

# Acceleration Theory

Srinivasulu Charupally\*

R&D Department, Hyderabad, India

**Abstract:** The Acceleration Theory, a novel concept explored in this research paper, challenges the classical and quantum theories to elucidate the accelerating expansion of the universe. While the constancy of mass for subatomic particles over time and the existence of various matter particles, including Dark Matter (DM), Anti-Matter (AM), and regular matter, are well-established, the origins of these particles and the driving forces behind cosmic expansion remain intriguing questions. This work delves into the theoretical foundations of how Dark Matter, Anti-Matter, and regular matter particles were generated in the early universe, unraveling the cosmic mechanisms that led to their existence and the compelling phenomenon of universal expansion. Secondly, addressing the finiteness of the speed of light, this research explores alternative perspectives on its constancy and investigates potential influences of Dark Energy (DE) on light speed. Thirdly, furthermore, the paper examines the four fundamental forces—Electromagnetic Force (EF), Strong Force (SF), Weak Force (WF), and Gravitational Force (GF)—in the context of quantum unification. While EF, SF, and WFs have found unification through quantum theory, GF remains distinct. Despite efforts in General Relativity (GR) to comprehensively address gravitational forces, a unifying framework with the other three forces is elusive. To bridge this gap, the paper introduces innovative concepts of Space Energy (SE) and Space Constant (SC) to reconcile and unify these fundamental forces. Finally, the research concludes by contemplating a unified theory for the universe and explores the possibility of an acceleration principle governing every cosmic event. By scrutinizing diverse theories and introducing new concepts, this paper contributes to advancing our understanding of the fundamental principles that govern the cosmos.

**Keywords:** acceleration theory, dark energy, gravitational force, multi-universe, black hole, light of speed.

## 1. Introduction

Einstein's endeavors with the Cosmological Constant (CC) are one of the most interesting features of scientific history. It is known that to offer a static universe, Einstein appended a CC to his equations [1]. He was unsuccessful to anticipate the universe's expansion owing to this bias, which was soon viewed by Hubble. Einstein introduced the CC  $\Lambda$ , the antigravity vacuum energy, in 1917. The scale of  $\Lambda$  was adjusted to gravity by him in order that the Universe remains static. Einstein's equation for a vacuum Universe devoid of matter was computed by Willem de Sitter in 1917. This solution impels the Universe's inflation. The universe is expanding, which was evinced by Edwin Hubble in 1928. Then, Einstein called the CC the major mistake of his life [2]. Someday, an expanding universe filled only with ordinary matter (for

example: matter whose stars are formed) will slow down owing to gravitation attraction. While observing supernovae in 1998, astronomers realized that their evident luminosities were decreased as an impact of more redshifting. Astronomers remarked that the Universe is not only in a stage of expansion, but this expansion is accelerating [3]. The process behind the present phase of Accelerated Expansion (AE) of the universe is not comprehended. The magnitude is small when analogized to expectations as of fundamental physics if acceleration is engendered by a CC (or vacuum energy) [4]. In its simplicity, the standard model of cosmology is magnificent: it can simply rationalize just about all observations, which probe a huge gamut of scales in space along with time with a small handful of parameters grounded on linear perturbations regarding a spatially homogeneous along with isotropic background model. The greater picture, which appears is a model with an exponential expansion rate for much of the universe's evolution, engendered by the inflation at the commencement and Dark Energy at the final [5]. The experimental detection of the existence in the universe of "dark" matter [6] along with the "dark" energy [7] is one of the most vital findings in astrophysics of the XX century. The whole mass of the visible universe encompasses 4.9% of the ordinary (baryonic) matter, 26.8% of DM, together with 68.3% of DE, as per the observations "Plank" Space Observatory [8]. Therefore, the universe at 95.1% comprises non-baryonic matter, which did not partake in Electromagnetic (EM) interactions; so it is invisible. Amid the evolution of all known kinds of matter of the universe, the circumstance forces regard it as some "protomatter" from which it was created, and reassess the function of gravitational energy in the process of its evolution [9]. In general, because once the universe began expanding, one could anticipate the rate of expansion to retard, the integrated gravity of the entire constituents must draw it back, i.e., decelerate it (similar to a stone thrown upwards). Consequently, the Deceleration Parameter (DP) was predicted to be a positive value. An accelerating universe is denoted by a negative DP with repulsive gravity along with negative pressure. Moreover, the measurements of Type Ia supernovae have exhibited that this AE is ascribed to the termed Dark Energy [10]. The universe's acceleration can be explicated by invoking Dark Energy parameterized by a state  $w$  equation. A group of limitations is proffered by distance measurements on  $w$ ; however, Dark Energy also impacts how rapidly a structure grows. If higher the acceleration, the more suppressed the

\*Corresponding author: [srinivasulu.res1@outlook.com](mailto:srinivasulu.res1@outlook.com)

structure's growth [11]. Einstein's gravity theory is not precise. That could not only influence the universe's expansion, however, it could also impact the way that usual matter in galaxies along with clusters of galaxies acted. A way to determine if the solution to the Dark Energy issue is a novel gravity theory or not is given by the above said fact. Nevertheless, it does conclude that a novel gravity theory is required, what type of theory could it be? How could it precisely explain the bodies' movement in the Solar System, as Einstein's theory is identified to do, as well as still provide the diverse forecasts for the universe that one requires? There are candidate theories, yet none are effective. Hence, the anonymity continues [12]. A comprehensive depiction of how the universe is expanded owing to the acceleration of Dark Energy with the aid of space energy is provided in this work. Here, the GF is combined with other forces, namely EF, SF, and the WF, and the answers to a few unsolved questions are also exhibited.

The leftover section is arranged as follows: the associated work is exhibited in section 2, the research technique and discussion are explicated in section 3, and the conclusion with its findings is inferred in section 5.

## 2. Related Works

Sebastian Bahamonde et al. [13] researched the incidence of accelerating universe vs. decelerating universe among the gravity frame (Jordan frame) along with non-minimally coupled Scalar Field Theory (SFT) as well as the minimally coupled SFT frame (Einstein frame) for diverse models. If acceleration were enforced in '1' frame, it would not essentially signify an accelerating metric when converted in another frame, as per the research. Moreover, this problem was system and frame-dependent; however, it was observed that there was no regular system that allowed the classification of these kinds.

