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Review

The Validity of The Basic Cosmos Laws From 2003 Now 2024 A Review Based on The Latest Scientific Findings

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A B S T R A C T

This article critically reviews the Basic Cosmos Laws (BCL) formulated in 2003, which propose a universal model beyond the four-dimensional space-time continuum of relativistic physics. This review takes into account the scientific knowledge gained up to the year 2024 and focuses on the three core aspects of the BKG: the critical stability of systems, the evolutionary causality principle and the assumption that the universe contains more than four dimensions.

Keywords: Self-regulating universe; Fundamental property; Cosmic Law

The analysis of the first cosmic law, which addresses critical stability and its effects on system dynamics, confirms the universal validity of this principle. Current research data support the thesis that the principles of critical stability represent fundamental and unchanging laws of nature. The mathematical modelling of these laws enables a precise representation of the dynamics of instability and underlines the concept of a self-regulating universe. With regard to the second cosmic law, the evolutionary causality principle, its foundation is reinforced by the latest findings from quantum mechanics and the general theory of relativity. It is shown that the irreversibility of cause-effect chains and the directional scale of causality are essential concepts for understanding cosmic processes. The study shows that causality remains a fundamental property of the universe, unaffected by relativity and dimensionality.

The third cosmic law, which postulates the existence of more than four dimensions in the universe, is confirmed by recent astrophysical observations, especially in the field of black holes. It is proven that an extended dimensionality is necessary to gain a comprehensive understanding of the cosmos. These findings confirm the hypothesis that the universe contains complex structures that go beyond the four known dimensions.

In summary, the article reaffirms the continued relevance of the 2003 basic cosmological laws and contributes to a broader understanding of the structural and dynamical properties of the universe. By incorporating the latest scientific findings into the basic cosmos model (BCM), the importance of a multidimensional approach to the future exploration of the cosmos is emphasised[1-3].

"If you want to understand and explain a system, especially the universe or, as the ancient Greeks called it, the cosmos, you first have to identify its essential components and the comprehensive laws on which it is based. A model for the universe must of course be a maximal one, which offers space for all models that are created for sub-areas of reality. We call such a model a basic cosmos model (abbreviated BCM). In the following, we summarise the foundations for a BCM, which are new in that they are broader and more comprehensive than the four-dimensional space-time continuum of relativistic physics, which goes back to Einstein. These principles are formulated in three Cosmic Laws for the structuring of space, time, masses and their interaction. We believe that these laws represent guidelines for the design and construction of models of natural reality. In our opinion, this makes it possible to represent Natural Reality comprehensively and thus exclude false conclusions and inexplicable "singularities"[4].

We have now taken this idea from 2003 as an opportunity to check whether our formulations and laws are still valid today.

First Cosmic Law: Critical Stability

Every system, in the simplest case an accumulation of masses (= matter), is subject to the natural law of "critical stability" or instability[5]. This natural phenomenon is characterised by the fact that there is always at least one flow factor, expressed by a metrically measurable influence quantity X such that if X exceeds a critical lower limit K_g the instability of the system increases as X continues to grow. The increase in the influence quantity is caused by an increase in the system, i.e. in the simplest case by an ever-increasing accumulation of mass. If the influence quantity X reaches a critical upper limit K_G, the instability of the system exceeds any finite value, in abstract terms it becomes infinitely large, which manifests itself in the decay of this very system. This also applies to the accumulation of energy[6-9]. Instability is therefore a driving force behind the constant reorganisation of the universe. This natural phenomenon of instability can also be positively formulated as a phenomenon of limited or critical stability. Stability collapses at the upper limit K_G. We can derive this law from our experience of natural reality in subsystems of the universe. As it is valid for all subsystems (nuclear size of atoms, solar masses, size of galaxies), we claim to be able to speak of a universal cosmic law.

Thanks to their ability to think abstractly, humans are able to deal with the concept of "infinity" in maths and physics. Our world of experience, on the other hand, is finite. This shows us the way to the first cosmic law[10]. Let us model the instability as a function of the metrically measurable influencing variable in such a way that for values above the critical lower limit K_g, an infinitesimal increase of the variable X increases the instability (approximately) by a fixed factor C, i.e. that the differential $dI(x)$ of I applies:

$$I(x+dx) - I(x) \approx \mathrm{d}I(x) - \mathrm{C}I(x)dx$$

This results in an exponential increase in instability as a function of the variable X. Expressed using the mathematical concept of elasticity, this means that the elasticity of the instability increases linearly with x. The exponential function proves to be a "natural" growth function in many contexts.

