

Peer Review

Review of: "Parity Violation and Magnetic Helicity on Cosmological Scales: From Turbulent Baryogenesis to Galaxy Clusters"

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The author is studying the effects of parity violation and magnetic helicity on cosmological scales. Though the work is generally interesting, I have some questions and comments on the work before publication.

1-In equation 9, a functional form for the probability distribution function is claimed. However, the exponential function can have any power, and there is a lot of degeneracy in choosing the function, all of which are consistent with the dimensional analysis done in Eq.8. Is there any other justification for choosing such a form of the distribution function?

2-The author is studying the effects of parity violation on small scales, for example, as can be seen in Fig.3. On these scales, one expects that the quantum nature of fields is important, and one should be careful about treating them as classical ones. Is there any justification for neglecting the quantum effects?

3-The same as the previous question: in Fig.4, the author is claiming about the behavior of magnetic energy in case the fermions are relativistic. What is the justification that QED (quantum electrodynamics) effects are not important?

4-I expect that equations 14-16, as well as 3-5, are written in the curved space format, or one justifies using their flat space version. Can the author explain the justification?

5-It would be good if the author explained the physical intuition for the behavior of Figs. 2, 3, 6, and 7. For example, why should one expect that the spectra for helical forcing are more than in the case of non-helical forcing in Fig. 3, etc.? It would be great if the physical intuition behind the figures is explained.

Best regards,

Amin

Declarations

Potential competing interests: No potential competing interests to declare.