UNIFIED THEORY'S NON-EXPANDING UNIVERSE REPLACES BIG BANG & STEADY STATE THEORIES OF EXPANDING UNIVERSE

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In a universe expanding as per the Big Bang or Steady State theory the cosmic redshifts should increase exponentially with time, which is not actually observed. So the universe is NOT expanding. In Unified Theory's non-expanding universe the total energy-mass content is eternally conserved with NO 'initial creation of matter from nothing' in a single big explosive event of the Big Bang theory or continuously as in the Steady State theory. The cosmic redshift is caused not by Doppler effects of receding velocities of stellar light sources but by depletion of photon energy during long passage through the sharmon medium due to non-Doppler effects of gravitational, electromagnetic & viscous losses. Cosmic microwave background follows naturally and plausible explanation given to the observation on Ia type supernovae, which has amazed & horrified the astronomers. Halton Arp's observation of high-redshift quasars in the vicinity of low-redshift parent star systems is also explained. There is no antigravity force permeating space and no likelihood for the universe to become empty ever in future. Age of the non-expanding universe is about 45 billion years. Dark energy and dark matter are related to the Sharmon medium. Realistic theory of Non-expanding universe replaces Big Bang & Steady State theories of expanding universe.

This paper will mainly present the theory of the non-expanding & non-contracting universe under the Unified Theory [1]. A reappraisal of the current Big Bang [2] and Steady State [3] theories of expanding universe will also be given. Outstanding observations and problems of cosmology will be discussed in the light of the theories of expanding and non-expanding universe. A crucial experiment will be proposed to test whether the universe is actually expanding or is non-expanding.

1. **The Cosmological red shift**

Astronomer Edwin Hubble was the first to observe in 1920s that the spectral lines in the light from distant galaxies are shifted towards the red end of the visible spectrum with an increment of their wavelength. If λ is the original wavelength and λ' ($>\lambda$) of the same spectral line in the light from the galaxy as received by an observer on earth, the red shift is $Z = (\lambda' - \lambda)/\lambda$. But since λ is connected with frequency ν to the light velocity $c = \lambda\nu$, we also have the red shift

$$Z = \Delta\lambda/\lambda = -\Delta\nu/\nu.$$

Lemaitre & Gamow attributed this red shift to the Doppler effect due to recession of galaxies. But in Unified Theory's [1] non-expanding universe it is caused by the depletion ΔE of spectral photon energy ($E=h\nu=hc/\lambda$) during the long passage through the sharmon medium. Therefore
$$Z = \Delta\lambda/\lambda = -\Delta\nu/\nu = -\Delta E/E.$$

2. Optical Doppler effect in expanding universe

The Doppler redshift is basic to the theories of expanding universe. The relative motion between the observer and the source of light causes an apparent change in the wavelength, called "Doppler Effect". But the phase remains invariant to the Lorentz transformations. It has been shown in Chapter-14 sec.14.3 of the 2008-eBook ref. [1] that the Doppler red shift for $v < c$ is given by

$$Z = (\lambda' - \lambda)/\lambda = \Delta\lambda/\lambda = v/c.$$

2.1. *The Hubble's law for expanding universe*

Edwin Hubble had observed that "*fainter (more distant) the stellar source the more red-shifted light (of lower frequency and higher wavelength) it emits*" or the cosmological red shift Z increases directly with the distance D of the light-emitting galaxy. That is,

$$Z = ((\lambda' - \lambda)/\lambda) \propto D.$$

This with the above equation leads to the Hubble law

$$V = HD$$

wherein V is the velocity of receding galaxy. The Hubble constant $H = V/D$ has the dimension of time inverse $(1/t)$ and is a measure of the rate of expansion of the universe V/D. The intervening cosmic dust can scatter away the incoming light from the stellar source to decrease its brightness and make it fainter to appear distant.