T.X. Zhang and C. Frederick [14] examined the Black Hole (BH) universe's acceleration and offered a substitute description for the redshift along with luminosity distance measurements of sort Ia supernovae. When the BH universe was accumulated the ambient matter at an augmenting rate, the BH universe speeds up its expansion, as per the findings. External energy caused the expansion along with acceleration of the BH universe.

Frederic Henry-couannier [15] put forward a comprehensive description of dark gravity theory that permitted comprehension of the perceived the universe's current acceleration in a very actual way on investigating the universe's dark side" together with '1' of the major forecasts of the theory: the evasion of a factual BH Horizon. A whole, regularly-updated, survey of the theory was displayed.

Ozgur Akarsu et al. [16] examined the gamut of the EMPG parameters ( $\alpha$ ,  $\eta$ ) on a theoretical and observational basis engendering the Universe's late-time acceleration with pressure less matter only whilst maintaining the victories of GR. It was discovered that  $\eta = 0$  characterizes the  $\Lambda$ CDM model, while  $\eta \neq 0$  engenders a  $w$ CDM-type model. Nevertheless, in the manner that the energy in the EMPG Universe was sourced by pressureless matter only, the EMPG model's underlying physics was completely diverse. Yet, the pressureless matter's

energy was not conserved, i.e., it did not dilute as  $\rho \propto a^{-3}$  with the universe's expansion.

## 3. Research Methodology

A few improvements are done in some concepts, and they are unified by examining different theories in this work. For the following concepts, this work profoundly provides elucidation. Light Speed: how the velocity of light is affected is provided, Acceleration Theory of Universe: it explicates space energy, how Dark Energy and Dark Matter are developed in the universe, Acceleration Theory of Matter: it explicates diverse types of matter particles, namely AntiMatter, Dark Matter, and regular matter particles, Acceleration Theory of Subatomic Particles: it elucidates the particle's generation from Space Energy and under what all conditions the basic particles of matter are formed, neutron, proton, electron, Gravity, Multi-Universe and BH explanation utilizing the theory, how is an Atom developed from the subatomic particles and how different atoms/elements created in the universe, along with unification of '4' forces.

### A. Acceleration Theory of Light Speed

Due to changes in the structure of space, there has been an alteration in the velocity of light resulting from the expansion of the universe. This alteration allows the light signal to travel at varying speeds. Let two objects, A and B, be located  $3 \times 10^8$  meters apart (it is equivalent to the light's velocity per second). Consider a light signal with the frequency of  $3 \times 10^8$  Hz, and a velocity of  $3 \times 10^8$  meters/sec. To travel the light signal consumes one sec (figure 1),  $3 \times 10^8$  meters distance. A to B the velocity of light of the signal is assessed as,

$$C = n\lambda \quad (1)$$

Where, the signal's frequency is indicated by  $f$ , and the signal's wavelength is  $\lambda$  symbolized (the wavelength of the signal is 1 meter).

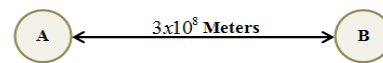


Fig. 1. Light's velocity is  $3 \times 10^8$  meters/sec; Time to attain B as of A is one sec

$$D = V * T \quad (2)$$

Where, the distance is signified by  $D$  and the time is indicated by  $T$ . The  $D$  and  $V$  values are  $3 \times 10^8$  meters and  $3 \times 10^8$  meters/sec respectively. Hence,  $T$  is evaluated as,

$$T = \frac{D}{V} \quad (3)$$

$$T = \frac{3 \times 10^8 \text{ meters}}{3 \times 10^8 \text{ meters/sec}} \quad (4)$$

$$T = 1 \text{ sec} \quad (5)$$

To travel from *A* to *B*., the light signal *C* takes exactly 1 sec. At a particular rate, the universe is expanding, that is, accelerating the distance betwixt the ‘2’ points *A* and *B* will augment by *D* meters subsequent to a period *T* say *T* = *X* million years, as well as distance augmented owing to Universe expansion betwixt the objects is *D*. The total distance betwixt ‘2’ objects *A* and *B* will turn out to be  $(3 \times 10^8 + D)$  meters (figure 2). A similar light signal possessing a frequency (*f*) of  $3 \times 10^8 \text{ Hz}$  and wavelength  $\lambda = 1 \text{ meter}$  is utilized. Utilizing the basic principle i.e.,  $D = V * T$ , the time taken by it to travel as of point *A* to *B* is found. As the distance was augmented by *D* meters, the light signal *C* must consume more than 1 sec to travel as of *A* to *B*, presuming that the light’s velocity was constant with the aid of the Special Theory of Relativity (STR). Yet, although the distance betwixt the ‘2’ objects were augmented by *D* meters, the light signal does not take more than 1 sec; the light signal consumes a similar period of time to attain the object *B*, that is, 1 sec. Thus, it is not simple to infer that the light velocity was not constant, and regarding time, it might be changing to satisfy the universe expansion principle.

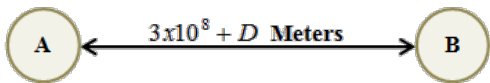


Fig. 2. The entire distance between ‘2’ objects, A and B will become  $3 \times 10^8 + D$  meters

ince the distance betwixt the ‘2’ objects is augmented by *D* meters, the time consumed to travel the signal as of *A* to *B* must not be equivalent to ‘one’ second if the light’s Velocity Limit (VL) does not change, which is not true. The light’s velocity may be varying over time, either increasing or decreasing, and the change is purely owing to the structure change of space. When gauged in any inertial frame, the light’s speed is constant in special relativity. The suitable generalization is that the light’s speed is constant in any freely falling reference frame (in an area small enough that tidal impacts can be ignored) in GR. In such a frame, owing to the impact of gravity (space-time curvature) on clocks along with rulers, the light’s speed can vary from *C*., On account of the structural change in space, which occurred with universe expansion, the change in light’s velocity takes place and it permits the light signal to travel at diverse speeds.

