Prof. Andrew Steinmetz
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November 7th, 2023

Dr. Rashmi Ray, Ph.D.
Senior Associate Editor
Physical Review D

Re: PRD submission of "Matter-antimatter origin of cosmic plasma"

Dear Dr. Ray,

With this letter, we enclose a revised version of our submission to PRD titled "Matter-antimatter origin of cosmic plasma." We would first like to clarify to you and the referee the reason of our late response. Two of the authors of this work: Cheng Tao Yang and Andrew Steinmetz both successfully defended their Ph.D. dissertations on Oct. 20th and Oct. 27th respectively. Andrew Steinmetz also successfully completed his hiring process and is now a Global Professor for The University of Arizona and will be delegated to the UA-HEBUT global campus in Tianjin, China. As this research was completed before the appointment, only the Arizona address will be included. We appreciate your and the referee's understanding of this delay.

This revised version has been prepared with the assistance of all authors. All changes in the copy attached to this letter are highlighted in blue. The changes made to the manuscript were primarily in response to the referee report that we received on Oct. 13th. This is a summary of the relevant changes made:

- Sect. I: In response to the referee's recommendations, two paragraphs have been added to the introduction. The differences between the Gilbertian and Ampèrian magnetization length scale are anticipated. A brief overview of the major sections of the paper is also added.
- Sect. IV: We in passing address the magnetic helicity parameter in the context of plasma flow.
- Sect. V C: This is a short new subsection which discusses spatial inhomogeneities and fluctuations in the electron-positron plasma. This informs our understanding of future work.

We believe that with these changes, we have responded fully to the recommendations from the referee. In making these revisions, the following four references have been added (listed in alphabetical order):

- Boyarsky, Alexey, Jürg Fröhlich, and Oleg Ruchayskiy. "Self-consistent evolution of magnetic fields and chiral asymmetry in the early Universe." Physical review letters 108.3 (2012): 031301.
- Jedamzik, Karsten, Višnja Katalinić, and Angela V. Olinto. "Limit on primordial small-scale magnetic fields from cosmic microwave background distortions." Physical Review Letters 85.4 (2000): 700.
- Kahniashvili, Tina, et al. "Evolution of primordial magnetic fields from phase transitions." Physical Review D 87.8 (2013): 083007.
- Stoneking, M. R., et al. "A new frontier in laboratory physics: Magnetized electron–positron plasmas." Journal of Plasma Physics 86.6 (2020): 155860601.

We hope these changes have addressed the referee's points and incorporated their advice. We look forward to having our work accepted for publication.

Sincerely,

All authors