

Remark on Creatio ex Nihilo, Intelligent Design and Emergence Philosophy Approaches to Origin of the Universe

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Abstract

It is known that the Big Bang theory was based on the concept of creation ex nihilo, after ancient Greek philosophers. In this paper, we will make few remark on the concept of *creatio ex nihilo* (as a commentary to a recent paper by Kalachanis, Athanasios Anastasiou, Ioannis Kostikas, Efstratios Theodossious and Milan S. Dimitrijevi), as well as two other approaches, i.e. Intelligent Design and Emergence Theory by Clayton/Yong. As continuation of our recent paper to appear in forthcoming issue of J. Asia Matematika, we argue that beside the above three approaches, a new concept called *creatio ex-rotatione* offers a resolution to the long standing disputes between beginning and eternity of the Universe. In other words, in this respect we agree with Vaas, i.e. it can be shown: “*how a conceptual and perhaps physical solution of the temporal aspect of Immanuel Kant’s „first antinomy of pure reason“ is possible, i.e. how our universe in some respect could have both a beginning and an eternal existence. Therefore, paradoxically, there might have been a time before time or a beginning of time in time.*” By the help of computational simulation, we also show how a model of early Universe with rotation can fit this new picture.

Keywords: Big Bang, Steady state, rotating universe, fluid, singularity-free, cosmology model, early Universe, Genesis, Spirit in Creation, spirit-filled medicine, mind-body-spirit medicine.

Introduction

Considering the Big Bang Theory, promulgated by the Belgian priest Georges Lemaître in 1927 who said that the universe has begun through an explosion of a primeval atom, which is based on the Christianity believe that the universe was created, the following questions will naturally occur:

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a) where did this primeval atom come from?

b) what was before this big bang?

The term “big bang” was derogatorily coined by Fred Hoyle in a BBC interview and it is supposed that the universe, according to this theory, was created between 10-20 billion years ago.[33]

In this article we will explore three approaches to the origin of the universe, all of them can be related to the notion of Big Bang (spontaneous creation). In the last section, we will discuss a new proposed concept: *creatio ex-rotatione*, based on our investigation in the past few years.

Three Approaches on the Origin of the Universe

First of all, we will shortly review Kalachanis, Athanasios Anastasiou, Ioannis Kostikas, Efstratios Theodossious and Milan S. Dimitrijevi’s paper which will appear in forthcoming issue of European Journal of Science and Theology [31]. Their paper have the following words as abstract: “The Big Bang Theory considers that the Universe, space and time have a beginning. Similar is the position of the Christian writers of the early Christian Church, who support the *ex nihilo* - ἐκ μὴ ὄντος (*ek me ontos* = from the „non-being“) creation of the world through the divine „energy“, with the two theories converging to the fact that space and time have a beginning.”

That the Big Bang concept has a beginning, that is true, but what kind of beginning that its originator had in mind is rather different from the concept that Christian writers had in mind, see for instance: Jonathan Pennington & Sean McDonough.[32]

The Big Bang hypothesis was formulated by Lemaitre based on the notion of primeval atom (“cosmic egg”). Although it is true that some Christian writers also mentioned “Creation from nothing”, they were more likely to have different concepts compared to the primeval atom. Moreover, the notion of “creation from nothing” should be accepted as debatable, since it was mentioned in a few verses only in NT, and it can be traced back to the book of Maccabee in Deuterocanonica. So, in the next sections, we will take a look directly and closely at Hebrew version of the book of Genesis 1.

In summary we argue that: (a) while both the Big Bang originator and Christian writers shared similar concept of creatio ex nihilo, they have different views on “primeval atom,” (b) even the idea of primeval atom itself seems in direct contradiction with “ex nihilo” term.

Secondly we will discuss Intelligent Design’s view on the Origin of the Universe, then we will discuss Emergence Philosophy.

a. Intelligent Design

With regards to ID hypothesis, some philosophers began with Psalm 19 to argue in favor of *The Intelligent Creator*:

The heavens declare the glory of God;
And the firmament shows His handiwork.