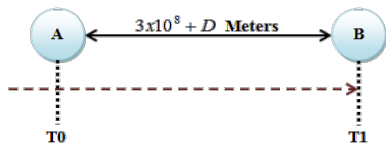


Fig. 3. Light’s velocity =  $3 \times 10^8$  meters/sec;  $T_1 - T_0$  is 1 sec

1) *Light Velocity Increasing or Decreasing?*

It can be affirmed from the abovementioned elucidation that the light’s velocity might not be constant in the actual universe. Regarding time, it could be either augmenting or declining. On account of the structural change in space, which occurred with

universe expansion, the change in light’s velocity takes place, and it permits the light signal to travel at diverse speeds. There are ‘2’ cases:

Case#1: Regarding time, the light velocity reduces, i.e., the velocity is inversely proportional to time.

$$C \propto \frac{1}{t} \tag{6}$$

Where, the light’s speed is symbolized by *C* and the time is seconds is indicated by *t*.

$$C = \frac{S}{t} \tag{7}$$

Where, the proportionality constant is indicated by *S*, and the term *t* has a diverse description; it is the total time span as of the day of light velocity began reducing as of the Big Bang (BB) time. In the earlier instance, via the distance betwixt the objects was augmented by *D* meters, the light signal *C* consume (figure 3) one sec to travel as of object *A* to *B*, which denotes the light signal velocity must be augmented to fulfill the criteria, the light’s velocity must augment to travel the  $(3 \times 10^8 + D)$  meters in one sec. It is obvious that the velocity is not reducing, it may augment with time. So, Case# 1 is invalid.

Case#2: Regarding time, light velocity increases, i.e., velocity is proportional to time.

$$C \propto t \tag{8}$$

$$C = St \tag{9}$$

To fulfill the fundamental principle of the universe expansion notion, presume that the light’s velocity is augmenting and express the proportionality constant *S* as a universal Space Constant.

2) *Calculation of Universal Space Constant*

It was perceived that the light’s velocity  $C = 299792458 \text{ m/s}$ , the age of the Universe  $t = 13.7 \text{ billion years}$ , approximately. By carrying out the following, the conversion of the universe’s age into seconds takes place.

$$\begin{aligned} t &= 13.7 \text{ billion years} \\ t &= 13.7 \times 10^9 \times 9 \times 365 \times 24 \times 60 \times 60 \\ t &= 432043200 \times 10^9 \text{ sec} \end{aligned} \tag{10}$$

By employing the values of *C* and *t* into equation (9), it is given as,

$$\begin{aligned} 299792458 &= S \times 432043200 \times 10^9 \\ S &= 0.693894 \times 10^{-9} \text{ m/s}^2 \end{aligned} \tag{11}$$

Hence,  $0.693894 \times 10^{-9} \text{ m/s}^2$  is the universal constant. Here, *S* is a constant with the unit  $\text{m/s}^2$  and it exhibits that the light’s velocity is not just augmenting but also accelerating regarding time to persuade the universe expansion, which is speeding up. In the earlier instance, after *X* million years, the distance

between the '2' objects are augmented by  $D$  meters along with the light velocity is augmented by  $Lm/s$ . Likewise, the distance between '2' objects will increase by  $2D$  meters subsequent to  $2X$  million years because universe expansion is accelerating. Light velocity is accelerated by  $2 Lm/s$  to satisfy this; next, the light signal can arrive at the 2nd object in the same period. In theory, it exhibits  $S$  is an accelerating constant.

3) *Is the light velocity changing over time?*

As of equation (11), for every 1 sec, Universal Space Constant  $S$  is  $0.693894 \times 10^9 m/s^2$  and there is a modification of  $0.69 \times 10^{-9}$  meters in the light velocity. Then, compute how much time it consumes to raise the light velocity by  $1m/s$  as,

$$0.699894 \times 10^{-9} \frac{m}{S^2} < \text{---} > 1sec$$

$$1 \frac{m}{S^2} < \text{---} > X(it's \text{ required value})$$

$$X = 1.411423 \times 10^9 sec$$

Converting the  $1.411423 \times 10^9$  sec into years

$$X = 0.45 \times 10^2 years$$

$$X = 45 years \tag{12}$$

For every 45 years, the speed of light is increasing by  $1 m/s$

So, it was not capable of detecting the variation in the lab environment since the augmentation in the light velocity was very small. According to the STR, the light's velocity is constant. Then, the notion is still valid at any provided instance of time but not over time, the proposed model is not infringing the STR.

4) *Is  $C = N\lambda$  affected by the Universal Space Constant?*

The earlier computations exhibit that light's speed is accelerating. Discover the wavelength along with frequency of the signal with an augment in velocity. The change in the light's velocity is owing to the structural change in space, which occurred with the universe expansion, and it permits the light signal to travel at diverse speeds and it engenders a modification in wavelength. According to basic principles,

$$C = N\lambda \tag{13}$$

Where, the light signal's frequency is indicated by  $N$  and the signal's wavelength is signified by  $\lambda$ . There are three scenarios.

- Case1:  $N$  augmented with augment in light velocity,  $\lambda$  as constant
- Case2:  $\lambda$  augmented with augment in light velocity,  $N$  as constant
- Case3:  $N$  along with  $\lambda$  are varying proportionally to boost in  $C$

**Case#1:** The frequency ( $N$ ) is augmented with the augmentation in light velocity, along with wavelength ( $\lambda$ ) is constant. Let, frequency  $N = 3 \times 10^8 Hz$  be the frequency of the light source and the light signal traveling betwixt '2' points having a distance of  $D = 1 meters$ . A wavelength of 1 meter is possessed by the light signal. At this moment, presuming no

difference in signal frequency, carry out the same experiment after 3 million years, i.e., the equipment produces a light signal with the same frequency  $N = 3 \times 10^8 Hz$ .

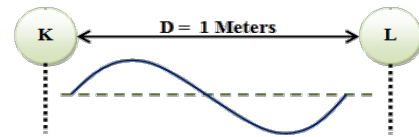


Fig. 4. The signal's frequency  $N = 3 \times 10^8 Hz$ , the signal's wavelength  $\lambda = 1$  meter

Then, owing to the universe expansion, the distance betwixt '2' points altered to  $D = 2 meters$ , so there will be a modification in wavelength. Next, after  $X$  million years, the same experiment is carried out. The equipment designed in such a manner that there would not be any modification in produced light signal frequency, that is,  $N = 3 \times 10^8 Hz$ . Owing to the universe's expansion, presuming that the distance between the '2' points exhibited in figure 4 augmented from 1 meter to 2 meters (figure 5), the augmentation in the distance of 2 meters might not be accurate. It was a hypothesis, but it is merely welded to explicate the theory. Since it is apparently exhibited that the device was capable of generating the same frequency that was generated million years ago, the frequency is always constant. Thus, the frequency does not vary; however, the other parameters vary.

