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Astrophysical neutrino oscillation accounting for neutrino charge radii

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It is believed that the running (for instance, COHERENT) and forthcoming terrestrial neutrino experiments will be sensitive to the neutrino charge radius [1] that is one of the neutrino fundamental electromagnetic characteristics [2] predicted [3] to be non-zero even in the Standard Model. In this work we derive the neutrino evolution equation accounting for charge radii for the case of the neutrino propagation in an extreme astrophysical environment. On this basis, we study conditions for new neutrino oscillation resonances in astrophysical environments (such as supernovae, neutron and binary neutron stars) accounting for neutrino magnetic moments and charge radii. We discuss possibilities to have reasonable effects of the charge radii on supernovae neutrino fluxes in the forthcoming large volume neutrino experiments.

[1] M. Cadeddu, F. Dordei, C. Giunti, K. Kouzakov, E. Picciau, A. Studenikin, Phys. Rev. D100 (2019) 073014.

[2] C. Giunti, A. Studenikin, Rev.Mod.Phys. 87 (2015) 531.

[3] J. Bernabeu, L. G. Cabral-Rosetti, J. Papavassiliou, and J. Vidal, Phys. Rev. D62 (2000) 113012.

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Secondary track (number)

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