referenced figure 3

- 137 + 142 != 281 --> check the numbers (and propagate the correct ones).

Corrected, thanks for catching that

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-section3.1: Could you add the redshift in the figures?

Median redshifts added

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-Section3.3:

1st paragraph: - I am not very knowledgeable about SB99 models but do you assume an IMF or a star formation history?

A kroupa IMF is assumed for each model. This info was added to the text

- Additionally, does it include lines? Or did you mask them during the fit?

The models do not include lines, but strong ISM absorption was masked during the fit. See table 1

2nd paragraph: 'E(B-V) extends from 0.0 to 5.0'. This should go in 'stellar attenuation (E(B-V), ranging from 0.0 to 0.5)'. Or something similar.

rephrased

5th paragraph: 'table ??' --> Fix the reference

Fixed reference to table 2

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-section 4.1:

1st paragraph: 'qausar spectra' --> to be fixed

fixed

'global statistics' --> what does that mean?

Rephrased to read: “by subtracting the metal absorption statistically.”

'we chose to apply the method from Kirkman et al 2005' --> You just said you are using this method, don't repeat it. Maybe replace by: 'We chose to apply this method Because....'

Fixed to read: “We chose to apply this method because....”

2nd paragraph: -could you be me explicit on 'DM'?

Added context and reference to definition

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-section 4.2: redshift formula: Could you explicit what this redshift transformation does?

I believe z_i is the redshift of a particular absorber? It is important to understand this formula to understand fully your results.

Context given: “Where z_i is the redshift of a particular absorber in the IGM and…”

-section 4.4: 'act as a pivot' --> what does that mean?

Rewritten to read: “The z_piv value included in the fitting function, shifts the power-law index pivot, normalizing the fit to our redshift range.

Added reference to Becker 13

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-section 4.5:

'broke down ....moving away' --> what does that mean?

Rewritten as : “With a best fit power law index error sigma_B = 11.6, we report poor sensitivity to the known evolution of teff at redshifts higher than z = z_piv”

'law index error = 11.60' --> I believe this should be 'law index error sigma_B = 11.60' This would also fix the next question arising in the next paragraph 'what is sigma_B'.

Added sigma_B

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Appendix: Some tables are cut. If you want to put all data maybe you can create wider table in this format (example table 2):

z | teff | sigma_T | blank | blank | z | teff | sigma_T |blank | blank .....

--> this would make the tables entirely visible.

Reformatted so the tables span multiple pages