Universe: the dynamics resulting from its maximum states of contraction and expansion

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Universe: the dynamics resulting from its maximum states of contraction and expansion

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Abstract

The evolution of the Universe is observable or characterizable by quantum mechanics and field equations from the Planck scales or when the expansive motion already exists; thus, the definition of universal states (before the beginning and after the end of the expansion) with zero kinetic energy can be a challenge to be solved only by parallel analysis. Considering that a complete description of the Universe can provide important insights, the logic of conceptual connections is used as an alternative to the formal use of the Friedmann equations; in this sense, an exclusive presence of linear Space (1D) in momentary states of maximum contraction and expansion is analyzed, with our Universe (3D Space) considered as created and existing between these extremes. The concept of absolute rest mass energy became specifically applicable, revealing that the complete evolution of the Universe is spatially dynamic in a permanent time dimension, allowing for the relative maintenance of any existence.

Keywords: Universe, Dimension, Entropy, Energy, Conceptual Physics, Existence

I. Introduction

The state of the Universe depends on energy. When the states are of extreme contraction or expansion, no environment conducive to life is configured, therefore the study of universal evolution is important to the definition of our own existence.

Globally, technology has progressed more than social advancement. The world population has reached approximately 7.9 billion people [1], with 1.3 billion living in extreme poverty [2].

Inequalities are admissible, when on merit; however, in an excessively unfavorable conditions, efforts and ability generate few results for the majority, promoting a concentrated and disorderly development, with destruction of much of the limited natural resources [3].

When there is no evidence of an existential continuity, individuality tends to prevail for many, and the realization that everyone is a fraction of a changing environment (not always directly manipulated) is left aside.

Initially, for the configuration of any evidence, the Universe is considered the holder of all that exists [4], and through the restricted analysis of its extreme states, which characterize the beginning and the end of its expansion, it has a permanent presence established and related to that of any other existence.

Given that the Universe is currently in a state of observable accelerated expansion, the states of more intense past contraction and more intense future dissipation are well accepted.

Some fundamental concepts are emphasized for a definition of Space that establishes the distinction between the Universe and its exterior.

The past existence of 2D and 1D Space is considered possible based on the study of vanishing dimensions [5] and becomes a viable alternative in the face of the fact that calculations and data suggesting that the Universe is flat ($\Omega \cong 1$), and infinite, conflict with studies suggesting other attributes [6,7].

It is also recognized that if the origin of the Universe is considered to begin with an expansion of 3D Space and to end with a maximum dissipation in the same type of Space, the description of its complete evolution becomes infeasible.

In this new approach, the maximum contraction state of the Universe is defined by the characterization of its maximum expansion state.

A sketch of the possible basic steps in the formation of the maximum contraction and expansion states related to the Standard Cosmological Model is presented.

Although less detailed, this study is broader, develops its own equation for the extreme spatial states of universal evolution, and provides a reason for the expansive beginnings of the Universe.

II. The extreme states of universal evolution

According to the standard cosmological model, the Universe is in a state of accelerated expansion; to characterize the possible states of past maximum contraction and future maximum expansion, the following points should be emphasized:

- The Universe is considered to have everything that exists (mass and energy, Space and Time) [4] at every instant.
- Existence is any presence (characterizable) of mass and energy and the consequences of their constant changes in Space, which represents "Time".

- Space is the region that holds or is between existences; thus, Space (occupied or not) exists only when it belongs to the Universe, with the presence of masses and energy. Outside the Universe (at every instant) is considered non-existence, that is, Space is non-existent.

  The type of Space (3D, 2D or 1D) is related to the dimension of the masses (energy) that it contains or separates.

- Energies represent states, the Universe, or its existential components [8].

- The Universe is considered finite (Hawking, S.W.) [6] or has a limited amount of mass and energy (set), with its maximum contraction limited to the maximum lack of unoccupied space [there is no way to occupy more space (for contraction) if all possible spaces are already occupied].

- At a state of maximum contraction or concentration of energy, a linearized Universe (1D Space) is defined with a past of vanishing dimensions [5].

  Data re-analysis (2005) showed that the particle jets produced by energetic cosmic rays were aligned closer to a plane than would be expected, which could imply a reduction in dimensions. Vanishing dimensions indicate that the three dimensions of Space can be reduced to two or even one dimension [5].

