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Research Article

Not a Cosmic Matter Singularity, but Vacuum Pressure Caused the Primordial Expansion of the Universe!

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How to speak about the whole universe?

All around the world people say: Everything in this universe has its origin in the initial cosmic “Big-Bang”! But people saying so, nevertheless up to now even do not at all know, how this Big-Bang could ever physically have been caused, and if at all, how especially mankind could then ever have escaped from this life-threatening, early cosmic infernal catastrophe? [1]. It seems; Either there was no Big-Bang - or there is no mankind in this universe! Though already this puts a prime question to our thinking mankind, perhaps an even major, more fundamental question still may be, how one should think of this phenomenon and speak at all of the “whole all-comprehending universe” in a logically convincing and physically constructive manner? What kind of conception would we in fact need to describe a subject addressed as the breathtaking, all-comprehending vastness of the infinite cosmos?

According to a common conception this world is infinite both with respect to its extension in space as well as in time. How in this case, however, one should appropriately talk about such an object - called and addressed - as “the whole of the universe”? Rather at first it may become clear that the “whole of such a universe” only makes sense, if all its parts maintain an effective, essential and intrinsic connection to each other, and if - as consequence of this - in each part of the universe already the “whole and its fundamental “ontic” essence” becomes manifest. A genuine ontic sense can only then be connected with the infinity of the whole cosmic phenomenon, if all the single parts of this infinite “**Totum**” have an essential, undissolvable interconnection to each other - each part substantially and necessarily pointing and representing all the others. If instead, in contrast to that, the distant parts of the universe coexist as completely relationless and independent entities without a clear pointing to the other parts, then the gigantic size of the whole universe would be a useless vision and thus - one had to say so - an intellectually complete mis-conception.

On the other hand, this raises the deep question, how this universe with its infinite extensions into all directions should by itself be able to fulfill this principle requirement, since the whole of this gigantic cosmic building completely escapes from the intellectual possibilities of our imagination force. And nevertheless all generations of mankind, ever before in the past or most probably ever later in the coming future, thought or will think of the universe as an infinite reality without

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any borders, meaning that even the most distant parts of this universe must have the same genetic imprints or creator as our local cosmos has. According to the above conception of a general interrelatedness of all parts of the universe every single part of this universe by itself had already to mirror the whole essence of this infinite cosmic system.

This may remind one to the philosophy advocated originally by the philosopher G.W. Leibniz, when thinking of all real beings as so-called “Monaden” with their inherent general inter-alliances through deeply intrinsic mutual referencings [2]. Only in case that everything in this universe seen from its own ontic role is connected with everything else in this universe, - only then - there emanates a sense for the whole of the universe, otherwise the idea of “the whole universe” would rather remain a blind chimera, - a useless ideologic misconception. On the other hand - Leibniz’ens view of the necessity of the essence of the universe existing independent on the human brain was highly creative and philosophically helpfull, culminating finally in his essential and fundamental question: “Pourquoi est ce qu’ il y a plutot quelque chose que rien?” (Why at all is there something, instead of nothing in the world? (in German: Leibniz- Warum gibt es da überhaupt etwas in der Welt und nicht vielmehr nichts?) [2].

Just along this way of thinking on the cosmic reality of the universe also the famous Nikolaus Kusanus already several centuries ahead of our and Leibniz’ ens time formulated his sovereign and famous cosmic views which still now founded the scenical basis of our standard present cosmology: i.e. along the so-called “cosmologic principle”! [3] According to Kusanus the middle, or the center, of this universe is everywhere!, - but the border of this universe is nowhere! At each place of the universe the cosmic reality is equivalent to what it is at all other cosmic places around, but no place in fact is at the border of the universe. Just according to this basic cosmological symmetry principal the universe has to be established, if its conception is to meet the uppermost logic criteria - and otherwise there would not at all exist any chance to practise at all with sense cosmology as a science!.