² Day unto day utters speech,
And night unto night reveals knowledge.

³ *There is* no speech nor language
Where their voice is not heard.

⁴ Their line^{al} has gone out through all the earth,
And their words to the end of the world. (Psalm 19: 1-4, NKJV)¹

We can note some proponents of ID, such as Michael Behe etc. While such attempt to link the old conception of Intelligent Design to Biblical account may sound interesting at first glance, one can note immediately that all ID proponents seem to avoid to point to God of Bible as the Intelligent Creator that they talk about.

Yes, ID theory is a nice hypothesis to talk about, but the end of the day, such a hesitation to speak about the Biblical God reflects their adherence (perhaps) to a number of theoretical possibilities which enable them to theorize around and around without daring to point at the Real Subject behind all Design in the Universe. And clearly, such a hesitation to point to God is not without implications, as Erkki Vesa Kojonen wrote in his dissertation in University of Helsinki [30]:

*“ID’s design arguments are quite minimalistic, not aspiring to prove the existence of God, but merely of an **unidentified** intelligent designer of cosmic and biological teleology.”*

¹ <https://www.biblegateway.com/passage/?search=Psalm+19&version=NKJV>

At the price of giving too much “intellectual room,” then we find in recent decades some scientists or pseudo-scientists come up with alternative hypothesis on who or what is behind the Design of the Universe:

- In their book “*Grand Design*,” Hawking and Mlodinow argue that in their TOE model based on certain variations of Superstring theories, that such TOE does need the role of God as Creator.² In other words, they seem to argue that physical laws exist eternally before the Universe exist, so by such physical laws themselves, there was Big Bang triggered by primordial vacuum fluctuations. But how did it happen...it seems many cosmologists remain silent on this vague hypothesis. This fact alone should alert us that Hawking and Mlodinow ask their readers to believe in a story based on a baseless-theory which does not conform to any experimental backup. See also article by Michael G. Strauss.³ Moreover, other alerts may come from the fact that: It is worth noting, that calculation shows that Quantum Field theory predicts cosmological constant at astronomical error compared to observed value.⁴ Even mathematicians like Peter Woit already wrote a book called “*Not even wrong*” to alert us on the fact that Superstring theories do not predict anything which can be measured.⁵ See also his other book: “*String theory: an evaluation*.”⁶
- And much worse than Grand Design, some college students (and may be with support of their professors) have come up with a new god called “*Flying Spaghetti Monster*” (FSM religion). They even managed to push their case that FSM religion should be taught at high schools and colleges in the same way of ID/evolution theory.⁷ Such a fancy FSM reminds us to the *golden cow* made by Aaron and the Israelites soon after Moses went to the mount.

b. Emergence Philosophy

² <https://www.reasonablefaith.org/writings/popular-writings/science-theology/the-grand-design-truth-or-fiction/>

³ <http://www.michaelgstrauss.com/2017/08/the-grand-design-is-god-unnecessary.html>

⁴ Quote from J.R. Roldan: “The quantum field **theory prediction** of the **cosmological constant** is 120 orders of magnitude higher than the observed value. This is known as the **cosmological constant problem**.” <https://arxiv.org/abs/1011.5708>

⁵ <http://www.math.columbia.edu/~woit/rutgers.pdf>

⁶ <https://www.math.columbia.edu/~woit/strings.pdf>

⁷ <https://www.telegraph.co.uk/news/worldnews/northamerica/usa/1498162/In-the-beginning-there-was-the-Flying-Spaghetti-Monster.html>

According to Amos Yong, a full professor in Fuller Seminary:

“To be clear, emergence is a philosophical or metaphysical hypothesis rather than a theological doctrine or scientific datum. Yet the theory of emergence, Clayton suggests, identifies patterns of developments in the natural history of the cosmos as understood through the findings of the various scientific disciplines. ...” [6, p. 145]

In other words, emergence philosophy as proposed by Clayton⁸ seems to be founded on certain metaphysical assumptions on how nature functions. We will not go into details of Emergence here, suffice it to say (with all respect to Amos Yong as a leading contemporary theological scholar from Fuller) that there is danger that we do **eisegesis** on biblical narratives, rather than doing a fair and faithful reading (exegesis) on Biblical account of Creation.