  The lower dimensions have no 3D degrees of freedom, so are not susceptible to the propagation of three-dimensional gravitational waves. This fact represents a universal maximum frequency at which primordial waves (spatial 3D) can propagate, which marks the transition between dimensions [5].

- Alternatively, with the continuation of the current expansion, possible future thermal death, subsequent complete dissipation of the 3D and 2D particles, and the emergence of the minimum possible amount of 1D particles, a linear (1D) Space can also be generated.

- At maximum contraction (1D Space), the universal spin is zero, just as the primordial Universe (3D Space) does not spin. Thus, spins can also arise from the formation of 3D cosmic structures [derived from others that originated in the fundamental state (1D Space)].

  The present Universe is considered flat ($\Omega \cong 1$) because of the angular momentum that can be generated at unexpectedly large scales [9].

- Entropy depends on the spatial distribution of the constituents, or the degree of freedom and disorder present [10]; thus, the type of spatial dimension that can exist (3D, 2D or 1D), which depends on the stage of expansion of the Universe, influences entropy.

  During the complete evolution of the Universe, the increase of entropy is not always present; with 3D Space being extinguished for the formation of 2D Space and subsequent 1D Space, entropy necessarily decreases with dissipation and decreasing existing mass.

  Thus, with a limited degree of freedom and the maximum degree of organization both achieved in the 1D Space present in the universal maximum expansion, entropy can become minimum.

  With extreme universal states (1D Space) of minimum entropy, that is, with an entropic variation between the initial and final states equal to zero, the evolutionary process can become reversible, only through the internal exchange of energy as mass is formed or dissipated, given that the Universe is the unique holder of all existence [4].

Before the expansive beginning, the entire Universe had to be at rest (with total absence of motion or zero kinetic energy); there is no characterization of expansive beginning if there is already motion in a universal state of minimum Space and maximum density.

The entire Universe will be at rest when it reaches its maximum expansion or for a reversal of motion (flow); there is no characterization of an expansive end if there is still motion.

With the current expansion of the Universe, the state of maximum mass dissipation [consisting of only two minimum (1D) massive particles separated by a maximum 1D Space] is expected for the future.

The state of the Universe is defined by its internal energies and, in parallel (considering the relationship between mass and energy), by the amount of mass that exists or the energy that represents it.

Given that the extreme states of universal rest can only have 1D mass due to the presence of 1D Space, there are no 3D components in them (that is, atoms, molecules, rotation, translation, vibration, or chemical, thermal, quantum, electric, and electromagnetic energies cannot exist). Thus, the internal energies that can exist initially are those related to the existence of 1D mass i.e., Epg and kinetic energy.

When the state of maximum expansion is reached, the future gravitational potential energy (Epg) will have its maximum value equal to zero, because it is considered as binding energy.

The state of maximum expansion, with a linear Space, no more curvable, has Epg equal to zero before the masses completely dissipate (with 1D masses still existing).

With Epg equal to zero, the expansion ends with the kinetic energy (Ek) also equal to zero [the energy of the state of maximum expansion is zero (EME = − Epg + Ek = 0)]; Ek = 0 characterizes the state of reaching the maximum expansion of the Universe.

Thus, the extreme state of maximum expansion is defined by the following points:

- The 1D Space has a minimum occupancy.
- The space (between the two minimum 1D mass particles) is maximum.
- Epg is zero, Ek is zero; Spin is zero.

Considering the mass and energy configuration of the extreme linear states of Space, and the mass dissipation during the expansion of the Universe, it is possible to determine the constitution of the maximum contraction state from the maximum expansion state.

The maximum contraction state is the opposite of the maximum expansion state, that is, instead of two 1D minimum mass particles maximally separated in a 1D Space, there are two 1D minimum unoccupied spaces between three mass parts.

Thus, the universal structure (in its maximum contraction) consists of a maximum 1D mass, a minimum 1D unoccupied space, a minimum 1D mass (particle), another minimum 1D unoccupied space, and another maximum 1D mass.

The extreme state of maximum contraction is defined by the following points:

- The maximum 1D Space has a maximum occupancy of 1D mass parts.
- Epg is zero, Ek is zero; Spin is zero.

The evolution of the Universe, that is, its change of state (more contracted or more expanded) must be analyzed by the variation of its internal energies, which in continuation, by generating a variation of mass, must have the energy corresponding to this variation, included in the study in parallel.