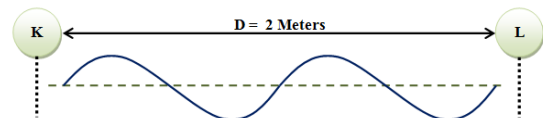


Fig. 5. The signal's frequency  $N = 3 \times 10^8 Hz$  Wavelength of the signal  $\lambda = 2$  meter

**Case#2:** Presume that the wavelength ( $\lambda$ ) is augmented with an augment in light velocity along with the frequency ( $N$ ) is constant. The frequency was not altered; however, after  $X$  million years, the distance betwixt '2' objects was augmented as of 'one' meter to 'two' meters owing to universe expansion in case#1. Hence, to uphold frequency as constant, the light signal wavelength should stretch by 1 meter.  $N = 3 \times 10^8 Hz$  is the signal's frequency and the signal's wavelength  $\lambda = 1$  meter; hence, regarding the change in time along with change in light velocity, it is displayed that the light signal's wavelength  $C$  is changing. In this, since the wavelength is wholly reliant on the space structure, wavelength  $\lambda$  is increased; it suggests that the wavelength augments but not the frequency. Thus, a similar wave attempts to stretch along with fit between the points.

**Case#3:** To the augmentation in the light velocity  $C$ , both frequency ( $N$ ) and wavelength ( $\lambda$ ) are changing proportionally. Rationally, it is inaccurate as verified that the signal frequency is constant in Case#1.

5) *Why is the Light Velocity a Function of Light? What happens if not?*

It is owing to the Hubble Constant as well as the fundamental principle in the universe expansion that Hubble law is known.

$$v = HD \quad (14)$$

$$H = \frac{1}{t} \quad (15)$$

$$\begin{aligned} H &= \frac{S}{C} \\ c &= St \end{aligned} \quad (16)$$

It is noted that the Hubble constant reduces in the event of light velocity augments as of the above computations. This is due to maintaining the universe expansion along with do not possessing an infinite-length universe, the universe dimensions are limited, however, the dimensions are extremely larger/broader. There is a possibility that the acceleration reaches where there is no universe at all if the universe acceleration is constant. Since light velocity never touches an infinite, the acceleration constant never equals to '0', which is a critical point. In this manner, the universe's expansion occurs, and it never exceeds a limit.

The light's velocity is a constant  $c$ ; the principle is valid at any instance of time but not forever in the universe, according to the STR. The new theory is not violating the STR. The space structure was the major reason for the constant VL. The universe space structure permits anything to travel at a velocity, i.e., termed the VL, which is equivalent to  $C$ . Nevertheless, the light particle's mass, like photons, will never be equivalent to '0'. Over time, the space structure changes so the velocity changes. Thus, in case of the object's mass is equivalent to the light photon, everything can accomplish the light's velocity. At the same velocity as the light  $C$ , the gravitational waves also travel.

### B. Acceleration Theory of the Universe

Acceleration Theory of Universe, a new concept, explicates how matter was formed in the universe. Initially, comprehending why Dark Energy (DE) is present in the universe, its significance, and why the universe is expanding is essential. Years ago, the Hubble Space Telescope (HST) observations of very far-away supernovae in 1998 displayed that the universe was expanding more gradually than it is now. Thus, the slowing down of the universe's expansion is not owing to gravity, but it has been accelerating. Ultimately, '3' kinds of explanations were presented by the theorists. It was the product of a long-forgotten version of Einstein's gravity theory, one with a "Cosmological Constant (CC)" in it. There were a few strange energy fluids filling the room. A sort of energy fluid that permeates the universe is DE. It was earlier stated that the cosmos was filled with unknown energy called Dark Energy that expands with the universe's expansion. Yet, there is a question of how matter is created in the universe and why Dark Energy exists. Hence, deem the universe is packed with an energy called space energy, which will be converted into subatomic particles when a light photon interacts with it. Space energy is not as similar as DE.

The space energy will be converted into particles, as well as the empty space acts as DE; it is accountable for holding objects together, which is a fascinating thing. What ensues if a light's beam, that is, photon falls on the space energy, along with what

sort of reactions can it make? Does the Photon transform the space energy into matter? Yes, the space energy will be transformed into subatomic particles, namely quark, electron, proton, neutron, et cetera, when a photon interacts with space energy. Then, these small matter particles will be assembled together to create the original atoms. After that, molecules are constructed, and ultimately, matter objects are formed as what we view currently in the universe. The space energy may have the ability to bend into any shape. In the early phases of the universe, there was an only light source that was created owing to the greater density along with pressure of the universe, and over time, the number of light sources augmented, so more amount of the space energy was transformed into matter, which is the foundation for the expansion.

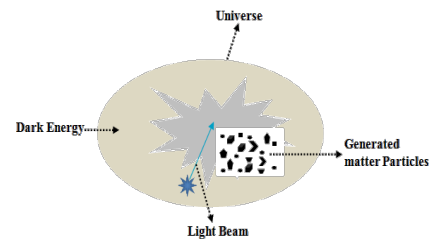


Fig. 6. Space energy

### 1) Impact on Hubble Constant

For further derivations, consider Hubble's equation.

$$v = HD \quad (17)$$

Where, the recession velocity is indicated by  $v$ , the Hubble constant is symbolized by  $H$  along with the distance is signified by  $D$ . The  $H$  is assessed as,

$$H = \frac{1}{t} \quad (18)$$

The universal constant is indicated as  $C = St$ , it will be derived in later sections.

