

The Christocentric scope of universe Landmarks from the perspective of the current cosmological scientific paradigm

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Abstract: Christocentrism is the theological doctrine that affirms the centrality of Christ in all aspects of creation and existence. In Orthodox Christian theology, Jesus Christ is the Logos of God through whom all things were created and thanks to whom everything retains its coherence and meaning. This article explores how current scientific landmarks reflect and align with this Christocentric theological view of creation.

Keywords: Logos, Christocentrism, Rationality, Creation, Universe, Anthropropic Principle, Fine-Tuning, Time.

Introduction

In Orthodox Theology, Jesus Christ is the Alpha and Omega, the beginning and the end of all things, He is the Creator and purpose of creation, the One through whom and for whom the universe exists (Colossians 1) and has reason, unity, meaning and purpose.

The Big Bang theory, which describes the origin of the universe (space, time, matter, energy) from “nothing”, provides a context in which we can reflect on the beginning of the universe’s existence. In a remarkable way, this scientific theory is consistent with the Christian theological view that the universe has a beginning, being created out of nothing by God, which can be rationally understood as a creative act of the Logos.

Another relevant concept is that of *fine-tuning* of the fundamental constants of the universe. Many scientists observe that the physical parameters of the universe are adjusted with a precision that tends to infinity to allow for the existence of human life that has consciousness. This *fine-tuning* can be rationally under-

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stood as evidence of the existence of a plan and purpose for the universe, resonating with the *Christocentric vision* of creation affirmed by Orthodox theology.

Quantum mechanics reveals a deep level of interconnectedness between all particles in the universe, known as quantum entanglement. This phenomenon shows that particles can remain related and influenced each other regardless of the distance between them, in a way that is mysterious to science, which denotes an amazing unity of the universe. Thus, quantum entanglement can be expressed theologically as a manifestation of the unity and rationality of creation in the *Logos*, the One who binds all things together in a rational way and keeps them in existence.

The universe is presented as a unitary, rational reality, as evidenced by the order and harmony of the constituent elements, elegantly¹ described by the laws of various scientific paradigms. For Orthodox Christian theology, every existing thing has its own reason in *God's Reason*, or the *Logos* of God². The existence of everything has its origin in God's will for that thing to be.

The meaning and purpose of creation is Jesus Christ. Thus, according to Orthodox theology, creation is *Christocentric*. The rational foundation of created things has a twofold purpose, a physical one, *namely* to be useful to man for the maintenance of life; and a spiritual one, *that* of increasing the knowledge of the spiritual meanings that culminate in their source, which is God, the only one who offers existential fulfillment to man³.

The Orthodox Christian doctrine regarding the rationality of the world is based on the *Logos*. *Rațio* is the Latin equivalent of *the Greek term logos*. The Patristic Orthodox Theology on the *Logos* begins with the prologue of the Fourth Gospel, that of the Holy Apostle John, and with authors such as St. Justin the Martyr and the Philosopher, culminating in the elaborate doctrine on *the logoi* of St. Maximus the Confessor, involving Revelation, creation, cosmology, and theological anthropology. Also, this topic requires at least elementary knowledge of classical Greek philosophy, starting with the Pre-Socratics and up to late Hellenism⁴. The Philonian paradigm for *logos*, which integrated philosophical meanings with Jewish theological meanings, played an important role for Christianity.

Logos in Greek has the meaning of word, reason or plan, having the plural *logoi*. In ancient Greek philosophy, the term *logos* has the meaning of divine reason implicit in the cosmos, which gives the latter order, form, and existential purpose.

¹ Brian Greene, *The Elegant Universe*, New York, Random House, 2000.

² Pr. Prof. Dumitru Stăniloae, *Teologia Dogmatică Ortodoxă*, vol. I, București, Ed. Institutului Biblic și de Misiune a Bisericii Ortodoxe Române, 2003, p. 360

³ Pr. Prof. Dumitru Stăniloae, *Teologia Dogmatică Ortodoxă*, vol. I..., pp. 360-374.

⁴ Dan Chițoiu, Pr. Petre Comșa, Sorin Mihalache, Costea Munteanu, "Raționalitatea creației", în Adrian Lemeni (coord.), *Repere patristice în dialogul dintre teologie și știință*, București, Basilica, 2009, p. 129.

The Holy Fathers gave great importance to the subject of the rationality of the world. Following this theological foundation, Father Nicolae Moșoiu underlined the importance of this subject in contemporary times⁵, offering an extensive analysis, considering that it provides theology with a sure premise of honest dialogue with the exact sciences⁶.

According to Professor Nicolae Chițescu, *Paradigms* are the eternal divine models while the *logoi* or *Seminal reasons* are the natural laws, or the productive and rational causes in the universe; the essential difference between *Paradigms* and *logoi* is that they belong to the temporal plane and the empirical world, while the paradigms “synthetically pre-exist in God, as primordial elements of all reality”⁷; and the uncreated divine energies are the reasons in the creative and sustaining action of God with regard to all creation.

Father Adrian Sorin Mihalache notes the rationality and unity of the physical world, elegantly expressed in the current scientific context⁸.

1. The Big Bang Contingency

The impossibility of separating time from processes has been elaborated since antiquity, from the Hellenistic period, by Philo of Alexandria in biblical exegesis through synthesis with Hellenic philosophy. Thus, Philo asserts that time cannot be separated from what is observed as change in time. In this way, time reveals the immanent reality of the world. In contrast to this view, most ancient Greek philosophers believed that the world was the work of divine creation in pre-existing space and time. Christianity developed the concept of creation out of nothing – *creatio ex nihilo*. Thus, the universe is created with space and time, and not in pre-existing space and time. Father Dumitru Stăniloae states that:

“This world cannot be forever. For there cannot be forever a world in the temporal aspiration towards a goal - as it is evident - without having reached this goal of perfection until now, which satisfies it. It [...] must once again end its form of temporal, or changing, existence”⁹

⁵ Nicolae Moșoiu, *Taina prezenței lui Dumnezeu în viața umană. Viziunea creatoare a Părintelui Profesor Dumitru Stăniloae*, Paralela 45, Pitești, 2002, pp. 33-45.

⁶ Pr. Conf. Nicolae Moșoiu, *Hermeneutica Ortodoxă ca dezvoltare teologică în Tradiție*, Astra Museum, Sibiu, 2013, pp. 122-160.

