
On the Birth of the Universe and the Time Dimension in the 3-Spaces Model

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Abstract: Discussion on the conflicting relations between black holes and Big Bang theories. Proposal of an alternate process for the origin of the Universe grounded on an expanded space geometry, leading to an analysis of the objective and subjective aspects of time.

Keywords: Big Bang, Black Holes, Electromagnetic Theory, Objective Time, Subjective Time, Past, Future

1. Introduction

"Bending facts to theories is a constant danger, whereas bending theories to facts is essential to science. Epistemologically, the fundamental theories must develop in converging lines of investigation, and if they do not converge, it is an indication that there are flaws in the theories, and they are revised." ([1], page liii)

Alfred Korzybski, 1921

I hesitated a long time before producing this paper as a stand-alone abstract from a chapter located three quarters of the way into the book that describes the complete 3-spaces model [2]. The main reason was that reading and understanding the preceding three quarters of the book is required to properly introduce this part. This issue is now mostly covered by the separate publication of the best part of the material concerned.

Another reason was the awareness that the only theories on the birth of the Universe that have been popular in the astrophysics community over the course of the past century all involve the Big Bang as an axiom at the exclusion of any other approach. The big bang solution seemed so deeply rooted and so solidly grounded in the minds of the majority of physicists that proposing any other approach seemed currently doomed to be discarded without a second look, and this, for a long time to come.

2. Inconsistencies in the Various Flavors of Big Bang and Black Hole Theories

However, a recent paper by Stephen J. Crothers [3], masterfully demonstrates to what degree the various flavors of black hole and Big Bang theories on the origin of the universe can be mutually exclusive and contradictory.

In his outstanding paper, he clearly demonstrates with full mathematical support the failings of each one of the complete set of currently popular flavors of black hole and big bang theories, failings that can only render all of them logically invalid. Moreover, a careful examination of the extensive Reference section of his paper clearly highlights the fact that over time, quite few major physicists have also come to the conclusion that these theories are invalid and not correctly grounded even in mathematics, let alone in objective physical reality.

Each flavor of these theories is nevertheless wholeheartedly accepted by its own following, some schools of thought even inappropriately merge some of these flavors, as made obvious by Stephen Crothers' analysis, and spend lifetimes defending their conflicting views, sometimes vehemently attacking the followers of opposing flavors, and virulently attacking doubters of their own flavor; their absolute anathema befalling the doubters of the very existence of black holes and/or space-time General Relativity Theory curvature fabric.

Obviously, the fascination that these followers develop for

their own version of these theories end up amounting to simple faith. To the point that even contradicting experimental evidence is not taken as a hint that the theory may not match reality, but as a hint that yet undiscovered and perpetually unverifiable "unknowns" have to exist to explain the gap between their pet theory's predictions and verified physical reality.

A telling example of this was the observation in 1933 by astronomer Fritz Zwicky that the mass of a cluster of far galaxies calculated from its luminosity compared to the mass of the same cluster calculated from Einstein's General Relativity theory gave a much larger figure with the latter method (the virial theorem), than could be estimated from the experimentally observed luminosity alone.

This observation gave birth to the theory that "dark" invisible matter must exist to explain the difference, because in his mind, GR could not possibly lead to wrong conclusions. His faith in the absolute axiomatic validity of GR was such that it apparently did not even cross his mind that "maybe", "just maybe", GR may not be the absolutely final theory for describing the Universe in all of its aspects, even if it does allow describing some aspects of physical reality more precisely than Newton's non-relativistic theory. His new hypothesis was immediately and wholeheartedly adopted by a huge following.

More recent experimental evidence also unexplainable by the equations of GR and SR pertain to the so-called "anomalous" acceleration of spacecrafts Pioneer 10 and 11 on their inertial hyperbolic trajectories leading out of the Solar System, both theories purportedly covering all possible cases of inertial motion in the Universe ([4], Section XII).

A seldom mentioned fact about Einstein is that after decades of constant research, he seriously doubted his own brainchildren GR and SR theories. At the beginning of the 1950's, close to the end of his life in 1955, he was proposing the hypothesis that there could be a connection between electromagnetism and gravitation, but his new conclusion was rejected outright by the scientific community of the time, without a second look!