3. The redshift in the non-expanding universe

3.1. *The non-expanding & non-contracting universe*

According to Unified Theory the eternally conserved most basic total cosmic substance constitutes an eternally existing 'primordial cosmic body' herein named as the '**Megovum**', meaning the 'big egg' for mega (extremely big) and ovum (egg) as it gives rise to all in the Cosmos including, but not limiting to, the perceptible material universe. The megovum does not originate or come from anywhere but has always existed in the entire past and will always exist in the entire future. The actual perceptible universe is created from a part of the megovum. The inward contracting pressure due to self-gravity of the total mass-energy content is counter balanced by the outward expanding pressure due to intra-universe kinetic motions. Due to lack of precise knowledge about the dimensions and mass distributions in the actual universe the mathematical balancing relation cannot be established. But the perceptible material universe remains non-expanding and non-contracting [1]. See also sec. 9 below.

3.2. *The red shift due to non-Doppler effects in non-expanding universe*

The combined non-Doppler effects of gravitational, electromagnetic (resistive plus inductive) and viscous losses cause the cosmological red shift. These losses deplete the energy $E = h\nu$ of the sharmon-composed spectral light photon by $\Delta E = h.\Delta\nu$, thereby shifting the wavelength $\lambda = c/\nu$ by $\Delta\lambda$ towards red end of the spectrum. The red shift is given by

$$Z = +\Delta\lambda/\lambda = -\Delta\nu/\nu = -\Delta E/E = \lambda.\Delta E/hc.$$

3.2.1 *Red shift due to gravitational losses*

First, if the light from a galaxy distant D passes through distances D_1, D_2, D_3, ..., D_n of n regions with +ve or -ve gravitational accelerations g_1, g_2, g_3, ..., g_n the gravitational depletion from the spectral energy quantum will be $\Delta E = (hn/c^2)\sum g_n D_n$ and the gravitational red shift

$$Z_g = \sum g_n D_n /c^2 = K_g D.$$

As the regions with +g and -g are crossed alternately on the way, net K_g is expected to be negligible. Finally, if U_2 is the gravitational potential around the distant source and U_1 for the observer on earth, the resultant red (increment of wavelength) or violet (decrement of the wavelength) shift would be $\pm (U_2 - U_1)/c^2$.

In Special Relativity the redshift results from time-dilatation. Gravity Probe A was therefore launched in 1976 to test the time dilatation. Its findings are consistent with Unified Theory [1].

3.2.2. *Red shift due to Electromagnetic losses*
Secondly, since propagation of electromagnetic wave in the sharmon medium involves real displacement currents, the resistive as well as the inductive (electric & magnetic) losses are proportional to the distance D. The electromagnetic red shift becomes

$$Z_{em} = K_{em}D.$$

But these too are insignificant losses because the electrical resistance of the sharmon medium is extremely high. Therefore, K_{em} like K_g is also very small.

3.2.3. *Red shift due to viscous losses*
This will require the viscosity of the sharmon medium for which its rigidity is needed.

3.2.3.1 *Rigidity or shear elasticity of the sharmon medium*
The modern physics rules out shearing stresses and strains in fluids, but Unified Theory admits them as transients e.g. during propagation of transverse gravitational waves in the sharmon medium. The propagation velocity $V_g = (e_r/d_s)^{1/2}$ is set by the rigidity or shear elasticity e_r and the density d_s of the medium. It is equal to light velocity $c=2.9979 \times 10^{10}$ cm/sec. So, $e_r = 4.6875 \times 10^{-12}$ dyne/cm^2 as compared to adiabatic volume elasticity of air at N.T.P. 1.45×10^6 dyne/cm^2, and in striking contrast to "extremely more rigid than air" classical ether.

3.2.3.2 *The viscosity of sharmon medium*
For a fluid (liquid or gas), the viscosity is related to rigidity as sliding friction is to static friction, all involving transverse forces. The volume elasticity involves a longitudinal force, hence is larger than the rigidity. Since the viscosity of air (1.77×10^{-4}) is 1.22×10^{-10} times its volume elasticity (1.45×10^6), we can roughly take the viscosity of sharmon medium as $\eta = 4.68 \times 10^{-12} \times 1.22 \times 10^{-10} \times 0.1 = 0.5709 \times 10^{-22}$ dyne.sec/cm^2 vis-a-vis its rigidity 4.68×10^{-12}.

This choice of the empirical multiplication factor 0.1 roughly allows for the non-spherical enlongated shape and small size of the sharmons in the free sharmon medium as an open system, as also for the contribution of the 0-spin sharmons. Most importantly, the calculated red shifts and Hubble constants agree with observations. See below.