The universal extreme states are momentary because the rest (Ek = 0) and the existence of invariant 1D masses in linear Space [no more curvable (Epg = 0)] cause the rest energy ($E_0 \neq 0$ when representing these linear mass states, distinguishing them from the state of complete dissipation) to change its value to zero.

Given that the energy corresponding to E_0 cannot disappear, only transform, E_0 equal to zero indicates that the state is no more represented by stationary 1D masses, but by the motion of these masses; thus, for E_0 to vary to zero, the energies Ek and Epg must vary, causing the existing masses to begin to motion.

Thus, the universal evolution continues even after rest, with the energy of the subsequent state (state of motion) equal to the energy variation (E_0) of the rest state and equivalent to Epg and Ek of this beginning of evolution, which continues posteriorly with a mass variation for the remainder of the process.

III. The evolution of the internal energy variations of the Universe from the states of maximum contraction and expansion

For the momentary states of universal rest (maximum contraction and expansion) and the energetic evolution of the Universe, the following points are assumed:

- Energy in the state of Maximum Contraction: EMC = − Epg (=0) +Ek (=0) =0.
- E_0C = Resting energy of the maximum Contraction state = 0
- E_0EI = Resting energy of Expansion **I**nitial state ≠ 0
- VE_0E = Variation of rest energy to begin Expansion or the energy available to begin the expansion of the Universe ($VE_0E = E_0EI - E_0C$).
- EEI = Energy of Expansion Initial state or the energy of the state at the beginning of the expansion (the state after the resting state of maximum contraction). EEI = − Epg (≠ 0) + Ek (≠ 0) = 0
- VEDME = Energy associated with the mass reduction (through dissipation) in the expansion process.
- Energy in the state of Maximum Expansion: EME = − Epg (=0) + Ek (=0) = 0.

- E_0E = Resting energy of the maximum expansion state = 0

- E_0CI = Resting energy of Contraction **I**nitial state ≠ 0

- VE_0C = Variation of rest energy to begin Contraction or the energy available to begin the contraction of the Universe ($VE_0C = E_0CI - E_0E$).

- ECI = Energy of Contraction **I**nitial state or the energy of the state at the beginning of the contraction (the state after the resting state of maximum expansion). ECI = − Epg (≠ 0) + Ek (≠ 0) = 0.

- VEIMC = Energy associated with the formation or increase of mass in the contraction process.

- $M_0 - m_0$ = Minimum mass (1D particle; where $M_0 > m_0$, and $M_0 \cong m_0$).

- $M_0 + M_0 + (M_0 - m_0)$ = Universe total 1D mass in the maximum contraction state (If it were possible the non-existence of two 1D minimum unoccupied spaces).

- The masses ($M_0 + M_0 + (M_0 - m_0)$) subtracted from 2 ($M_0 - m_0$) that would correspond to the two (1D) masses that could occupy the two presents minimum (1D) unoccupied spaces =
  $[M_0 + M_0 + (M_0 - m_0)] - (M_0 - m_0) - (M_0 - m_0) = M_0 + M_0 - (M_0 - m_0) =$
  $M_0 + m_0$ = Universe total 1D mass in the maximum contraction state [with the necessary presence of the two minimum (1D) unoccupied spaces].

- There is no energy directly associated with the existence of the unoccupied spaces (1D) in these extreme states of the Universe. Such existence is related to a limit of gravitational potential energy (existence of a determined amount of mass) in states of maximum, but not complete, contraction or expansion.

The Process of Energetic Evolution of the Universe

The evolution of the Universe consists in the constant change of its state, enabled by the existing interchangeable relationship between mass and energy.

In expansion, the energy that decreases (corresponding to dissipation with a maximum decrease in the amount of mass) is equal to the energy that increases to form a state of maximum separation between the two 1D masses that will arise.

In contraction, the energy that increases (corresponding to maximum mass formation) is equal to the energy that decreases to reach a state of minimum separation between the masses forming a 1D space of maximum occupancy (different to a non-existent state of higher energy and greater separation of this maximum amount of mass).

Thus, with a Universe containing everything that exists, during its evolution there is no gain or loss to the set (mass and energy), and therefore, only with the existence of the interchange between these its internal components, its evolution process becomes permanent.