⁷ Prof. Nicolae Chițescu, “Paradigmele divine și problemele pe care le ridică ele pentru Teologia Dogmatică”, în *Ortodoxia*, an. X, 1958, nr. 1., p. 45.

⁸ Diac. Adrian Sorin Mihalache, *Lumina Celui Nevăzut: O privire teologică în raționalitatea creației și teoriile științifice recente despre Univers. Vol. I*, București, Basilica, 2016, pp. 284-287.

⁹ Pr. Prof. Dr. Dumitru Stăniloae, *Chipul nemuritor al lui Dumnezeu*, Ed. Mitropoliei Olteniei, Craiova, 1987, p. 249.

At present, science confirms the Christian theological vision of the creation of the universe from nothing, with space and time, in a dynamic development rationally grounded, according to a plan, towards a goal that encompasses rational human life. Thus, the scientist Stephen Hawking states about the beginning of the universe “I believe that the universe arose spontaneously out of nothing according to the laws of science.”¹⁰ Thus, he implicitly considers the contingent character of the laws of science, as they belong to the metaphysical sphere. Also, Steven Weinberg, Nobel Prize laureate in physics, noting the compatibility of the Big Bang theory with the Christian theological vision of the seen creation, states:

“Certain cosmologists are philosophically attracted to the oscillating model, especially because, like the steady-state model, it elegantly avoids the problem of *GENESIS*. Such a model does, however, face a severe theoretical difficulty. With each cycle, the ratio of the number of photons to the number of particles (or more precisely, the entropy per number of particles) increases slightly, due to a kind of friction (known as global friction) that occurs as the universe expands and contracts. As we deduce, the universe starts in each new cycle with a new ratio of photons to particles, somewhat higher than the previous ratio. The current ratio is large, but not infinite, so it’s hard to see how the universe could have gone through an infinite number of cycles.”¹¹

The scientist Max Plank scientifically affirms the existence of the rational foundation of creation, the contingent character of the laws of science, and the existence of multilayered physical and metaphysical reality:

“Metaphysical reality is not to be understood spatially, as being situated behind the natural world. Metaphysical reality is not located behind empirical experience, which is located in its very depths, structuring and determining it. All we want to say is that the sensible world is not the only one that exists, but there is also another reality, superior, inaccessible to empirical experiment, but which science intuits and recognizes. Scientific knowledge makes the scientist research and discover these deep structures of existence.”¹²

The rationality of the cosmos, inherent to the scientific observations presented paradigmatically in scientific theories, having a contingent character, can only be explained by the involvement of the metaphysical domain, the mathematical language being used by human rationality. Thus, the scientist Roger Penrose

¹⁰ Stephen Hawking, *Răspunsuri scurte la marile întrebări*, Editura Humanitas, 2021, p. 44.

¹¹ Steven Weinberg, *Primele trei minute ale Universului - Un punct de vedere modern asupra originii Universului*, Ed. Politică, București, 1984, pp. 167-168

¹² Max Plank, *L’image du monde dans la physique moderne*, Zurich, Gonthier, 1949, p. 174.

notes that the universe presents a multilayered reality, in which the physical and the metaphysical are intertwined.

“The very reality of the physical world seems more nebulous than it had appeared before the advent of SUPERB theories of relativity and quantum mechanics [...] The very accuracy of these theories has given physical reality an almost abstract mathematical existence [...] Is this a paradox? How can concrete reality become abstract and mathematical? [...] Perhaps, in some sense, the two worlds are practically *one and the same*?”¹³

In this context, from the Orthodox theological point of view it is found that the current scientific theories

“Suggests that there is something that might be called levels of reality that separate Reality. In other words, the current scientific theories, which describe our image of the Universe, do not exactly place one in the extension of the other, but on the contrary they are discontinuous.”¹⁴

Discussions about the cause of the way the universe works are not part of the scientific field because the hypotheses cannot be empirically verified with the help of the current scientific method. Thus, these discussions belong to the metaphysical field that preoccupies theologians and philosophers.

At the initial singularity from which the Big Bang emerged, space and all matter were infinitely compressed into an infinitely small volume, which in our common language defines nothingness, and time and space did not exist. Thus, there was no space-time in which the Big Bang explosion took place, but space and time itself have a beginning of existence at the Big Bang, along with matter, out of nothing¹⁵. We can make an analogy with a balloon. Only its surface represents the space, and the material of the balloon is evenly distributed on this surface. At the time of the Big Bang, an external cause of the universe made the beginning and expansion of space, the beginning and flow of time, the emergence and scattering of matter in this dynamic space-time, but not in any way but in a rational, planned way, which can be described by scientific laws, having a meaning and a purpose that involves rational human life that has consciousness.

In the beginning, each point in space represented a possibly different way from which the Universe could have started. Thus, the Creator, in order to make

¹³ Roger Penrose, *Mintea noastră... cea de toate zilele*, trad. Mircea Rusu și Cornelia Rusu, Tehnică, București, 2006, p. 775.

¹⁴ Dan Chițoiu, Pr. Petre Comșa, Sorin Mihalache, Costea Munteanu, “Raționalitatea creației...”, p. 219.

¹⁵ Diac. Adrian Sorin Mihalache, *Lumina Celui Nevăzut: O privire teologică în raționalitatea creației și teoriile științifice recente despre Univers. Vol. II*, București, Basilica, 2016, pp. 122-128.

a low-entropy universe in which it would be possible for rational human life to emerge, had to choose exactly a certain point in the phase space¹⁶. Each point in phase space corresponds to a certain type of possible universe. Scientist Roger Penrose states in reference to *the fine-tuning* of the universe:

“How large was the initial volume of phase space that the Creator had to aim for in order to produce a universe compatible with the second law of thermodynamics and the one we are now observing? [...] This value shows us how precisely the Creator had to aim, namely with an accuracy of part of . This is an extraordinarily high value. We can’t even write this number in its entirety, in base 10 it would be «1» followed by 10^{123} successive zeros! Even if we wanted to write ‘0’ on every proton and neutron in the entire universe – in fact, we could take all the other particles in a row – we won’t be able to write the whole number because of the lack of particles.”¹⁷