From the above equations,  $H$  is depicted as,

$$H = \frac{S}{C} \quad (19)$$

It is apparent that the Hubble acceleration constant is reducing with a raise in the light velocity as of equation (19), which does not imply the universe is negatively reducing. It is the rate at which the Hubble constant is reducing, it is decelerating. The number of new spaces formed was constant even though the Hubble constant is reducing.

$$HC = S \quad (20)$$

It is obvious that always, the new space formed was constant. It is as well one of the major causes for acceleration continuously decreasing. Because the light velocity never becomes infinity, the Hubble constant never becomes '0'. The Hubble constant  $H$  along with light velocity  $C$  is

interdependent. It can be deduced that the universe's accelerating rate is the number of photons falling on space energy as more number of mass particles are produced from time to time. Regarding time and maintaining the relative velocity of a frame as constant, an object's mass reduces by utilizing the Light's Acceleration Theory,  $C = St$ . So, the energy produced as a particle stays constant.

2) *How the mass of the generated particles affected*

The mass of an object/particle reduces with regard to time by maintaining the frame constant's relative velocity, according to the theory, that is, Acceleration Theory of Light,  $C = St$ . Hence, even though the light's velocity increases, the energy produced from a particle will be the same. The derivation for the above statement is executed as follows: As of the relative theory, it is given as,

$$m = \frac{m_0 v}{\sqrt{1 - \left(\frac{v}{c}\right)^2}} \tag{21}$$

Where, an object's mass in a frame is indicated by  $m$ , the initial mass in a reference frame is symbolized by  $m_0$ , the velocity of the given frame is signified by  $V$ , and the light's speed is specified by  $C$ . At a particular period in the future, let  $t = t_1$ , the velocity becomes  $v = \frac{c}{2}$ . Substitute  $v = \frac{c}{2}$  in equation (21),

$$mt_1 = \frac{m_0}{\sqrt{1 - \left(\frac{\frac{c}{2}}{c}\right)^2}} \tag{22}$$

$$mt_1 = \frac{m_0}{\sqrt{\frac{3}{4}}} \tag{23}$$

$$mt_1 = \frac{2m_0}{\sqrt{3}} \tag{24}$$

Where,  $mt_1 = \text{object mass at time } t_1$ . Consider that the light's speed is augmented from  $C$  to  $2C$  at some point; however, the frame's velocity is the same. Then, at a certain time in the future  $t=t_2$ , the velocity turns out to be  $v = \frac{c}{2}$  and  $c = 2c$ . Substitute  $v = \frac{c}{2}$  and  $c = 2c$  in equation (15),

$$mt_2 = \frac{m_0}{\sqrt{1 - \left(\frac{\frac{c}{2}}{2c}\right)^2}} \tag{25}$$

$$mt_2 = \frac{4m_0}{\sqrt{15}} \tag{26}$$

It is obvious that  $mt_2$  is less than  $mt_1, mt_2 < mt_1$  when equations (18) and (20) are compared.

3) *How planck constant affected*

The planck's energy equation is given as,

$$E = hf \tag{27}$$

Where, the light signal's energy is symbolized by  $E$ , the

planck's constant is exhibited by  $h$ , and the light signal's frequency is indicated by  $f$ . The Einstein mass-energy equation is expressed as,

$$E = mc^2 \tag{28}$$

Where, a given particle's energy is represented by  $E$ , the particle's mass is articulated by  $m$ , along with  $c$  is the speed of light. Substitute equation (22) in (23).

$$hf = mc^2 \tag{29}$$

$$c = f\lambda \tag{30}$$

Regarding time, the light's velocity  $c$  increases, and the light signal's wavelength augments as of the new theory of light. It is mentioned that the mass of the produced particles reduces over time. Then, regardless of change in  $m, c, \lambda$ , the Plank Constant  $h$  remains constant forever.

4) *Total available space in the universe*

The experiments verified that the universe has an age of approximately 13.7 billion years, in relation to the Big Bang (BB) theory. Compute the entire available free space in the universe by considering the universe age as one of the parameters. From the previous derivations, the Acceleration Theory of Light  $C = St$  is utilized for the computation. Where, the universe's age in seconds is indicated by  $t$ .

$$\begin{aligned} \text{Universe length } L &= \sum_{i=1}^{13.7 \text{ billionyears}} 0.6938 \times 10^{-9} \\ &= 1(0.6938 \times 10^{-9}) \\ &+ 2(0.6938 \times 10^{-9}) + \dots + 13.7 \text{ billionyears}(0.6938 \\ &\times 10^{-9}) = 0.6938 \times 10^{-9}(1 + 2 + \dots + 13.37 \text{ billionyears}) \end{aligned}$$

Convert 13.7 billion years into seconds

$$\begin{aligned} &= 0.6938 \times 10^{-9}(1 + 2 + \dots + 432043200 \times 10^9) \\ &= 0.64 \times 10^{26} \text{meters} \end{aligned}$$

Length of the universe,

$$L = 6.4 \times 10 \text{ meters} \tag{31}$$

This is not exactly the universe's total dimension; however, it is the total free space available in the universe.

C. *Acceleration Theory of Matter*

Diverse types of matter particles and their properties are discussed. Consider the Photo-Electric Effect for mathematical equations.

$$hf = KE + W_0 \tag{32}$$

Where, the plank's constant is  $h$ , the frequency of light of signal is symbolized by  $f$ , the Kinetic Energy (KE) of the photon is specified by  $KE$ , which is equivalent to  $(mv^2/2)$ , the velocity at produced photon moves, the work function that is delineated as the smallest energy needed to emit a photon is

symbolized by  $W_0$ , and the photon's energy is  $hf$ . When a light photon interacts with space energy, the space energy will be transformed into matter particles, as stated by the Acceleration Theory of the Universe. Substitute the work function  $W_0$  with mass-energy equivalence theory,  $E = mc^2$ , which is equivalent to the produced matter particle's energy. It is mentioned that the energy is stored in newly produced matter particles.

$$W_0 = mc^2$$

$$hf = KE + mc^2 \quad (33)$$

$$hf = \frac{mv^2}{2} + mc^2 \quad (34)$$

Certain frequency is possessed by the space energy at which the matter particles could be produced. Threshold Frequency (TF) range is the frequency needed to transform the space energy into matter particles.

$$\text{Threshold frequency} = f_0 \quad (35)$$

The produced particles will not possess any KE at precisely the threshold frequency range.

$$KE = 0 \text{ at } f_0 = 0 \quad (36)$$

$$hf = 0 + mc^2$$

$$hf = mc^2 \quad (37)$$

#### 1) Light frequency versus Threshold frequency range

The answer to the following question is discovered here: "if the photon frequency isn't equivalent to the threshold frequency (TF) range, either the light frequency could be below or above a given TF range." Hence, the following '3' conditions are formed.