The steps of the process

1. Maximum contraction state:

The universal structure consists of a maximum 1D mass, a minimum 1D unoccupied space, a minimum 1D mass (particle), another minimum 1D unoccupied space, and another maximum 1D mass, all distributed over a maximum distance of one dimension (1D Space).

Momentary rest mass present (Ek=0) in the no more curvable linear Space (Epg=0).
Maximum existing mass: $[M_0 + M_0 + (M_0 - m_0)] - (M_0 - m_0) - (M_0 - m_0) =$
$M_0 + M_0 - (M_0 - m_0) = M_0 + m_0$
Energy (EMC) = − Epg (=0) + Ek (=0) = 0.
Resting energy of the maximum Contraction state (E_0C) = 0

2. The energy corresponding to E_0C (when representing the linear mass state and distinguishing it from a state of complete dissipation) cannot disappear, only transform; thus, for E_0C to vary to zero, the energies Ek and Epg must vary.

3. Energy of Expansion Initial (EEI) = − Epg (decreases) + Ek (increases) = 0

$$(EEI) = - Epg (\neq 0) + Ek (\neq 0) = 0$$

With resting energy of Expansion Initial state (E_0EI) = $(M_0 + m_0) \times c^2$
That is, the variation of rest energy to begin Expansion ($VE_0E = E_0EI - E_0C$) =
$VE_0E = (M_0 + m_0) \times c^2 - 0 = (M_0 + m_0) \times c^2$

Thus, the energy available to begin the expansion of the Universe:

$$VE_0E = (M_0 + m_0) \times c^2 \qquad (1)$$

The value of this energy must be very high (as high as possible) to be able to initiate the motion of the maximum possible amount of mass that can exist.

During the expansion, with the dissipation and after the beginning of the decrease of the mass and its corresponding energy, through the exchange between the existing internal energies, the Universe will reach the minimum possible amount of mass with its corresponding energetic value, sufficient to begin the motion of contraction of the minimum mass that will exist.

4. After this initial expansion, the Universe will continue to evolve until it reaches its maximum expanded state, which consists in the presence of two particles $[2(M_0 - m_0)]$ of minimum (1D) mass at the extremities of the maximum unoccupied (1D) Space.

Thus, from the state of maximum contraction to the state of maximum expansion, the Universe, through dissipation, will have a decrease in mass corresponding to the following energy (VEDME):

Energy associated with the mass reduction in the expansion process,
$(VEDME) = [(M_0 + m_0) - 2(M_0 - m_0)] \times c^2 =$
$[(m_0 + m_0) - (M_0 - m_0)] \times c^2$.

5. Maximum expansion state:

The universal structure consists of a minimum 1D mass (particle), a maximum 1D unoccupied space, and another minimum 1D mass (particle), distributed over a maximum distance of one dimension (1D Space).

Momentary rest mass present (Ek=0) in the no more curvable linear Space (Epg=0):
$[(M_0 - m_0) + (M_0 - m_0)] = 2\,(M_0 - m_0)$
Energy (EME) = − Epg (=0) + Ek (=0) = 0.
Resting energy of the maximum expansion state (E_0E) = 0

6. The energy corresponding to E_0E (when representing the linear mass state and distinguishing it from a state of complete dissipation) cannot disappear, only transform; thus, for E_0E to vary to zero, the energies Ek and Epg must vary.

7. Energy of contraction Initial (ECI) = − Epg (decreases) + Ek (increases) = 0

$$(ECI) = -\,Epg\ (\neq 0) + Ek\ (\neq 0) = 0$$

With resting energy of Contraction Initial state (E_0CI) = 2 ($M_0 - m_0$) x c^2
That is, the variation of rest energy to begin Contraction ($VE_0C = E_0CI - E_0E$)

$$VE_0C = 2\,(M_0 - m_0) \times c^2 - 0 = 2\,(M_0 - m_0) \times c^2$$

Thus, the energy available to begin the contraction of the Universe:

$$VE_0C = 2\,(M_0 - m_0) \times c^2 \qquad (2)$$

The value of this energy may be extremely low, but it is enough to initiate the motion of the minimum possible amount of mass that can exist.

During the contraction, with the beginning of the formation or increase of mass and its corresponding energy, through the exchange between the existing internal energies, the Universe will reach the maximum possible amount of mass with its corresponding energetic value, sufficient to begin the motion of expansion of the maximum amount of mass that will exist.