Therefore in the next section we shall show what we can infer from Biblical narratives, with minimal assumptions, i.e. using hermeneutics of Sherlock Holmes.

How *creatio ex-rotatione* may Resolve Dispute on the Origin of the Universe through re-reading Gen. 1:1-2

1. Introduction

In recent years, the Big Bang as described by the Lambda CDM-Standard Model Cosmology has become widely accepted by majority of physics and cosmology communities. But the philosophical problems remain, as Vaas pointed out: Did the universe have a beginning or does it exist forever, i.e. is it eternal at least in relation to the past? This fundamental question was a main topic in ancient philosophy of nature and the Middle Ages. Philosophically it was more or less banished then by Immanuel Kant’s *Critique of Pure Reason*. But it used to have and still has its revival in modern physical cosmology both in the controversy between the big bang and steady state models some decades ago and in the contemporary attempts to explain the big bang within a quantum cosmological framework.

⁸ <http://philipclayton.net/files/papers/EmergenceOfSpirit.pdf>

Interestingly, Vaas also noted that Immanuel Kant, in his *Critique of Pure Reason* (1781/1787), argued that it is possible to prove both that the world has a beginning and that it is eternal (first antinomy of pure reason, A426f/B454f). As Kant believed he could overcome this „self-contradiction of reason“ („*Widerspruch der Vernunft mit ihr selbst*“, A740) by what he called „*transcendental idealism*“, the question whether the cosmos exists forever or not has almost vanished in philosophical discussions. [3]

In this paper we will take a closer look at Genesis 1:2 to see whether the widely-accepted notion of *creation ex-nihilo* is supported by Hebrew Bible or not. It turns out that a new concept called **creatio ex-rotatione** is in agreement with Kant and Vaas’s position, it offers a resolution to the long standing disputes between beginning and eternity of the Universe. In other words, in this respect we agree with Vaas: “how a conceptual and perhaps physical solution of the temporal aspect of Immanuel Kant’s „*first antinomy of pure reason*“ is possible, i.e. how our universe in some respect could have both a beginning and an eternal existence. Therefore, paradoxically, there might have been a time before time or a beginning of time in time.”[3]

2. Preliminary remark on Hermeneutics of Sherlock Holmes

In the preceding section, we have discussed on how our proposed term of “*creatio ex-rotatione*” has sufficient logical background.

In the subsequent section we will discuss how to answer this question by the lens of hermeneutics of Sherlock Holmes. This is a tool of mind which we think to be a better way compared to critical hermeneutics.

- What is *Hermeneutics of Sherlock Holmes*?⁹

⁹ <https://www.str.org/blog/learning-hermeneutics-from-holmes>

- The following are 10 tips from Eric McKiddie to adapt Sherlock Holmes to interpreting biblical passages:¹⁰

- Tip no 1:

Holmes: “I have no data yet. It is a capital mistake to theorize before one has data. Insensibly one begins to twist facts to suit theories, instead of theories to suit facts.”

Far too often students of the Bible (and cosmology folks as well) twist verses to suit interpretations instead of formulating interpretations to suit what the verses say.

Guide: Don’t approach your passage assuming you know what it means. Rather, use the data in the passage – the words that are used and how they fit together – to point you toward the correct interpretation.

- Tip no 2: **The kind of looking that solves mysteries.**

- *Holmes: “You have frequently seen the steps which lead up from the hall to this room.”*
- *Watson: “Hundreds of times.”*
- *Holmes: “Then how many are there?”*
- *Watson: “How many? I don’t know!”*
- *Holmes: “Quite so! You have not observed. And yet you have seen. That is just my point. Now, I know that there are seventeen steps, because I have both seen and observed.”*
- There is a difference between reading a Bible verse and observing it. Observation is a way of collecting details contained in a passage. As you read and reread the verses, pull the words into your brain where you can think about them and figure them out.
- This habit will shed light on how you understand the text, even if the passage is as familiar as the stairs in your house.