The rationality of creation from the perspective of current cosmology is based on the nature of the observed interactions between the particles of matter of the universe, which according to human intellectual knowledge implies an order, which denotes the existence of a plan. The foundation of these correlations involves the present value of entropy in the universe, entropy being the one that measures the state of order and disorder of the universe, its value being directly proportional to the disorder. At the time of the Big Bang, entropy (S) was almost entirely due to radiation, with an estimated value of $10^{88}k$, where k is the Boltzmann constant. The thermodynamic understanding of entropy is based on the second law of thermodynamics¹⁸, which explains why the universe is in a continuous dynamic state in the direction of increasing entropy. The specific entropy (s) has an estimated value of 10^{88} and represents the number of photons per baryon, being a fundamental parameter for the existence of stable physical systems. Even the slightest variation of a few decimal places in this value would

¹⁶ *Phase space* is a method of mathematical representation of space. *The phase space method* was introduced by Henry Poincaré for the study of dynamical systems with one or more degrees of freedom. In principle, it is associated with the movement of the system considered a point that moves simultaneously with the system in a space related to a coordinate system, made up of the variables (parameters) that determine the momentary position of the system and the derivatives of these variables, called *phase space*. The advantage of this method of representing space is that it presents a clear picture of all the possibilities of movement that arise in a dynamic system.

¹⁷ Roger Penrose, *Mintea noastră...*, p. 614.

¹⁸ *The second law of thermodynamics* postulates that “the passage of heat from a body with a given temperature to a body with a lower temperature is an irreversible process”. In most of the formulations of the second law, it is specified that within this phenomenon of energy transfer, entropy always increases. Entropy is a physical quantity that characterizes the degree of disorder of the movement of molecules.

cause the gravitational balance to disappear, making the existence of stars and galaxies, for example, impossible. The calculated value of the present entropy of the universe is 10^{103} . Although both the values of the entropy of the universe, the Big Bang and the present one, are very high, the value of the Big Bang is lower, which implies the irreversibility of the processes in the universe as well as an initial order higher than the present one.

The early universe had a low entropy compared to the present value because there were no black holes at the beginning. The entropy of the entire Universe is mostly present in the background radiation left over from the Big Bang, and to a small extent in neutrinos. Since the elements of the universe that we easily observe, such as stars, galaxies, etc., have a negligible entropy compared to the entropy of the background radiation, it is easy to fall into the trap of considering that entropy changes significantly as the structure of the universe is formed, but this is only a coincidence, not the cause. It took tens of millions of years for the Universe to form its first stars and its first black hole. Until that happened, the entropy of the Universe, with an accuracy of more than 99%, remained unchanged. If there were no black holes, the entropy of the universe would have been almost constant for the last 13.8 billion years of the universe's age. That primary state of the universe also had a considerable amount of entropy, but black holes have much more entropy and are easy to achieve from a cosmic perspective.

The present state of the universe, which denotes a degree of order and correlation between the constituent elements, is related to the initial conditions of the universe and not to some intrinsic mechanism of the universe that directs the flow of time, giving the direction of evolution of the universe to its current planned state, according to the anthropic principle.

Professor John Hands, who has devoted more than 10 years to evaluating current scientific theories, concludes that from a scientific point of view

“The current ‘orthodox’ explanation of cosmology¹⁹ regarding the origin of matter and energy of which we are made does not belong to the scientific field.”²⁰

2. The irreversibility of Time in the Universe

In contemporary times, the attempt of the British scientist Roger Penrose to solve the mystery of the irreversible flow of time, considering the initial con-

¹⁹ The term „*orthodox model*” in the context of cosmology refers to the Lambda Cold Dark Matter (ΛCDM) model. It is named „*orthodox*” because it represents the prevailing and widely accepted understanding of cosmology, supported by extensive empirical evidence, predictive success, and a comprehensive theoretical framework.

²⁰ John Hands, *Cosmosapiens: Evoluția omului de la originile Universului*, Trad. de Carmen Strungaru și Doru Căstăian, București, Humanitas, 2019, p. 670.

ditions of the universe responsible for it, is remarkable. *Since the observable universe is unique, it is difficult to distinguish between the laws of science that govern the universe and the initial conditions of the universe that govern these laws of science.* Penrose states that if the laws of science at the local level are symmetrical in terms of time, then the cause of statistical asymmetry at the global level is at the level of the initial conditions of the universe.

According to experience at the macroscopic level, the initial conditions of the universe involve an infinitely precise arrangement of the velocity distribution of the particles that make up the universe, requiring an infinite amount of information to obtain the present state of the universe. The lack of information implies an initial entropy with a value greater than zero. It has been shown that the existence of initial conditions of the universe that have low entropy in the future is a consequence of the second law of thermodynamics. The relatively small entropy of the current state of the universe, evidenced by the existence of stable structures in the universe, implies an entropy with an even lower value of the initial state. Thus, the conclusion is that *the irreversible evolution of the universe towards states with high entropy is caused by the conditions of the initial singularity with low entropy.*

In this regard, theologian Nicolae Vladimir Dobre, emphasizes the Orthodox theological teaching of the Creator Logos, using current scientific language:

“The process of entropy tells us that order cannot be achieved naturally. In other words, the initial state of the Universe, that state of maximum structuring from which everything started, could not be obtained spontaneously, but a certain amount of energy/information had to be “supplied”. Which one, where could it come from? Well, the first chapter of the Gospel of John tells us that it comes from God Himself. But, of course, the language of the Gospel is not the same as the language of astrophysics, and in connection with this some clarifications are required. In this sense, the ‘Word’ spoken of in the Gospel is the [...] translation of the Greek term ‘*Logos*’.”²¹

The expansion of the universe does not explain the arrow of time, the irreversible flow. Roger Penrose demonstrated that *there is no direct link between the expansion of the universe, the increase in entropy, and the arrow of time.*

The current universe presents ordered structures, specific to a low entropy, and according to the second law of thermodynamics, this corresponds to an initial state with even lower entropy, therefore even more orderly. If the entropy in the universe were currently large, then it would not be possible for the existence of ordered structures such as stars, galaxies, solar systems, etc.

²¹ Nicolae Vladimir Dobre, *De la Credență la Știință și înapoi la Credență. Puțină teologie pentru ingineri dar nu numai pentru ei*, București, Sophia, 2013, p. 94.

Classical cosmology assumed that the state of matter at the Big Bang is in thermodynamic equilibrium, with an entropy value close to the maximum, even though all physical parameters are infinite at the initial singularity. The entropy of the universe has been considered to be an intrinsic attribute of matter. Observations of the present universe, however, contradict this assumption of maximum entropy at first.

