# A REAPPRAISAL OF THE EINSTEIN MODEL

Rati Ram Sharma,

Retd. Prof. & Head, Biophysics Department, Postgraduate Institute of Medical Education & Research, Chandigarh, India. Present mailing address: H.No. 615, Sector 10, Panchkula-134113, Haryana, India; rrjss615@gmail.com;
http://www.worldnpa.org/php2/index.php?tab0=Scientists&tab1=Scientists&tab2=Display&id=664 .

**ABSTRACT: A wave exists only in its propagating medium but Einstein erred to discard the medium for 'light-wave' and introduce 4-D spacetime continuum. It denied him the chance to address wave-quantum Unity of light and to predict the existence of 'basic substance' to compose all forms of E & m so compellingly demanded by E=mc$^2$, otherwise E & m could not interconvert. Unified Theory gives convincing arguments and experimental support for the existence of a real physical medium in space viz. 'sharmon medium' as the all-composing and all-pervading 'basic substance', which propagates light as a Wave-Quantum UNITY. The non-substantive abstract concepts of space & time arise from the perceptions of successive motions & changes in the surrounding objects and cannot fuse into any concrete spacetime continuum. All spacetime continua of 4 to 32 dimensions are non-existent mathematical constructs and theories based on them are unrealistic. Unified Theory explains Michelson-Morley & Sagnac experiments and constancy and invariance to source-observer motion of c, the two axiomatic postulates of Special Relativity, as also the observed variability of light velocity c and superluminality which *invalidate* Relativity. Lorentz formulae do not describe any natural velocity which varies (like v) with and is invariant (like c) to source-observer motion at the same time. And a real event, viewed by say, 100 differently moving observers cannot undergo 100 different objective alterations at the same time. This makes 'contraction of length' and 'dilation of time' unrealistic. Unified Theory explains Photoelectric Effect and Bending of Light in a Gravitational field. As against Relativity, no particle or energy quantum is massless or sizeless point.**

Standard Model is the conceptual soul for the body framework of a theory. Chapter-1 has presented the Standard Model underlying Unified Theory and the Modern Standard Model constituting the guiding core for the current theories of Physics and Cosmology. However, the Einstein's theories and thoughts had a profound influence on the twentieth century Physics. So much so that one can identify the 'Einstein Model' as an inseparable significant part of the Modern Standard model.

This Chapter will reappraise the conceptual component of the Einstein Model, which lies beneath its mathematics, to bring out its unrealities and rectify the same through Unified Theory. But before doing so we would consider the 'Maxwell Model' and the 'Planck Model', which in fact formed the forerunner bases of Einstein Model.

## 1. The Maxwell Model

In his theory of electromagnetic radiation, Clark Maxwell [1] derived the velocity of electromagnetic waves as

$$c = (e_o.\mu_o)^{-1/2}.$$

where $e_o$ is the electric permittivity and $\mu_o$ the magnetic permeability of the free (empty) space.

The magnitude of c (= $2.997 \times 10^{10}$ cm/sec) calculated for his theory from the known values of $e_o$ (= $8.85 \times 10^{-12}$ Farad/meter) and $\mu_o$ (=$1.26 \times 10^{-8}$ Henry/meter) for free space or vacuum came out to be equal to that of light in vacuum. Since the light from the sun to the earth travels mostly in vacuous space Maxwell declared that light is an electromagnetic **wave** propagated in empty space or vacuum. Thus the seed idea of a

'wave without its propagating medium' was created by Maxwell, which was later adopted and promoted by Einstein in relativity theories.

The Maxwell Model comprises the assumptions made and the conclusions arrived at in his theory. These are:

(a) Light is an electromagnetic wave.

(b) Electromagnetic waves, including light, are propagated in the free space or vacuum without any real physical medium.

(c) The velocity of electromagnetic waves, including light, in vacuum $c = (e_o \mu_o)^{-1/2}$ depends on the electric permittivity $e_o$ and magnetic permeability $\mu_o$ of the free space.

