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Remark on Possible Binary Companion of the Sun: Towards a Symmetric Cosmology model which may be called Quantum Liquid Dirac-Milne (QLDM) model

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1 Abstract

In a recent paper, we review our previous paper where we put forth an argument that from Bohr-Sommerfeld quantization rules we can come up with a model of quantized orbits of planets in our solar system, be it for inner planets and also for Jovian planets. Now, considering a well-known problem of asymmetry between matter-antimatter in cosmology studies[18], we discuss how we can solve this problem by put forth a new conjecture that there are large scale antimatter in the form of negative masses in this Universe, hence avoiding the problem of matter-antimatter asymmetry. Subsequently, we argue that provided that Newton-Schrödinger approach to planetary quantization may be problematic, then perhaps it is time to consider Dirac-Milne cosmology with its extension to quantum liquid, especially in the context of symmetric cosmology.

2 Introduction

In a preceding article, we introduced some new disputes on the theoretical little star thought to be a partner to our Sun, known as the Nemesis, which is proposed to explain a clear example of mass destructions in Earth's history.

Some speculated that such a star could impact the hover of comet shower in the far outer close planetary framework, sending them on a brief training with Earth. While continuous infinite surveys fail to find any verification that such a binary companion star exists, we present in this article some theoretical arguments including our own, proposing that such a small star buddy of the Sun stays a possibility. Also, one great marker for such a bantam buddy of the Sun is Sedna, a planetoid which has been found around 2004 by Mike Brown and his Caltech group. Sedna area and unconventional circle are with the end goal that it should be there [1][6]. Therefore a physical explanation of why Sedna is located there can be a good start to begin to search the existence and location of the supposedly dwarf companion of the Sun. Strikingly, we can comment here that condition above is actually the equivalent with what is gotten by Nottale utilizing his Schrödinger-Newton formula [12]. In this manner here we can check that the outcome is the equivalent, it is possible that one uses Bohr-Sommerfeld's quantization rules of Schrodinger-Newton condition. The relevance of condition above can incorporate that one can anticipate new exoplanets (i.e., extrasolar planets) with noteworthy outcome. Consequently, one can find a neat correspondence between Bohr-Sommerfeld quantization rules and development of quantized vortices in united issue structures, especially in superfluid helium [1]. Here we propose a guess that superfluid vortices quantization runs additionally give a decent depiction to the planetary circles in our Solar System. A thought that given the science structure of Jovian planets are unique in relation to inward planets started around 15 years prior, in this manner it is likely both arrangement of planets have diverse cause. By accepting inward planets circles have distinctive quantum number from Jovian planets, here by utilizing "least square difference" method (with the help of a computer spreadsheet program) so as to look for the most ideal straight line for Jovian planets circles in an alternate quantum number. At that point it came out that such a straight line must be displayed on the off chance that we accept that the Jovian planets were begun from a twin star framework: the Sun and its partner, utilizing the idea of reduced mass, as we often find at solid state physics textbooks. Although based on statistical optimization, it yields new prediction of 3 planetoids in the outer orbits beyond Pluto, from which prediction, Sedna. A figure as shown below shows results of our simple model based on large-scale quantization inspired by Bohr-Sommerfeld's rule obtains a remarkably good prediction compared to observation:

3 Extension to symmetric Dirac-Milne cosmology is possible

In the previously mentioned segments, we set forth a contention for low temperature material science model of nearby planetary group, specifically utilizing Bogoliubov-de Gennes conditions which are typically used for superconductors. While this makes the model somewhat less difficult and understandable, one may

Object	No.	Titius	Nottale	CSV	Observ.	Δ , %
	1		0.4	0.43		
	2		1.7	1.71		
Mercury	3	4	3.9	3.85	3.87	0.52
Venus	4	7	6.8	6.84	7.32	6.50
Earth	5	10	10.7	10.70	10.00	−6.95
Mars	6	16	15.4	15.4	15.24	−1.05
Hungarias	7		21.0	20.96	20.99	0.14
Asteroid	8		27.4	27.38	27.0	1.40
Camilla	9		34.7	34.6	31.5	−10.00
Jupiter	2	52		45.52	52.03	12.51
Saturn	3	100		102.4	95.39	−7.38
Uranus	4	196		182.1	191.9	5.11
Neptune	5			284.5	301	5.48
Pluto	6	388		409.7	395	−3.72
2003EL61	7			557.7	520	−7.24
Sedna	8	722		728.4	760	4.16
2003UB31	9			921.8	970	4.96
Unobserv.	10			1138.1		
Unobserv.	11			1377.1		

Table 1: Comparison of prediction and observed orbit distance of planets in Solar system (in 0.1AU unit) [28].