In order to meet the boundary conditions for $x = K_g$ and $x = K_G$ namely "$I(K_g) = 0. I(K_G) = \infty$", the distance $(x - K_g)$ must be proportional and the distance $(K_g - x)$

are included in the formula in inverse proportion. The exponential increase in instability then applies to the term

$$y(x) = \frac{(x - K_g)}{(K_G - x)}, K_g \leq x < K_G.$$

Thus, the mathematical formulation of the natural law of instability is given by the formula

$$I = C_e\left\{exp\ exp\ \left[\frac{C_i(x-K_g)^+}{K_G - x}\right] - 1\right\}, 0 < x < K_G$$

In this context, denote:

$x \triangleq$ values of X, $0 \leq K_g < K_G\ \infty$ the critical lower or upper limit, $(x - Kg)^+ \triangleq$ the maximum of the two real numbers $(x - K_g)$, 0. Furthermore, let $exp \triangleq$ be the exponential function, i.e. $= e^x$ for a real number x, where is the Euler number, $C_i > 0$, $C_e > 0$ are constants, $I \geq 0$ is the instability.

In a concrete frame of reference, the term instability is of course to be filled in by a concrete measurand, such as the reciprocal lifetime of the system in question. The constant C_i i is to be adapted to the internal state of the system, such as the type of matter and the structure of the system, the constant C_e to the environment or the external influences acting on the system, such as pressure, temperature or gravitational effects from the environment. Since every system is subject to both internal and external conditions, two constants appear in the formula. Since the constant C_i "adheres to the mass", it appears as a multiplier of $(x - K_g)^+$, since C_e represents external effects, it acts as an external factor.

A direct consequence of this law is that the accumulation of masses is generally finite.

It therefore remains to be clarified whether the critical stability also applies in higher dimensions. It has not escaped the authors' attention that larger stars have now been discovered than those named in the original paper. But no limitless growth in three-dimensional space has yet been proven[11].

If one understands the Big Bang as a reaction caused by the black holes exceeding a limiting mass absorption, then the first cosmic law also applies here. Even in oversized space, limitless growth is therefore not possible. Instability occurs in the supra-dimensional structures and this overloading effect leads to the Big Bang. So, the critical stability also comes into play here.

Second Cosmic Law: The Evolutionary Principle of Causality

If we look at the universe from a conventional point of view, we first have to deal with the concepts of space and time. However, as we know thanks to Einstein, time depends on the speed of a reference system and is therefore relative. If people seeking knowledge want to bring order to the events of nature in order to be able to do (natural) science at all, if they postulate an absolute law, if they are looking for a universal, cosmic principle of order, then this cannot be based on time, as something relative is not suitable for explaining something absolute.

In this context, Kronheimer and Penrose (1967)[12], for example, introduce causal spaces that are structured with causal relations in order to distinguish between causal and chronological order.

The essential physical components of the universe are space, energy and matter, which are interconnected in interactions. We postulate the evolutionary causality principle as a comprehensive law for cosmic events, as the second cosmic law:

The following applies to every interaction of the individual components with themselves or with other components:

If a cause has produced an effect, there is a directed "cause-effect" chain of events. This is irreversible, i.e. an event that has come about cannot be undone or changed.

To illustrate this principle, we design the directional causality scale, on which the following applies: "The cause precedes its effect". All events of the "cause-effect" structure are subject to this causality scale.

e model the causality scale K as a set K with a complete order ≤ This means that the following applies to any points k_1, k_2, k_3 on K:

$$k_1 \precsim k_1$$

$$k_1 \precsim k_2 \text{ and } k_2 \precsim k_1 \text{ implies } k_1 = k_2$$

$$k_1 \precsim k_2 \text{ and } k_2 \precsim k_3 \text{implies } k_1 = k_3$$

$$k_1 \precsim k_2 \text{or } k_2 \precsim k_1$$

The points on the scale K can therefore be interpreted with regard to their "position" in relation to other points on K, defined by the full order ≤, but there is no "standard point" zero or one on this scale. In addition, "distances" between k_1 and k_2 with $k_1 \leq k_2$ cannot be interpreted. The directional causality scale is not directly observable, but only indirectly detectable through the observation of events.

In principle, i.e. independent of a reference system, all events are ordered on K. It is not possible for humans to grasp this completely, as they would have to have knowledge of all causes and effects, including all interactions. Of course, people can only assign events on the causality scale if they are aware of their cause and effect.

The causality scale represents the evolutionary causality principle insofar as the following applies to all events of the "cause-effect" structure for the point u on K assigned to the cause and the point w on K assigned to the effect: $u \leq w$.

Causalities and effects are not always accessible to humans. This is why we have previously organised chains of events according to a time scale that we have modelled. The time scale is congruent with the causality scale for large areas of our world of experience. However, since time itself is relative, its scale can be distorted under certain circumstances by unsuitable T with regard to the causality scale and can simulate paradoxical events.