- Tip no 3: **Know what to look for.**

- *Watson: “You appeared to [see] what was quite invisible to me.”*
- *Holmes: “Not invisible but unnoticed, Watson. You did not know where to look, and so you missed all that was important.”*
- Know where to look for clues that will illuminate your passage. Look for repeated words and phrases, bookends (where the beginning and end of the passage contain similarities), and clues in the context around your passage.

¹⁰ <https://www.thegospelcoalition.org/blogs/trevin-wax/10-tips-on-solving-mysterious-bible-passages-from-sherlock-holmes/>

- Don't know what to look for? *Living by the Book* by Howard Hendricks and *How to Read the Bible for All Its Worth* by Gordon Fee and Douglas Stuart are great resources to start learning how to study the Bible.

- Tip no 4: **Mundane details are important!**

- *Watson: "I had expected to see Sherlock Holmes impatient under this rambling and inconsequential narrative, but, on the contrary, he had listened with the greatest concentration of attention."*
- Don't ignore parts of the passage that seem insignificant to its meaning. Treat every word as if it contains clues to the interpretation of the passage.

- Tip no 5: **Use solutions to little mysteries to solve bigger ones.**

- *Holmes: "The ideal reasoner would, when he had once been shown a single fact in all its bearings, deduce from it not only all the chain of events which led up to it but also all the results which would follow from it."*
- Once you understand the passage that baffled you, your work is not done!
- Now it's time to locate that passage in the grand narrative of the Bible. How do previous books and stories lead up to your passage? How does your passage anticipate the consummation of all things that results at Jesus' second coming?

- Tip no 6: **The harder the mystery, the more evidence you need.**

- *"This is a very deep business," Holmes said at last. "There are a thousand details which I should desire to know before I decide upon our course of action."*
- In grad school, one professor gave us an assignment requiring us students to make 75 observations on [Acts 1:8](#). The verse does not even contain that many words!
- The professor's goal was to train us in compiling evidence. Harder Bible passages demand that we collect as much information as possible.

- Tip no 7: **Break big mysteries down into little ones.**

- *Watson: "Holmes walked slowly round and examined each and all of [the pieces of evidence] with the keenest interest."*
- Difficult passages can be overwhelming. Break chapters down into paragraphs, paragraphs into verses, and verses into clauses. Devote careful attention to each chunk of the passage individually. Then try to piece together the meaning they have when added up as a whole.

- Tip no 8: **Don't be so committed to a solution that you ignore new evidence.**

- *“I had,” said Holmes, “come to an entirely erroneous conclusion which shows, my dear Watson, how dangerous it always is to reason from insufficient data...I can only claim the merit that I instantly reconsidered my position.”*
- After you’ve put the hard work into grasping a mysterious passage, the case isn’t necessarily closed. Often you’ll run across other passages that shed new light on your passage. Or you’ll hear someone preach those verses in a different way than how you interpreted it.
- Always be willing to consider new insights. This will at least help you nuance your understanding of the passage, if not take a different stance.
 - Tip no 9: **Simple solutions often provide answers to manifold mysteries.**
- *Holmes: “The case has been an interesting one...because it serves to show very clearly how simple the explanation may be of an affair which at first sight seems to be almost inexplicable.”*
- Many passages that seem mysterious at first end up not being so bad. Their bark is worse than their bite. For example, several passages in Revelation, intimidating to so many, have simple explanations. (Not all, but some!)
 - Tip no 10: **On the other hand, so-called simple passages may be more complicated than initially meets the eye.**
- *Holmes: “This matter really strikes very much deeper than either you or the police were at first inclined to think. It appeared to you to be a simple case; to me it seems exceedingly complex.”*
- This is often true of coffee mug and bumper sticker verses. We think they are simple to understand because we see them all the time. But once you dig into them, you realize they are more mysterious than meets the eye.