8. From the state of maximum expansion to the state of maximum contraction, the Universe will have an increase in mass due to formation, corresponding to the following energy (VEIMC):

Energy associated with the formation or increase of mass in the contraction process,
(VEIMC) = $[(M_0 + m_0) - 2(M_0 - m_0) \times c^2] =$
$[(m_0 + m_0) - (M_0 - m_0)] \times c^2$

Internal energetic exchanges during the process of universal evolution, according to the presented maximum states of contraction and expansion:

Expansion: VE_0E – VEDME (decrease in mass) = VE_0C

$[(M_0 + m_0) \times c^2] - [(m_0 + m_0) \times c^2 - (M_0 - m_0) \times c^2] = 2\,(M_0 - m_0) \times c^2$

$(M_0 + m_0) \times c^2 - (m_0 + m_0) \times c^2 + (M_0 - m_0) \times c^2 = 2\,(M_0 - m_0) \times c^2$

$[(m_0 + m_0) \times c^2 + (M_0 - m_0) \times c^2] - (m_0 + m_0) \times c^2 + (M_0 - m_0) \times c^2 = 2(M_0 - m_0) \times c^2$

$(m_0 + m_0) \times c^2 - (m_0 + m_0) \times c^2 + (M_0 - m_0) \times c^2 + (M_0 - m_0) \times c^2 = 2\,(M_0 - m_0) \times c^2$

$(M_0 - m_0) \times c^2 + (M_0 - m_0) \times c^2 = 2\,(M_0 - m_0) \times c^2$

$2\,(M_0 - m_0) \times c^2 = 2\,(M_0 - m_0) \times c^2$

Contraction: VE_0C + VEIMC (mass increase) = VE_0E

$[2\,(M_0 - m_0) \times c^2] + [(m_0 + m_0) \times c^2 - (M_0 - m_0) \times c^2] = (M_0 + m_0) \times c^2$

$(M_0 + M_0) \times c^2 - (M_0 - m_0) \times c^2 = (M_0 + m_0) \times c^2$

$(M_0 + m_0) \times c^2 = (M_0 + m_0) \times c^2$

Thus, given that there are no gains or losses, only exchanges between internal energies and variations in the set (mass and energy) during each phase of evolution (contraction or expansion), the transformation process of the Universe is permanent.

IV. The Complete Evolution with Fundamental energies

An evolution (sketch) is presented from the fundamental energies (Potential and kinetic).

The dark energy present is related to the increase in the spin effect due to the increase in the amount 3D mass, making the current expansion accelerated.
The Dark matter is represented by the existence of lower dimensional masses.

Figs. 1–2 illustrate that any contraction and expansion, although intense, cannot be total; revealing that the Universe is always transforming with the preservation of variation among the energy types (=existence).

The linearity is not visually perceptible, so the following sketch only represents, illustrating the energy evolution of the Universe to make more understandable the meaning of M_0, m_0, and $(M_0 - m_0)$.

Figure 1. Universe (1D maximum contraction, 2D, 3D, inflation, 2D, 1D maximum expansion)

Expansion: Space created by the interaction, groupings, or dissipation of pre-existing masses (1D, 2D, or 3D). Expanding 3D Space: (1D and 2D) masses to 3D masses [except in state of intense expansion, or in an already greatly expanded state (inflation or at the end of accelerated expansion)].

Maximum Contraction:

Part A (1D) **Part B (1D)**

The spaces (empties)

Epg =0 [maximum mass (1D) distributed in maximum Space: 1D].
Ek= 0; Spin = 0. Motion = 0.
Maximum concentration for minimum unoccupied (between masses) space.
Part A (mo), Part B (mo), particle (Mo – mo) and two spaces (1D) empties exist.
(Ek = 0); with E_0 = 0, Kinetic energy (Ek) increases and Epg begins to decrease.

The total amount of mass (1D + 2D + 3D) is conserved, until the possible amount of mass (1D, 2D) is converted to a maximum to 3D mass (end of accelerated expansion).

No spatial curvature: the expansive process starts.

1D Space expanding:

Part A Part B

The expansive beginning [9] (orbit) is oriented according to the fact that the disappearance of any curvature from the center is inferred to the extremities as the expansion progresses.

