

Department of Physics,  
The University of Arizona,  
Tucson, AZ 85721, USA

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MDPI Universe

Dear Editors,

Thank you for reviewing our submission to Dr. Remo Ruffini's Festschrift. With this letter, we submit our revised manuscript with changes requested by the reviewers and minor changes we ourselves wished to make. Within the revised manuscript, added or revised text has been highlighted in blue. Minor grammatical changes or corrections remain unmarked. Below we provide a list of relevant changes with the Section of Figure number denoted where appropriate.

- Sect. 1.2 - Introductory paragraphs 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. Possibilities for contemporary antimatter domains (compact or large) are briefly mentioned.
- Sect. 1.3 - Added references to dynamical or phantom dark energy which are alternatives to the  $\Lambda$  DE model as recommended by Reviewer #2.
- Sect. 1.3 - Revised sentences discussing the Hubble tension to better connect to content discussed within this work.
- Sect. 4.2 - Introductory paragraph rewritten for clarity emphasizing overlap between hadronic and leptonic plasma epochs.
- Sect. 4.2 - Section is revised to emphasize antimatter presence in muon (antimuon) production and decay as recommended by Reviewer #1.
- Sect. 5.2 - Classical description of anomalous magnetic moments are briefly mentioned in comparison to quantum description.
- Sect. 5.5 - Final paragraph revised to clarify lack of sensitivity in electron-positron chemical potential on magnetic fields within the ranges considered.
- Sect. 5.6 - Paragraph expanded to explain the mean field approximation used to obtain magnetization.
- Sect. 6 - The photographs honoring Remo Ruffini and Lizhi Fang have been grouped together and moved to the acknowledgements in coordination with editors. The first line of the abstract, as well as the last paragraph of the conclusions have also been moved to 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 an corrected value for the Solar core density.
- Fig. 23 - Caption rewritten for clarity.

The following references were added to support above revisions or otherwise support statements already present in the work:

- K. Eguchi *et al.*, "First results from KamLAND: Evidence for reactor anti-neutrino disappearance," *Phys. Rev. Lett.*, vol. 90, p. 021802, 2003.
- G. L. Fogli, E. Lisi, A. Marrone, and A. Palazzo, "Global analysis of three-flavor neutrino masses and mixings," *Prog. Part. Nucl. Phys.*, vol. 57, pp. 742–795, 2006.
- Y. Fukuda *et al.*, "Evidence for oscillation of atmospheric neutrinos," *Phys. Rev. Lett.*, vol. 81,

- pp. 1562–1567, 1998.
- S. F. King and C. Luhn, “Neutrino Mass and Mixing with Discrete Symmetry,” *Rept. Prog. Phys.*, vol. 76, p. 056201, 2013.
  - E. Fernandez-Martinez, J. Hernandez-Garcia, and J. Lopez-Pavon, “Global constraints on heavy neutrino mixing,” *JHEP*, vol. 08, p. 033, 2016.
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  - 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.
  - Rubakov, V.A.; Shaposhnikov, M.E. Electroweak baryon number nonconservation in the early universe and in high-energy collisions. *Usp. Fiz. Nauk* **1996**, *166*, 493–537.
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- Benevento, G.; Hu, W.; Raveri, M. Can Late Dark Energy Transitions Raise the Hubble constant? *Phys. Rev. D* **2020**, *101*, 103517.

The following references were removed:

- Yang, C.T.; Rafelski, J. Bottom quark chemical nonequilibrium in primordial QGP. Update in preparation, **2023**.
- 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.

We look forward to having our work accepted for publication.

Sincerely,

Johann Rafelski  
 Jeremiah Birrell  
 Andrew Steinmetz  
 Cheng Tao Yang