(d) Since the electric permittivity $e_o$ and magnetic permeability $\mu_o$ of the free space are constant, the velocity c of the electromagnetic waves, including light, is constant.

## 2. **The Planck Model**

Starting from the '*law of equi-partition of energy*', Raleigh & Jeans found that the energy density $E_v$ for frequencies between $v$ (Greek, new) and $v + dv$, is

$$E_v = (8 \pi v^2 / c^3) \, KT.$$

Here K is Boltzmann constant, T the absolute temperature and c the velocity of light in free space.

This Raleigh-Jeans law agrees with the experimental results at low frequencies. But at higher frequencies its integral leads to *infinite* total energy density, which has been called the "*ultraviolet catastrophe*".

However, Max Planck [2] hypothesized that the law of equi-partition of energy was not applicable to the black body radiation because the micro oscillators exchange energy with the surrounding environment not in a continuous manner but as the quanta of discrete units given by

$$E = h v.$$

Here h is a universal constant, now called Planck's constant of action. His expression for the energy density is

$$E_v = (8 \pi h v^3 / c^3)/(e^{\,hv\,KT} - 1).$$

This Planck's law agrees with the experiments at all frequencies, lower to higher. The ultraviolet catastrophe is avoided because the available energy states at high frequency $v$ are now widely separated.

This represents the spectrum of the electromagnetic radiation. It leads to Stefan-Boltzmann fourth power law, namely,

$$E_T \ = \ \sigma T^4.$$

Here $E_T$ is the total emissive power or the total energy density of radiation emitted from the black body at the absolute temperature T. The $E_T$ is proportional to fourth power of the absolute temperature. The constant of proportionality $\sigma$ (Greek, sigma) is the Stefan-Boltzmann constant. It implies that at the absolute zero temperature the energy density is zero ($E_T = 0$ for $T = 0$) and the radiation disappears.

That is, the perfect vacuum is possible, which is empty of all solids, liquids and gases and also can be freed of the thermal radiation by cooling the void.

*Since absorption is only reciprocal to emission the Planck Model essentially connotes that the electromagnetic radiation is emitted and absorbed as quanta of energy E = h v.*

It also supports the existence and the possibility of experimental creation of absolute vacuum. A tacit assumption in Planck Model, like the Maxwell Model, is that the energy quanta of electromagnetic radiation, including light, do not need a physical medium for propagation.

## 3. **The Einstein Model**

I greatly admire Einstein's intellectual abilities but am constrained to remark that through out his life he remained unclear about the real nature of light and its propagating medium. This he admitted in his letter of 12 December 1951 to M. Besson vide sec. 4.2 below.

Einstein [3-5] adopted the Maxwell Model and the Planck Model in a somewhat extended and modified form.

### 3.1 *The Newton's corpuscular theory revived*

Einstein [3] extended the Planck Model and postulated that the electromagnetic radiation, including light, of frequency $\nu$ and wavelength $\lambda$ is not only emitted and absorbed but also propagated as quanta of energy $E = h\nu$ and momentum $p = h/\lambda$. Lewis, in 1926, named this energy quantum of light radiation as 'photon'.

This, in a way, revived the Newton's corpuscular theory of light. With this theory Einstein [3] explained the 'photoelectric effect', which won him the Physics Nobel Prize in 1921. But see sec. 4.4 below for the Unified Theory explanation of the photoelectric effect.

### 3.2 *The theory of Special Relativity*

In accord with the Maxwell and Planck Models Einstein [3-5] stated that the light photon [3] and the electromagnetic [3, 4] and gravitational [5] waves are propagated in the free space without a physical medium.

He discarded the light medium as superfluous for his mathematical theories and introduced the 4-dimensional spacetime continuum instead to propagate electromagnetic and gravitational fields, forces and waves [4, 5].

