

DOI: <https://doi.org/10.24297/jap.v17i.8649>**Einstein's Vision of Time and Infinite Universe without Singularities: The End of Big Bang Cosmology**

Amrit Šorli Srečko

Bijective Physics Institute

sorli.bijective.physics@gmail.com

Abstract

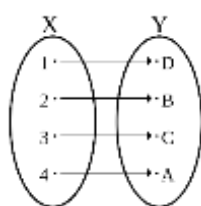
Cosmology should be built on falsifiability, bijectivity, and experimental data. Speculations are not allowed. NASA has measured universal space has Euclidean shape, which means universal space is infinite in the volume. Einstein's vision on time as the sequential order of events running in space has bijective correspondence with the physical reality and means that the universe does not run in some physical time; it runs only in space, which is time-invariant. In this timeless universe, there is no singularity of the beginning, there is no singularity inside of black holes. The energy of the universe is non-created, its transformation is eternal without the beginning and without the end.

Keywords: Time, Inflation, Singularities, Black Holes, Falsifiability, Bijectivity, Big Bang Cosmology, Universe In Dynamic Equilibrium.

1. Introduction

Big Bang cosmology is not falsifiable. The statement: "Universe has started out of infinitely small point with infinite temperature and pressure", is not falsifiable. Big Bang cosmology is speculation, which is supported by the wrong interpretations of experimental data. CMB radiation does not prove the "recombination period", it only proves that existent universal space radiate CMB. The redshift of the light from the distant galaxies is not due to the universe expansion. It has origin in "tired light" effect where light when pulling out of the strong gravity field of the galaxy loses some of its energy [1].

Big Bang cosmology is not bijective because it speculates universe is running in some physical time. We take universe as the set X and model of the universe as the set Y. In the set X we have three fundamental elements: energy (Ex) in the form of matter, in the form electromagnetic energy, in the form of superfluid quantum vacuum energy which is the physical origin of universal space [2], change (Cx) and the observer (Ox). The observer has no data that changes run in some physical time. In order to progress cosmology, this speculation has to be dropped.

**Figure 1. Bijective function of set theory**

$$X: \{Ex, Cx, Ox\}$$

$$Y: \{Ey, Cy, Oy\} \quad (1).$$

In the set Y, we also have three fundamental elements: energy (Ey) in the form of matter, electromagnetic energy, superfluid quantum vacuum energy, which is the physical origin of universal space, change (Cy) and the observer (Oy). The bijective research methodology assures that the universe and the model are related by the bijective function.



Back in 2009, Julian Barbour won the first prize of the Foundational Questions Institute (FQXi) for his research on time. He proved time has no physical existence [3]. Fisaletti has showed that a three-dimensional quantum vacuum is the fundamental, timeless arena of the universe [4]. Our research has confirmed that time is numerical sequential order of events running in timeless space [5]. These scientific facts have to be taken into serious consideration not only in quantum physics but also in cosmology. We are starting the new page of physics that Julian Barbour has named "The Third Revolution of Physics" [3].

In order to progress physics, we have to find a model of time which will have bijective correspondence with the time that exists in the universe. We do not have a single data evidence time is the 4th dimension of universal space, this view seems false. With clocks, we measure time, which means the idea that time is non-existent is not right. The proposal in this article is that time is deeply related to the physicist's perception and experience of the change that run in the universe. Nicolas Gisin conclusions in his article on mathematics impact on our experience of time are the following: "Contrary to usual expectations, I bet that the next physical theory will not be even more abstract than quantum field theory, but might well be closer to human experience"[6]. His conclusion is inspiring. Taking human experience as the basis and putting it into clear mathematical form can give us the model of the time that will be closer to the time which runs into the universe.

Let's take an example: the motion of light in space. Photon is moving from A to B in space from one Planck distance to the next Planck distance and so on. When the photon is on the Planck distance N, it is not anymore on the Planck distance N-1. When the photon is on Planck distance N+1, it is not anymore on the Planck distance N. Motion of the photon in space is irreversible, and this is valid for all changes. The elapsed time t of the photon motion from A to B we can express as follows:

$$t = t_{p1} + t_{p2} + \dots + t_{pn} = \sum_{i=1}^N t_{pi} \quad (2) [5].$$

The observer is observing the motion of photon from A to B in space. He does not observe duration. He observes only motion. For duration to come into the existence observer need to measure the motion of the photon. This is fundamental to be understood: when motion is measured by the observer, duration enters existence. We do not have any evidence that change in the universe has a duration on its own.