3. A close reading at Genesis 1:1-2 and implications

One of the biggest mysteries in cosmogony and cosmology studies is perhaps: *How to interpret properly Genesis chapter 1:2*. Traditionally, philosophers proposed that God created the Universe out of nothingness (from reading “empty and formless” and “*bara*” words; this contention is called “*creatio ex nihilo*.”). Understandably, such a model can lead to various interpretations, including the notorious “cosmic egg” (primeval atom) model as suggested by Georges Lemaitre, which then led to Big Bang model.[18-20] Subsequently, many cosmologists accept it without asking, that Big Bang stands as the most faithful and nearest theory to Biblical account of creation. But we can ask: Is that primeval atom model the true and faithful reading of Genesis 1:2?

Let us start our discussion with examining key biblical words of Hebrew Bible, especially Genesis 1:1-2. It can be shown that the widely accepted creation ex nihilo is a *post-biblical invention*, rather than as faithful reading of the verses. To quote Ian Barbour: “*Creation out of nothing is not a biblical concept.*”[4]

Let us consider some biblical passages:

- The literal meaning of Gen. 1:1, “bareishit bara Elohim.” This very first statement of the book of Genesis literally reads: ‘first’ and ‘beginning’ are reasonable alternatives for the Hebrew noun, *reishit*. Also note that in Hebrew, subjects and verbs are usually ordered verb-first (unlike English in which the subject is written first). If the verb and subject of this verse are reordered according to natural English grammar we read: [1]
{In, When} {first, beginning} Elohim created...
reishit: The noun, reishit, has as its root the letters, *רש* (Resh -Aleph-Shin). Words derived from this root often carry the meaning of ‘primary’, ‘chief’, ‘begin’, ‘first’ or “first-in-line”, “head of”, and so forth. Harris’s Theological Wordbook of the Old Testament (TWOT) is more specific, namely, reishit means[1]

“...*first, beginning, choicest, first or best of a group. [Reishit is] a feminine noun derived from the root [Resh-Aleph-Shin], it appears fifty times in nearly all parts of the [Old Testament]. [Its] primary meaning is “first” or “beginning” of a series.*”

Accordingly, we can now retranslate *bareishit bara Elohim* as “When first created Elohim”, or as we would render in English,[1]

When Elohim first created...

- Gen. 1:2, “And the earth had been.” In English this is easily handled by the past perfect tense (also called the pluperfect or the “flashback” tense). Likewise, if *haytah* in v 1:2 is translated as a past perfect verb, then verses 1:1-2 would read,[1]

When Elohim first created the heavens and the earth, the earth had been ...

In this translation the universe, in some form or other, was already in existence when God executed His first creative act, the creation of light.

In other words, a close reading of Hebrew Bible seems to suggest that *creatio ex-nihilo* is a post-biblical invention. Other scholars have suggested an alternative concept, called *creatio ex-materia*, but many orthodox Christian scholars have raised objection to this notion, partly because the term

seems to undermine God's ultimate power and control of the Universe. Besides, the notion of *creatio ex-materia* has been advocated by Mormon preachers.

To overcome this problem, and based on what we learned recently, allow us now to come up with a new term: **creatio ex-rotatione** (rotatione is a Latin word for "rotation"). As we shall see in the next chapter, it is possible to come up with a physical model of early Universe with rotation, where the raw materials have been existed for long period of time, but suddenly it burst out into creation. And it seems to fit with Kant's idea to resolve the dichotomy between finite past or eternal Universe. Furthermore, it can be shown that the model naturally leads to accelerated expansion, without having to invoke *ad hoc* assumptions like dark energy or cosmological constant.

4. A computational model of rotation in early Universe

Our discussion starts from the fundamental question: how can we include the rotation in early Universe model? After answering that question, we will discuss how "turbulence-generated sound" can be put into a mathematical model for the early Universe. We are aware that the notion of turbulence-generated sound is not new term at all especially in aerodynamics, but the term is rarely used in cosmology until now. We shall show that 3D Navier-Stokes will lead to non-linear acoustics models, which means that a turbulence/storm can generate sound wave.