The constancy of light velocity in Maxwell Model was upgraded as the pair of two postulates of the theory of Special Relativity [4]. He postulated that the velocity of light c is not only constant but also invariant to the source-observer motion. That is the light velocity remains unchanged as c and does not add up to (c+v) if and when the observer moves with a *uniform* velocity v relative to the source of light. The Special Relativity is also sometimes called the Restricted Theory of Relativity because it is restricted to the uniform motion (v) of the observer relative to the source. The theory of General Relativity removes this restriction. See also below.

For an observer moving with a velocity v along the x-axis of the stationary frame of reference the space and time coordinates x and t appear as x' and t' on the moving frame given by the so named Lorentz transformation formulae

$$x' = \beta (x - vt) \qquad t' = \beta (t - vx/c^2)$$
$$\Delta x' = \beta (\Delta x - v\Delta t) \qquad \Delta t' = \beta (\Delta t - v\Delta x/c^2)$$

and reciprocally

$$x = \beta (x' + vt') \qquad t = \beta (t' + vx'/c^2)..$$
$$\Delta x = \beta (\Delta x' + v\Delta t') \qquad \Delta t = \beta (\Delta t' + v\Delta x'/c^2).$$

Here $\qquad \beta = (1 - v^2/c^2)^{1/2}$ .

The length $l' = dx' = l/\beta$ at rest on the moving frame with its both ends observed simultaneously (dt' = 0) appears shorter as l on the stationary frame and also reciprocally the length $l = \Delta x = l'/\beta$ at rest in the stationary frame ($\Delta t = 0$) appears shorter as l' in the moving frame.

That is, when two bodies are in relative motion, the lengths appear shorter on the other than on themselves reciprocally in the same ratio of $1: (1-v^2/c^2)^{1/2}$. It is called Lorentz-Fitzgerald contraction [6] after the initial authors of the hypothesis, which Einstein thus supported, with this mathematical derivation of the same formula.

On the other hand

$$\Delta t' = \beta \Delta t.$$

is the relation between the time intervals on the two frames.

That is, the interval of time $\Delta t'$ between two events at the same site ($\Delta x' = 0$) is minimum in the reference frame stationary with the site of events. In a frame moving in relation to the site of the natural event, however, the time gets dilated or slowed down.

Kinetic energy E of a particle of mass m moving at a velocity v is $E = mc^2(1/\beta - 1)$ and not $\frac{1}{2}mv^2$. Kinetic energy E becomes infinite when v=c. So c is the upper limit of natural velocities and no particle with mass ($>0$) can move at a velocity v$\geq$c.

The expression for the total energy

$$E = c\,(m^2c^2 + p^2)^{1/2}$$

predicted the possible existence of massless (m = 0) particles moving at velocity c with momentum p and kinetic energy E = pc. That is how photon, neutrinos & antineutrinos became massless. But it was not clarified why the the momentum p = mc, hence E = pc are NOT zero at m= 0.

During the inter-conversions of energy E and mass m, as for example during the creation and annihilation of electron-positron pair or for the nuclear reactions, the relation $E=mc^2$ holds [7]. That is one gram of mass yields $\sim 9 \times 10^{20}$ ergs of energy. The $mc^2$ is the energy content of a body with mass m.

An elementary particle does not have a composition. Hence it is extremely rigid and cannot deform. So a force must be transmitted to its whole instantly. An electric force, for instantaneous transmission to the whole of a particle with more-than-zero finite size, needs a velocity > c, which is prohibited by Relativity. Therefore in the current Relativistic Quantum Electrodynamics, all non-composite elementary particles like electron, proton, and neutron are sizeless points

### 3.3 *The theory of General Relativity*

As mentioned above the theory of Special Relativity [4] had restricted the invariance of light velocity c to the uniform motion or velocity (v) of the observer relative to the source of light. The theory of General Relativity [5] removed this restriction. It stated that the light velocity c is invariant to any non-uniform source-observer motion.