The pan-cosmologic view onto the universe

To many thinking people of our times it astonishingly appears already as a sacrilege of mankind to simply look for a physical explanation of the universe - in view of all its grandiosities, incomprehensibilities and miracles. It appears to them as a devaluation of the marvelous cosmic creation to a simple brain-made construction, as if actually the attempt to look for a physical interpretation of this glorious, divine universal being would already represent something like a prime intellectual sin and a profanation of the holy cosmic reality - as if thereby taking away from it all its beauty and miraculosity that just gives a testimony of its divine cosmic creation.

The question hereby put to the active astrophysicist is: Does he really want to commit such a blasphemy, when trying to explain the universe on simply the basis of his science? But perhaps the question prior to that even may be: Is not primarily the human interpretation of the appearing world a wonderful sign for the fact that the transcendental reality of the world, despite its ontic independence, talks trustfully to our human conscious, even talks with deep engagement to our human brain, opening up thereby an essential deep interrelation? Is’nt it something extremely breathtaking, if it along this way becomes evident that the transcendental universe as creator of the world and mankind nonetheless talks intensively to this human creature and its brain? This in fact means and expresses the astonishing fact that the human being as a product of the universe does reflect on his stage already the deepest secrets of cosmic existence - it

understands the secrets of the universe, and the universe thereby is transformed into one which is understood by mankind, without thereby transforming the universe into an “immanent, purely humanistic” object without its own dignity, since finally the cosmic view in our brain is completely controlled by the hints given to him by the transcendental de-facto-existence of the universe. The universe is a reality by its own dignity and has the status of a complete, existential independence. This, by the way, was the reason why already G.W. Leibniz at 1700pC. asked; “Pourquoi il y a plutot quelque chose que rien?” (Why is there at all something, and not simply nothing?). It is the question of the “onto-dizee”, the justification for existence: is there an advantage of being - compared to non-being? According to Leibniz the advantage and justification of being, compared to non-being, is the fact that the “being” makes our thinking controllable which otherwise would only have the status of dreams, imaginations or irrelevant fantasies.

Under the educated view of the professional astrophysicist the cosmic evolution must appear as based on the sheer action mechanics of the physical laws and of principals that enforce without selecting any ideas all what happens in the universe. According to this view the cosmic growing and becoming all around is definitely based more on a determination, rather than on a target-focused evolution taken in a biological sense.

Consequently one should truthfully ask whether the cosmic processes on the basis of strict dictations of pure physical, unchangable and uncorruptable laws can at all explain the upcome of something qualitatively new? This then leads to the fundamental question: If the human being was not already present from the beginning of the universe, how then could it appear at all on this cosmic stage?

According to centuries-old understandings of the pure roots of physical nature natural happenings or upcoming events are bound to the prime theorem of thermodynamics according to which things only then can happen in a system, when thereby the system-immanent, intrinsic information is reduced. The upcoming physically new state of the system therefore is indeed more mature compared to the earlier one, but contains less information and less impulses for further evolutions. Processes running in a physical system will automatically decrease the system’s information by such motion impulses, and instead the processes running in the cosmic system will increase the entropic disorder of that system tiring or even killing the inner evolutionary activities.

Scientifically seen the cosmic evolution is nothing else but an unchangeable, unavoidable way towards physical chaos and entropic death - from a maximum of physical information at the begin towards a complete garbidding of the system towards the end, when along physical ways no new evolutionary states of the system can be achieved or realized.

Where by the way do we stand at present on this physically enforced cosmic ladder down towards a complete physical garbidge world? The present cosmologists do tell us that the beginning of the universe was the so-called Big-Bang - namely that unique initial explosion of the cosmic matter singularity from which everything else originated later at the continuous expansion of the universe to larger and larger world volumes. But exactly this now provokes the basic question: Namely at which moment of this Big-Bang- paradigmatic evolution did mankind arrive at the present time? When did the human being appear for the first time in this hostile universe? What degree of garbidding can mankind presently diagnose in this universe? And how by the way could mankind escape at all from this initially hostile, life-threatening and furious Big-Bang hell to

more anthropophilic regions of the present universe?

What in fact made the world expand?