Figure 1: Comparison between observed and calculated inner and outer planetary orbit distances in the Solar System. Source: V. Christianto, Apeiron, vol. 23, July 2004. url: <http://redshift.vif.com>

ask: what are different confirmations accessible to legitimize the BdG model for the Solar framework. In this respects, permit us to submit three supporting confirmations which appear to compare to the calculated model as we illustrated previously: * Pairing of Pluto-Charon and other TNOs/KBOs seem to be attributed to the BCS/BdG pairing condition; ** pointing to low temperature physics model of Solar System; *** Solar interior has superfluid inner structure (Oliver K. Manuel et al); see for instance [19-20]. Some literatures argue that G1.9 is remnant of supernovae, others argue that G1.9 cannot be supernovae, instead it is more plausible to argue that G1.9 is brown dwarf star. Now, we refer to paper by Boney and also by Heald, who argue that (a) Dirac Feynman's interpretation of Dirac equation symmetry as requiring that antimatter is just an ordinary matter going backward in time, that is not the only possibility. Quote from Heald [13]: "If rest mass energy is not a real scalar quantity but a potential imaginary energy, then the rest mass of antimatter will have negative potential energy. Accordingly, it would follow that the total relativistic energy of a matter or antimatter particle can be described by a complex vector summing the real kinetic and imaginary rest mass energies and Newton's law of gravitation will remain valid for antimatter. Theorems of quantum physics and general relativity have shown that antimatter has negative gravitational mass, and so matter and antimatter bodies will exert mutual gravitational repulsion." Boney also suggests that it is also equally possible to interpret antimatter as having negative mass. He wrote: "Unfortunately, it seems there is no imperative to imagine antimatter moves backwards in time, at least from the Dirac Equation, if you allow negative mass solutions." [14] The notion of negative mass is admittedly quite strange for solar physics or cosmology, but it is well accepted in solid state physics and condensed matter physics. Moreover, Anastopoulos Hu argue that (b) Newton-Schrödinger equation which is quite common in some models for AQT (alternative quantum theory), especially for macroquantum physics, is quite problematic.[15] Provided arguments (a) and (b) above can be accepted, then we suggest to consider symmetry between ordinary matter and antimatter (negative mass) should be considered from the beginning of physical modelling. As such, that is why we consider Bogoliubov-De Gennes instead of Newton-Schrödinger equation. In addition, we may also consider symmetric Dirac-Milne cosmology model, which is essentially a generalized Newtonian cosmology which admits negative gravitational mass. There are growing interests to such a Dirac-Milne model in recent years. [16-17] This appears to help our suggestion of conceivable twofold buddy of the Sun as negative mass star (NMS) as we considered in a prior paper [1]. Similarly as with expected area to discover the bantam friend of the Sun, we can specify quickly here that since 2017, there is an article named as G1.9 which was seen around 60-66 AU (around Pluto/Kuiper Belt); see [21]. In this manner it very well may be a decent begin to see if the G1.9 is surely the bantam friend of the Sun that we're searching for from the beginning. Moreover, further investigations are needed to extend Dirac Milne model towards symmetric Quantum Liquid Dirac Milne (QLDM), as implicated by our superfluid dynamics model.