To solve this paradox, Penrose states that it is necessary to analyze the degrees of gravitational freedom of the universe, that is, the initial conditions of the universe must be considered not only from the perspective of matter, but also from the perspective of the geometry of space-time, according to the relationships described by the general theory of relativity. Thus, Penrose proposed adding the property of entropy to the gravitational field, called gravitational entropy (EG). By analyzing the possible volume of entropy that can occur in the universe throughout the evolution of the universe from the Big Bang to the final great implosion, the Big Crunch, Penrose discovered the lack of a large amount of entropy in the baryonic universe currently observed compared to the maximum possible. Thus, he considered that the low gravitational entropy of the Big Bang is responsible for the maximum ordering of the universe to the initial singularity and the subsequent planned and irreversible evolution towards a state of higher entropy. The initial order condition can be presented in geometric terms by the correspondence between the increase in gravitational entropy and the regrouping of matter accompanied by an increase in the level of anisotropy of the gravitational field, described by the Weyl-type curvature tensor (CW). Thus, Roger Penrose proposed a development scenario for the Universe that starts with gravitational entropy (GE) at a minimum level, involving low gravitational anisotropy, and develops towards a state of high entropy with high gravitational anisotropy. The brief description of the Weyl curvature hypothesis (ICW) proposed by Penrose is: The Weyl curvature tends to zero in all past singularities when the singularity is viewed from future directions. Thus, the ICW is considered as a special initial condition of the Universe, which cannot be derived from retrospective dynamics, so the solution of the arrow of time problem is not in the sphere of statistical physics but in the sphere of physics that precisely elaborates the laws of physics. In other words, *the irreversibility of perceived time cannot be explained by temporal statistical series, but by means of physical laws as yet unknown, which acted at the moment of the initial singularity of the Universe and which are external to the temporal statistical series, therefore belonging to the metaphysical. These laws that acted on the initial singularity of the Universe can only be intuited by observing their macroscopic effects in the current Universe, and can be associated with a development plan, according to the anthropic principle, imprinted on the universe in accordance with the second law of thermodynamics.* Thus, this

consideration of Penrose's has a strong view similar to the Orthodox theological one of *Christocentric creation*.

Penrose uses phase space²² to express the hypothesis that Weyl curvature (ICW) implies the existence of special conditions in the early universe, applicable to all possible universes. Thus, considering the maximum potential entropy for our universe to be 10^{123} , Penrose estimates that the initial volume of phase space, corresponding to the special initial conditions of the universe, is $V = .$ Our current universe, physically observable, has a volume of phase space $W = .$ Thus, the relationship between the multitude of potential intelligible universes (V) and our physically observable universe (W) can be analyzed from the perspective of the initial conditions of our physically observable universe. The W/V ratio, which has an extremely small value of approximately $\frac{1}{10^{123}}$ from V , shows us that *the precision with which the Big Bang corresponding to our physically observable Universe must be triggered by the Creator tends to infinity*. The V/W ratio having an extremely high value, approximately 10^{123} , shows us that *a quantity of information tending to infinity is necessary for the Creator in order to choose the Big Bang corresponding to our physically observable Universe, from the infinity of possibilities of the universes existing in V* . Expressed in probabilistic language, the priori probability for our currently physically observable Universe W , analyzed from the perspective of the model of the irreversibility of time, it is maximum.

3. The Anthropic Scope of the Universe Present in the Initial Singularity

Penrose asserts that only an omniscient and omnipotent God could have created our physically observable Universe, since only He had the reason, the power, the science, and the information necessary to locate and utilize that extremely small part of the phase space, corresponding to the initial conditions of our physically observable Universe.

The observation of the existing order in the Universe and its description in current paradigmatic scientific language, leads to the conclusion that it is impressed on the Universe, in a contiguous way, making impossible the hypothesis that the various objects of our physically observable Universe could collaborate to achieve and develop the order towards a clear finality, to which the human intellect attributes a purpose and a plan. Thus, human reason appeals to the need for a rational cause that created our universe. Penrose considers that the law that determines the contingency of the Universe does not belong to any empirical

²² Henry Poincaré in 1889 formulated the theory of dynamical systems. The basic element of nonlinear dynamics is represented by the dynamical systems, which have a purely deterministic character, being characterized by a law of evolution. In order to define a *dynamic system*, it is necessary to specify *the phase space*, which represents the set of all possible states of the system. It may in principle be any set, but in practical applications it is a differentiable manifold, being specified by its coordinates.

causal series of the relationships between physical objects, but is transcendent to our physically observable Universe W. Thus, the infinity of possible universes, described by the infinite initial conditions in the space of phases V, as well as God the Creator are transcendent to our physically observable Universe W.

From the Orthodox theological point of view, the relationship between the infinity of potential intelligible universes V and our physically observable universe W does not in any way show the creation of W from V, but the differentiation between the infinity of potential intelligible universes and our physically observable universe. Thus, W and V represent *the distinction (diaphora)* between created and uncreated. Thus, Penrose provides valuable scientific clues to the intelligible elements of creation *ex nihilo*. The irreversibility of time in W, with the aspects related to entropy, constitutes a particular fundamental element for W in relation to V. So, the ICW model proposed by Penrose is an attempt to present *the distinction (diaphora)* between W and V, from the perspective of W, that is, in paradigmatic scientific language, specific to our physically observable Universe. Thus, it can be concluded that the existence of *the distinction (diaphora)* in Penrose's model shows *the rationality (logoi)* common to both V and W, highlighting that both are created *ex nihilo*. Thus, seen from the Orthodox theological perspective, in our physically observable Universe W, *the rationality* of the irreversibility of time and implicitly *the rationality* of the complexity of the order that highlights the existence of a plane, are based on *the rationality (logoi)* of creation, which have their source in *the Logos* (Reason, Wisdom) of God. Thus, science's attempt to explain the source of the irreversibility of time through the special initial conditions of the Universe, implies framing exclusively in the context of the dogmatic theological perspective of creation *ex nihilo*. It is found that it *is precisely the problem of the irreversibility of the time that presents the fundamental contingency in the Universe, which determines the opening of contemporary cosmological science to explanations from the metaphysical sphere of philosophy and theology*. Thus, the irreversibility of time in our physically observable Universe is related to the transcendent, ineffable and unknowable existence of *the Logos* of God.