This was not the first time indeed that he had expressed doubts about various aspects of his General Relativity theory, but as often occurs with popular ideas, they sometimes take on a life of their own and completely escape the control of their author. Very soon after his theories were aired in the 1910's, his opinion no longer carried much weight regarding the interpretation that the physics community at large made of his theories. As recently as 1995, we can find the following comment from John Wheeler in a book on gravitation that he co-authored with Ignazio Ciufolini:

"A distinguished physicist even published in his very last years works, the main point of which is to claim that gravitation follows the pattern of electromagnetism. This thesis, we cannot accept, and the community of physics, quite rightly, does not accept." ([5], page 391)

John Wheeler, 1995

In fact, these various flavors of black hole and big bang theories seem to remain popular only on account of their own inertia in the astrophysics community in the absence of any other popular self-consistent alternatives, just like Quantum Chromodynamics keeps on being taught as being the final theory despite its proven inability to properly describe nucleons in particle physics [6].

But since it is reasonable to think that only one objective physical reality can exist, it also appears reasonable to think only one of the proposed explanations stands even one chance of being valid, or at least that if they even were aiming in the right direction, that they all should "converge" over time towards a common description, as Korzybski so pointedly highlights, which is definitely not the case for these black holes and big bang theories.

On the other hand, they could all be invalid if the real explanation has not yet really been identified, an idea that now seems to be considered by a growing number in the physics community.

This leaves the door wide open to the possibility that entirely new perspectives on the whole issue become more likely to be considered, taking into consideration all that was experimentally discovered since these accepted theories were conceived of, most of them in the first half of the past century.

And why not this one, that aims directly in the direction that Einstein was looking towards at the end of his life, after a lifetime of research, that is, that of electromagnetism?

3. The First Electrons and Positrons

For example, a discovery made in 1997 at the SLAC facility by Kirk McDonald and his team opens a new and fascinating possibility in this regard as they confirmed that by converging two sufficiently concentrated photons beams toward a single point in space, one beam being made up of photons exceeding the 1.022 MeV threshold, electron/positron pairs were created without any atomic nuclei being close by, which means that massive particles can be naturally created in a process involving only massless pure energy [7].

The mechanics of conversion of a photon of energy 1.022 MeV or more during such a process in the context of the electromagnetism based 3-spaces model is analyzed in a separate paper [8], a model in which particle physics and astrophysics become a single discipline.

Actually, this discovery by Kirk McDonald et Al. in 1997, combined with Louis de Broglie's theory regarding the possible internal dynamic energy structure of localized free moving electromagnetic photons [9, 10] was directly instrumental in 1999 in the elaboration of the 9-dimensions expanded Maxwellian space geometry, AKA the 3-spaces model [2, 11], that underlies the analysis that will be carried out in the present paper.

The McDonald team's discovery actually means that to trigger the appearance of mass at the beginning of the Universe, the only requirement may have been the prior existence of only 2 sufficiently energetic electromagnetic

photons which, their trajectories eventually intersecting in an optimal manner, could have produced the first 2 pairs of massive electron/positron, that is, the first massive particles being produced from massless light.

The mere existence of two such photons, which implicitly involves the existence of an attractive force between the two electromagnetically oscillating energy halves of these photons (from de Broglie's theory [10, 11]), would have made it just a matter of time for their two primordial trajectories to eventually intersect optimally, and this, irrespective of the time that this would have required, possibly even countless billions of years, when nothing else but these two photons existed.

4. The First Protons and Neutrons and the Principle of Conservation of Energy

The first two positrons thus produced could then have produced by adiabatic acceleration the first proton by interacting in the proper manner with one of the electrons when the right conditions were eventually met, as the possibility arises as a natural outcome of the 3-spaces model [12], here again irrespective of the time that it would have taken.

Such an irreversible adiabatic process, however, involves understanding how the irreversible initial adiabatic acceleration of newly created massive particles relates to the Principle of conservation of energy, the Principle of least action and entropy. This is the object of a separate paper that puts in perspective all aspects of this important issue [13].