In the example of photon motion from A to B, Planck time is the fundamental unit of time as the numerical sequential order of photon motion. Time as the numerical sequential order of motion, we can name "fundamental time". When fundamental time is measured from the side of the observer, "emergent time," which is duration enters existence [5]. An elapsed time t is the sum of Planck times. Time is not continuous, time is discrete. And time is not running in the universe on its own. Time is the epiphenomena of change.

$$X: \{\text{Fundamental Time } x, \text{ Emergent Time } x\}$$

$$Y: \{\text{Fundamental Time } y, \text{ Emergent Time } y\} \quad (3).$$

Formalism (3) confirms that in the physical universe, which is denoted as set X fundamental time exists only as the numerical sequential order of events and emergent time as measured fundamental time. The same is valid in the model of the universe, which is denoted as set Y. By using bijective research methodology, we see that time in the universe exists as the numerical sequential order of events.

The question appears: "If there is no physical time running in the universe, how it is possible that we experience the flow of time"? Buhusi and Meck have proved that our experience of linear time flow is based on neuronal activity of the brain [7]. Change, i.e. motion, happens in space only, not in time. We experience change in the frame of psychological time, which is based on neuronal activity of the brain. We somehow project linear psychological time "past-present-future" in the physical reality. In the universe physical past and physical future are non-existent. Changes run in space and are irreversible. When change X enters into existence, change X-1 is not in existence anymore. When change X+1 enters into existence, change X is not in existence anymore. We experience this flow of change in the frame of psychological time, and we think the change to run in some physical time. There is no such physical time, and there is no arrow of time. Time is non-existent as the physical reality and is not pointing anywhere.

This inside into the real nature of time is the theoretical basis for the unification of quantum physics and General Relativity Theory. Elementary particles and stellar objects both move in space only. The velocity of clocks depends on the variable density of space, which today we call "superfluid quantum vacuum". In interstellar space density of the space is at the maximum, on the surface of a given stellar object density of space is diminished exactly for the amount of its mass and corresponded energy:

$$\frac{E}{c^2} = m = (p_{max} - p_{min}) \cdot V \quad (4) [2].$$

where m is the mass of a given stellar object, p_{max} is density of space in interstellar space, p_{min} is density of space on the surface of a given stellar object, and V is the volume of the stellar object. The variable velocity of clocks is correspondent to the variable density of space. More space is dense higher is the rate of clocks, and higher is the velocity of change in generally [2]. The change of a given velocity does not happen in time. It happens in space only.

Clocks run in space only, and time is the numerical sequential order of their "ticking". Time is the epiphenomena of change running in space. Theoretically, no change means no time. Albert Einstein's vision is here fully realized: "Time has no independent existence apart from the order of events by which we measure it" [8]. Nicolas Gisin won's his bet: Linear time "past-present-future" is shaped by human experience. In order to progress physics, we need to step out of the linear psychological time "past-present-future". This is the forgotten legacy of Albert Einstein: "The distinction between the past, present, and future is only a stubbornly persistent illusion" [9]. This illusion has its origin in psychological time. Stepping out of psychological time, one sees the universe from the perspective which is free of mathematical languages and their shaping of time. This view was the main source of Einstein's genius and his breakthrough achievements of Relativity Theory. This view is the core of physics and cosmology progress.

2. Big Bang speculations of the beginning

The time is only the sequential numerical order of events running in space means the cosmological principle is time-invariant [10]. Seeing the universe as something that runs in time is not appropriate. The universe, as we observe it today is its real picture, which is time-invariant. Black holes are rejuvenating systems of the universe [1]. In black holes old matter is transformed into the fresh energy of elementary particles. This circulation of the energy is eternal, it has no beginning and no end. The universe is a system in a permanent dynamic equilibrium (UDE – Universe in Dynamic Equilibrium). Big Bang cosmology (BB) needs initial kick from outside, it needs the Creator, UDE does not need an initial kick, UDE is a self-creating system. BB is the extension of Bible cosmology into science. In the Bible God has created universe in 6 days (the seventh day was for resting), in BB, God was much faster, less than a million part of the second. Speculations on the beginning of the universe are not in accord with the first law of thermodynamics. The inflation model is not solving the problem of energy appearance in BB with its speculations of gravity as the negative energy of the universe.

3. Big Bang universe size and measured size of the observable universe

BB model suggests the universe is expanding. NASA results provide strong evidence that universal space has the shape of Euclidean space [11], which excludes the use of non-Euclidean geometries in cosmology. Universal space does not have an open curvature, it does not have a closed curvature, and universal space is flat and infinite in extent. We can imagine the hypothetical expansion of the universe according to the BB model only as of the increase of distances between galaxies in the infinite Euclidean space.