4. Fine-tuning the Universe

According to the analysis of the observable data of the universe from the perspective of the current scientific paradigm, it appears that our observable Universe had to meet extremely precise initial conditions. According to the explanations of Prof. Andrei Linde from the Department of Physics at Stanford University²³, the initial conditions of the Universe that allowed the energy density

²³ Andrei Linde, "Inflation, Quantum Cosmology and the Anthropic Principle", in "Science and Ultimate Reality: From Quantum to Cosmos", honoring John Wheeler's 90th birthday. J. D.

to be close to the critical value, making it possible to evolve our universe to the current state, imply the need to add an inflationary phase to the Big Bang theory. According to the inflationary phase²⁴, in a tiny fraction of the first second 10^{-35} s, the Universe had an accelerated expansion, increasing from the initial Planck²⁵ size of about 10^{-33} cm to the immense size of about cm.

Observations of the cosmic microwave background have played a crucial role in confirming the inflation theory. In particular, two space missions have provided significant data in this regard: the Cosmic Background Explorer (COBE)²⁶ and the Wilkinson Microwave Anisotropy Probe (WMAP).²⁷ These NASA missions provided clear evidence of the anisotropies of the cosmic microwave background, confirming that the early universe was affected by quantum fluctuations that developed and were extended during the inflationary period. This confirmation has significantly contributed to the consolidation of the inflation theory as an integral part of the Big Bang model and has helped to form a consensus in the scientific community on the validity of this model.

NASA's Wilkinson Microwave Anisotropy Probe (WMAP) mission²⁸ was crucial in providing significant confirmations of the Big Bang model and inflation theory, providing a solid foundation for understanding the early evolution of the universe. WMAP observations were later extended and improved by other missions, such as the European Space Agency's (ESA) Planck, contributing to an even more precise understanding of the origins and structure of the universe.

Barrow, P.C.W. Davies, & C.L. Harper eds. Cambridge University Press (2003)

²⁴ John HANDS, *Cosmosapiens: Evoluția omului de la originile Universului...*, pp. 54-64.

²⁵ *The Planck dimension* is an extremely small scale at which the laws of physics, as we know them, come together in a unique way. In physics, it is considered the limit at which the quantum effects of gravity become important. At this scale, about 10^{-35} meters, it is considered that space and time become discrete (discontinuous), and the classical concepts of space and time are no longer applicable. It is the point at which Einstein's general theory of relativity and quantum mechanics can no longer be applied.

²⁶ COBE (1989-1996) was crucial in confirming the homogeneity of the cosmic microwave background, as well as the first detection of its anisotropies. In 1992, *the Cosmic Background Explorer (COBE)* provided the first clear evidence of small anisotropies in the cosmic background radiation, showing that its temperature is not perfectly uniform, but shows small variations across the scale of the entire sky. These results were consistent with the predictions of inflation theory, which suggested that these small variations in radiation should exist and should reflect the primordial quantum fluctuations extended and strengthened during the inflationary period.

²⁷ WMAP (2001-2010) was launched to make precise measurements of the anisotropies of the cosmic microwave background. It provided detailed maps of these anisotropies and made highly accurate measurements of their characteristics as well as the relevant cosmological parameters. *The Wilkinson Microwave Anisotropy Probe (WMAP)* confirmed and expanded on many of the COBE findings, providing data that allowed for more precise testing of cosmological models, including those related to inflation.

²⁸ "Wilkinson Microwave Anisotropy Probe". NASA, accessed November 17, 2023, <https://map.gsfc.nasa.gov>

Martin Rees, professor at the University of Cambridge, explains *Fine-tuning* of the universe²⁹, centered on *the anthropic principle*, by the existence of only six fundamental constants³⁰:

1. N (*Dirac's large number*)³¹ is the number that measures the intensity of the electric forces that hold the atoms together, divided by the value of the gravitational intensity between them, having a value of 10^{36} . If N had been different, the life of the universe would have been very short, insufficient for evolutionary development toward the goal of the emergence and maintenance of intellectual human life that can comprehend the universe.
2. ε (*epsilon*) Represents the efficiency of converting mass into energy in stars (especially in nuclear fusion reactions), having a value of 0.007. This is related to the strong nuclear force. If it had been slightly larger or smaller, the chemical elements necessary for life could not have formed.
3. Ω , *the cosmic number*, measures the amount of matter in the universe (including "dark matter") that is characterized by gravity (attraction), relative to the expansion energy of the universe, having a small value of about 0.3. It measures the expansion rate of the universe, finely tuned to allow for the existence of galaxies, stars, chemical elements, etc.
4. λ represents *the cosmological constant*, which is associated with *vacuum energy* or *dark energy* and represents a measure of antigravity responsible for the expansion of the universe. λ has a small value of about 0.7. If it had any other value, then it would not have been possible for the universe to evolve towards the purpose of the emergence and maintenance of human life.

²⁹ John Hands, *Cosmosapiens: Evoluția omului de la originile Universului...*, pp. 130-133.

³⁰ Martin Rees, *Doar șase numere. Forțele fundamentale care modelează universul*, trad. Irinel Caprini, Humanitas, București, 2008, pp. 10-12.

³¹ *Dirac's large number* refers to an observation made by physicist Paul Dirac in 1937 regarding the relationships between the dimensions of the large-scale and subatomic scale universes, noting that the ratios are often around 10^{40} . These observations include:

a) the ratio between the size of the observable universe (10^{26} meters, approximately equal to the Hubble radius) and the size of a proton (10^{-15} meters, given by the Compton wavelength) is about 10^{40} .

b) the ratio of electromagnetic forces to gravitational forces between two elementary particles, for example two protons is about 10^{36} .

c) the ratio between the radius of the electron and that of the observable universe is of the order of 10^{40} ;

d) the ratio between the age of the universe (about 13.8 billion years) and the time it takes for light to pass through a proton (about 10^{-24} seconds) is of the order of 10^{40} ;

e) the ratio of gravitational attraction to the observed electrostatic attraction between a proton and an electron is 10^{39} . Between two electrons, this ratio is about 10^{42} .