The evolutionary causality principle is not bound to the observation medium of light, in particular not to the speed of light. Should higher speeds than the speed of light ever be discovered, this principle does not require correction, whereas in Einstein's model, phenomena occur when faster-than-light speeds occur, in which the effect appears to precede the cause.

As soon as an event takes place in any dimension, this results in a mechanical and therefore temporal process according to our definition of time. A further point that emerges from this is that causality obviously also has an oversized existence. As Helmecke noted in his work (Mosel 2014 conference, symposium on chance) on chance, causality also exists retrospectively in chance. However, this causality cannot be calculated in advance in the case of chance and therefore the causality can only be determined retrospectively with the present result.

If there were no causality in the oversized universe, the processes at the black hole would have a chaotic character. However, this is not the case; instead, the observations show a constant progression that does not contradict the electromagnetic cosmos. Such statics can only be achieved if causality and thus the logic of the process are preserved!

The Third Cosmic Law: The Number of Dimensions in The Universe Is Greater Than 4

The universe is the comprehensive totality of natural reality, i.e. the totality in which it is located and takes place. It thus provides the place where matter is and can be and where events can take place.

We call for a basic cosmos model (abbreviated to BCM) that allows the universe to be described and analysed in terms of its state and development in the various sciences such as physics, astrophysics and cosmology. Such a model should be of an absolute nature and not relative, i.e. detached from reference systems and limiting subsystems of the universe in terms of knowledge, understanding and measurement possibilities. To date, space-time models have been used for this purpose, such as the four-dimensional space-time continuum of relativistic physics, which is widely regarded and accepted today as the "standard model".

The reasons why we do not consider this model to be sufficient for a BCM with the claim described above are:

- Time is a relative quantity, it lacks absolute nature as an organizing principle for processes,
- Three spatial dimensions are too few to provide space for everything that exists in natural reality.

This line of thought in itself is not new. Kaluza (1921) and Klein (1926) already considered a higher-dimensional model. More than 3 spatial dimensions are discussed as a possibility in the context of cosmology by Liebscher (1994, Chapter 9). A group of physicists endeavouring to provide a unified explanation of all physical interactions (GUT, Grand Unified Theory) has been working with higher-dimensional models for about 20 years, see for example Breuer (1993).

Back in 2003, in the paper "The Basic Cosmos Laws", we established that the number of dimensions in the universe must be greater than three. At that time, black holes had not yet been detected and, of course, their jet stream had not yet been recognised. Today we can draw on the data and it is clear that these structures exist.

In the online encyclopaedia Wikipedia, the universe is defined "as the totality of space, time and all the matter and energy in it." This definition is not comprehensive enough, as the term space is associated with three-dimensionality[13].

Black holes absorb matter, but this matter does not remain in the known three-dimensional space. This proves that there are oversized structures in our universe. This has significant consequences for our considerations as to how the universe itself could be constructed. There are hardly any limits to our imagination. An important consideration here is whether time exists in these auditory dimensions.

We believe this question can be answered if we have the following understanding of time: "Time is a unit of measurement for the course of mechanical processes. It should be noted here that we also define the oscillations of a wave as a mechanical movement.

If a big bang is proven, then it is a reaction of processes in over-dimensionality. If the absorption of matter were a static process in super-dimensionality, there would be no reaction with a new creation of matter in three-dimensional space. It is remarkable that time exists in all dimensions.

Summary

The review of the Basic Cosmos Laws of 2003 in 2024 reveals that these fundamental laws retain their universal validity even in the face of new scientific developments and findings. These laws, which include the principles of critical stability, evolutionary causality and the existence of more than four dimensions in the universe, serve as an indispensable basis for analysing and understanding the physical relationships of the cosmos.

The latest research, especially in the field of astrophysical observations and theoretical physics, confirms the relevance of the first cosmic law of critical stability. It shows how the balance between stability and instability defines the dynamic equilibrium of the universe. Similarly, the evolutionary causality principle is underpinned by recent findings that emphasise the time-independence and irreversible nature of cause-and-effect chains. The third law, which emphasises the need to consider more than four dimensions, finds new confirmation through research into black holes and other cosmic phenomena.

This confirmation emphasises the need to measure all new findings in the field of cosmology and physics against the basic cosmological laws. New theories and discoveries must be brought into line with these fundamental principles in order to check their validity. If discrepancies arise, the challenge is to identify the causes of these deviations and to clarify whether the discrepancies are due to shortcomings in the new theories or to a potential need to adapt the basic cosmological laws themselves.

Overall, the review of the basic cosmological laws from 2003 to 2024 shows that these laws provide a robust and flexible basis for the ongoing exploration of the universe. They not only enable a deeper understanding of cosmic structures and dynamics, but also encourage us to always critically scrutinise new theories and discoveries and evaluate them in the light of these fundamental principles.

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