Concentration decreases (1D spatial dimension). Epg (2D Space) decrease with the formation of an edge = approximation of the parts [with 2D Space created=Ek (spin) increases (1D to 2D Space = expansion)].
The total amount of (maximum) mass is preserved; the 2D Space is larger than the 1D Space dimension. 2D Space

spin

From the 1D spatial dimension (with maximum 1D mass) to the 2D spatial dimension = Expansion.

Groupings in the edge (Presence of the central particle) begin to form particles with 2D masses.
With the total amount of mass being conserved, and the amount of 2D masses increasing to the maximum, the 2D mass concentration increases (in 2D Space), the spin increases = more intense centrifugation= expansion.

2D Space

Occupied by components (of 1D and 2D, masses), with 2D particles in the 2D space dimension, the groupings continue, and the first particle (3D mass) is formed.
= beginning of the expansion into 3D Space dimension. Our Emerging 3D Space Universe:
"Field" Fundamental point (3D)
Our 3D Space Universe began as a 3D particle (point), 1D and 2D masses (Field). Beginning Planck era (3D).

The 3D mass formation depends on the non-flattening of the space by centrifugation = mass (energy) concentration = mass 3D ($E_0 = m_0 \times c^2$) = "excitation" of the field from 2D to 3D by curvature in minimum central space.

With the first 3D Space curvature and more groupings, the amount of 1D and 2D masses (particles) decrease, while the amount of 3D masses increases (great unification); Epg decreases in 2D Space, and EK increases [(= High interaction, concentration, and temperature (3D Space)]. The total amount of mass is still preserved.
Due to a higher concentration of 3D mass in 3D Space, spin effect (centrifugation) is intensified = Inflation: 3D Space with high spin will generate a flat Universe. Flat

Given a sudden increase of 3D Space (inflation), the amount of mass (2D and 1D) increases, and the amount of mass (3D) decreases. Expansion slows down after inflation (1D and 2D masses are more abundant). Eras: electroweak, quarks, hadrons, quantum dominance: the formation of atoms happens intensely (the propagation of cosmic radiation has more freedom).
Due to the interaction (agglutination) of masses (1D and 2D) under specific conditions, fundamental particles (of 3D mass) are produced again. When the amount and concentration of masses (3D) in Space (3D) increase [Epg (potential) decreases, Ek increase], the spin effect is intensified and generates the present accelerated expansion. Even if the density (1D, 2D and 3D masses together) decreases with expansion, the amount or concentration of 3D (small masses) may increase, accelerating the expansion. The actual concentration and spin of the Universe depends on the presence of particles (1D, 2D), 3D masses (atoms, another masses), and 3D Space.

There are studies that propose a flat, or closed, Universe [7]. The extreme linear states of space are the ones that define the continuity of evolution.
Dark (matter and energy) are related to the existence or agglomerations of 1D and 2D mass particles [that by grouping together (appropriately), "excite" the field and form more massive particles of three-dimensional concentration (3D masses)]; thus, they can accelerate the expansion of our Universe (3D Space dimension). Dark energy = mass energy (1D and 2D) to 3D, increasing the spin effect.

After the maximum formation of 3D masses in ample 3D Space (concentration increase ceases), the expansion begins to slow down. With the 3D mass tending to dissipate (expansion), the concentration in 3D Space decreases, EK, and the intensity of the spin decreases.
Epg increases.

Future of expansion: Spatial Universe, completely flat (2D).

(Expanding Disk) (Spin)
The 3D spatial dimension becomes 2D Space (Disk); spin and EK decrease, Eg (potential) increases, with less and less mass. For maximum expansion, the smallest masses (1D particles) arise: 2 (Mo – mo) separated by the maximum space:

Linear Space

($M_0 - m_0$) **($M_0 - m_0$)**

The Universe does not continue to expand (the existence of two minimum particles with mass (1D) preserves the energy (Existing, the Universe can never be completely homogeneous).

Figure 2. Universe (1D maximum expansion, 2D, 3D, 2D, 1D maximum contraction)

In the state of maximum expansion: Ek = 0; linear, Space becomes no longer curvable, thus, Epg decreases with the return of the motion. The only possible motion that corresponds to an increase in EK (in this case) is the beginning of a contraction (orbital).