It has been known for long time that most of the existing cosmology models have singularity problem. Cosmological singularity has been a consequence of excessive symmetry of flow, such as "Hubble's law". More realistic one is suggested, based on Newtonian cosmology model but here we include the vortical-rotational effect of the whole Universe.

In other paper, we obtained an Ermakov-type equation following Nurgaliev [8]. Then we solve it numerically using Mathematica 11. An interesting result from that simple computational simulation is shown in the following diagram:[9]

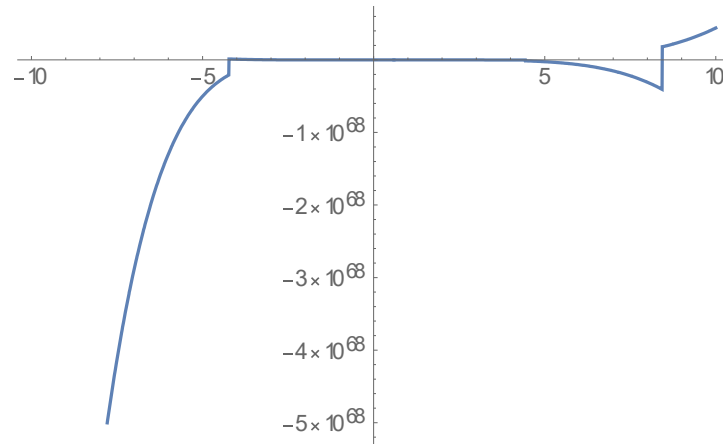


Diagram 1. Plot of Ermakov-type solution for $A=1$, $B=-10$ (from [9])

From the above computational experiment, we conclude that the evolution of the Universe depends on the constants involved, especially on the rotational-vortex structure of the Universe. This needs to be investigated in more detailed for sure.

One conclusion that we may derive especially from Diagram 1, is that our computational simulation suggests that it is possible to consider that the Universe has existed for long time in prolonged stagnation period, then suddenly it burst out from *empty and formless* (Gen. 1:2), to take its current shape with observed “accelerated expansion.”

As an implication, we may arrive at a precise model of flattening velocity of galaxies without having to invoke *ad-hoc* assumptions such as dark matter.

Therefore, it is perhaps noteworthy to discuss briefly a simple model of galaxies based on a postulate of turbulence vortices which govern the galaxy dynamics. The result of Vatistas’ model equation can yield prediction which is close to observation, as shown in the following diagram:[14]

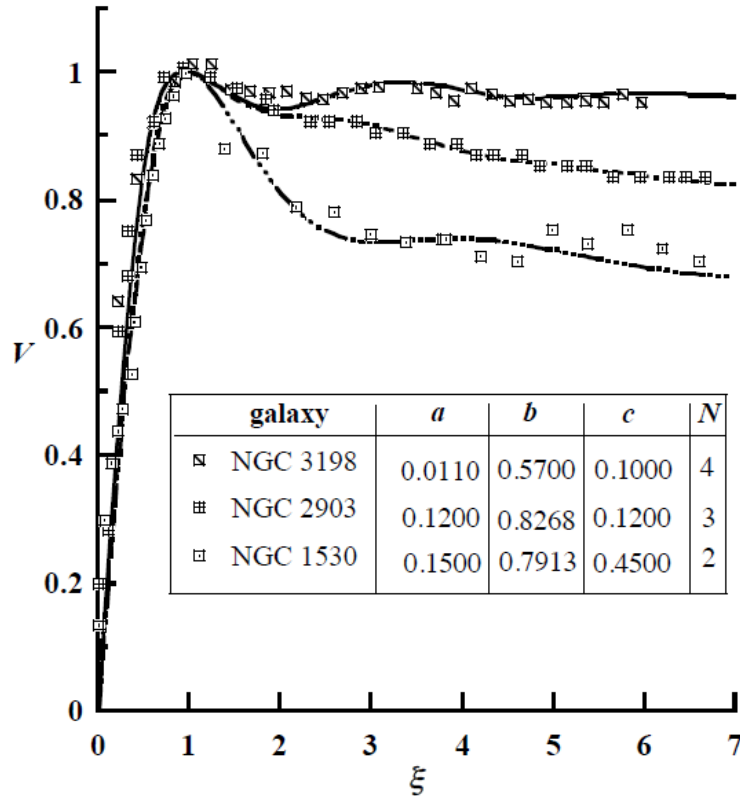


Figure 1. From Vattistas [14]

Therefore, it appears possible to model galaxies without invoking numerous *ad hoc* assumptions such as *dark matter*, once we accept the existence of turbulent interstellar medium. The Vattistas model is also governed by Navier-Stokes equations, see for instance [14].