The 3 highly energetic bremsstrahlung photons resulting from the creation of this proton, now forming a hydrogen atom with the left over first generation electron, would then have eventually triggered the appearance of minimally 3 new highly energetic electron/positron pairs on top of releasing a huge amount of energy that eventually generated more particles, as analyzed in reference [12].

These new electrons and positrons could then have continued to combine very naturally over time, creating more and more hydrogen atoms, at a very slow rate at first due to the small number of particles involved, but in a completely unstoppable exponential process; an irrepressible and possibly still ongoing chain reaction that could have created the innumerable nucleons and other pairs of particles that now make up all existing matter in the Universe.

5. Ongoing Generation of Electrons, Positrons, Protons and Neutrons

We could also extrapolate from this possibility that from the moment when stellar masses began to form when a sufficient number of hydrogen atoms had been created for them to accumulate into separate stellar masses, countless billions of years after the first electron-positron pairs came

into being, the rate of this constant process of hydrogen creation could only have accelerated in stars coronas [14] and within the central areas of stars [4], a constant creation due to that irrepressible and still ongoing chain reaction triggered at the beginning of the universe and that could well be a major cause of the considerable extent of the active period of hydrogen fusion in the first phase of stars' existence.

Presently, since the bremsstrahlung photons generated as each triad is created through adiabatic acceleration are orders of magnitude more energetic than the fusion binding energy photons that are liberated during nucleosynthesis of heavier elements from hydrogen and helium nuclei combinations, it is entirely possible that most of the energy radiated from stars could be due to that bremsstrahlung energy, at least for those photons that would reach the stars outer edge before converting to more electron-positron pairs, and not mainly to that of hydrogen fusion as is currently assumed, the latter possibly turning out being only a marginal source of the radiated energy at best.

6. The Origin of the First Two Primordial Photons

The only remaining enigma would then be the actual origin of these 2 hypothetical primordial photons. How could these first 2 photons appear before the appearance of atoms, which support the only known process of electromagnetic photons production by forced slowing down (bremsstrahlung¹) of particles after an acceleration phase, which thus liberates the energy then in excess, universally defined as bremsstrahlung photons?

Something is obviously missing even with this more elaborate space geometry to give an answer to such a question; possibly a few more dimensions yet, who knows!

But the answer may well lie in a direction that could have escaped general attention up to now, that is, the possibility that photons could possibly also be produced by some means other than the only one known up to now, which is that of emission through a process of de-excitation of electrons, up and down quarks and larger masses after accelerating towards more stable configurations.

7. The 3-Spaces 9 Inner Spatial Dimensions

However, before this time related issue can be discussed, it is useful to summarily reproduce here for convenience the complete set of dimensions that make up the underlying expanded 3-spaces geometry, which allows defining the permanently localized photon of Louis de Broglie's hypothesis in a manner that was deemed conform to

¹ Bremsstrahlung: German word that translates literally to "braking radiation". A word adopted in the English language to name the energy released when an elementary particle is suddenly stopped in its motion as it is captured in various states of electromagnetic equilibrium by an atom or other particles.

Maxwell's equations by the peer-reviewers and editors of the Journal of Physical Mathematics. The paper describing this expanded space geometry and the permanently localized electromagnetic photon was formally published in issue No. 7 of the journal [10]. This paper thoroughly exposes the considerations that led to the development of the 3-spaces model, which involves three orthogonal spaces joining at the center of each electromagnetic particle.

For coherence, we will identify normal, electrostatic and magnetostatic spaces as being X-space, Y-space and Z-space respectively.

Within normal space, let us rename the three minor spatial dimensions: X-x, X-y and X-z and likewise, for electrostatic and magnetostatic spaces: Y-x, Y-y, Y-z and Z-x, Z-y, Z-z.

Let us assume furthermore, that the minor x-axes of all 3 spaces are mutually parallel in a direction corresponding to the conventional direction of motion of energy in normal space in plane wave treatment. Of course, when the x, y and z dimensions are used without major axis prefix, they refer by default to the usual normal 3-D space.