Contraction: masses can be naturally generated by the variation of pre-existing Spaces. Epg begins to decrease and Ek to increase with two minimum pre-existing 1D masses (1D Space) beginning their motion.
1D Spatial dimension [with minimum (1D mass)] to 2D Spatial dimension = contraction oriented according to the fact that the signal from the complete disappearance of the curvature of space does not instantaneously reach the entire Universe.
The contraction begins: With a change in energy (increase in Ek and decrease in Eg); the beginning of the motion generates an orbit and therefore a 2D curved space. Thus, curvature or an energy flow can become available only after the beginning of the motion.

(v) (v)
($M_0 - m_0$) **($M_0 - m_0$)**

Speed (v) tends to the limit (c).

Just as the Relativity of time varies according to the speed and gravity present, the spatial dimension in extreme states is guided by the existing gravitational potential and kinetic energy.
The possible variation of Time relativity is always the same: limited by speed.
(v= 0 and v= c).
Limited variation in time relativity ↔ mass (or energy concentration) limited in 1D, 2D or 3D Space ↔ limited contraction and expansion.

When v tends to c, the only way to complete the process that increases EK by decreasing Epg is 1D mass generation, which happens more easily in 2D Space due to the lack of space (3D).

(v ≅ c) (v ≅ c)

When 1D mass is generated, there is a tendency for the speed (v) to decrease at the edge or orbit in a curved 2D Space. While the evolution continues, (v) is restored. Thus, 1D masses are generated and 2D masses are formed in 2D Space.

2D(Space) (Spin)

The contraction continues:
The total amount of mass (1D and 2D) increase = increases concentration (2D spatial dimension) and spin. Epg has not yet fully decreased for the full increase of Ek.
The possible amount of mass that will be produced has not yet been reached. The spatial curvature and concentration increase until they form 3D masses and the 3D dimension.

When mass production ends, the total mass amount, concentration, and spin become maximum (3D spatial dimension).
Ek begins to decrease and Epg to increase.

Flat Universe

Contraction 3D Space: 3D Mass to (2D and 1D masses).
The contraction with flattening continues but is beginning to slow down: Ek has not fully decreased and Epg has not fully increased.
3D to 2D and 1D Space:
via centrifugation and planarization Ek begins to decrease and Epg (potential) begins to increase; disk + two (1D masses) particles arise. This incomplete contraction will consist of a fully compressed disc, between two particles (symmetry); spaces are necessary for the presence of potential energy [maximum mass of the disk between the two (1D mass particles].

Flat disk

The spin (centrifugation) allows the existence of space for motion, only between the edge of the disk and the particles (shape of the surface of a double cone). This shape (by equilibrium) does not allow the two particles to approach in the direction of the disk. In its maximum state of contraction 2D, the disk (without internal spaces) loses its internal gravitational effect, the contraction continues (spin) to 1D Spatial dimension.

Future Part A

(Spin)

Future Part B

The disk decreases from the edges with the spin, and through the unoccupied space that exists (shape space: double conical surface). The homogeneous distribution of mass from the disk to the future parts (A and B) is defined by spin and entropy.

The spaces (empties)

Part A **Part B**

Consecutive new expansion:
Through linearization, the Universe returns to a spatial dimension (1D); the state of maximum contraction reappears (with largest amount of 1D mass). The parts are separated by necessary central (unoccupied) spaces and a minimum particle (1D mass). Parts A, B, and the particle (1D mass) completely reach the 1D space dimension, and expansion resumes.

Entropy is minimum (in extreme states of 1D Space).

V. Existence

Existence being considered as any presence (characterizable) in constant transformation, the Universe is an example of existence; it is constantly in transformation or motion; the instant of rest [configured in its extreme states by the change or reversal of motion (flow)], ends with the decrease of potential energy and increase of kinetic energy, by the linearity of space, thus, maintaining the continuity of time, that is, a continuous transformation.

Even constantly changing, or even presenting itself in different dimensions of Space, what characterizes the essence of the Universe, making it permanent, is the fact that it is always the holder of any existence.

Through logical analysis, it is possible to produce an analogy between the permanent existence of the Universe (that is, of a space and time in constant transformation) with the maintenance of our own existence.

Since this possibility can change actions and allow better personal interactions, the following points may be worth evaluating:

- no transformation can disfigure our individuality when physical presence is essential for interaction with the environment.

- Without a physical presence, leaving our 3D Space dimension, the loss of the characteristics that define us seems certain, that is, any reaction, interaction, memory, or processing of information is impossible.