5. Q has a value of about 10^{-5} and represents the amplitude of the density fluctuations of matter in the early universe, which are essential for the formation of the cosmic structures we see today, such as galaxies, galaxy clusters, and superclusters. Q expresses a fraction of the total resting energy (mc^2) of the clear structures of matter in the universe (stars, galaxies, clusters of galaxies) needed to hold them together (by gravity) or to disperse them. The density fluctuations in the early universe were very small, but sufficient to initiate the formation of cosmic structures by gravitational collapse, but not so large as to disrupt the large-scale homogeneity of the universe. Q has exactly the necessary value that allows galaxies, stars, chemical elements and life to exist. If Q had been smaller, the universe would have been too smooth and matter could not have compressed to form galaxies, and if Q had been larger, the universe would have been too turbulent to allow matter to be organized into ordered structures.
6. D represents the number of spatial dimensions of the universe and has the value 3. Three spatial dimensions are essential for the stability of planetary orbits and for the complex structure necessary for life. Fewer dimensions would lead to gravitational collapse, and more would make the laws of physics unstable and incomprehensible to intellectual human life.

Martin Rees also notes the contingent character of the laws of science and the *fine-tuning* of the universe, and it is necessary to involve the metaphysician in their explanation:

“Our everyday world, simply shaped by subatomic forces, also owes its existence to the well-regulated speed with which the universe expands, the processes of galaxy formation, the appearance of carbon and oxygen in old stars, etc. A few basic physical laws give the “rules”; our emergence from a simple Big Bang depended sensibly on the six “cosmic numbers”. If these numbers had not been “well-tuned”, the gradual unfolding of the successive layers of complexity would have stopped in its tracks. [...] We must look for other reasons for the providential values of the six numbers.”³²

Professor Owen Gingerich states the following about fine-tuning in the early moments of the universe:

“To achieve a balance between the expansion energy and the braking forces of gravity required extraordinary precision – such precision that it seems that the universe was designed specifically for humanity. The Big

³² Martin Rees, *Doar șase numere...*, pp. 209-210.

Bang is the classic example of “fine-tuning”, as astrophysicists and cosmologists call it, and at that moment the universe was indeed fine-tuned. If you’re looking for a project, how about that? Surely a benevolent Creator worked to produce the universe suitable for intelligent life!”³³

The Anglican physicist and theologian John Polkinghorne notes regarding the fine-tuning of the universe:

“This world that began so simple has become, after fifteen billion years, immensely rich and complicated. You and I are the most complicated known consequences of this fruitful history. A universe that, when it was ten thousand millionths of a second old, was only a hot soup of elementary particles, became the abode of saints and scientists. Remember that this was only possible because the universe has a fine tuning built into its physical fabric.”³⁴

Professor Owen Gingerich notes with regard to *fine-tuning* that:

“We humans are the most extraordinary creatures known [...] As physicist John Wheeler once suggested to me, perhaps the universe is like a large plant whose ultimate goal is to produce an extraordinary little flower. Maybe we are that little flower.”³⁵

From the Orthodox theological point of view, Alexei Nesteruk emphasizes *the fine tuning* of the constants of the universe³⁶ without which the emergence of human life would not have been possible, and in contemporary Romanian Orthodox theology, Professor of Orthodox dogmatic theology Adrian Lemeni and Father Răzvan Ionescu offer an extensive analysis of this³⁷ theme.

5. “All Things Were Created Through Him and for Him” (Colossians 1:16) and All Things will be Brought (Recapitulated) Under the Same Head, Christ: “*Anakephaleosasthai ta Panta en to Christ*” (Ephesians 1:10)

In the search for a profound understanding of the universe and man’s place within it, the dialogue between theology and science has revealed surprising and fertile convergences. One such point of convergence is the meeting between *the*

³³ Owen Gingerich, *Universul lui Dumnezeu*, Trad. Viorel Zaicu, Bucureșt, Curtea Veche, 2010, p. 64.

³⁴ John Polkinhorne, *Quarci, haos și creștinism*, București, Curetea Veche, 2006, p. 52.

³⁵ Owen Gingerich, *Universul lui Dumnezeu...*, p. 56.

³⁶ Alexei Nesteruk, *Universul în comuniune*, trad. Mihai-Silviu Chirilă, București, Curtea Veche, 2009, p. 259.

³⁷ Adrian Lemeni, Pr. Răzvan Ionescu, *Teologie și știință. Repere pentru un dialog*, București, Ed. Institutului Biblic și de Misiune a Bisericii Ortodoxe Române, 2007, p. 392.

anthropic principle and Orthodox theology *Christocentric*. This section aims to explore how these two perspectives, one scientific and the other theological, meet and enrich each other.

The anthropic principle, enunciated within modern cosmology, indicates that the universe is “fine-tuned” to allow for the existence of rational human life that has consciousness. This implies that the laws of science and the fundamental constants of the universe are adjusted with extraordinary precision to make possible the emergence and evolution of human life. Observations supporting this *anthropic principle* raise profound questions about the purpose and meaning of the universe, indicating that it is not a product of chance, but of a plan.

On the other hand, Orthodox theology argues that all creation has meaning and purpose *Christocentric*, which are revealed in and through the person of Jesus Christ, the Man *Logos*. According to this perspective, the universe is not just an impersonal mechanism, but a creation full of God’s intentionality, oriented towards fulfillment in Jesus Christ. This theological vision sees in the Man Christ not only the Creator *Logos*, but also the ultimate goal of all creation, thus giving it ultimate reason and meaning.

Convergence between *the anthropic principle* and the *Christocentricity* of Orthodox theology it manifests itself in the way both perspectives recognize a deep reason, a plan, and a purpose imprinted in the fundamental structure of the universe. While *the anthropic principle* indicates a precise planning of the physical constants of the universe to allow rational human life, Orthodox theology sees in this *fine-tuning* of the universe an expression of God’s Wisdom and love, manifested in, through and for Jesus Christ, the *Logos Incarnated*.

