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The Big Defreeze of the Universe: Identity Stem Waves and Complex Forces in Cosmology

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Abstract: ***This study proposes that the universe originated from a reverse mechanism of the Big Freeze, beginning as a tiny collective quantum wave, the 'Identity Stem Wave of the Universe' (ISWU). This wave accumulated energy, forming identity stem waves of matter, eventually leading to a super symmetrical crystal structure. The study introduces the concept of "The Big Defreeze," wherein the universe emerged from a frozen state at nearly absolute zero temperature. Additionally, the research explores three new fundamental forces, termed "The Complex Forces," which could explain universal expansion and symmetry-breaking mechanisms. The study also suggests a methodology using Bose-Einstein Condensates (BEC) to test the proposed framework, offering new insights into cosmology and quantum mechanics. Purpose: This research aims to propose a mechanism that explains the conditions preceding the Big Bang, the formation of identity stem waves, and the role of newly identified complex forces in shaping the universe. Significance: This research presents a significant advancement in cosmology and quantum mechanics by providing a novel framework for understanding the early universe and fundamental forces. The proposed model could offer new perspectives on the origins of matter and universal expansion.***

Keywords: Cosmology, Big Bang, Bose-Einstein Condensates, Quantum mechanics, Schrödinger equation, wave function, energy operator

1. Methodology

As the universe is expected to become cooler and cooler, heading towards absolute zero, this study proposes that all matter, even if it is not a boson or ideal gas, is expected to form Bose-Einstein Condensates (BEC). (The fermions problem is addressed in this paper as well).

When a gas is cooled down, the atoms slow down, and their energies decrease. Due to the quantum nature of atoms, they behave as waves that increase in size as the temperature decreases. At very low temperatures, the size of the waves becomes larger than the average distance between two atoms. At this very low temperature, all of the bosons can have the same energy in the same quantum state. They all form a single collective quantum wave called a Bose-Einstein Condensate (BEC).

This study proposes a scenario called “The Big Defreeze” at the beginning of the universe, where all matter started with a single collective quantum wave which could be referred to as the Identity Stem Wave of the Universe (ISWU). In other words, the universe was in a “frozen state” at almost absolute zero temperature and potentially shrunk in a very tiny collective wave.

The study proposes that our universe started with a reverse mechanism to a modified big freeze scenario. It began as a tiny collective quantum wave, which could be referred to as the “Identity Stem Wave of the Universe” ISWU. This stem wave started gaining energy leading to fluctuations behaving like a string forming what could be referred to as the “Identity stem waves of matter,” leading to a super symmetrical crystal with no well-defined boundaries.

The “Identity stem waves” of all elements started forming and interacting. This is so far pretty much what is generally expected anyway.

If all matter even if it is neither a boson nor an ideal gas were smashed and shattered into their elementary particles, and these elementary particles or, more accurately, fluctuations of waves started cooling down to degrees close to absolute zero forming Bose-Einstein Condensates. This BEC or quantum wave would act as the “blueprint” or the “Identity Stem Wave” of this matter.

The frequencies of these identity stem waves ISWs are comparable to the temperature at which they form BEC. This study proposes using the Fourier transformation to test and measure the mechanism of forming the ISWs as spikes/fluctuations. It indicates that for the ISWs of all matter, the winding frequency is comparable to the ISW’s frequency except for helium; the winding frequency is expected to be 299,789,012 times the frequency of Helium’s ISW, which suggests a symmetry-breaking mechanism. This mechanism breaks the symmetry of the super-symmetrical crystal leading to an explosion or a big bang with a value comparable to the speed of light.

This study suggests that the universe began in a frozen state, heated up to initiate the Big Bang, and is gradually cooling down again.

This proposed mechanism could help us understand the time frame of forming identity stem waves of all elements. These identity stem waves can lead to what can be referred to as the “Big Defreeze Grand Spectrum,” from where we can determine the identity stem waves of all elementary particles and how they were “born.”