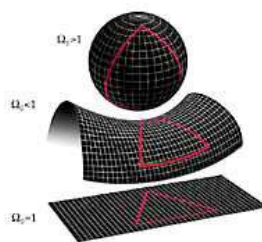


Figure 2: NASA has measured universal space has Euclidean shape

Let's imagine that the universe is expanding with the light speed from its beginning. In the BB model, the estimated age of the universe is 13.7 billion years which is $4,3 \cdot 10^{17}s$. The radius of the observed mapped universe is 46,6 billion light-years which is $4,4 \cdot 10^{26}m$. To reach the size of today's observed and mapped universe, according to the BB model, the universe should expand since its beginning with the speed of $1,02 \cdot 10^9ms^{-1}$. The velocity of light is $3 \cdot 10^8ms^{-1}$. To reach today radius universe should expand with the velocity v , which should be 3,34 times bigger than light speed. This shows BB model does not fit into the mapped universe. The velocity of accelerated expansion of the universe today is valued between $6,78 \cdot 10^3 ms^{-1}$ to $7,4 \cdot 10^3ms^{-1}$ [12].

- velocity of expansion accordingly to the BB model $1,02 \cdot 10^9ms^{-1}$
- velocity of expansion with the light speed $3 \cdot 10^8ms^{-1}$
- velocity of expansion that is measured $6,78 (7,4) \cdot 10^3ms^{-1}$

The discrepancy between measured velocity of expansion and calculated velocity of expansion accordingly to the BB model (so that BB model could fit in existent measured model) is of the rate 10^6ms^{-1} . The BB model seems to be a prediction without experimental data support. BB cosmologists try to defend this discrepancy between the measured diameter of the universe and diameter calculated accordingly to the BB expansion with the proposed Non-Euclidean shape of the universal space (see figure 3 below), which won't work. NASA has measured universal extremely precisely universal space has Euclidean shape.

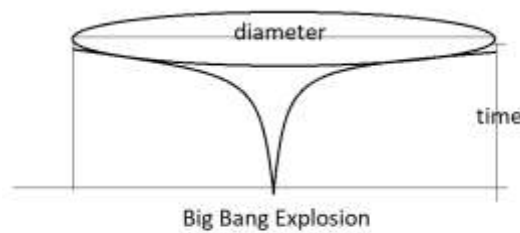


Figure 3: Inadequate picture of the universe expansion based on Non-Euclidean shape of universal space

4. Singularities of Big Bang are not bijective

Alan Guth, the founder of the Inflation model, said following: "In the inflationary theory the Universe begins incredibly small, perhaps as small as $10^{-24}cm$, a hundred billion times smaller than a proton" [13]. Before the size of $10^{-24}cm$ universe was even smaller. According to Hawking and Hartle, it started from nothing, from a mathematical point [14]. The logical consequence of this scenario is that at the mathematical point, energy density and temperature were infinite. With the explosion, the universe started cooling down and expanding. In mathematics, infinity is not problematic. In physics, yes, because "infinite temperature + 100 degrees = infinite temperature". Infinity is not a metric term. NASA has measured universe has Euclidean geometry, which means universe has infinite volume. We have to understand that infinity of the universal space volume does not mean singularity. Singularities of Big Bang beginning were never measured. Taking the universe as a set X and model of the universe as the set Y we can write the following equation:

$$\begin{aligned}
 X: \{Sx\} \\
 Y: \{Sy\} \quad (5),
 \end{aligned}$$

where between actual universal space denoted as Sx and the model of the space Sy there is a bijective function. Physical universal space Sx and its model Sy which is Euclidean space, are related by the bijective function. Infinite pressure P_y in the Big Bang model, infinite density p_y , and infinite temperature T_y have no corresponding element in the set X of the universe. Infinite pressure, energy density, and temperature are pure unproved



speculation which is not falsifiable. The beginning of the Big Bang is not falsifiable. In the Bible universe was created in six days in Big Bang cosmology universe was created in less than second. The elapsed time is the only difference.

In cosmology, only Euclidean space is a proper model of universal space. We cannot use Riemann space or any other spherical geometry because they do not have bijective correspondence with the physical world. Euclidean geometry is time-invariant, and also the geometry of universal space is time-invariant. There is no way that today's universal space could appear from a mathematical point, as suggested by Stephen Hawking [14]. There is no need for advanced intelligence to prove the Big Bang model is false. You just put observed data in a computer for systems simulation. The computer will give you "ERROR". Because nothing can expand with the speed of $1,02 \cdot 10^{19} \text{ms}^{-1}$. Big Bang model is artificially kept in life because of so much intellectual involvement, and money was invested in this theory that nobody is ready to see it is false. This won't help. It is now the time we change this false and speculative view.