3.2.3.3 *The viscous red shift*
According to Stoke's law the sharmon aggregate of spectral energy quantum $h\nu$ of spherical radius r, in traveling a distance D through the sharmon medium of viscosity η [1] suffers a viscous loss $\Delta E = 6\pi r\eta Dc$. It produces a viscous red shift

$$Z_v = 6\pi r \eta D \lambda / h = K_v D.$$

Here the energy loss is reflected in the increase of wavelength λ because the velocity c of the photon remains unaffected. But, for the motion of a large body in a viscous fluid velocity v decreases to mark the loss of its kinetic energy $\frac{1}{2}mv^2$.

As an example, for the sodium yellow light $\lambda = 5890 \times 10^{-8}$ cm, the $h\nu = hc/\lambda$ quantum with sharmon energy quantum $\Delta E_s = 4.66 \times 10^{-25}$ erg, has $n_s = hc/\lambda\ \Delta E_s = 3.6146 \times 10^{14}$ sharmons or $n_c = 2n_s$ cosminos each having a radius $r_c = 0.8078 \times 10^{-33}$ cm. Taking the photon as a sphere of closely packed cosminos its radius becomes $r = r_c \cdot (n_c)^{1/3} = 7.24 \times 10^{-29}$ cm. Thus, the photon radius is inversely proportional to the cube root of the wavelength of the electromagnetic wave. With $\eta = 0.5709 \times 10^{-22}$ dyne.sec/cm^2 [1],

$$K_v = 0.69249 \times 10^{-27} \text{ cgs units.}$$

If the distance D consists of n sections $D_1, D_2, ... , D_n$ having viscosity $\eta_1, \eta_2, ..., \eta_n$, then

$$Z_v = 6\pi\, r\, c\, /\, h \sum \eta_n D_n .$$

The total non-Doppler red shift in the non-expanding universe is Z = KD where the total

$$K = K_g + K_{em} + K_v$$

of which K_v, for the viscous loss, is the most prominent.

To these can be added the Doppler red (increment of wavelength) or violet (decrement of wavelength) shift $Z_D = \pm V/c$ of local origin, if any.

When a supernova explodes a burst of sharmons is showered into its ambient environment, which raises the viscosity η and the constant K_v of the light-propagating medium in its surroundings. The resultant rise in the observed redshift Z leads to overestimation of the source-distance D ($\propto$ Z) and of the expansion rate of the universe V/D=H ($\propto$ Z). But these rises in the $cK_v = H$ etc. are *local effects* and do not signify any generalized property of the whole universe permeating space. See also below.

4. **The Hubble constant in expanding and non-expanding universe**

The numerical value of the Hubble constant H comes to 1.8×10^{-4} when D is measured in light years and V in kilometers per second [2]. However, there is no general agreement on the precise value of H, which therefore is controversial.

In the theories of expanding universe, Doppler red shift Z = V/c and Hubble's law V = HD connect the receding velocity V of the galaxy with its red shift Z and distance D. This gives the constant cK_v (= H) = 2.076×10^{-17} cgs units or 67.5 Km/s/ Mps in Unified Theory [1]. It can be compared with the constant H = 1.91607×10^{-17} cgs units or 62.3 Km/s/Mps for Big Bang theory given by Gamow [2] and 58 - 73 Km/s/Mps as observed later [4].

The Hubble constant H loses its original meaning and significance in the new theory of non-expanding universe since there is now no receding velocity V for the Hubble's law V = HD.

The redshift Z can be used to estimate the distance of the light source D=Zc/H in expanding universe. For the non-expanding universe, however, D = Z/K, as below.

5. **Theories of Expanding Universe**
5.1. *The Big Bang Theory*

Abbe Georges Edouard Lemaitre during 1920s developed the hypothesis that the interpretation of the cosmological red shift as optical Doppler effect suggests an expanding universe, which began with a violent explosion or a "Big Bang" of the extremely dense and

intensely hot substance. These ideas were further developed in 1940s by George Gamow [2]. He estimated the age of rocks, oceans, moon, sun, stars, Milky Way, etc. and always got nearly the same value: "a few billion (10^9) years"! He therefrom suggested that initial Big Bang occurred a few billion years ago and the various features of the "Expanding Universe" have since developed evolutionally.