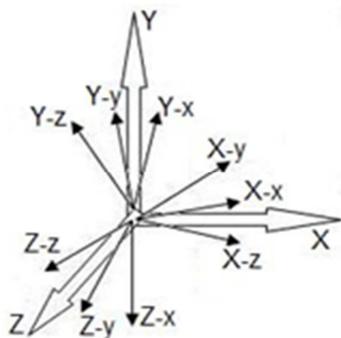


Figure 1. Orthogonal structure of the 3-spaces geometry.

In this space geometry, a point-like junction between these three orthogonal spaces would be located at the geometric center of each photon, and it is this point-like junction that would be moving point-like at the speed of light in normal X-space, that is, along the X-x axis of this expanded geometry in plane wave treatment.

Referring to the accompanying dimensions drawing (Figure 1), we will now proceed to a very special mental exercise to succeed in relating normal 3-D space as being the major X-axis of this superset coordinates system.

We must now imagine the 3 familiar x-y-z orthogonal dimensions describing normal 3-D space as if they were the ribs of an open 3-ribs metaphorical umbrella, the apex of which would be located at the origin. If we mentally fold the umbrella, we can now visualize the folded umbrella as if it was this linear major X-axis of this expanded coordinates superset.

With this representation of both Y and Z spaces intersecting only along the major X-axis, we can visualize these two spaces (representing the electric and magnetic aspect of energy) moving at the speed of light along the X-axis, and we have a representation of a plane-wave electromagnetic event now tentatively point-like as observed

from normal space (along major the X-axis) moving at the speed of light along this major X-axis representing normal 3-D space, in conformity with Maxwell's theory.

In this space geometry, electrostatic properties such as the Coulombian inverse square interaction with distance belongs to electrostatic space (Y-space), while the magnetostatic inverse cube interaction, as analyzed in reference [11], belongs to magnetostatic space (Z-space).

Kinetic energy will appear massive to an observer located in normal space (X-space) when it is in motion in either of the other two spaces, but would locally be perceived as non-massive if it is located in the same space. For example, as perceived from normal space, magnetostatic space and electrostatic space would be the realm of massive states, while normal space would be, as far as we observers located in this space are concerned, the realm of free fall acceleration induced unidirectional quantities of kinetic energy between bodies.

With the umbrella metaphor, it is easy now to visualize the three orthogonal spaces as three umbrellas meeting at their tips. We only need to mentally open any one of them to examine what is occurring in it at any given moment of a photon electromagnetic energy cycle.

To understand how an occurrence of this 3-spatial structure can be located at the center of each existing stable electromagnetic elementary particle (photon, electron and positron), it is highly recommended to read references [10, 11], where it is clearly explained why any liberation of electromagnetic energy (photons) always involves the translation of half this energy to a plane (Y-space and Z-space) orthogonal to the direction taken by the unidirectional half that remains in normal space (X-space), propelling the other half at the speed of light, the best experimental example of which being the production of x-ray photons in Crookes or Coolidge tubes.

8. The "Time" Dimension

Now, there exists a dimension that we have not yet discussed, which is precisely perceived as being orthogonal to normal space in Minkowski's familiar 4-dimensional space-time geometry. We are talking of course about the flow of time, which cannot be dissociated from motion in space since any motion involves duration.

8.1. Objective Time Flow

The objective duration² of any motion sequence is accounted for in the 9 dimensional tri-spatial complex of the 3-spaces geometry in exactly the same manner as in Minkowski's model. So it can be appreciated that this "time" dimension can only be orthogonal to all three spaces of the new model.

So, let us examine more closely now this so abstract dimension that we name "time". We will have to make

² Not to be confused with the subjective perception of time flow from "past" to "future" that we will also analyze further on.

abstraction here however of the hypothetical model of time reversal of Stückelberg and Feynman, to consider only the unidirectional flow of time that we can directly observe.

8.2. The Objective “Present Moment”

Let us consider how difficult it is to imagine that all photons and all particles in the universe would not all be existing at the same moment, that is, at the "present moment", and that they would not all advance at the same rate or “speed”, so to speak, from past to future.