A suggested methodology for experimental validation would be: Shuttering particles of two periodic table elements in the cold atom lab and observing the reactions, including the potential formation of two identity stem waves and how they react.

Understanding the “Identity stem waves ISWs” of matter, basically how matter was born, how the ISWs of different matter interacted with each other, and the time frame for that could help us create hybrid matter.

One of the proposals of the Big Defreeze is that the universe is going to end the same way it started. So if we know enough accurate information about how the universe is going to end, we will have good information about how the universe started and vice versa.

If we follow the logic that suggests that the universe will end the same way it started, as proposed in this study. Then what would be the most likely scenario?

The intuitive answer would be the big crunch, as the universe would be back to a dense, hot, and compact state, a lot like the state that preceded the Big Bang. Yet, our most recent observations show that the expansion of the universe is accelerating. This means that the big defreeze or the big rip is more likely to happen depending on the strength of the repulsive force or the amount of dark energy.

Whether we consider the particle as a collapsed wave function or a quantum excitation of a field or a vibrating string, the idea of the Big Defreeze suggests that when all matters are shattered to their elementary particles, even if they are not bosons or ideal gases are expected to form Bose-Einstein Condensates. The atoms will slow down, and their energies decrease. Due to the quantum nature of atoms, they behave as waves that increase in size as the temperature decreases. They all form a single collective quantum wave, a Bose-Einstein Condensate (BEC), which could be referred to as the ISW "Identity Stem Wave" of the universe "ISWU."

So basically, this is greatly compatible with what the big rip suggests, where the matter that makes up the stars breaks into tiny pieces. Even atoms and subatomic particles will be destroyed. The Big Defreeze suggests that the shattered/destroyed atoms and subatomic particles form the BECs, and the identity stem waves ISWs. The Big Defreeze is compatible as well with the Big Freeze in the part related to the heat death of the universe.

The Big Defreeze suggests that galaxies and objects within them would be shattered to their elementary particles due to the big rip and then frozen to their BEC/ISW state due to the heat death of the universe. And not in the form of frozen lonely, separated galaxies. In other words, the Big Defreeze suggests that the state that preceded the Big Bang was an initially small, compact, and frozen state, and then it started gaining heat and energy.

The identity stem waves ISWs of matter proposed in this study could be considered a type of Bose-Einstein condensates. They are basically matter waves. The idea of the Big Defreeze put it in the context that these matter waves were formed for all matter at the beginning of the universe before the Big Bang and inflation.

Achieving and testing the Bose-Einstein Condensates

If you want to achieve Bose-Einstein Condensation, you have to cool down a gas for Micro and Nano Kelvin temperatures until the De Broglie wavelengths are comparable to the spacing between atoms. The matter waves overlap and start to oscillate. The De Broglie wavelength depends on temperature; the distance between atoms depends on density. So the transition to Bose-Einstein Condensation is characterized by a combination of temperature and density. Wolfgang Ketterle described watching how a condensate formed for him, like "how nature is giving birth to something very fragile, but we were able to observe it in its natural environment."

Laser cooling

The principles of laser cooling are pretty simple, you shine laser light on atoms, the atoms scatter light, and if you play some tricks, the light which is scattered/emitted has a shorter wavelength, is more energetic than the absorbed light. The scattering of light removes energy from the system, and the system cools down.

Magnetic traps

There are two types of magnetic traps. Some have a pointy potential, and a linear, V-shape potential. Others have a round potential at the bottom; those traps are more tightly confined.

Interference between two condensates

Interference between two condensates allows you to photograph matter waves directly.

The interference is clear evidence of the wave nature. Where you build two condensates, so you basically have lots of atoms in the ground states in each of the two traps, and then you turn off the traps, let them go. Then you can measure the distribution of atoms as a function of position. You see fringes in the atomic density because the two condensates were interfering with one another. What determines the spacing between the fringes? There is a De Broglie wavelength for the atoms, and there is a De Broglie wavelength difference between the two condensates. this is quantum interference between atoms.