5.2. *The Steady State Universe*

According to Hubble's law, every receding galaxy moves increasingly faster as it goes farther away. At a distance of 2×10^9 light years away on the cosmological horizon a galaxy recedes with a velocity of light c. When it crosses the cosmological horizon it would disappear since any signal from it to ever reach us has to move faster than light, which is prohibited by Relativity theory. So the observable universe would eventually end up as an empty space. The time for this to happen is about 10^{10} years, which is only about a fifth of the sun's remaining life. To save this unpalatable situation the Theory of Steady State Universe [3, 5] has been proposed. This is based on the Perfect Cosmological Principle (PCP) [5], which admits no preferred or singular position, direction, or epoch. The universe looks the same in all directions and at all positions steadily with time. It has been in the past and will in future look the same all round as it is now. It did not have a big bang like singular beginning and will not have a singular end.

Some authors [6, 7], have disproved the Big Bang model without establishing the Steady State version convincingly. On the other hand the Americans John C. Mather (NASA Goddard Space Flight Center in Greenbelt, Md.) and George F. Smoot (Lawrence Berkeley National Laboratory, Calif.) won the 2006 Nobel Prize in Physics on 3rd October, 2006 for supporting the Big Bang theory. This has created a sort of conceptual vacuum, which our new Theory of Non-expanding & Non-contracting Universe [1] fills. This author issued a Press Statement on 10th October 2006, contesting the basis of the 2006 Nobel award. It was followed by the interviews published in various News Papers like The Hindustan Times (Basis of Physics Nobel Contested: HT Chandigarh LIVE, page 4, Col.1-5, October 16, 2006), The Tribune (Chandigarh Tribune, p5, col 2-5, October 29, 2006).

6. **The decisive crucial experimental test**

To test whether the universe is actually expanding, red shifts of individual galaxies need to be monitored. In theories of expanding universe redshift is $Z = V/c$ and Hubble's law $HD = V = dD/dt$, gives $Z/Z_o = \exp(Ht)$, Z_o being starting value. So the redshift Z increases exponentially with time. But for a non-expanding universe $Z = KD$, D being constant, redshift Z does not change with time.

That is, the inter-galactic distances, the receding velocities of galaxies and the cosmological red shifts should all increase exponentially with time if the universe is expanding according to the Big Bang [2] or Steady State [3] theory, but should remain unchanged in the non-expanding universe of Unified Theory [1]. However, since $c = \nu\lambda$, the spectral shift $= (+\Delta\lambda)/\lambda = (-\Delta\nu)/\nu$. In other words, the increase in wavelength will be found more marked for long wavelengths (red and infrared) and fall in frequency will be more pronounced at high frequencies (violet, X-rays).

Since the individual red shifts have never been found to increase exponentially with time galaxies are not flying away to generate an expansion of the universe. Actual observations therefore support Unified Theory's non-expanding universe.

In the nonexpanding universe some observations of higher than expected Hubble constants signify only *local effects* in the surrounding light medium due to bursts of sharmon showers from the exploding stars and NO *general property* of the whole universe permeating space is implied.

7. **The Cosmological Horizon**

In the expanding universe the intergalactic distances increase continuously like the separations among dots placed over the 2-D surface of an inflating rubber bladder. As a result the receding velocities of galaxies increase in proportion to the distance from the observer situated on

any one of them. It can be shown from the Hubble's law equation that the galaxies distant $2x10^9$ light years away recede with a velocity of light c. This marks the Cosmological Horizon. Because the galaxies beyond it cannot be observed as the signals from them to reach us have to move faster than light, which is prohibited by Relativity Theories. Theory of non-expanding universe does not have a cosmological horizon or a 'horizon problem'.

