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Re: MDPI Universe Festschrift for Remo Ruffini

Dear Dr. Vereshchagin,

With this letter we bring to your attention our expanded and updated contribution to Dr. Remo Ruffini's Festschrift following on the review round, which I have prepared with active assistance of Prof. Rafelski. In our revised manuscript we mark in blue our response to requests made by the reviewers and some changes we ourselves wished to make. Trivial grammatical changes or corrections remain unmarked. This is a brief summary of relevant changes made:

- Sect. 1 - Revised to discuss the origin of baryon asymmetry and the application of the Sakharov conditions in more detail as recommended by Reviewers #1 and #2.
- Sect. 1.3 - Added references to dynamical or phantom dark energy which are alternatives to the  $\Lambda$ CDM model as recommended by Reviewer #2.
- Sect. 3 - Emphasized mesons as a participant in antimatter evolution as requested by Reviewer #1.
- Sect. 4 - Section is sprinkled with remarks to emphasize antimatter presence as recommended by Reviewer #1. (Some language revisions are also present here.)
- Sect. 5 - Emphasis is added that the unique situation of hot dense matter and antimatter in large quantities makes the  $e^\pm$  epoch uniquely interesting in terms of magnetization as recommended by Reviewer #1.
- Sect. 6 - The photographs honoring Remo Ruffini and Lizhi Fang have been grouped together and moved to the acknowledgements. The first line of the abstract, as well as the last paragraph of the conclusions have also been grouped within the acknowledgements with slight revision.

The following figures were changed or modified:

- Fig. 16 - Caption has been expanded to explain all curves.
- Fig. 19 - Figure has been replaced with a corrected value for the Solar core density.
- Fig. 22 - Content of figure was repetitive; removed.
- Fig. 22 (old 23) - Caption rewritten for clarity.
- Fig. 24 (old 25) - Photo of Lizhi Fang has been added.

The following references were added to support above revisions or otherwise support statements already present in the work (some as requested by referees added/omitted):

ADDED

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- vol. 76, p. 056201, 2013.
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  - I. Esteban, M. C. Gonzalez-Garcia, M. Maltoni, T. Schwetz, and A. Zhou, “The fate of hints: updated global analysis of three-flavor neutrino oscillations,” *JHEP*, vol. 09, p. 178, 2020.
  - B. Abi *et al.*, “Deep Underground Neutrino Experiment (DUNE), Far Detector Technical Design Report, Volume II: DUNE Physics.” 2 2020.
  - L. Alvarez-Ruso *et al.*, “NuSTEC White Paper: Status and challenges of neutrino–nucleus scattering,” *Prog. Part. Nucl. Phys.*, vol. 100, pp. 1–68, 2018.
  - J. Rafelski, M. Formanek, and A. Steinmetz, “Relativistic Dynamics of Point Magnetic Moment,” *Eur. Phys. J. C*, vol. 78, no. 1, p. 6, 2018.
  - M. Formanek, A. Steinmetz, and J. Rafelski, “Motion of classical charged particles with magnetic moment in external plane-wave electromagnetic fields,” *Phys. Rev. A*, vol. 103, no. 5, p. 052218, 2021.
  - M. Formanek, A. Steinmetz, and J. Rafelski, “Radiation reaction friction: Resistive material medium,” *Phys. Rev. D*, vol. 102, no. 5, p. 056015, 2020.
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- M. J. Dolinski, A. W. P. Poon and W. Rodejohann, Neutrinoless Double-Beta Decay: Status and Prospects, *Ann. Rev. Nucl. Part. Sci.* 69, 219-251. 2019. Melrose, Donald B.
- Quantum plasmadynamics: magnetized plasmas. New York: Springer, 2013.

#### REMOVED/REGROUPED

- Yang, C.T.; Rafelski, J. Bottom quark chemical nonequilibrium in primordial QGP. Update in preparation, **2023**; added to another reference
- Demiański, M.; Doroshkevich, A.G. Beyond the standard  $\Lambda$ CDM cosmology: the observed structure of DM halos and the shape of the power spectrum, arXiv:astro-ph.CO/1511.07989. **2015**.

The first removed reference (Yang, 2023, in preparation) was a duplicate of another article included in the citations which is on arXiv, and will be submitted for publication once updated. The second (Demiański, 2015) was replaced with a more relevant reference which has been fully published as requested by Reviewer #2. Additionally, a note was added in the bibliography justifying the arXiv reference (Fromerth and Rafelski, 2002) which was published in part in *Acta Phys. Polon. B* (Fromerth et. al., 2012) and in full in *Eur. Phys. J. ST* (Rafelski, 2019) as requested by Reviewer #2.

After these changes the number of references grew to a total of 164.

We look forward to having our work accepted for publication.

Sincerely,

Andrew Steinmetz