5. Advantages of “creatio ex-rotatione” concept

In the preceding section, we have discussed on how our proposed term of “*creatio ex-rotatione*” has sufficient logical background.

Now, allow us to discuss some advantages of the proposed “*creatio ex-rotatione*” cosmology view over the Lemaitre’s primeval atom (which is the basis of Standard Model Cosmology).

- a. Explain excess of handedness in spiral galaxies

As reported by Longo et al, there is an excess of left-handedness in spiral galaxies.

According to Longo, the simplest explanation of such left-handedness is that there is net

angular momentum of the Universe. This seems to suggest that our hypothesis of *creatio ex-rotatione* is closer to the truth with respect to origin of the Universe. [2]

See also the Appendix section.

b. Avoid inflationary scheme.

It is known that inflationary models were proposed by Alan Guth et al. (see [25][26]), in order to explain certain difficulties in the Big Bang scenario. But some cosmology experts such as Hollands & Wald has raised some difficulties with inflationary model, as follows:

“We argue that the explanations provided by inflation for the homogeneity, isotropy, and flatness of our universe are not satisfactory, and that a proper explanation of these features will require a much deeper understanding of the initial state of our universe.”[27]

In our diagram plot above, it is clear that an early rotation model can explain why the Universe can burst out into creation in a very short period, without invoking ad hoc postulate such as inflation model.

c. Explain accelerated expansion.

As far as we know, one of the earliest models which gave prediction of accelerated expanding Universe is Carmeli’s Cosmological General Relativity.[29]

But it has been shown by Green & Wald that for the large scale structures of the Universe, Newtonian model can give similar results compared to general relativity picture.[28]

Furthermore, it seems that there is no quite clear arguments why we should accept Carmeli use of 5D metric model (space-time-velocity metric). In the meantime, in our rotating Universe model, we do not invoke ad hoc dimension into the metric.

d. Explain inhomogeneity, breeding galaxies etc.

Astronomers have known for long time, that the Universe is not homogeneous and isotropic as in the usual model. It contains of inhomogeneity, irregularity, clumpiness, voids, filaments etc, which indicate complex structures. Such inhomogeneous structures may be better modelled in terms of turbulence model such as Navier-Stokes equations, see also our early papers [11][12].

Furthermore, observations clearly suggest that matter ejected continuously in galaxy centers, which view is difficult to reconcile with Big Bang scenario of galaxy creation.

Concluding Remarks

In summary we argue that: (a) while both the Big Bang originator and Christian writers shared similar concept of *creatio ex nihilo*, they have different views on “primeval atom,” (b) even the idea of primeval atom itself seems in direct contradiction with “*ex nihilo*” term; (c) the proposed *creatio ex-rotatione* offers a resolution to the long standing disputes between beginning and eternity of the Universe. In other words, in this respect we agree with Vaas, i.e. it can be shown: “how a conceptual and perhaps physical solution of the temporal aspect of Immanuel Kant’s *„first antinomy of pure reason“* is possible, i.e. how our universe in some respect could have both a beginning and an eternal existence. Therefore, paradoxically, there might have been a time before time or a beginning of time in time.”

We argue that a close re-reading of Genesis 1:2 will lead us to another viable story which is different from Lemaitre’s primeval atom model of early Universe, albeit this alternative has not been developed rigorously as LCDM theories.

It is our hope that our exploration will lead to more realistic nonlinear cosmology theories which are better in terms of observations, and also more faithful to Biblical account of creation.