8. **Initial creation of matter in expanding universe**

No cosmological theory can avoid a serious discussion of this basic issue. Gamow's [2] estimations yielded similar ages of a few billion years for atoms, rocks, oceans, stars, galaxies etc., suggesting that the matter in the universe is perhaps not infinitely old. This points to the period of occurrence of some major reorganization related to the initial '*creation of matter*'(from nothing) in the universe [2]. The Big Bang theory envisages creation of the entire matter in the whole of the universe in a single "big bang", which also created the 3-D space that has since been expanding exponentially with time.

According to the Steady State model, there is a continuous creation of matter all round, which keeps the cosmological scenario "steady" by compensating for the continuously disappearing galaxies beyond the cosmological horizon $2x10^9$ light years away. This requires the mean density of the background material (of unclear nature) to be maintained constant at about $3x10^{-31}$ gm/cm^3 through creation of matter [8] at a rate of about $1.5x10^{-48}$ gm/cm^3/sec. That is, of one new hydrogen atom per gallon of expanding space once in every 250 million (or $2.5x10^8$) years [3, 8].

Magnitudewise, this is not a big scale of creation but conceptually it is highly infirm. To the most vital question: "Where does the newly created matter come from?" Hoyle [3] replies: "It does not come from any where. Material simply appears; it is created. At one time atoms composing the material do not exist, and at a later time they do. This may seem a very strange idea, and I agree that it is. But in science it does not matter how strange an idea may seem so long as it works, that is to say, so long as the idea can be expressed in a precise form, and so long as its consequences are found in agreement with observations. ...."

But this weakness of logic applies also to the Big Bang Theory [2]. That is why Hoyle [3] continues: "Some people have argued that continuous creation introduces a new assumption in science - and a very startling assumption at that. Now I do not agree. It only replaces a hypothesis that lies concealed in the assumption that the whole of the matter in the universe was created in one big bang at a particular time in the remote past. On scientific grounds, this big bang assumption is much the less palatable of the two. It is an irrational process that cannot be described in scientific terms. Continuous creation on the other hand can be represented by precise (mathematical) equations whose consequences can be worked out and compared with observations. ..." *The Unified Theory [1] does not endorse this kind of unrealistic logic.*

9. **No initial creation of matter in the non-expanding universe of Unified Theory**

The unreality of Big Bang and Steady State theories of expanding universe has been brought out above. In String Theories the explosive Big Bang is caused by the collision of membranes of 11-dimensions and **zero** thickness, *which are non-existent*.

However, Unified Theory's argument remains that "*creation of matter from nothing*" is irrational and unrealistic whether it is a continuous process of the Steady State theory or one time single event of the Big Bang theory. Kapp's hypothesis of the Symmetrical Impermanence of Matter [9] invokes and implies both, creation of matter from, and disappearance into, "nothing". It also therefore is unrealistic.

According to Unified Theory the eternally conserved most basic total cosmic substance constitutes an eternally existing 'primordial cosmic body' herein named as the '**Megovum**', meaning the 'big egg' for mega (extremely big) and ovum (egg) as it gives rise to all in the Cosmos including, but not limiting to, the perceptible material universe. The megovum does not originate or come from anywhere but has always existed in the entire past and will always exist in

the entire future. In its ground energy state the cosmic substance of the resting megovum was composed solely of the 0-spin sharmons only. In this state there were no energies, no momenta and no cores or carriers of energy & momentum and there were no transfers, propagations or exchanges of energy. There were no motions and changes, no perceptions of 'there, here, there' and of 'then, now, then', no perceptible space or perceptible time. The absence of all motions is akin to the state of absolute zero temperature. But the zero-point thermal motions cannot be eliminated in the perceptible universe due to the Sharmon Medium's nature as a kinetic gas.

It is a common experience that a part of pond water turns into solid ice in a severe winter and re-converts into liquid water on a rise in temperature. Similarly the actual perceptible universe is created from a part of the megovum and later can dissolve into the megovum. Conceptually, there is nothing against the existence of more than one Megovum and more than one non-expanding perceptible material universe to form the infinite Cosmos.

9.1 *Initial creation of radiation & material particles*

The cosmic substance composing the perceptible universe is neither created from 'nothing' when the universe is created out of the megovum nor does it disappear into 'nothing' when the universe dissolves into the megovum.