Such a simultaneous existence and progression of all existing particles towards the future could maybe explain why we seem to be able to become aware of no other moment but the precise moment which is in the process of passing, given that our bodies as well as our brains, which support our awareness, are made of the same particles. It definitely feels as if it was the only really existing moment!

By concentrating our attention on this question, each of us can observe that this "present moment" seems omnipresent. We seem to be swimming in it, so to speak. Whether we want it or not, we seem to be inexorably living in this “present moment” and to constantly be following it, even when we are not paying any attention to it³, or should we more precisely rather say, that we are plain and simple inexorably taken along for the ride, whether we want it or not.

Considering that its existence and its flow are not under our control, it can be concluded that this present moment has an objective existence.

8.3. The “NOW” Moment

Interestingly, the existence of this all pervading “present moment” was perceived and described before. Einstein for one, was aware of its existence as can be seen in this quote from a text titled "The Problem of Space, Ether and the Field in Physics" that appears as Chapter V in some versions of his book titled "How I see the World" [15]:

"Hitherto it had been silently assumed that the four-dimensional continuum of events could be split up into time and space in an objective manner – i.e. that an absolute significant attached to the “now” in the world of events."

Albert Einstein, 1934

I was informed of this awareness of Einstein of the "present moment" during a quite enlightening conversation I had with Amrit Sorli, who, with his colleagues, a group of European scientists, had also become aware of the deep significance of the concept and had independently drawn the very same conclusions presented here about the "time dimension", conclusions that can be found in reference [16].

Difficult not to see here a clear case of the "convergence"

that Korzybski deemed necessary for the evolution of fundamental theories.

8.4. The Objective Motion of the Present Moment

So we could describe this “present moment” as the moment when the present state of the progressive change of state of things really occurs. Which is highly parallel to Amrit Sorli et al.'s conclusion that "*The Universe exists in what Albert Einstein used to call NOW*" and that "*The universe does not run in time, on the contrary: time is a numerical order of material change.*" [16]. In other words, every change in the universe is happening simultaneously at the same moment, that is, at the "present moment", or the "NOW" moment.

Our senses can transmit to our awareness only the signals that reach them during this unique moment of real existence that could metaphorically be compared to a razor's edge that cuts every hair of a beard as they come in contact with the advancing edge of the blade, where the edge of the blade represents the "present moment" and each individual hair represents a "potential event" that becomes real only during the fleeting moment when the cutting edge of the blade touches it.

8.5. Objective Data Perception Only as the “Present Moment” Progresses

As an example, let's observe that the words that you are reading at this very moment impregnate your brain one by one as you read them and the complete sentence is already stored in your memory as "a past memory" when you reach the last word. When you meditate and ponder on the meaning of the sentence, after having read it, or even as you are reading it or re-reading it again, you always are thinking about the stored memories of a past event.

Regarding what objective reality might be, the question then arises as to what we really observe, or should we say, what our awareness observes. Physiologically, what our awareness (whatever that is) is observing, can only be the stored memories of the patterns that our neocortex abstracted from the data that is continuously being gathered as the present moment moves on.

This means that we are physiologically unable to directly observe objective physical reality, but rather have to be content with observing and analyzing memories of signals that we are continuously collecting as the "present moment" moves on in this objective physical reality that exists outside of us and that we are part of.

So what we know (or think we know) about objective reality can only be a set of conclusions that we have individually drawn (and verbally shared with each other) from the signals arriving at the entry layer of our neocortex, signals resulting from the interaction of photons hitting our retinas after having been released by de-exciting electrons in materials close or far (scattering), from sound waves pervading the surrounding atmosphere (scattering), from the chemical signals for smell and taste (electromagnetic

³ Even when we are sleeping, the wind goes on blowing, the Earth goes on rotating and so on, and when we wake up we observe that a measurable amount of objective time has elapsed without our having been momentarily aware of its passing.

interaction) and pressure on our nerve endings for material that we touch (scattering and electrostatic interaction).

These conclusions are the only macroscopic data at our disposal to extrapolate and try to understand what lies "out there" outside of us, in objective physical reality ([17], Chapter "Reasoning method"), and these conclusions constitute the total sum of what our collective knowledge and sciences amounts to⁴. We can know nothing beyond these conclusions.

