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Nuclear decay oscillations as possible emergent gravity effect

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Recently, several experiments reported small violations of radioactivity law in alpha- and beta-decay of heavy nuclei [1,2]. Beside standard exponential time dependence of nuclei decay rate, they found additional periodic terms of the order .05% corresponding to annual and daily nucleus life-time oscillations. It supposes that decay parameter variation can be related to temporary variation of Sun gravitation potential U in lab., resulting from elliptic form of Earth orbit and its daily rotation [1]. We argue that such effects can be explained by nonlinear interaction of quantum systems with gravity proposed by Kibble [3,4]. It corresponds also to some emergent gravity theories, in which gravity induced by scalar bilocal field Φ [4,5]. Φ interaction with bilocal nucleus operators described by Doebner- Godin nonlinear formalism [6] can significantly influence nucleus decay life-time [7]. For Gamow alpha-decay model, such nonlinear terms induce nucleus life-time variations, which agree with experimental results for Po-214 alpha-decay [7].

- 1. E. Fischbach et al. , Rev. Space Sci. 145, 285 (2009); Astrop. Phys. 59,47 (2014)
- 2. E. Alekseev et al., Phys. Part. Nucl. 47, 1803 (2016), ibid.. 49, 557 (2018)
- 3. T.W.B. Kibble, Commun. Math. Phys. 64, 73 (1978)
- 4. P. Diaz, S. Das and M. Walton, Int. J. Mod. Phys. D27, 1850090 (2017)
- 5. S.Das and A.Jevicki, Phys. Rev. D68, 044011 (2003)
- 6. H. Doebner and G. Goldin, Phys. Rev. A 54, 3764 (1996)
- 7. S.Mayburov, Int. J. Theor. Phys. 60, 630 (2021)

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