As the very first step for the creation of the material perceptible universe some dynamical instability became operational spontaneously in the Cosmos akin to the stresses and strains in a supersaturated vapour precipitating a phase change. Some scriptural philosophies ascribe this event to the wish of the all-intelligent & all-powerful megovum/megamind **Brahm,** to '*become many from one*' or to the effect of *Maayaa*.

The opposed ½ -spins of the negatrinos and positrinos composing some 0-spin scalar sharmons in a part of the megovum became co-directional. This raised the sharmons to the 1-spin vector state, which then attracted the 0-spin sharmon aggregates to create 1-spin energized sharmons or 'photons'. Some 1-spin energized sharmons created the 2-spin gravitons. Here the bosonic condensation of sharmons was supported by the close distance attractions among the masses and opposite electric charges of the constituent cosminos to impart gregarious property to the sharmons. On the other hand, the ½ -spin cosminos of some 0-spin sharmons separated and got attached to some other 0-spin sharmons or sharmon aggregates to create the energized cosminos i.e. energized +ve positrinos and energized –ve negatrinos. Thus the energized sharmons and energized cosminos were created. It marked the beginning of the 1-spin photons of the electromagnetic radiations and the ½ -spin Fermion material particles.

The 1-spin sharmons started propagating the 0-spin sharmon-composed electromagnetic wave energy in the sharmon medium to generate and evolve electromagnetic radiations. The nascent electromagnetic radiations had the wavelength $\lambda = h/mc = h/nm_sc$, where the quantum of the wave energy-mass $m = nm_s$, n being the number of constituent 0-spin sharmons and $m_s = 5.19 \times 10^{-48}$ gm, the mass of a sharmon. The most primordial electromagnetic radiation had the wave energy equal to that of a single 0-spin sharmon (mass $m = m_s = 5.19 \times 10^{-48}$ gm) and wavelength $\lambda = h/m_sc = 4.25 \times 10^{10}$ cm or 4.25×10^5 (hundred thousand or lac) Kilometers. This was followed by the evolution of higher and higher energy radiation and a rise in temperature. The wavelengths of the next higher energy radiations are 2.12×10^{10} cm, 1.42×10^{10} cm, 1.06×10^{10} cm, 0.85×10^{10} cm, etc corresponding to their wave energy m equal to the mass of n=2, 3, 4, 5 sharmons respectively.

The actual observations [10] do reveal and support the existence of electromagnetic radiations with wavelength extending up to a few hundred thousand (10^5) Kilometer. Bosonic condensations of sharmons, supported by close distance attractions among sharmon's oppositely charged constituent cosminos, impart gregarious properties to sharmons for aggregation to compose the wave-energy. The wave energy of the 7 cm cosmic background radiation mentioned in sec. 10 below is an aggregate of some 6 billion sharmons.

The lightest fermion, after cosminos, comprises a ½-spin ±ve cosmino attached to a 0-spin sharmon and has the mass of 7.788×10^{-48} gm. The 0.1 eV/c^2 mass of a muon-neutrino comprises 3.43×10^{13} sharmons. The details about various neutrinos and antineutrinos are given in Ref. [1].

The electron e^- is composed by $n_1 = 3.50 \times 10^{20}$ negatrinos plus $n_2 = 3.944 \times 10^{17}$ sharmons, the positron e^+ by n_1 positrinos plus n_2 sharmons, and 1-spin 1.022 MeV photon by $(n_1 + 2n_2)$ sharmons of which one has spin 1 and the rest spin 0. The photon of energy 1.022 MeV can create an electron-positron $(e^- \ e^+)$ pair. The electron and positron co-annihilate to generate two 0.51 MeV photons moving away back to back. See details in Ref. [1].

The electrically neutral mass of the subatomic particles is composed by 0-spin sharmons and the electrically ±ve charged mass by the corresponding ±ve cosminos. It, however, is not clear why only some values of the extended mass spectrum are stable and others are not. For example the neutrino of mass 0.1 eV/c^2, the electron of mass $m_e = 9.109534 \times 10^{-28}$ gm or 0.511 MeV/c^2, proton of mass $m_p = 1.6726485 \times 10^{-24}$ gm or 938.26 MeV/c^2 and neutron of mass $m_n = 1.6749543 \times 10^{-24}$ gm or 939.55 MeV/c^2 are stable particles. The cosmino-sharmon composition of electron, proton & neutron is given in Ref. [1].