We hope this short review may inspire younger generation of physicists and biologists to rethink and renew their approaches to Nature, and perhaps it may also help to generate new theories which will be useful for a better future of mankind.

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Appendix:

Tushna Commissariat. Was the universe born spinning? PhysicsWorld 25 Jul. 2011¹¹

The universe was born spinning and continues to do so around a preferred axis – that is the bold conclusion of physicists in the US who have studied the rotation of more than 15,000 galaxies. While most cosmological theories have suggested that – on a large scale – the universe is the same in every direction, these recent findings suggest that the early universe was born spinning about a specific axis. If correct, this also means that the universe does not possess mirror symmetry, but rather has a preferred right or left “handedness”.

Led by Michael Longo from the University of Michigan, the team had set out to test whether mirror symmetry, also referred to as “parity”, was violated on the largest scales. If a particle violates parity, its mirror image would behave differently, and such particles can be described as right- or left-handed. Parity is violated in nuclear beta decays and there is a strong preference in nature for left-handed amino acids, rather than right-handed.

“To my knowledge, no-one had asked the question of whether the universe itself had a preference of say left-handed over right-handed. My idea was to test this by seeing if there was a preferred sense of rotation of spiral galaxies. At that time, I didn’t quite appreciate that, if so, it meant that the entire universe would have a net angular momentum,” explains Longo.

Galaxies in a spin

Longo and a team of five undergraduate students catalogued the rotation direction of 15,158 spiral galaxies with data from the Sloan Digital Sky Survey. They found that galaxies have a preferred direction of rotation – there was an excess of left-handed, or counter-clockwise, rotating spiral galaxies in the part of the sky toward the north pole of the Milky Way. The effect extended beyond 600 million light-years away.

The excess is small, about 7%, and Longo says that the chance that it could be a cosmic accident is something like one in a million. “If galaxies tend to spin in a certain direction, it means that

¹¹ Tushna Commissariat. Was the universe born spinning? PhysicsWorld 25 Jul. 2011, url: <https://physicsworld.com/a/was-the-universe-born-spinning/>

the overall universe should have a rather large net angular momentum. Since angular momentum is conserved, it seems it [the universe] must have been “born” spinning.”

What impact would this have on the Big Bang and how the universe was born? Observers in our universe could never see outside of it, so we cannot directly tell if the universe is spinning, in principle, explains Longo. “But if we could show that our universe still retains the initial angular momentum within its galaxies, it would be evidence that our universe exists within some larger space and it was born spinning relative to other universes,” he told *physicsworld.com*. “I picture the Big Bang as being born with spin, just like a proton or electron has spin. As the universe expanded, the initial angular momentum would be spread among the bits of matter that we call galaxies, so that the galaxies now tend to spin in a preferred direction,” he explained. When asked if the preferred spin on a large scale could be induced by some other means, he agrees that, while it may be possible, a net universal spin would be simplest explanation and so probably the best-case scenario.

Looking for ‘other manifestations’

Longo also points out that the axis of asymmetry that they found is closely related to the alignments observed in WMAP cosmic microwave background distributions. He feels that it would be interesting to see if we could find “other manifestations” of a spinning universe.

The Sloan telescope is in New Mexico, and therefore the data that Longo’s team analysed came mostly from the northern hemisphere of the sky. However, they did find a similar trend in the galaxy spin data from the southern hemisphere compiled by Masanori Iye and Hajime Sugai in 1991. Longo and his students are now looking through more data to show an equal excess of right-handed spiral galaxies in the southern hemisphere.

Neta Bahcall, an astrophysicist at Princeton University in the US, feels that there is no solid evidence for a rotating universe. “The directional spin of spiral galaxies may be impacted by other local gravitational effects,” she said. She believes that this could result in small correlations in spin rotation over distances less than about 200 Mpc – whereas the observable universe is about 14 Gpc in size. She feels that the uncertainty quoted in the paper includes only the minimal statistical uncertainty and that no systematic uncertainties – such as local gravitational effects or the fact that galaxies are correlated with each other – have been considered.

A paper on the findings is published in [*Physics Letters B* 10.1016](#).