Optical trap

The optical trap could be used as a transport mechanism for Bose-Einstein's condensates again, thanks to Wolfgang Ketterle and his colleagues. They now can form a condensate in one vacuum chamber, then focus the laser light on it and translate the focus by around 40 cms and carry the atoms in a new chamber. So they can deliver condensates with precision through pin holes and put condensates into new environments into micro traps and resonators, for example.

The Fermions Problem

The Big Defreeze proposes that all matter even if it is not, Bosons will form Bose-Einstein condensates when shattered to their elementary particles and cooled down to near absolute zero, Fermions might have a different opinion. We will have a "Fermions problem" here because their quantum behavior would be different. The answer to that is that the Big Defreeze is dealing with the beginning of the universe. Basically, there were no bosons and fermions. This means that the quantum behavior of fermions is not to be considered at this stage. The Big Defreeze suggests that there was the collective Identity Stem Wave of the universe ISWU. Fluctuations and interactions started to happen to lead to the ISWs of matter and the symmetry breaking by the identity stem wave of helium. All that does neither have fermions nor their quantum behavior.

One of the predictions of the idea of the Big Defreeze is that the universe will end the same way it started. Won't we still have fermions towards the end of the universe? The answer is that in the case of the Big Rip, even the sub-atomic particles would be destroyed, they will lose their properties, including the quantum behavior of the fermions. But they are expected to maintain the behavior of forming BEC-like matter waves, which we refer to here as "Identity Stem Waves ISWs". So, after the sub-atomic particles are destroyed in the big rip scenario, the universe will be heading towards heat death and near absolute zero temperature, where the destroyed sub-atomic particles will start losing energies and forming BECs/ISWs, which will eventually shrink to again a collective Identity Stem Wave of the Universe ISWU.

The Big Defreeze in the Cosmic Microwave Background and applying the Fourier transformation to measure identity stem waves.

The idea of the Big Defreeze of the Universe suggests that the first identity stem wave that started fluctuating is that of iron ISW_{Fe} with a frequency of approximately $5*10^{-5}$. Then other ISWs started fluctuating until the ISW of helium ISW_{He} broke the symmetry of the ISW crystal with a value comparable to the speed of light.

In the 1990s, more precise measurements found that the Cosmic Microwave Background (CMB) is not perfectly smooth, but it has ripples in it. Inflation theorized that these ripples are the result of quantum fluctuations that were amplified when the universe expanded.

The temperature fluctuations $\Delta T/T = 10^{-5}$. These tiny fluctuations can be mapped. When you look at the structure of these fluctuations, you can Fourier decompose them and then calculate the power spectrum of these fluctuations; you find that you can get evidence from how these tiny fluctuations form, for instance, most of the gravitating matter in the universe is actually invisible, it is dark matter we only see it via its rotational effects among others on how these fluctuations were formed. It is also the stuff that keeps the galaxies together; if we do not have this dark matter, they will just fly apart, and they will rotate too fast. We also have evidence of dark energy which basically behaves like the cosmological constant, which has been now measured. It speeds up the expansion of the universe. It accelerates it.

If you take these tiny fluctuations, they cause variations in temperature and also in the density of matter and, therefore, variations to the gravitational potential. You put it in a computer and run it forward; you find that these tiny fluctuations generate all the large-scale structures of the galaxy clusters and superclusters that we see today in our universe. You can show that wherever you find deviations from the mean temperature, you find clusters or voids. You can map this.

When you Fourier decompose it and compute the power spectrum of the two-point function of these fluctuations, you see that there are distinct structures in there. There are waves, sound waves basically, that propagated through the hot plasma before it cooled enough that hydrogen could form.