9.2. *The age of the non-expanding universe*

The eternally conserved total mass-energy content of the primordial Megovum comprised of only 0-spin sharmons, which freed it of all motions and changes and made it imperceptible. The very first step for the creation of perceptible universe associated with all sorts of motions and changes made the ½-spins of some 0-spin sharmons co-directional, which then led to the creation and evolution of radiation during the cold 'pre-radiation era' and 'radiation era'.

The above "cold" beginnings were followed by the evolutions of higher and higher energy 1-spin sharmon aggregates or radiation quanta leading to the wide spread "hot regions". The evolution of subatomic particles, material atoms, molecules, etc. from the electromagnetic radiations, cosminos and sharmons may be worked out on the lines suggested by Gamow [2].

As mentioned above Gamow [2] estimated the age of rocks, oceans, moon, sun, stars, Milky Way, etc. and always got nearly the same value: "a few billion (10^9) years"! It was therefrom inferred that initial Big Bang, creating the entire matter of the universe in a single event, occurred ~ 15 billion years ago and the various features of the "Expanding Universe" have since developed through evolutionary processes.

The Unified Theory's theory of nonexpanding universe considers the whole of the matter as eternally conserved. However, its slower progressing 'pre-radiation' era and 'radiation' era of evolution had lasted longer than the Gamow's 'post-radiation' era. The total period of creative evolution of the perceptible universe in the Unified Theory may therefore be taken to exceed that of the oldest star in Big Bang cosmology by the period of "cold" era comprising the 'pre-radiation' era plus the 'radiation' era described above. This total is about three times the 'age' suggested by Gamow [2] and comes to about 45 billion years for the Unified Theory.

9.3. *The dark matter & dark energy*

In modern Astronomy and Cosmology **dark matter** is that matter which does not emit or reflect enough electromagnetic radiation to be observed directly, but its presence can be inferred from gravitational effects on visible matter and **dark energy** permeates space. "The universe is made mostly of dark matter and dark energy," says Saul Perlmutter, leader of the Supernova Cosmology Project headquartered at Berkeley Lab, "and we don't know what either of them is."

According to Unified Theory all forms of mass and energy are composed by two elementary cosminos (+ive positrino and –ive negatrino) and the sharmon made of these two. The mass-energy content of the Megovum is eternally conserved. The perceptible material universe accounts for only a small fraction of the Megovum mass-energy content. Actually existing material universe contains not only the matter comprising atoms, molecules and mass-bodies like stars & galaxies composed by them and radiations but also the all-pervading Sharmon Medium

and cosmino-sharmon aggregates scattered through out. The positrino, negatrino and sharmon being ~ 10^{-33} cm in size the 1-spin Sharmons (**dark energy**) and 0-spin sharmon and/or ±ive cosmino aggregates (**dark matter**) cannot be observed directly.

10. **Cosmic microwave background**

In 1955, Arno A. Penzias and Robert W. Wilson of the Bell Laboratories established that a microwave cosmic radiation at about 7 cm wavelength baths the earth almost uniformly from all directions. The Big Bang theory explains it as a remnant of the isotropic early era of "hot" radiation, but does not clarify as to how the "big" explosion could be so symmetrical as to impart isotropy to this radiation around the earth. In fact, it should have left significant turbulences and anisotropies, which are not actually traceable. Moreover, no evidence of the site of the big explosion is discernible. The Steady State theory has no hot era, hence no explanation of the cosmic background and its isotropy.

In Unified Theory, however, the existence as well as isotropy of the background cosmic radiation is very natural expectation because it is a residue of the isotropic evolutionary process during the creation of the material perceptible universe, which had a '**cool**' instead of a 'hot' beginning vide sec. 9.2 above.

Sec. 9.1 traces the evolution of radiation starting from the most primordial wave energy equal to that of a single 0-spin sharmon (mass $m = m_s = 5.196 \times 10^{-48}$ gm) and wavelength $\lambda = h/m_s c$ $= 4.25 \times 10^{10}$ cm or 4.25×10^5 (hundred thousand or lac) Kilometers. This was followed by the evolution of higher and higher energy radiation and a rise in temperature. The wavelengths of the next higher energy radiations are 2.12×10^{10} cm, 1.42×10^{10} cm, 1.06×10^{10} cm, 0.85×10^{10} cm, etc corresponding to their wave energy m equal to the mass of $n=2, 3, 4, 5$ sharmons respectively.