**Case#1:** Light frequency  $\sim$  threshold frequency (TF) range  $F=f_0$ . At the TF range  $KE=0$ , the Kinetic Energy (KE) of produced particles is equal to zero. Substitute  $KE=0$ ,  $hf=mc^2$  is obtained. At the threshold frequency (TF) range, the produced particles would not have any KE, so the particles would not budge on their own and it needs external energy to budge. As a result, these particles rely on the Gravitational Force (GF). These types of particles are termed the Regular matter particles, which are viewed in the real world.

**Case#2:** Light frequency  $>$  TF range  $f > f_0$ . It was viewed earlier that  $hf_0=mc^2$ , where, the lowest energy needed to produce a particle as of the space energy is  $hf_0$ . The frequency is more than the TF range in this condition, so the photon's energy is more than needed. Hence, extra energy will act as KE of the produced particles.

$$\begin{aligned} hf &= KE + m_0c^2 \\ KE &= hf - m_0c^2 \end{aligned} \quad (38)$$

$$KE = +ve \text{ energy, because } hf > m_0c^2 \quad (39)$$

These particles go with positive KE, i.e., centered on the light frequency, the produced particles will have diverse KE levels and diverse particles budge at diverse velocities. These types of particles are termed as Dark matter (DM) particles.

**Case#3:** Light frequency  $<$  TF range ( $F < f_0$ ). In this,  $KE = -ve \text{ energy, because } hf < m_0c^2$ . The Antimatter (AM) particle, which is the created particle, will have negative KE. When Antimatter (AM) particles collide with Dark matter particles with an equal quantity of positive KE and release energy, the annihilation process takes place. If it is presumed that the frequency accessible below the TF range is lesser than the frequency available above the threshold, in the previous condition, there is a higher probability of possessing Dark matter particles than Antimatter (AM) particles. Moreover, even though Antimatter particles are very rare in the universe, the Anti Matter particles collide with Dark matter (DM) particles that have similar positive energy.

#### 2) Subatomic Particles generated from Space Energy; Quark, Electrons, Protons, Neutrons, and so on

There should be something that can be turned into particles since particles cannot be formed out of the thin air. As mentioned earlier, when a light photon with a frequency within the gamut of a threshold value engenders the creation of subatomic or fundamental particles from space energy, normal matter is generated. Distinct kinds of subatomic particles are engendered by diverse frequency ranges, which are given below.

1. Fermions are one of the two basic classes of particles, the other being bosons. The Fermions possess half-integer spin; all known elementary fermions will have  $1/2$  spin.
2. The basic constituents of hadrons are quarks and interact through strong Force (SF). Totally, there are 6 quarks: up, down, charm, strange, top, along with bottom.
3. Leptons do not interact through strong interaction. The irrespective antiparticles are the anti-leptons, which are alike, besides that, they hold the opposite electric charge and lepton number.
4. One of the two basic classes of particles is Bosons and fermions. Bose-Einstein statistics characterize the Bosons, and all possess integer spins. Bosons may be either elementary, like photons and gluons.
5. '2' up and '1' down quark (*uud*) are encompassed in Protons.
6. Neutrons consist of '2' down and '1' up quark (*ddu*).
7. Electrons are one of the Lepton charged particles.

Discover at which frequency the electrons, protons, and neutrons could be produced from space energy. Relative masses of the subatomic particle (Neutron =1, Proton =0.99862349, and Electron=0.00054386734). Masses of the subatomic particle in eV (Neutron = 939.56563 MeV, Proton =938.27231 MeV, and Electron = 0.51099906MeV). Discovering neutron energy centered on the relative mass of electron and neutron mass promotion alto energy: ((E) 0.00054386734 = 1.602176634 x 10<sup>-19</sup>J) (N-1=NE), where NE is neutron energy. NE=1.602176634 x10<sup>-19</sup>/0.00054386734, which implies that

NE = 2945.8960231 x 10<sup>-19</sup>J. Finding Proton Energy (PE) centered on relative mass is promotional to Energy, which is indicated as (E) 0.00054386734 = 1.602176634 x 10<sup>-19</sup> J(P) and PE=0.99862349. The PE is given as:

$$PE = 1.602176634 \times 10^{19} \times 0.99862349 / 0.00054386734$$

$$PE = 2941.840967765 \times 10^{-19} \quad (40)$$

### 3) Frequency calculation of basic particles, quarks & electrons electron

Discovering the photon frequency at which the electron will be produced is computed as,

$$hf = E + \Delta \quad (41)$$

$$f = \frac{(E+\Delta)}{h} \quad (42)$$

By employing the  $E, f,$  and  $h$  values, the equation is given as,

$$fe = (1.602176634 \times 10^{-19} \text{ J} + \Delta) / 6.62607004 \times 10^{-34} \text{ J-s}$$

$$fe = 0.241798928 \times 10^{15} \text{ per sec}$$

$$fe = 2.41798928 \times 10^{14} \text{ per sec} \quad (43)$$

Photons having a frequency of 2.41798928x10<sup>14</sup> Hz could generate an electron from space energy. Here, the frequency needed to produce the Dark Energy (DE) in the process of producing an electron subatomic is indicated by  $fe$ .

#### (a) Up Quark

The up quark energy ( $UE$ ) is calculated as,

$$Ue = 2/3 \text{ (electron energy)}$$

$$Ue = 2/3 * (1.602176634 \times 10^{-19} \text{ J})$$

$$Ue = 1.068117756 \times 10^{-19} \text{ J} \quad (44)$$

$$UF = (1.068117756 \text{ J} \times 10^{-19} \text{ J} + \Delta) / 6.62607004 \times 10^{-34} \text{ J-s} = 1.61199285 \times 10^{14} \text{ per sec} + Fuq \quad (45)$$

The up quark frequency ( $UF$ ) is computed as,

$$UF = (1.068117756 \text{ J} \times 10^{-19} \text{ J} + \Delta) / 6.62607004 \times 10^{-34} \text{ J-s} = 1.61199285 \times 10^{14} \text{ per sec} + Fuq$$

Where, the frequency needed to produce the Dark Energy in the process of producing an up quark subatomic is signified by  $Fuq$ .