5. Singularity of space-time inside black hole is not bijective

Maxime Van de Moortel has developed an idea of space-time having singularity inside the black hole [15]. In the introduction part of this article was shown time has no physical existence, which means it cannot be the 4th dimension of space. Only universal space could have singularities. We have to understand that universal space is energy (we call it today "superfluid quantum vacuum" and has variable density. Each physical object is diminishing density of space exactly for the amount of its mass and correspondent energy:

$$\frac{E}{c^2} = m = (p_{max} - p_{min}) \cdot V \quad (3) \quad [2],$$

where E is the energy of the physical object, m is the mass of the object, p_{max} is the density of the space in interstellar space, p_{min} is the density of the space on the surface of physical object, and V is the volume of the object. In the center of the black hole density of space is not infinite, it is of the same value as on its surface [1]. On the surface of the black hole and in its center, the old matter is transforming into fresh energy in the form of elementary particles. Black holes are rejuvenating systems of the universe. There is no singularity of any kind inside the black holes [1].

6. Conclusions

In Einstein's vision of time universe is timeless, it does not run in time. NASA measurements confirm the volume of the universe is infinite, the amount of energy of the universe is infinite. Bijective analysis confirms the Big Bang model singularities are pure prediction without any experimental evidence whatsoever, singularities in the black hole are also pure prediction. We cannot build physics on predictions. The progress of cosmology is based on a bijective research methodology where a given model is passing the bijectivity test, which is the guarantee for its falsifiability. The universe, as a non-created system in a permanent dynamic equilibrium, is falsifiable and based on a direct reading of data.

References:

1. Amrit Srecko Sorli, Black Holes are Rejuvenating Systems of the Universe, Journal of Advances in Physics, 17, 23-31. (2020) <https://doi.org/10.24297/jap.v17i.8620>
2. Šorli, A.S. Mass-Energy Equivalence Extension onto a Superfluid Quantum Vacuum. *Sci Rep* 9, 11737 (2019). <https://doi.org/10.1038/s41598-019-48018-2>
3. Barbour Julian, The Nature of Time (2009), <https://arxiv.org/abs/0903.3489>
4. Fisceletti D., Towards a Non-Local Timeless Quantum Cosmology for the Beyond Standard Model Physics, *Bulg. J. Phys.* 45 (2018) 334–356, http://bjp-bg.com/papers/bjp2018_4_334-356.pdf
5. Fisceletti D., Sorli A., Perspectives of the numerical order of material changes in timeless approaches in physics, *Foundations of Physics*; 45(2):105-33. (2015) <https://doi.org/10.1007/s10701-014-9840-y>



6. Gisin, N. Mathematical languages shape our understanding of time in physics. *Nat. Phys.* (2020). <https://doi.org/10.1038/s41567-019-0748-5>
7. Buhusi, C., Meck, W. What makes us tick? Functional and neural mechanisms of interval timing. *Nat Rev Neurosci* 6, 755–765 (2005). <https://doi.org/10.1038/nrn1764>
8. Zyga, L. Scientists suggest spacetime has no time dimension <https://phys.org/news/2011-04-scientists-spacetime-dimension.html>
9. Albert Einstein Quotes https://www.brainyquote.com/quotes/albert_einstein_148814 (2020)
10. Sorli, A. S., & Čelan, Štefan. Integration of Life and Consciousness into Cosmology. *Journal of Advances in Physics*, 17, 41-49. (2020) <https://doi.org/10.24297/jap.v17i.8623>
11. NASA https://wmap.gsfc.nasa.gov/universe/uni_shape.html (2014)
12. Castelvechi D., How fast is the Universe expanding? Cosmologists just get more confused, *Nature* **571**, 458-459 (2019) <https://www.nature.com/articles/d41586-019-02198-z>
13. Guth. A., The Inflationary Universe, "The Beamline" 27, 14, (1997). <https://ned.ipac.caltech.edu/level5/Guth/Guth3.html>
14. J. B. Hartle and S. W. Hawking, Wave function of the Universe, *Phys. Rev. D* 28, 2960 (1983) <https://doi.org/10.1103/PhysRevD.28.2960>
15. Maxime Van de Moortel, The breakdown of weak null singularities inside black holes <https://arxiv.org/abs/1912.10890> (2019)