While our nerve endings interact with our environment and pick up innumerable signals at the infinitesimal particle level, the patterns abstracted from these collections of signals by the neocortex provide us with the macroscopically significant information that is contained in these collections of microscopic signals.

9. Progression of the "Present Moment" from Past to Future

9.1. Subjective Time

Besides, there is what could be termed "subjective time", with its past, present and future aspects, and which is a reflection of our interpretation of the collection of our memories. The impression of "duration" that we experience is due uniquely to the fact that we remember the sequence of occurrence of the general coherences that we perceive at the macroscopic level in the flow of data continuously being stored in our memory as collected by our senses as the "present moment" progresses.

From the coherences that we perceive in the sequences of events that we recall (the subjective past), we extrapolate possible outcomes (potential futures), and if we have the possibility, we may decide to take some action (the present) to influence the course of these expected potential futures to our advantage.

Why term it "subjective past"? Simply because we may not have perceived enough data to abstract the proper conclusion about any given event, or despite having perceived sufficient data we may still have drawn a biased conclusion due to a warping momentary emotional condition or to some ill established certainty that we accepted from others (possibly ill established without our having become aware of the fact) that we may have accepted as correct without thoroughly rechecking, or grounded by others on faulty premises that we do not double check, and so on.

Here again, the same conclusion can be found in Amrit Sorli et al.'s work: "*Past, present and future belong to the*

⁴ This sum of conclusions was of course rather limited at the beginning of humanity and has increased as time passed up to the larger set that we are currently using. Some of these conclusions have been proven out of any doubt and are recognized by all while others are still uncertain or even possibly objectively outright false without our having been able to determine yet. Each of us ends up making his own subjective opinion about each of these conclusions.

It is up to us however to continue accumulating data to confirm those that are possibly right but still uncertain of and reject those that eventually prove to be false.

psychological time..." [16].

9.2. Objective Time

But how can we reconcile this progression from past to future of this "present moment", that we may see as the flow of time, with the time dimension of fundamental physics? We do have a problem here, since the "second", which is the unit used to measure time, is in fact a measure of "duration" of processes, not a measure of "velocity" of time flow.

Although this may seem confusing, to really describe the flow of time with the current definition of the "second", we would have to say that time flows at the rate of 1 second per second (1 s/s), which looks more like a velocity, and where s is the standard second as measured at sea level on the Earth.

To summarize, "*time is only a mathematical parameter of change*" as concluded in Amrit Sorli et al.'s paper [16].

9.3. Locally Variable Progression of the "Present Moment" in SR and GR

Special Relativity somewhat muddled the issue however by defining the time flow rate as being variable and dependent on motion in a very special manner, with General Relativity making it also dependant on gravity. In SR, moving particles or bodies have a local flow of time moving at the rate $(s + ds)/s$, while in GR, clocks marking time in diminished gravity (in altitude) according to another variation, that is $(s - ds)/s$ ([4], Section XII).

The first case has always been impossible to prove, since we do not have the technology to cause measuring instruments to reach the minimum relativistic velocities that would allow verification, while the second case seems to come from an apparently biased interpretation of the increase in frequency of the photons required to keep atomic clocks working as they gain altitude ([18], p. 8). An explanation coherent with the 3-spaces model is given in ([4], Section XII).

9.4. Alternate Explanation to the "Proof" of Time Dilation

The same reference [4] extensively expounds on how the only way for orbiting electrons to have their energy increased, involves diminishing the distance between them and the nucleus, which increases the frequency of the energy required to cause them to reach this closer distance from an orbital located further away from the nucleus.

This means that the only way possible for cesium atoms in atomic clocks to require more energy than at sea level to keep them hitting the control target in altitude is a contraction of the cesium electronic and nuclear structure, a contraction that fundamentally has nothing to do with time but all to do with electrostatic interaction, combined with a relativistic effect inside nucleons which is not taken account of in both SR and GR [4, 12].