4 Concluding remarks

In this paper, we present a contention that Bohr-Sommerfeld quantization condition can be connected to Bogoliubov-de Gennes conditions, and hence it will in general be demonstrated that such a Bohr-Sommerfeld's quantization rules can be associated with enormous degree structure quantization, for instance, our close by planetary gathering in Solar framework. At that point we recommend to think about balance between customary issue and antimatter (negative mass) ought to be considered from the earliest starting point of physical demonstrating. Accordingly, that is the reason we consider Bogoliubov-De Gennes rather than Newton-Schrödinger condition. Furthermore, we may likewise consider DiracMilne cosmology model, which is basically a summed up Newtonian cosmology which concedes negative gravitational mass. In addition, further examinations are expected to broaden Dirac Milne model towards symmetric Quantum Liquid Dirac Milne (sQLDM), as involved by our superfluid vortices model.

References

- [1] Victor Christianto. *A Cantorian superfluid vortex and the quantization of planetary motion*. Apeiron, vol. 22, 2004;11(1):112-52. <http://redshift.vif.com>
- [2] Victor Christianto Florentin Smarandache. *On the possibility of binary companion of the Sun*. Prespacetime J, Vol. 11 No. 1, (2020)
- [3] Victor Christianto, Florentin Smarandache, Yunita Umniyati. *Towards Gross-Pitaevskiiian Description of Solar System and Galaxies*. Prespacetime J, Vol. 11 No. 3, (2020)
- [4] Sonin, E.B. *Dynamics of quantized vortices in superfluids*. Cambridge, Cambridge University Press, 2016.
- [5] Huang K. *A superfluid Universe*. Singapore: World Scientific Publishing Co. Pte. Ltd., 2016.
- [6] Victor Christianto, Florentin Smarandache, Yunita Umniyati *A Derivation of Fluidic Maxwell-Proca Equations for Electrodynamics of Superconductors and Its Implication to Chiral Cosmology Model*. Prespacetime J., Vol. 9 No. 7 (2018).
- [7] Florentin Smarandache Victor Christianto *Schrodinger Equation and the Quantization of Celestial Systems* Prog. Phys. Vol. 2, pp. 5-12 (2006).
- [8] Victor Christianto, Diego Rapoport, Florentin Smarandache *Numerical Solution of Time-Dependent Gravitational Schrodinger Equation* Prog. Phys. Vol. 2, pp. 9-11 (2007).

- [9] Victor Christianto Florentin Smarandache *An Exact Navier Stokes equation to Schrodinger equation via Riccati equation* Prog. Phys. Vol. 1 (2008).
- [10] Ildus Nurgaliev *Singularities are averted by vortices* Gravitation and Cosmology Vol. 16(4), 313-316 (2010).
- [11] Victor Christianto *On the origin of macroquantization in astrophysics and celestial motion* Annales de la Fondation Louis de Broglie Vol. 31(1), 2006.
- [12] L. Nottale *Astron. Astrophys.* Vol. 327:867-89 (1997).
- [13] Graeme Heald *Complex Energy of Matter and Antimatter*. ResearchGate.net, 2020.
- [14] Evans T.D. Boney *Negative Mass Solutions to the Dirac Equation Move Forward in Time* ResearchGate.net, 2019.
- [15] C. Anastopoulos B.L. Hu *Problems with the Newton-Schrödinger equations*. New J. Phys. Vol. 16 085007 (2014).
- [16] A. Benoit-Levy G. Chardin *Introducing the Dirac-Milne universe*. Astronomy Astrophysics manuscript no. BLC11. March 2012
- [17] Giovanni Manfredi et al. *Cosmological structure formation with negative mass*. arXiv:1804.03067v3 [gr-qc]
- [18] Brian Albert Robson *The Matter-Antimatter Asymmetry Problem*. Journal of High Energy Physics, Gravitation and Cosmology, 4, 166-178. <https://doi.org/10.4236/jhepgc.2018.41015>
- [19] O. K. Manuel, B. W. Ninham, and S. E. Friberg *J. Fusion Energy*. vol. 21, pp. 193-198 (2002).
- [20] O.K. Manuel *Proc. The Third Int. Conf. on Beyond Standard Model Phys.* pp. 307-316 (2003).
- [21] S. Reynolds, et al. *THE YOUNGEST GALACTIC SUPER-NOVA REMNANT: G1.9+0.3*. <https://arxiv.org/abs/0803.1487v2>; see also [21a] Nemesis, brown dwarf star has been discovered. url: <https://www.youtube.com/watch?v=Ev7YhmKv80>