Today, according to the Patristic Tradition, St. Luke of Crimea reaffirms that Holy Scripture is not to be considered as a substitute for scientific endeavor, emphasizing the Christocentrism of creation:

“The Bible does not teach about a physical center, but about a metaphysical center of the universe which is Christ the *Logos* (for it does not contain teachings about transient physical things, but about eternal and spiritual things) [...] The world is Christocentric. [...] This immeasurable cosmos (the macrocosm) is Christocentric, as is the small world of our being (the microcosm).”³⁸

The fulfillment of man is related to Jesus Christ, “for in him were made all things, things in heaven and things on earth, things visible and things invisible, whether thrones, or lords, or beginners, or masters. All things were made through Him and for Him.” (Col 1:16). The Orthodox exegesis of this verse highlights not only the Godly and creative nature of Christ, but also the personal relationship He has with creation. Creation is not merely an abstract work, but has a personal

³⁸ Sfântul Luca al Crimeii, *Știința și religia*, Doxologia, trad. Denis Chiriac, Iași, 2018, p. 67.

purpose and an intimate connection with the Holy Trinity through *the Logos Incarnated*. The expression “in Him” emphasizes that Christ is not only an instrument in the process of creation, but its Architect and Maker, because in the Holy Trinity there is a unity of being, will and work. Through Him, the entire universe was brought into existence out of nothing, which emphasizes the all-powerful and divine creative nature of the Savior Jesus Christ. The statement “for Him” emphasizes that all creation is not a purposeless or unconditional process, as one might think. Creation has a purpose, and that purpose is Jesus Christ Himself, the development towards the goal being governed by Him as *the Creator Logos*. Creation exists for the purpose of knowing Him, giving Him glory, reflecting His greatness, and serving Christ. Only in this way can man be fulfilled, because “God made us to know Him”³⁹. He created us out of love, with love and for eternal communion of love. Father Dumitru Stăniloae states that in relation to the world

“He perfects man’s being, gathering together the reasons of the world, and thereby making his reason and the reason of the world effective in himself through the virtues, so that by surpassing his reason and the reasons of the world, he may at the same time become the purest possible mirror of the divine Reason and goodness from which they radiate.”⁴⁰

Creation is the gift of God the Father to His Son, Christ Jesus. Thus, the *Christocentrism of creation is affirmed*, the meaning and purpose of creation being Jesus Christ⁴¹ truly Man and truly God. The procurator Pilate, intuiting the divine origin of Jesus Christ, emphasized this truth when he said: “*Behold the Man*” (Jn 19:5). The Holy Fathers affirm that God became man in order to make man godly. The statement of St. Gregory the Theologian is well known: “*hina ghenomai tosouton theos hosan ekeinos anthropos* - so that I may become godly as much as He became man⁴²”.

The universe is created by God with a *Christocentric meaning and purpose*, according to “His will, according to His good pleasure which He purposed in Himself, that the dispensation of the fulness of the times He might gather together in one all things [ἀνακεφαλαιώσασθαι]⁴³ in Christ” (Ephesians

³⁹ Pr. Prof. Acad. Dr. Dumitru Stăniloae, *Studii de Teologie Dogmatică Ortodoxă*, Craiova, 1991, p. 163.

⁴⁰ Dumitru Stăniloae, nota 154, la Sfântul Maxim Mărturisitorul, *Ambigua*, trad. de Pr. Prof. Dumitru Stăniloae, Editura Institutului Biblic și de Misiune a Bisericii Ortodoxe Române, București, 2006, p. 205.

⁴¹ Diac. Adrian Sorin Mihalache, *Lumina Celui Nevăzut: O privire teologică în raționalitatea creației și teoriile științifice recente despre Univers. Vol. I*, București, Basilica, 2016, p. 415.

⁴² Sfântul Grigorie de Nazianz, *Cele cinci Cuvântări Teologice*, Ed. Anastasia, 1993, p. 67.

⁴³ The Greek term “ἀνακεφαλαιώσασθαι» (*anakephalaiōsasthai*) is usually translated as “to unify under one head” or “to recapitulate”. It comes from the Greek word “κεφαλῆ» (*kephalē*),

1:9-10)⁴⁴. St. Paul emphasizes that the ultimate goal of God's plan is for all things in creation to be brought (recapitulated) under the same Head, Christ (“*anakephaleosasthai ta panta en to Hristo*”), in order to be renewed. In the Vatopedi version of *the New Covenant*, *anakephaleosasthai* is translated as “recapitulation”⁴⁵. Thus, the central role of the Lord Jesus Christ in salvation and in the renewal of the entire cosmos in the “new heaven and new earth” is emphasized.

In this sense, Blessed Theodoret of Cyrus teaches in the interpretation of the Epistle to the Ephesians:

“Being gathered together in Christ, all things in heaven and things on earth in Him [. . .]. Therefore ‘reunion’ calls the sudden change of things, for through the inconomy of the Lord Jesus Christ the nature of men rises and puts on incorruption, and the visible creature, delivered from death, acquires purity, and the multitudes of the invisible spend in joy, because pain, sorrow and sighing have perished.”⁴⁶

In the present Orthodox theology, it is emphasized that:

“The union of all created things is possible precisely because, for its view, all things were made from the beginning; that the whole world, including here the universe and all others, may become the Church of God, and man may be His Priest in it, so that through the union of man with God, all that is in the world may be gathered together in him, and united with him.”⁴⁷

Conclusion

The whole of creation is *Christocentric*, and the Church is *Eucharistic*. The Church celebrates the Eucharist at the Holy Liturgy, and the Eucharist is, par

which means “head”. In a broad sense, “κεφαλαίω» (*kephalaiōō*) means “to summarize”, “to summarize”, “to gather” or “to unify under one head”. The prefix “ἀνα-» (*ana-*) indicates a movement of reunion or renewal. Combined, the term signifies the dynamics of the work of bringing all things under one head or recapitulating towards renewal.

⁴⁴ *The Orthodox Study Bible*, Prepared under the auspices of the Academic Community of St. Athanasius Academy of Orthodox Theology, Elk Grove, California, USA, Thomas Nelson Publishers, 2008.

⁴⁵ *Noul Testament - Sfânta Mare Mănăstire Vatoped*, Ediție bilingvă, Ed. Sfânta Mare Mănăstire Vatoped - Sfântul Munte Athos, Grecia, 2022.

⁴⁶ Fericitul Teodoret al Cirului, *Tâlcuire la epistolele Sfântului Apostol Pavel*, Vol. 1, Trad. Iulia cărare și Mircea Ștefan, Iași: Doxologia, 2015, pp. 63-64.