The rectilinear world line element ds of the Special Relativity [4] is defined by the relation

$$ds^2 = c^2dt'^2 = c^2dt^2 - (dx^2 + dy^2 + dz^2),$$

And the uniform velocity v of the source-observer motion is given by

$$v = (dx^2 + dy^2 + dz^2)^{1/2}/dt.$$

In the theory of General Relativity [5], however, the curvilinear line element ds for a non-inertial frame is given by

$$ds^2 = \sum g_{mn}\,dx_m\,dx_n, \quad m, n = 1 \text{ to } 4$$

Here the metric tensor $g_{mn}$ of the non-Euclidean 4-D spacetime is a function of the three space coordinates $x_1$, $x_2$, $x_3$ and the time coordinate $x_4 = ct$, c being the velocity of light photon in vacuum.

The General Relativity [5] treats the 4-D spacetime as an entitative continuum and applies to it the Reimannian differential geometry to develop a theory of gravitation.

The 4-dimensional spacetime continuum curves under a gravitational field. Therefore a ray of light from a distant star bends around a heavenly body of mass M and radius R by an angle $\theta$ given by the following relation.

$$\theta = 2GM/Rc^2 \text{ radian.}$$

Arthur Eddington verified this relation during the total solar eclipse on May 29, 1919.

The free motion of a mass body, not subjected to external force, is uniform in a straight line. In a gravitational field, all bodies have the same acceleration. And freely moving bodies, when viewed from a uniformly accelerated non-inertial frame, appear to have an equal and opposite acceleration. That non-inertial reference frame, therefore, is equivalent to a "certain" gravitational field. This is the "Principle of Equivalence" [5] in the general relativity.

### 3.4 *The conceptual content of the Einstein model*

The Einstein model can be summed up to contain the following conceptual assumptions and conclusions.

(a). There is no real physical medium in space to propagate electromagnetic radiation, including light.

(b). All motions are relative. There is no absolute motion and no absolute reference frame.

(c) The 4-dimensional spacetime continuum propagates electromagnetic and gravitational forces, fields and waves.

(d) The electromagnetic radiation, including light, of frequency $\nu$ and wavelength $\lambda$, is not only emitted and absorbed but also propagated as freely moving particles or quanta of energy $E=h\nu$ and momentum $p=h/\lambda$.

(e) The velocity of light in vacuum is constant and invariant to source-observer motion, whether uniform (Special Relativity) or non-uniform (General Relativity).

(f) The light velocity in vacuum c is the upper limit of natural velocities. No material body with a more-than-zero mass can have a velocity $v \geq c$ otherwise its kinetic energy is infinite.

(g) The photon, graviton, gluons, neutrino and the antineutrino, which move at a velocity of light c are massless.

(h) Non-composite elementary particles like electron, proton and neutron are sizeless points.

(i) The length contracts and time slows down as and when observed from a frame moving relatively to the site of an event.

(j) The gravitational field curves the 4-dimensional spacetime continuum. That is why a ray of light bends in a gravitational field.

(k) A uniformly accelerated non-inertial frame is equivalent to a "certain" gravitational field.

(l) The energy E and mass m are inter-convertible according to the relation $E=mc^2$.

### 4. **The Unified Theory reappraisal of the Einstein model**

### 4.1 *Unreality of the spacetime continua*

In Unified Theory the space and time are not real physical entities having substance but are mere abstract concepts evolving from the direct human perceptions of successive motions and changes in the surrounding objects. The concept of space arises from the successive perceptions of 'there, here, there' and that of time from successive perceptions of 'then, now, then'. The "time arrow" moves only forward and never backwards due to irreversibility of the natural processes of change generating the time concept. That is why all the living beings always grow (change) from childhood through youth to old age and all the plants from seed through seedlings to trees. The day always changes from morning through noon to evening and the position of the sun always changes from east to west. And so on and so forth. These and all other natural processes proceed only in one natural direction, which is never reversed.

