



**SDI Review Form 1.6**

Journal Name:	<a href="#">Physical Science International Journal</a>
Manuscript Number:	Ms_PSIJ_31388
Title of the Manuscript:	Toy model of evolving quantum cosmology with dark energy
Type of the Article	

**General guideline for Peer Review process:**

This journal's peer review policy states that **NO** manuscript should be rejected only on the basis of '**lack of Novelty**', provided the manuscript is scientifically robust and technically sound.

To know the complete guideline for Peer Review process, reviewers are requested to visit this link:

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**PART 1: Review Comments**

	<b>Reviewer's comment</b>	<b>Author's comment</b> (if agreed with reviewer, correct the manuscript and highlight that part in the manuscript. It is mandatory that authors should write his/her feedback here)
<b>Compulsory</b> REVISION comments	<p>Since the theoretical science is not yet able to give answers to questions about the essence of the dark energy and dark matter as well as a genesis of gravity, a starting position in the search of new ideas for the "revealing the reality exactly how it shows itself <i>before</i> science turns to it with its questions" (Heidegger M.) can be phenomenology. And on this path already obtained some results (Timashev S. On the Law of Universal Gravitation and the Quantum Essence of Gravity: Phenomenology // Astronomy and Space Science: Open Access. 2016. V. 1, Issue 1, ASSOA-1-003).</p> <p>In the peer-reviewed article the Universe is considered as the quantum gravitational object and the two quantitative relations have been chosen: the Planck scale Hubble parameter is introduced, and the "holographic principle" is used. In accordance with the last principle information of the evolving Universe as the four dimensional space-time system can be extracted from the well-known relation for a closed and massive object, similar a black hole.</p> <p>These chosen relations seems to me as unrealistic for the analysis based on these dynamics of the Universe. First, the gravitational constant <math>G</math>, which determines the scale factor – the Planck time, itself depends on the cosmological time (Mould J. et.al, Modified gravity and large scale flows // Astrophys.Space Sci 357 (2015) no.2, 162; arXiv.org/abs/1504.03027 [astro-ph.CO]), and secondly, it is difficult to correlate the equilibrium black hole and the real Universe with its complex dynamics. Of course, the author has developed a "toy model" and estimated matter density</p>	<p>Thanking you sir.</p> <p>We would like to appeal that, both, general theory of relativity and quantum mechanics can be considered as 'head' and 'tail' of the "cosmic coin". With current scientific understanding it is impossible to comment on the pre-eminence of tail and head of the cosmic coin. It is also quite challenging to make comments on the pre-eminence of massive cosmic space-time structure and the Newtonian gravitational constant. By considering the available physical concepts one may be permitted to proceed for interrelating all of the above in a consistent manner with possible physical logics and observations. \\</p> <p>It may be noted that, in principle, cosmic 'coin' can be considered the central portion of cosmic 'sphere'. With reference to the available physical models of cosmology and available cosmological observational data, in this paper, in a quantum gravitational (start-up) approach, we try to make a journey through the cosmic coin/sphere and try to connect its two ends/poles by the help of Newtonian gravitational constant, Hubble parameter, reduced Planck's constant and speed of light with simple logics. In this context, we request</p>



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	<p>and dark matter density with reference to the ratio of critical energy density to thermal energy density. However, the consideration of these problems without discussing the key problems – the essence of the dark energy, dark matter, gravity, is not so important. It would be much more interesting if a “toy model” could explain (like the phenomenology does) what could be the essence of dark energy, dark matter, gravity.</p>	<p>the readers to recollect the incomplete status of current quantum cosmology [1]. \\</p> <p>Commenting on ‘content of the cosmic coin’ is another impossible thing. Apart from the well known ordinary visible matter, many experiments and cosmological observations are on the way to explore the ‘actual’ physical identity of ‘well fitted’ dark matter, ‘‘well hypothesized’’ dark energy and ‘‘well believed’’ vacuum energy’. Compared to the ‘little’ identity of dark energy, from particle physics point of view and galactic structural formation point of view, there exists strong identification support for the dark matter. Now, the situation is very challenging in addressing the ‘identity’ and ‘role’ of dark energy. Whether it is the driving source of cosmic expansion or it is a result of cosmic evolution, is still unclear. The effects of vacuum energy can be experimentally observed in various phenomena like spontaneous emission, Casimir effect and Lamb shift. It is strongly believed that, vacuum energy is an underlying background energy that exists in free space throughout the entire Universe[2]. Based on this idea, it is also possible to imagine that, as the universe is evolving, decreasing matter density and increasing cosmic volume, both, paves a way for increasing vacuum content. Thinking in this way, from the beginning of cosmic evolution, dark energy can be identified with evolving vacuum energy.\\</p> <p>In this context, with reference to the currently believed cosmic density break up and Planck scale critical density, we proposed an empirical relation for understanding/predicting the</p>
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		quantitative percentages of past and future cosmic density breakups. Proceeding further and by considering the proposed set of assumptions, we tried our level best in fitting the current cosmological physical parameters. Further study, may help in understanding the actual nature of 'dark energy'.
<b><u>Minor</u></b> REVISION comments	In the cited numerical values is no need to store a lot of digits after the decimal point, leaving only two digits after the decimal point, for example, $H_{PI} \approx 1.85 \times 10^{43} \text{ sec}^{-1}$ .	
<b><u>Optional/General</u></b> comments	I believe that the submitted article will be of interest to readers, because the idea of using a holographic model of the Universe in relation to the dynamics is discussed in the literature. As the PSIJ will publish review comments on the article and the article's author answers to these questions, publication of the article will initiate further useful discussion. However, I consider that the article should be reduced: the Sections 3 and 4 should be deleted. The bulky and not very important material presented in these sections, will distract the readers from the main task of the article – to draw readers' attention to the fundamental problems of the dynamics of the Universe.	