When you analyze the properties of these fluctuations, you see that –besides all the local dynamics like sound waves, the way how the sound waves interact with the plasma, the way how the plasma interacts with the photons, etc. – overall, you find a very remarkable structure. *You find that the waves that caused these tiny fluctuations in the temperature were generated with having the same power on all wavelengths. So they have what is referred to as the scale-invariant power spectrum. And they always come with an initial coherent phase condition as if they are coming from a broadband laser.*

This is considered evidence that there was a very early phase - much earlier than these 400,000 years after the Big Bang on the CMB- of the expansion of the universe that was much faster, exponentially fast, and this called inflation.

The Big Defreeze introduced in this book predicts that the source of this coherent, scale-invariant fluctuation is the identity stem wave of iron ISW_{Fe}. *So, when the symmetry was broken by the identity stem wave of Helium* ISW_{He} *– as predicted in this book as well-. The ISW of iron maintained its power on all wavelengths as it did during the ISW crystal phase in maintaining its power on all the other ISWs leading to the interactions in the ISW crystal.*

It is like, the ISW of iron acts as the source of the laser beam in the CMB, and it maintained its power and properties, including coherence and scale invariance.

In the case of an ideal gas, the onset of BEC occurs at interparticle spacing is comparable to thermal wavelength. Let`s consider the same applies to the other elements of the periodic table when smashed and shattered to their elementary particles.

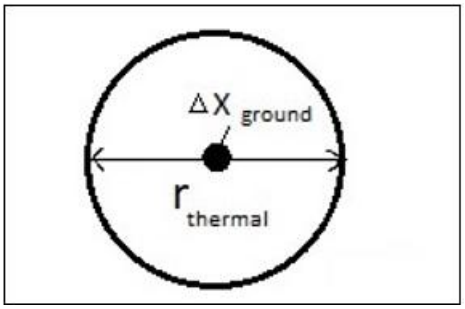

Figure 1.1

Where ΔX_{ground} shown in Fig. (1.1.) represents the ground state of iron`s identity stem wave ISW for example, let`s give at an approximate Tc value of 5.05×10^{-5} K). It also represents the width of the ground orbital.

Furthermore, $r_{thermal}$ represents the size of the symmetrical container or crystal -with no defined boundaries-where the Identity Stem Wave of iron, for example, is centered and symmetric.

The spread of the Gaussian wave function for a harmonic oscillator ground state is:

$$\Delta X_{ground} = \sqrt{\frac{\hbar}{m w_0}}$$

If we compare that to the thermal radius $r_{thermal}$ shown in Fig (1.1.) :

$$\Delta X_{ground} / r_{thermal} = \left(\frac{\hbar}{mw_0}\frac{m\omega_0^2}{T}\right)^{\frac{1}{2}} = \left(\frac{\hbar w_0}{T}\right)^{\frac{1}{2}} = N^{-1/6}$$

For T is comparable to T_E and Number of particles in excited state N_e (T_e) = the total number of particles N, and we set the total number of particles at this state to one, given that we only have one particle/wave at this stage, therefore :

$\Delta X_{ground} / r_{thermal} = 5.05 \times 10^{-5} / r_{thermal} = (1)^{-1/6}$
$r_{thermal} = (5.05 \times 10^{-5})^{-6} = 5.05 \times 10^{-30}$

ΔX_{ground} "Identity Stem Wave" of iron was the first to form. It then acted as a black hole in a supersymmetric crystal absorbing and emitting radiations comparable to hawking radiation and assisting in forming the "identity stem waves" of all the other elements of the periodic table. Elements that required smaller Tcs to form BECs or identity stem waves did not form except after interacting with the iron`s BEC stem wave, which was the first to form.

The Complex Forces

The Big Defreeze predicts that our universe started with a reverse mechanism to the Big Freeze, following this line of thought, a force should be there to basically retrieve the universe back to the way/state it started with. This could end up being one of the functions of gravity, for example. But it could also be a different force that could be referred to as **the R-force or the retrieving force** and could be considered as a "mother force" for gravity and dark energy.