The actual observations [10] do reveal and support the existence of electromagnetic radiations with wavelength extending up to a few hundred thousand (10^5) Kilometer. Bosonic condensations of sharmons, supported by close distance attractions among sharmon's oppositely charged constituent cosminos, impart gregarious properties to sharmons for aggregation to compose the wave-energy. The wave energy of the 7 cm cosmic background radiation mentioned above is an aggregate of some 6 billion sharmons. This shows that the background radiation has an extended wide spectrum and is not restricted to the 7 cm wavelength alone. This is consistent with actual observations [10].

11. **Observations on Type Ia supernovae**

For an expanding universe, the rate of expansion is given by the Hubble constant H or the ratio V/D of recession velocities-to-distances for the receding galaxies, $V = Zc$ being estimated by the redshift Z and the distance D by the apparent intensity or faintness of the stellar source. The attractive gravitational force varies inversely as the square of the distance and curves the spacetime continuum. In the relativistic Big Bang theory, as developed by Friedmann, Einstein, De Sitter & Gamow [3], the expansion rate of the universe due to gravitational force should gradually slow down over time and stop eventually at an infinite time.

But the Einstein's cosmological constant λ stands for a repulsive antigravity force un-curving the spacetime and varying in proportion to the distance. This universal repulsive force, whose physical nature is incomprehensible, tends to increase the expansion rate of the universe.

The observation [11] on some distant (old) type Ia supernovae as compared to those on nearby (young) ones have been made. These suggest that the expansion rate, during the past few billion years, has not only slowed down too little for the gravity to ever bring it to a stop but something is nudging the expansion along. It is the evidence for a cosmological constant and for a universal repulsive force permeating space. It is a "horrible" indication because as a consequence of the continued expansion the universe would/should gradually become more and more tenuous with time eventually ending up as an empty space.

So, these observations tend to precipitate a sort of conceptual crisis for or give a fatal blow to the relativistic Big Bang theory [2] because of the incomprehensible nature of the antigravity force. The *ad hoc* and arbitrary nature of the cosmological constant λ, which Einstein had put in the mathematical theory '*by hand'*, make the relativistic Big Bang theory weak. Einstein himself regarded the introduction of λ as a blunder of his life.

Introduction of positive cosmological constant (λ) [12] is unacceptable because it stands for two unrealistic features: one, gravity-like non-gravity imaginary attractive force permeating space and two, creation of matter from nothing.

For Unified Theory's non-expanding, as in these observations [11], the K-constant in sec. 3.2.3 above and hence the redshift does not or need not gradually decrease to become zero at infinite time. It may however vary (decrease or even increase) if, where and when, the causative factors (viscous, gravitational, electromagnetic or Doppler) vary to get reflected in the observed variations. A supernova explosion showers a burst of sharmons in the ambient environment to raise the viscosity η and the constant K_v of the light-propagating medium. The resultant rise in the observed redshift Z leads to overestimation of the expansion rate of the universe V/D=H ($\propto$ Z). But these rises in the c K_v = H etc. are *local effects* and do not signify any generalized property of the whole universe permeating space.

Halton Arp's [7] observation of high red shift quasars in the vicinity of low redshift parent star systems can also now be accounted for. There is no antigravity force in existence or any likelihood for the universe becoming empty or collapsing ever in future.

12. **Concluding remarks**

Since the cosmic redshifts are not increasing exponentially with time the universe is non-expanding. The redshifts in this non-expanding universe are caused, NOT due to Doppler effects of receding velocities of stellar light sources but, by depletion in the photon energy during passage through the sharmon medium due to non-Doppler effects of viscous, gravitational and electromagnetic losses. The total mass-energy content of the non-expanding universe is eternally conserved without any initial creation of matter from nothing. There is no antigravity force to permeate space and no likelihood for the universe to become empty ever in future.

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