⁴⁷ Dan Chițoiu, Pr. Petre Comșa, Sorin Mihalache, Costea Munteanu, “Raționalitatea creației...”, p. 222.

excellence, the Mystery of the Church. It is an indissoluble two-way link. Theologian Sergei Bulgacov pointed out that:

“The miracle of the transformation of gifts is not physical but metaphysical. *μετά* = *after, beyond, trans, pre, and μεταβολή* (= *transformation, transformation, transmutation or transposition*) does not mean the change of one material essence into another within the limits of the physical world, but *the union* of two worlds, of two separate domains of nature: physical and metaphysical, a *metaphysical transcendence*”.⁴⁸

The Holy Apostle Paul emphasizes the communion of men and angels in the Holy Liturgy, when through the synergistic liturgical service, we foretaste together the eighth day of the “new heaven and the new earth”, advancing in the spiritual knowledge of God, through the full communion with Jesus Christ:

“Are they not all ministering [λειτουργικὰ] spirits, sent forth to minister [διακονίαν] for those who will inherit salvation?” (Heb 1:14)⁴⁹

Man is like the angels, so he too is fulfilled by participating in the Holy Liturgy, and he is a liturgist like the angels, aiming together with the angels, especially the Cherubims⁵⁰ (כְּרוּבִים, *kerubim* in Hebrew), to know God more and more. After the Seraphims (Isaia 6), stand before God the wise Cherubims (Ezekiel 1 and 10)⁵¹, the many-eyed ones, who, more than other hosts of angels, shine unceasingly with the light of understanding and knowledge of God. The cherubim being enlightened in the mysteries of God, of the profound knowledge of God and of divine wisdom, enlighten others also. Through the Cherubim the wisdom from above is poured out and the soul’s eyes are given enlightenment to the knowledge of God. So, man is by his being liturgical, liturgical and is naturally called to

⁴⁸ Serghei Bulgacov, *Dogma euharistică*, trad. Pr. Paraschiv Angelescu, București, Paidea, 2000, p. 9.

⁴⁹ *The Orthodox Study Bible*, Prepared under the auspices of the Academic Community of St. Athanasius Academy of Orthodox Theology, Elk Grove, California, USA, Thomas Nelson Publishers, 2008.

⁵⁰ In Christian Orthodox theology, cherubims (כְּרוּבִים, *kerubim*) are celestial beings of high rank, serving as attendants of God’s throne, full of divine wisdom, protectors of holy places, and models of ministering [λειτουργικὰ]. They play a significant role in both the theological framework and liturgical life of the Orthodox Church, reminding the faithful of the transcendence, holiness, and glory of God. Cherubim play a significant role in Orthodox liturgy, particularly in the Cherubic Hymn, which is sung during the Holy Liturgy. This hymn calls the faithful to lay aside earthly cares and join with the cherubim in worshipping God.

⁵¹ Ezekiel’s vision provides a detailed and complex description of cherubims. They are depicted with four faces (a man, a lion, an ox, and an eagle) and four wings. Their appearance includes elements like wheels within wheels and eyes all over, symbolizing omnidirectional movement, perception and awareness.

know God especially in the Holy Liturgy, in a profound ministering [λειτουργικά] collaboration with God loving angels. Only in this way the man can be fulfilled.

„And this is eternal life, that they may know [γινώσκωσιν]⁵² You, the only true [ἀληθινὸν] God [Θεὸν], and Jesus Christ whom You have sent.” (John 17:3)⁵³

Man is fulfilled by partaking of the *Logos Incarnated*, the model and source of his perfection. But the transformation of gifts cannot and must not be the object of sensory perception, scientifically analyzed, because it concerns exclusively the knowledge of the physical reality of this world. The transformation of gifts, just like the humanity of the *Logos*, since it involves the union of two worlds, the physical and the metaphysical, without confusion and without mixing, without changing their reason of being, and is therefore completely imperceptible to the bodily sensory system, is therefore imperceptible and inaccessible to physical perception. Only spiritually, through spiritual extrasensory perception, can the reality of humanity, the *Logos* and the Eucharistic reality be known.

John Meyendorff emphasizes that the life of the Church, centered on the Eucharistic experience, goes beyond the daily human logic, affirming:

“Christ, after the Resurrection and Ascension, left us the memory of the encounter with Him, then expressed by the Church, not only from the historical point of view, but also from the Eucharistic and eschatological point of view, as an act of communion with God in His Kingdom. But this communion is ontologically different from what involvement means by natural law and causality. The absence of causal dynamics, so essential to the things of the empirical universe, is here replaced by the work of the divine agent, the Holy Spirit. [...] When the Church remembers the Christic event in the Eucharist, she calls the name of God into His kingdom; in doing so, it transcends space and time to live the presence of Christ (the Christ event), in the eternity of His kingdom.”⁵⁴

⁵² The term γινώσκωσιν (ginōskōsin) in John 17:3 is derived from the verb γινώσκω (ginōskō), which means “to know” or “to recognize.” In the context of John 17:3, this term is used in the subjunctive mood, indicating an action that is desired or intended. In this verse, γινώσκωσιν (ginōskōsin) is translated as “they may know.” It signifies a deep, personal, and experiential knowledge of God and Jesus Christ, which is characterized as the essence of eternal life. The use of this term emphasizes not just intellectual understanding but an intimate relationship and recognition of God and Jesus Christ.

⁵³ *The Orthodox Study Bible*, Prepared under the auspices of the Academic Community of St. Athanasius Academy of Orthodox Theology, Elk Grove, California, USA, Thomas Nelson Publishers, 2008.

⁵⁴ Alexei V. Nesteruk, *Lumina de la răsărit...*, p. 116.

Regarding the Unity of creation and the Church in the Logos of God, Father Prof. Dumitru Stăniloae states:

“Apart from God, unity, and therefore salvation, is not possible. Christ expands with His sacrificed and risen body in us, to unite us and make us like Him, filling us with the same love of His for God the Father.”⁵⁵

Professor Adrian Lemeni notes that Father Professor Dumitru Stăniloae has a perspective of the dialogue between theology, philosophy and science that could be a fruitful tool to discover the profound identity of reason, open to the vision given by faith and ecclesial experience⁵⁶.

⁵⁵ Pr. Prof. Dumitru Stăniloae, *Teologia Dogmatică Ortodoxă, vol 2...*, pp. 263-264.

⁵⁶ Adrian Lemeni, “References of Father Dumitru Stăniloae’s Thought in the Dialogue between Theology and Science”, in *Orthodox Christianity and Modern Science: Theological, Philosophical, Scientific and Historical Aspects of the Dialogue*, ed. by Christopher C. Knight and Alexei V. Nesteruk, SOC, 2 (Turnhout, 2021), pp. 155–163.