Another inevitable force would be a **"Balancing force or the B-force,"** which would be necessary to sort of balance and maintain the geometry of the straight line, which is a one-dimensional construction of reality with all the information scrambled and coded into it. The B-force could be responsible for some of the constants of nature.

The third force that is likely to be there is the force causing the fluctuation/ripple on the straight line which we referred to earlier as the **"Higher dimension HD-force."**

So we have three Complex Forces:

1) The Retrieving force (The R-force).
2) The Balancing force (The B-force).
3) The Higher dimension force (The HD-force).

The Retrieving force (The R-force)

The retrieving force would basically be the force working on retrieving our universe to the state it started with. It would operate in a different way from gravity. It could be considered as a "mother force" for gravity and dark energy. The potential properties of the R-force are:

- One of the potential functions of the retrieving force could be the decay of the sub-atomic particles to another sub-atomic particle in the sense of phase transition to another state in an attempt to be retrieved to its original state.
- During the retrieving process, the particle/wave will undergo partial retrieving phases which could be referred to as partial retrieval or phase retrieval in forms of decay or changing states. During each retrieving phase, the particle/wave will gain information/experience that would affect its next phase or its reconstruction.
- The conditions/states in which the retrieved particle/wave ends up with or during the retrieving phases will not always necessarily be the same exact initial states/conditions.
- The retrieving force could have the ability to change time into space and vice versa. It could create and annihilate spaces acting on or using creation and annihilation operators.
- The retrieving force would operate on a particle beyond space and time boundaries with a unified space-time operator. This is counter-intuitive; we will use some analogies to try to approach the idea.
- The retrieving force would be creating and annihilating space & time.
- Gravity and dark energy could be tools for the R-force to retrieve the ISWs and matter to their original state.

The R-force could be responsible for the anti-matter using annihilation operators to annihilate matter.

The potential mathematics of the R-force:

To better understand the below equations, please refer to the paper "Proposing the 'IN Sign' for Enhanced Schrödinger's Equation in Quantum Mechanics".

The main function of the R-force would be retrieving the universe to its initial state. Here the function would be the main player here; it would create space, annihilate & create space. It will use energy in order to that.

So, potentially in order to use notations for this idea, we can use:

$$\hat{E} \divideontimes \hat{s} = f\hat{\Psi}(x,t)$$

We will add some notations

$$Ra_n^+ f\hat{\Psi}(x,t) = \hat{E} \divideontimes \hat{s}$$

Where:

- R refers to the retrieving force or the R-force
- a_n^+ Refers to a creation operator and it could be a_n^- An annihilation operator.
- $f\hat{\Psi}(x,t)$ Refers to the wave function used by the R-force to whether operating on, create or annihilate energy and space.

The equation is a very basic notation telling us that the retrieving force, the R-force, is using a creation or annihilation operator through wave functions to operate on, create or annihilate energy and space. The second part of the equation $\hat{E} \divideontimes \hat{s}$ is dealing with the energy and shape formed, how they affect and interact with others as a result of the R-force`s operation on them. And how they have the freedom to swap roles.

The Balancing force (The B-force)

The straight-line analogy suggests a construction of reality in one dimension of a straight line. This one-dimension construction of reality could precede the two and three dimensions construction of reality. Or they all could happen to exist at the same time, or they could have different space-time parameters.

This straight line is an energy configuration. Information is encoded and scrambled on this straight line, which would require balancing properties to maintain its straightness, geometry, compactness, and dimensionality properties. This would be achieved by a balancing force.

Some of the properties or characteristics of the balancing force would be:

- Repetitive
- Continuous
- Descriptive
- Unlimited
- Unbreakable
- Reproducible
- Duality

The balancing force could be the main force behind some of the fundamental constants of our universe. The cosmological constant could be an example that will be presented shortly in this study.

The main mechanism of how the balancing force would operate is likely to be resonance.