#### (b) Down Quark

The down quark energy ( $DE$ ) is calculated as,

$$DE = 2/3 \text{ electron energy}$$

$$= 1 * (1.602176634 \times 10^{-19} \text{ J}) / 3$$

$$= 0.534058878 \times 10^{-19} \text{ J} \quad (46)$$

Down quark frequency,

$$DF = 0.534058878 \text{ J} \times 10^{-19} \text{ J} + \Delta) / 6.62607004 \times 10^{-34} \text{ J-s} = 0.080599643 \times 10^{14} \text{ per sec} + fdq = 8.0599643 \times 10^{12} \text{ per sec} + fdq \quad (47)$$

Where, the frequency needed to produce the Dark Energy in the process of producing a down quark subatomic is symbolized by  $fdq$ .

### D. Multi-Universe

The notion of a multi-universe is quite feasible with the proposed concept since there could be multiple places in which the initial light is produced and started converting space energy into matter, which turns out to be another universe. It is fairly probable that the two nearby sub-universes would combine and turn out to be a single big universe at some point in the universe.

#### 1) Gravity, Gravitational Effect

Gravity is a Dark Energy's (DE) feature when the Dark Energy spectrum is perturbed by a large, huge object, gravity. The Dark Energy is squeezed and seeks to drive objects towards the earth when a big object like the earth appears. It is not that the object is being pulled towards the earth by gravity, but rather by DE. Particles like neutrons, electrons, and protons will not exhibit gravitational qualities since the DE's effect on these particles is low or non-existent at the nano-scale. Gravitational effects could be observed only when the Dark Energy is disturbed. There is a potential that Dark Energy will be discovered if nano-scale particles, namely neutrons, electrons, and protons, are launched into space. In a layer-by-layer fashion, the Dark Energy is distributed across the universe; hence, any object in one layer will try to remain in the same layer until and unless there is an external force, which engenders it to switch to another layer. The vital thing was that the Acceleration theory should be capable of providing a theoretical explanation for why earth-like objects move around big objects like the sun? The reason is that massive objects like the Sun disturb the Dark Energy (DE) to a greater level, so there will be more compression of Dark Energy (DE) around the sun, and this compressed Dark Energy engenders an impact on other objects present in the nearby region.

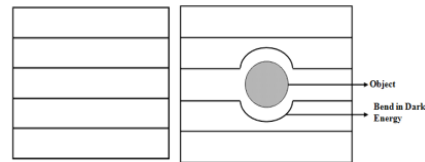


Fig. 7. Gravitational effects

### E. Gravity and Black Hole

As per the notion, gravity is not a property of matter. It is one of Dark Energy's (DE) characteristics. Deem burning papers in a container, which generates ashes and smoke. Smoke expresses the Dark Energy (DE), whilst the ashes are the subatomic particles generated. Ashes try to form large objects over time by swirling around in the smoke. In this scene, the matter objects disturb the smoke and try to put forth force on the outer layers of the haze. The gravitational effect is when compressed Dark Energy (DE) attempts to drive back towards the item. Accordingly, gravity is a property of Dark Energy (DE); Dark Energy is quantized; thus, gravity is too. Astronauts walk within the spaceship with less gravity as the amount of Dark Energy disrupted or compressed in space is restricted. No gravitational effect is possessed by Neutrinos; this could be



owing to their very small size, which permits them to escape from Dark Energy (DE). How mass and momentum bend space-time is explicated by the Einstein field equation, and it predicts gravitational waves. The new theory proposes that Dark Energy (DE) spreads equally throughout the cosmos, i.e. when a mass object is present, it bends, and when a larger mass object is present, it stretches.

After that is a Black Hole (BH); an area of space-time in which gravity is so powerful that no particles or even Electro Magnetic (EM) radiation, namely <https://en.wikipedia.org/wiki/Light> cannot escape from it, is called a Black Hole (BH). The boundary of no escape is termed the event horizon. As per General Relativity (GR), it has no locally detectable features even though it has a large influence on the fate along with conditions of an object crossing it. A Black Hole (BH) serves like a perfect Black body, as it reflects no light. Furthermore, the event horizons emit Hawking radiation is predicted by quantum field theory in curved space-time, with a similar spectrum as a black body of a temperature inversely proportional to its mass. As this temperature is around billionths of a Kelvin for Black Hole's of stellar mass, it is unfeasible to view directly. As per the Acceleration Theory, to comprehend the Black Hole (BH), deem a water tank with a small hole on top of it filled with water, no gaps inside the tank, and no space for an air particle to fit. Push '2' medium-sized balls into the tank; the balls will exert immense pressure on the water surrounding them. The pressure on the small object is appended by placing a little object between the two balls. Then, try to open the top of the tank's hole. The first thing that happens is the little object trying to exit the tank. A similar thing occurs with DE, which manifests as a large object in space.

#### F. How is an Atom created from the subatomic particles?

Only if the subatomic particles' weight / charge is equal to a specific weight / charge, any subatomic particles will be stable in the universe. Owing to this, quarks form either neutrons or protons to come to stable and exist in the universe. These subatomic particles unite together to form atoms. The exciting thing is the quarks form neutrons / protons, and these subatomic particles attract each other and form a nucleus. Afterward, the nucleus attracts electrons to form a stable atom. There is a probability in the universe that there could be a number of diverse subatomic particles that exist like quarks, which were produced owing to greater light frequency. A charge is equal to the electron. These subatomic particles assemble to form atoms. Let a charged particle (e.g. an electron) that develops an electric field around itself and always is spreading (propagating) Virtual Photons (VPs) be deemed. The field of propagation of this electric field is infinite. There is no alteration in the electric charge and mass of charged particles by emitting Virtual Photons (VPs) that carry electric force (it carries electrical energy too), as per prominent physical laws. Hence, it is implied that there is an electric field around any charged particle. There is no description of how this field developed and what is its interaction with other electrical and non-electrical fields, also encompassing gravity.