- Leaving the 3D space dimension, even if there is a return to 3D Space with a permanent time (probability), there will be nothing left to characterize our existential continuity; however, a time perspective must be highlighted..

- The sum of all the actions and reactions created at every instant (time) by interaction with the environment, is unique to each one, and can be defining of our essence; Thus, an existential continuity can at least be characterized by the return of a successive evolution.

In a Universe where everything is energetically related, it is not reasonable to believe that some people begin their existence with better characteristics or in more favorable environments than others, randomly. Therefore, it becomes important to make every instant of this existence useful, because actions of precaution, but also of collaboration, can become the way for consistent evolution in environments.

VI. Philosophy

Belief in God is of immense importance to a considerable part of the world's population.

Most churches do important social work. At every instant, the behaviors are stimulated by this belief, that comforts and brings tranquility to the most difficult times.

From this perspective, God is present and can be considered a transforming agent through the actions of those who believe. That is, if everyone considered others as many consider God, better interpersonal relationships would arise in a more prosperous environment.

VII. Conclusion

This article describes the evolution of momentary rest states, that is, how motion can arise from states of absolute Universal rest.

A complement to the standard cosmological model (considered the most suitable by the data collection) is described, using a cyclic model (with the preservation of causality, or the relationship between action and reaction).

Our Universe (3D Space) in motion will be considered created from a 1D spatial state [5]; a broader analysis of this creative state is proper to complete a possible understanding of the process.

The centrifugal effect and the existence of lower dimensions will be considered the representatives of dark energy and dark matter.

The presence of perpetual time will be related to the maintenance of any existence in the Universe (through probability).

The consideration of an analysis of the Universe (3D Space, observable and mathematically described) that begins its expansion at a given instant and will end it with a total dissipation, must be done in conjunction with an analysis of a generating Universe (1D Space) to understand a complete evolution.

With the generation of a centrifugal effect associated with gravity, a flat state tends to be formed with curved edges; a linear state is considered to arise at maximum expansion.

Just as components (ingredients) are always necessary for any creation, i.e., something cannot be generated from nothing, the end of any creation always generates something (preservation of existence). Thus, the Universe, even in a state of accelerated expansion, cannot expand to a complete dissipation.

The Universal maximum dissipation also cannot be restricted to the presence of only one smallest particle with mass occupying a 1D Space, because it would not configure the presence of unoccupied space, or gravitational potential energy (1D).

Existence is the transformation at any level through interaction with the environment by motion in space characterizing time; thus, the extremes of universal existence represent the momentary extremes of motion (momentary rest states).

The need for quantum gravity to characterize an origin becomes unnecessary, since all energies arising from the initiation or derived from the expansive termination of a Universal resting state arise of fundamental energies only: Epg and Ek.

There is no scope for vibrations or oscillations in truly extreme and rest states.

Well-established concepts prevent the description that something can expand from nothing, or that any expansion can have been preceded indefinitely from an infinite past.

It was pointed out that there can be maximum contraction to a single spatial dimension, but not so intense to be complete; similarly, maximum expansion [(1D space unoccupied between minimum (1D masses)] can only occur without the complete dissipation, preserving a permanent presence = existence.

Experiments with neutrinos (2020) show the possible asymmetry in the formation of matter and antimatter [11].

Symmetry may occur only in the contraction + expansion set.

The degree of freedom depends on the amount of mass, and the existing Space (between these). Thus, in a Space of maximum contraction or expansion (1D Space), the degree of freedom or entropy is minimum.

The rest energy (E_0) in 1D (Space) was considered, thus ruling out the use of certain relativistic and quantum calculations (4D=3D (Space) + 1D (Time)) [12,13]. Contractions and expansions are limited, but permanent in continuous cycles.

The model presented was able to clarify why the Universe begins its spin with the beginning of the expansion [9].

This approach respects the Ockham razor perspective and the principle of parsimony. The best explanation should assume the fewest number of premises [14].

The use of quantum mechanics or field equations in other studies that consider the origin of the Universe only from 3D Space, may result in less consistent conclusions, by indicating a creation without citing the cause, or ignoring concepts such as that of existence.

Although less dense, this alternative study can be reflected by its coherence in presenting the causes and effects present throughout the evolution of the Universe.

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