Some of the proposed operations and mathematics of the Balancing force (The B-force):

One of the potential operations of the balancing force is to bring fields or systems to a "Balanced state." The balanced state does not mean a zero value or a ground state. It is a state where the system is in balance to achieve its targeted function within a specific space and time.

$$\mathrm{B} \divideontimes f\widehat{\Psi}(x,t) = \ \mathrm{IS_b}>$$

Where:

- B is the Balancing force.
- $\divideontimes$ is the sign indicating that it is operating "in" something.
- $f\widehat{\Psi}(x,t)$ is a field of waves the B-force is operating "in"
- $\mathrm{IS_b}>$ refers to the resultant of the operation, which is the balanced state.

The Balanced State

The balanced state $\mathrm{IS_b}>$ would be the resultant of the balancing force operation on any operatee which could be a field of waves or just one single wave function.

The balanced state is usually not zero, and it should be the value or set of values that achieve the required balance for the operatee/system in which the balancing force is operating "in."

The non-zero principle of the Balancing Force

The balancing force cannot have a value of zero. The operations of the balancing force are targeting to bring energies or fields to a "Balanced state." Every system/field has its non-zero balanced state, which could be calculated.

The connection coefficients of the balancing force

Connection coefficients should allow the transformation of the balancing force to carry out the targeted operation, for example bringing a field down to its balanced state $\mathrm{IS_b}>$

A notation that could be used to express the introduction of connection coefficients to the balancing force operation:

$$\mathrm{B}\ \Gamma_{ij}^{k} \divideontimes f\widehat{\Psi}(x,t) = \ \mathrm{IS_b}>$$

Where Γ_{ij}^{k} is just a notation for the connection coefficient, which indicates that there are other components, factors, or forces that could affect the transformation or the operation.

The Higher Dimension Force (The HD force)

Some of the expected properties and characteristics of the higher dimension force (The HD force):

- **It is a phase transition and phase conversion accelerating force causing a paradigm shift:**
  This means that when the HD force operates on something or someone -either it operates on matter or organisms- it causes the acceleration of phase transition or even phase conversion. It changes the function of what it is operating on. This is not acceleration as the rate of change of velocity with respect to time. This is totally different and could have different mathematics describing it as well; this is basically accelerating the phase transition or conversion by introducing new information to the operatee (The thing the HD force is operating on) or, in other words, to the wave function of the operatee. This information will lead to a paradigm shift in the operatee and a change in its core function.

  Let`s use a notation for that:

$$\mathrm{HD} \divideontimes f\widehat{\Psi}(x,t) = \frac{\partial E}{\partial t}$$

- Where HD would be the higher dimension force.
- $\divideontimes$ is the "In sign" indicating that the HD force is operating "In" something or someone.
- $f\widehat{\Psi}(x,t)$ Refers to a complicated field of wave functions in a specific space and time. With a note here, that space and time $f\widehat{\Psi}(x,t)$ Are different from the space and time of the HD force. In other words, the HD force is independent of space and time parameters of the complicated field of wave functions $f\widehat{\Psi}(x,t)$ It is operating "in."
- $\frac{\partial E}{\partial t}$ is just a notation to indicate the phase transition or conversation of the operatee (The thing the HD force is operating on).

This equation and notation are just indicative and might require some complex numbers, and Planck constant. It is just merely a basic description of what this paradigm-shifting operation might look like. A different notation could be used as well as the idea here is that there would be a change in the Energy field of the operatee it could be with respect to time.

The Scaling and Projection operation of the HD-Force:

The scaling and projection operation of the HD force:

This could be one of the operations of the HD force, where it applies scaling mechanisms, scalar fields on an operatee along with a projection of the rescaled information into a different space which could be referred to as base space in some cases. It could just be a different space like space A, space B, etc.