9.5. Universally Constant Progression of the "Present Moment"

Whereas a specific cesium frequency f at sea level is used

to define the standard second s , it was considered that in altitude $f' = f$ and $s' = s - ds$ and consider this the experimental proof of time dilation, thus apparently confirming SR and GR, while close analysis of electrostatic equilibrium states in the 3-spaces model reveals rather that in reality $f' = f + df$ and $s' = s$.

Having become aware of this very simple alternate explanation, which, if confirmed, would invalidate the only direct experimental recognized so-called "proof" of "time dilation", doesn't it become obvious that SR and GR have to be reconsidered since they cannot be reconciled with a universal "present moment" occurring at the same time everywhere in the universe, and that this invariant and simultaneous progression of the present moment for all existing particles has to be more fundamental than all other laws of nature and so, could not depend on any less fundamental law.

9.6. Progression of the "Present Moment" Sustained by Unidirectional Energy

So we can suspect here the presence of a stable quantity of unidirectional energy (kinetic energy?...), whose direction is by definition orthogonal to normal space, and this, in Minkowski's orthodox geometry as well as in the tri-spatial geometry of the present model.

9.7. The Existence of the "Present Moment" More Fundamental than That of the Universe

Also, given that the progression of the "present moment" is universally impossible to separate from the motion of all existing particles, it is not at all impossible that the "time" dimension could belong to a plane of existence more fundamental than "space" as we conceive it, since a characteristic that is common to all elements belonging to a set necessarily belongs to the reference frame of that set and can in no way be itself an element of that set.

This means that it is not at all excluded that the flow of time, that is, this inexorable and constant motion of the "present moment" from what we perceive as being the past towards what we perceive as being the future, could have already existed even before the birth of the universe, which is made up, as we have no choice but to observe, of only the complete set of constantly interacting electromagnetic particles that we can observe, which in turn are only made up of quantities of kinetic energy quantized on various orthogonal planes.

9.8. A Momentary Slowing Down of the Progression of the "Present Moment" Could have Produced the First Photons

If we visit in thought this mysterious era that preceded the birth of the universe, that is the creation of the first photons, when theoretically maybe only the progression of the "present moment" actually existed, while keeping in mind that the rate of such a progression could hardly be maintained without the support of a constant quantity of unidirectional

kinetic energy as we just hypothesized, we can wonder what would have happened if "something" had, be it only momentarily, stopped or simply slowed down the rate of that flow!

To get a glimpse of what is at play here, let us think about what happens in a Coolidge tube when an electron, at the end of the stunning acceleration sequence that it is subjected to as it crosses the vacuum separating the cathode from the anode, brutally slows down as it is captured by one of the positive ions of the anode.

The total amount of kinetic energy that accumulated during acceleration is then released as an x-ray photon whose energy exactly matches the energy that built up in excess of that required for the electron to stabilize on the rest orbital that it will momentarily occupy in the target atom.

In fact, this type of radiation, named "Bremmsstrahlung" for a good reason, since it is due to the brutal slowing down of the electron, and is the quantity of kinetic energy newly accumulated via acceleration, has no other option but to continue on moving as a separate photon that will escape at the speed of light, when the electron that it carries is suddenly prevented from continuing on its natural direction of motion.

Let's now come back to the far past, before the birth of the universe, at this hypothetical moment when "something" could have momentarily blocked or slowed down the inexorable rate of motion of the "present moment" towards what we perceive as the future.

If that motion is really caused and maintained by a quantity of unidirectional kinetic energy as we hypothesize here, there is no doubt that the "temporal" unidirectional kinetic energy that will momentarily find itself in excess, will be in the exact same situation as the kinetic energy in excess of an electron coming to a momentary stop on the anode of a Coolidge tube, with no other way out but to escape this untenable situation by means of the same orthogonal translation mechanism that causes excess translational kinetic energy to escape as electromagnetic x-ray photons in Coolidge tubes!

Now, what is orthogonal to the direction of temporal flow, but normal space, in Minkowski's geometry, or alternately, the three spaces of the trispatial geometry in the present model!

We can then assume that this quantity of kinetic energy that normally maintains temporal flow and that momentarily finds itself in excess would have no other possibility but to enter normal space through orthogonal translation with respect to the direction of the temporal flow that it is momentarily prevented from following.