- Matter Particles with zero Kinetic Energy (KE), serve as Regular matter (RM): i.e.  $KE = 0$
- Matter Particles possessing positive KE serve as Dark Matter (DM); i.e.  $KE = \text{positive energy (+Ve energy)}$
- Matter Particles possessing negative Kinetic Energy (KE) serve as Antimatter (AM); i.e.  $KE = \text{negative energy (-Ve energy)}$
- If the particle's energy levels are equal but have opposite polarity, AntiMatter (AM) particles collide with Dark Matter (DM) particles. Owing to the Annihilation Process, the collision releases the utmost amount of energy.

#### G. How different atoms / elements formed in the universe

As we knew, the actual matter particles formed from subatomic particles; detailed explanation was provided in the previous chapters how the subatomic particles were generated in the universe. It's centered on the frequency range of light in that region. There exists N number of different sub-atomic particles in the universe, namely quarks, electrons, etc., as of the previous topic. A basic atom like a Hydrogen atom is created by these subatomic particles that have one proton, one neutron, and one electron. Near the solar system, Hydrogen is present, and there is the highest probability that diverse types of basic atoms are present in the universe like Hydrogen. In the universe, the entire elements are derived from the star's high pressure or amid a star's violent death. However, a few elements are not "star stuff". Hydrogen traces its lineage back to the BB. In trace amounts, other elements, say helium, francium, along with plutonium, are generated by the decay of uranium. Trace amounts refer to if all the naturally present plutonium in the earth is amassed, one could approximately get 0.05 grams of fit.

#### H. Four different forces

In this, the '4' diverse forces, namely Strong nuclear force, Electro Magnetic Force, Weak Force, and Gravitational Forces are presented. The strongest of all '4' forces is an SF. It is the force that keeps neutrons and protons together, with quarks inside. The strong nuclear force, the EF, and the WF are quantized out of '4' forces, but gravity is not. Thus, gravity is dissimilar from other forces. The gravitational Force (GF) is not a pull force from matter/earth; however, it is a push force from the DE, in accordance with the new theory. In the process of converting space energy into subatomic particles, Dark Energy (DE) was produced when space energy interacted with light. It was apparent that light was quantized and produced sub-atomic particles that were discrete. Hence, the produced Dark Energy must be discrete and must be in the form of packets. The GF would also be discrete, which was engendered by the DE. In the form of layers, Dark Energy is distributed all over space vertically and horizontally; the nucleus and electron subatomic particles remain in the Dark Energy layers. The Dark Energy layers are disturbed by the nucleus, and pressure on the outer Dark Energy layers is created. Similarly, just like orbits, electrons will align with the Dark Energy layers, and every electron orbit aligns with each of the Dark Energy layers. To

keep rotating, the Dark Energy layers supply needed energy.

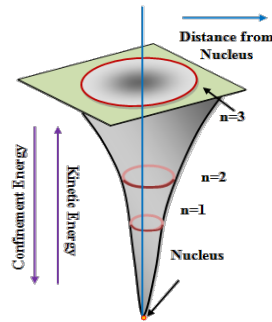


Fig. 8. Conversion of DE

To form a stable atom, the sub-atomic particles come together. The amount of energy needed to hold the subatomic particles within the nucleus is equal to the Dark Energy packet or Dark Energy field. A particular number of neutrons, protons, and electrons are possessed by one sort of atom. This could be owing to the number of subatomic particles found in the process of constructing an atom; it is all dynamic. At any given time, it could be interchangeable, for instance, changing Hydrogen into Helium.

In the form of layers/mesh, the Dark Energy (DE) is distributed ubiquitously in the space vertically and horizontally; the nucleus and electron subatomic particles line up in the Dark Energy layers. It is already known that the nucleus has a certain weight, and it disturbs the Dark Energy layers and develops pressure on the bottom/outer Dark Energy layers. It is similar to a ball on a Trampoline jumping; likewise, electrons will align with the Dark Energy layers, similar to orbits, and every electron orbit aligns with each of the Dark Energy layers. To remain rotating, the Dark Energy layers supply required energy. The novel concept recommends that a photon is a unique energy packet that can travel via the Dark Energy layers, which implies the photon packet size is below the Dark Energy (DE) mesh holes that permit traveling through.

### I. Supporting Big Bang

The whole thing in the entire universe was condensed in an infinitesimally small singularity, a point of infinite denseness and heat, approximately 13.7 billion years ago. I have proposed a concept that conveys that the BigBang (BB) is nothing but when the space energy begins converting to Dark Energy (DE) and particles, firstly, the process was so rapid that it seemed like a BigBang (BB).

## 4. Conclusion

The examination revealed that the velocity of light may not be constant; it could be undergoing acceleration, albeit at an extremely minimal rate as discussed in the first section. According to this analysis, the velocity of light is projected to increase by '1' meter every 45 years due to structural changes in the universe and bonds within empty space. Additionally, gravitational waves, as verified by General Relativity (GR), may contribute to variations in the notion of light velocity. While light speed was initially thought to be independent of

relative frames, it is now understood to be entirely dependent on Dark Energy (DE).

The novel theory introduces the concept of Space Energy, explaining that when a light photon interacts with space energy, the latter transforms into subatomic particles, subsequently releasing a small amount of Dark Energy (DE). The Dark Energy (DE) plays a crucial role in holding objects together in space. Furthermore, the newly produced matter in the future acts as a light source, continually converting space energy into matter. The work also illustrates the outcomes of diverse particle matter interactions, showcasing the conversion of space energy into different subatomic particles.

The proposed concept suggests the possibility of multiple universes. Gravity is redefined as not being a pull property of matter but rather the push force of Dark Energy (DE). When two or more massive objects approach each other, Black Holes (BHs) form, causing more disturbance in the DE spectrum and generating a significant push force. This results in a substantial gravitational force, pulling objects towards each other at a higher speed, potentially approaching the speed of light. Black Holes encompass light within them, and when photons interact with space energy packets, subatomic particles are produced. This process not only creates subatomic particles but also releases energy known as Dark Energy (DE). Regardless of the input photon energy, Dark Energy (DE) is identified as a universal constant.

In summary, the new theory strongly posits that the fundamental principle governing actions in the Universe is one of acceleration and deceleration. This perspective suggests that these dynamic forces play a central role in shaping the various phenomena observed across the cosmos.

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