Let`s continue with the example of the straight-line analogy and apply the scaling and projection operation of the HD force to it. Let`s consider the scalar field φ (x), (it is just a notation for the scalar field) which uses a solution to the classical equation φ_0 then we perturb small fluctuations about that solution ∂φ(x)

$$\phi(x) = \phi_0 + \delta\phi(x)$$

If we consider it in the following Lagrangian:
$L = \frac{1}{2}\partial\mu\phi\partial^{\mu}\phi - v(\Phi)$

For φ = Constant
$\frac{\partial v}{\partial \phi} = 0$
$v(\phi) = -\frac{1}{2}\phi^2 + \frac{1}{4}\phi^4$

The symmetry of the potential is that:

$$v(-\phi) = v(\phi)$$

We expect to get:
$L(\phi(x)) = \frac{1}{2}\partial\mu(\phi_0 + \delta\phi)\delta^{\mu}(\phi_0 + \delta\Phi)$ ……
=

The derivative of the fluctuations – the potential v (φ) (Equation 2)

$$\frac{1}{2}\delta_{\mu}(\partial\phi)\delta^{\mu}(\delta\phi) + \frac{1}{2}(\phi_0 + \partial\phi)^2 - \frac{1}{4}(\phi_0 + \delta\phi)^4$$

For the solution φ = 0

$$L_0 = \frac{1}{2}\partial_{\mu}\partial\phi\partial^{\mu}\partial\phi + \frac{1}{2}\partial\phi^2 - \frac{1}{4}\delta\phi^4$$

This Lagrangian (the values of the equations of motion around φ) has the symmetry of ∂φ → - ∂φ

The idea here (which could be derived or presented using a different mathematical framework and potentially more accurate approaches and notations) is that fluctuation(s) happen on the one dimension straight line without changing its geometry and applying a scalar field will be a tool to reconstruct the information and project it on a different space. A simpler notation that could represent the idea of the HD force`s scaling and projection operation:

$$\text{HD}\ \phi(x) \divideontimes \bar{x} = (\sigma :\ \text{SP}_m \longrightarrow \text{SP}_1) \longrightarrow \text{ISW}_n$$

This equation represents an example of a scaling and projection operation by the HD force, where:

- HD refers to the higher dimension force.
- $\phi(x)$ Refers to the scalar field or operator operating "in" something.
- ⋇ is the "in sign" indicating that the HD force using a scalar field or operator is acting "in" the operatee.
- $\bar{x}$ here represents the straight line in our straight-line analogy, but more generally, it represents the operatee, so if it`s a two-dimensional operatee it could be $(\bar{x}, \bar{y})$. If it is a complicated field of waves (which could be the situation in many cases), it could be $f\bar{\Psi}(x,t)$, so the proposed equation would be as follows:

$$\text{HD}\ \phi(x) \divideontimes f\bar{\Psi}(x,t) = (\sigma :\ \text{SP}_m \longrightarrow \text{SP}_1) \longrightarrow \text{ISW}_n$$

For the other side of the equation:

- σ Represents a point on the main space or, more generally, the operatee.
- SP_m represents the main space.
- SP_1 represents the base space or space number one.
- ISW_n represents the ISW or the identity stem wave (Fluctuation) resulting from the operation; for example, it could be the ISW of iron, then we can refer to it as ISW_{Fe}

To solve our basic example of the straight-line analogy, we will use the basic form of the proposed equation

$$\text{HD}\ \phi(x) \divideontimes \bar{x} = (\sigma :\ \text{SP}_m \longrightarrow \text{SP}_1) \longrightarrow \text{ISW}_n$$

For $\bar{x}$ we will consider a length of 10^{500}; it is just a number that we borrowed from the landscape of string theory.

The expected result of the operation is scaling the 10^{500} into $5*10^{-5}$, which would be the Identity Stem Wave ISW of iron, and again this is just an example. The value of $5*10^{-5}$ would be projected from the main space to the base space or our space to form the first ISW of our two-dimensional super-symmetrical crystal. So, one-dimensional straight-line information was reconstructed through this operation into two-dimensional information and projected to a different space.