9.9. Let There be Light

But let us consider that it is impossible for us to know the quantity of energy at play in the constant progression of the "present moment". Consequently, the quantity of kinetic energy that would have been released in space by momentarily forcing this progression to slow down is impossible to estimate, going from an obvious minimum of

two 1.022 MeV photons, which is the minimum required for the universe to start growing, up to an all pervading blinding flash involving unfathomable quantities of photons that would suddenly have come into being all over space.

Isn't it difficult not to think here of that little sentence that came to us from the dawn of times: "Let there be light!"⁵

It is entirely conceivable also that at least a few if not all of these primordial photons could have exceeded the minimum 1.022 MeV decoupling threshold required for pair decoupling to become possible, which is the minimal condition required to allow the universe to be born in this fashion and for particles and atoms to subsequently form in the manner described in the other papers describing the 3-spaces model.

So, even if in theory only two primordial photons of energy exceeding 1.022 MeV would have been sufficient to trigger the "birth" of the universe, if the hypothesis formulated here turns out to be valid, it may not have been a mere two photons that Nature would have had at its disposal to start the ball rolling, but an incalculable number of high energy photons, isotropically dispersed to infinity across the whole spread, possibly infinite, of vacuum.

10. The Progression Speed of the "Present Moment"

One can also wonder about the "speed" with which the "present moment" is moving along from past to future. In fact, it seems not at all impossible that it would simply be the speed of light, because it is the only known speed relative to quantized motion of energy in vacuum whose stability and immutability are similar to the apparent inexorable immutability of the temporal flow, and also since all energy and matter present in the universe are by definition in an orthogonal position with respect to the direction of temporal flow, the whole set is necessarily quantized with respect to the direction of that flow.

One must of course ask the fundamental question: "What is the primordial cause of the temporal motion?" As for that "something" that could have momentarily slowed down or stopped that flow to allow the possible creation of innumerable primordial photons, the following questions must of course be asked: "What could have forced such a slowing down?", a question that there seems to be no answer for!

On the other hand, nothing allows asserting that such slowing down could have occurred only once in the past, with all of the consequences that one could extrapolate from possible recursivity, including the possibility that the phenomenon could be cyclic over a period of time impossible to measure at our scale, and that it could consequently be a totally natural process.

Considering how, in the present model, a photon systematically falls into electromagnetic equilibrium by using half its quantity of kinetic energy to maintain its speed of

light in normal space, while the other half pulsates in a stationary manner between electrostatic space and magnetostatic space; and how an electron systematically falls into electromagnetic equilibrium by using half its quantity of kinetic energy to maintain its speed of light in electrostatic space, while the other half pulses in a stationary manner between magnetostatic space and normal space; it doesn't seem illogical to think that all of the energy in the universe could fall into electromagnetic equilibrium by using half its quantity of kinetic energy to maintain its speed of light along its temporal trajectory, while the other half would pulse in a stationary manner between a state of spherical expansion and regression similar to the magnetostatic phase of photons and electrons, and a state of expansion and regression as two mega-particles, similar to the electrostatic phase of the de Broglie electromagnetic photon.

11. Conclusion

Of course, conjecturing that time flow could be kinetic energy driven is only speculation and may be impossible to verify, but manufacturing mass from pure energy has definitely been experimentally proven to be real. So, not understanding what could have produced the first two minimally required primordial photons, does not *per se* invalidate the possibility that mass could have first appeared in the universe by the process that we have just analyzed.

Strangely, the 3-spaces model that predicts such a beginning for the Universe is rather easy and relatively inexpensive to prove or disprove, technically speaking, and as soon as the required very simple experiments have been carried out [4, 13], this avenue can be either totally confirmed, or else discarded without a second thought if proven false.

If confirmed, however, the benefits would be mind boggling to say the least, since they would, among other benefits, allow easy exploration of the Solar system, and travel to near stars in a time frame compatible with a human life span ([4], Section XI). The main benefit, however, would be control of an unlimited source of energy, as summarily described in [4, 13].

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⁵ Genesis (1, 3), of course.

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