The main problem connected with the Big-Bang paradigm not even is the sensibility of the human constitution and its conditional borderlines, it rather is the physics of the Big-Bang itself, which in first priority needs a convincing physical explanation. Why should gravitating cosmic matter, compressed as a highly compacted mass singularity, start to expand to larger and larger cosmic volumes? Matter - if densely compacted and compressed - unavoidably is strongly heated and thus by the relativistically increased masses creates a much stronger centripetal gravitational field which just counteracts the expansion of that matter [4]. Somehow an antigravitational, centrifugal force clearly needs to enter the physics of this initial cosmic game. People up to now did always expect that this explosive force is due to the enormous centrifugal thermal pressure forces which are automatically associated with the highly compacted cosmic matter, since everybody knows that matter becomes the hotter, into the smaller volumes it is compressed. This compression heat naturally induces a strong centrifugal pressure force, and just this force was always expected to have driven the initial explosion of the universe. - Astonishingly enough this explanation does, however, work and thus does solve the riddle of the Big-Bang!

This surprising fact is because the pressure as long as it is connected with matter in general relativity theory also gravitates like additional masses would do. This is simply because also the energy of this cosmic mass acts as a source of cosmic gravity and strengthens the centripetal gravity field, rather causing an implosion instead of an explosion. One can easily convince oneself that the thermal energy of the Big-Bang matter $\epsilon_{th} = kT$ for sure cannot be neglected with respect to the rest energy $\epsilon_r = mc^2$ of the cosmic matter. If however the thermal energy of the matter is equal to or even greater than its rest energy, then immediately the action of the centripetal pressure becomes evident from the relativistic energy-momentum tensor in Einstein's relativistic field equations [5-8]. The action of the material pressure becomes clearly evident in the so-called Friedman-Lemaître field equations derived from Einstein's field equations in the following form:

$$\begin{aligned} (\dot{R}/R)^2 &= \frac{8\pi G}{3} \rho(t) - \frac{Kc^2}{3} \\ \text{and} \\ \frac{\ddot{R}}{R} &= -\frac{4\pi G}{3} \left(\rho(t) + \frac{3p(t)}{c^2} \right) \end{aligned}$$

with the following denotations: R = scale of the universe, \dot{R} and \ddot{R} = first and second derivative of scale with respect to cosmic time t , G = Newton's gravitational constant, ρ = cosmic material density, p = thermal pressure, K = cosmic curvature parameter, c = velocity of light.

In the second of the above equations one can easily recognize that the thermal pressure $p = (\rho/m)kT$, as well as the material density, both in the same sense, contribute to a centripetal force which decelerates the cosmic expansion with $\ddot{R} \leq 0$, as a centripetal force naturally would do. When, however, as in case of the second of the above equations, \ddot{R} is negative, then it means that here nothing explodes from a singularity, it instead implodes! Even the hottest cosmic matter would collapse in its own gravitational field!

How then in case of the youngest universe close to the matter singularity the cosmic scale could have expanded like the Big-

Bang paradigm expects? This latter event can only happen when a "nonthermal" pressure is created - not connected with the thermal energy of the massive cosmic matter - a pressure not at all associated with matter and thus not creating gravitational fields. That this is not an utopic fantasy we have recently shown in publications [7-9]. In the present-day cosmology it becomes evident that the universe can only be adequately described, if for its physical description a volume-associated energy of the vacuum is admitted - a sheer energy of the empty cosmic space related to the pure geometrical size of the cosmic volume, but not connected with the matter within this volume. This vacuum does not contribute to the cosmic gravitational field, it nevertheless generates a positive cosmic pressure which is responsible for inflating the early universe [10-13].

So finally now everything may appear correct in the light of physics when the primordial Big-Bang of the early universe is driven by the early cosmic vacuum energy instead of by the pressure of the hot cosmic matter, and when at the later expansion phases of the universe more and more vacuum energy is converted into massive cosmic matter to later form stars, galaxies and clusters of galaxies which by the present generations of mankind can be observed all over on the sky. Maybe this new Big-Bang story presented here at the first glance appears a little bit like the story of the rabbit drawn out of the hat of an illusionist, but perhaps it is just the big proof that this universe talks to our human brain!!!!

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