Conservation and the Higher dimension force (The HD force)

It is expected that the HD force does not violate any conservation laws. The way the HD force is expected to be operating on fields, systems, matter, and organisms would be adding new information and potentially some in the form of energy that could be referred to as the HD energy. These added information or energy are not governed by space and time limitations of the operatee. They do not necessarily cause changes in the volume or the shape of the operatee. They might do in some cases, but it is not necessarily an effect of this added information or energy. Then the laws of conservation would apply to the new information or energy introduced to the operatee.

Entanglement as a mechanism for the HD force.

Resonance is expected to be one of the mechanisms of the balancing force. Yet, for the HD force, entanglement would be an expected mechanism. And it is not spooky action at a distance. There is a force behind it that is not spooky or magical, and this force does not define distance or space, or time as we define it. But we can still figure out the mechanisms by which this force operates, and entanglement could be a very good candidate.

Unitarity is the quantum equivalent that tells you that you can always reconstruct the past from the future. In the state of a quantum system, you can either run forward uniquely or run backward uniquely, and you will come to some unique previous state or future state. It is a kind of time reversibility.

We lose information because we lose the ability to follow the details, not because the information gets lost. That is when the

second laws come when you lose the ability to follow the information.

The evolution of systems can be represented by matrices. Multiplying matrices by matrices, if we want to update a second time, apply the same matrix to the resultant. If you want to update a state of a system five units of time, multiply the matrices together five times, you do it in sequence.

So, let`s consider a system of a field of wave functions evolving as we would expect, and then a paradigm shift was introduced to it by the HD force, which could be through entanglement. We can track this paradigm shift by identifying which parameter(s) of the matrix's wave function(s) has changed. This is not an easy task, and it requires tracking these changes down to a very fundamental level.

Another analogy would be human beings as a highly sophisticated measuring apparatus for the universe with a very high Q-factor. The measurement process that we do leads to a collapse of the universe's wave function that we observe/measure. In other words, reality as we perceive it would be a projection from the brain on the fabric of space-time. An entanglement happens between us (the measuring apparatus) and the field of waves. The entanglement could be with a specific collapse of a wave function. This wave function is not necessarily bound to our space-time parameters. If we develop the mathematics of the HD force and the complex forces in general further, we could track and measure such entanglement.

The mechanism of the HD-force`s entanglement

The nature of the entanglement properties of the higher dimension force (The HD-force) is not necessarily always as quantum entanglement. Potentially for the mechanism of HD-force`s entanglement:

- The HD force`s entanglement will not be limited to a specific number of states.
- "Partial entanglement" could be allowed, which means that the two entangled systems could be partially entangled, in a sense that some of the properties of one of the systems or fields could be entangled with some of the properties of the other system or field. And not necessarily the entire system/particle. Entanglement entropy could be a mathematical tool to measure the degree of entanglement.
- "Fading of entanglement" could be allowed and tracked as well. The term fading of entanglement would probably be more accurate than using "decay of entanglement."
- The HD-force could choose to pass the information to an imaginary particle/field, which is not limited by our space-time parameters. Then this particle/field would be entangled with the particle/field limited by our space-time parameters.

Note: Further testability and proposed laboratory methods of the Big Defreeze, the Identity Stem Waves, and the Complex Forces are discussed and explained in detail in the book "The Big Defreeze of the Universe- Analogies and Thought Experiments" by Mohammad Hasan Algarhy (2021, May 17).

2. Conclusion

This study introduces the concept of "The Big Defreeze," proposing that the universe originated from a frozen quantum state and transitioned into its current form through energy accumulation and symmetry breaking. The research outlines the formation of identity stem waves and the role of three complex forces in shaping cosmic evolution. Furthermore, it suggests an experimental approach using Bose-Einstein Condensates to validate the hypothesis. The findings provide a fresh perspective on universal origins and propose an alternative explanation to the standard Big Bang model. Future research should explore experimental verification and potential implications for quantum field theories.

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