Review of: "A Robust Assessment of the Local Anisotropy of the Hubble Constant"

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Potential competing interests: No potential competing interests to declare.

This manuscript addresses the anisotropy of the Hubble Constant in the local Universe, as probed by the SN luminosity distance measurements from the Pantheon+SH0ES compilation, by analysing the redshift range where the LCDM fit to the data is improved – i.e., after the lower redshift cutoff of z<0.035 -- so that the H0 best-fits obtained from the z<0.05 and z>0.05 sub-samples agree with each other the most at a sky direction roughly centred on the CMB dipole direction. In addition, this study shows that such a result can be obtained for an alternative model dubbed ncTL, based on a non-conservative tired-light assumption -- which, interestingly, provides an even better fit to the data (in this case, a lower chi2_dof value in Table 1) compared to the standard LCDM scenario when z>0.05.

Although I find this study definitely interesting, I would kindly like to advise some revision in the methodology, as well as in the result presentation and overall discussion, as I shall detail below:

1) Suggestion: I do not think it is necessary to mention the H0 tension between CMB and SN measurements, etc., in the abstract, as the solution of such a tension does not seem to be the main goal of the paper. Also, an interested reader might think that this tension is solved when the author says "LCDM predictions become consistent with SN data (…)", still in the abstract. In this case, it may seem that the "LCDM predictions" correspond to the Planck H0 best-fit, which is not the case here.

2) Important point: The author relies on a weighted magnitude residual to compute the chi2_dof (eq. 1). I would advise the author to adopt the SN full covariance matrix – not only the m_B diagonal uncertainty – in the appropriate redshift cutoffs, as this estimator might be biased due to noise. Alternatively, the author could perform a simple cross-check to assess its possible bias – e.g., producing some mock data with the same redshift distribution as the real one, but assuming a fiducial cosmological model for m_B instead of the observed measurements (so we know what the "true" H0 value is). Then we can see if the best-fitted H0 value agrees with the fiducial one – and if this agreement is robust with respect to different redshift cuts imposed on the data, etc.

3) Important point: I would like to suggest a colour scale in Fig. 3 so that an interested reader can better visualise the directions of the sky where the agreement between the H0 from low- and high-z SNe improves – also, how those directions were obtained. By means of random directions across the sky, or some other criterion? In addition, I would also

like to request some further explanation of the criterion used to estimate the agreement between the low- and high-z H0 fits at a given direction. I presume the author compared the H0 fits themselves, as well as the chi2_dof values for each case, and for the LCDM/ncTL models (sorry in advance if I misunderstood it). Still, it may not seem clear for all readers, which is the reason for this suggestion.

4) Important point: Some further motivation for the assumption of the TL models – especially the ncTL -- should be given. For instance, some further explanation of the model proposed in reference [11] of the paper (by the same author) might add to it. Furthermore, an interesting question might arise: what happens to the cosmic distance duality relation in this ncTL case?

5) Suggestion: The paper would also benefit from the inclusion of more recent references on the cosmic homogeneity scale measurements, as well as some papers reviewing cosmic anomalies and tensions in recent years – some of them were already suggested by other reviewers.