The two concepts of space and time are too intangible and abstract to fuse into any tangible spacetime continuum. In the universe with complete ubiquity of granularity throughout right up to the micromost cosmino levels, the existence of a non-granular continuous infrastructure is inconceivable. In fact the existence of **any** space continuum or spacetime continuum would have retarded the motion of terrestrial and heavenly bodies and of even photons to propagate light through or across it, which is not actually observed. Therefore all the various spacetime continua of 4, 5, 10, 11, …32 dimensions are mere mathematical constructs bereft of real physical existence and theories of relativity [4, 5] and others [8-12] based on them are unrealistic.

Einstein is reported [13] to have said that theoretical physicists cannot do without a physical space

medium. He did assign to the 4-D spacetime the property of a physical medium to propagate electromagnetic light and gravitation and discussed the Maxwell equations of electromagnetic radiation [4] but did not go further. The 4-D spacetime does not have mass density or viscosity etc. Such a non-entitative concept can exist only in mathematics, not in real Nature.

4.2 *The 'sharmon medium' in space is real*

In fact Einstein was unclear about the real nature of light and the light medium in 1905 when he formulated the Special Relativity and the theory to explain the photoelectric effect that won him the 1921 Nobel Physics prize and remained so through out his life. On 12 December 1951 he wrote to M. Besson thus: "*All these 50 years of conscious brooding have brought me no nearer to the answer to the question: What are light quanta?*"

James DeMeo [14] gives a comprehensive review of the experimental work on measuring the ether drift. Of all the workers Dayton Miller had used the most sensitive instrument and took the largest number of observations spread over the longest period of time. But Miller presents convincing positive evidence for the non-zero ether-drift and hence for ether as the light medium. Interestingly DeMeo cites Dayton Miller:

*"The effect [of ether-drift] has persisted throughout. After considering all the possible sources of error, there always remained a positive effect."* — Dayton Miller (1928)

Dayton Miller's '*positive*' results yielded more-than-zero ether drift as evidence for the existence of 'ether' or a light-propagating medium in space. This is in addition to the work of Young, Fresenel by 1827 and of Sagnac in 1913 on interference and/or diffraction of light establishing light as a wave transmitted in a physical medium.

This book presents scientific logic of the Unified Physical Theory (UPT) for the 'sharmon medium' composed by the new particle 'sharmon', which in turn is made of the two micromost basic elements: electrically positive *positrino* and negative *negatrino*. The positrino and negatrino compose all forms of energy, mass, energy quanta, particles of matter and antimatter in the Cosmos, hence given the common name '*cosmino*'.

A cosmino has the diameter lp = $1.6 \times 10^{-33}$ cm, mass = $2.596 \times 10^{-48}$ gm, electric charge = $1.37 \times 10^{-30}$ esu, and spin = ½. The sharmon mass is $5.192 \times 10^{-48}$ gm. Its spin is 0 or 1.

The time-averaged inter-sharmon distance $\sim 10^{-5}$ cm compares with the Mean Free Path for the real gasses (e.g. for Hydrogen $1.12 \times 10^{-5}$ cm, Oxygen $0.64 \times 10^{-5}$ cm, Nitrogen $0.595 \times 10^{-5}$ cm). Therefore sharmon medium is a kinetic gas with its number density $n_s \sim 10^{15}$ sharmons per cm$^3$. Its mass density is $0.519 \times 10^{-33}$ gm.cm$^{-3}$, rigidity $4.68 \times 10^{-12}$ and viscosity $0.57 \times 10^{-22}$ dyne.sec/cm$^2$.

Due to its nature as a kinetic gas, the sharmon medium approximates to a 'kinetic continuum' effectively obliterating the interstices between sharmons in fleeting contact. It fills all space leaving no 'vacuous space' with 'nothing inside' and rules out the existence of absolute vacuum for any significant period of time. It propagates electromagnetic light and gravitation.

4.3 *Propagation of wave-quantum unity of the electromagnetic radiation in Unified Theory*

The long wave electromagnetic (e.m.) radiation, like the radio waves, is predominantly wavelike and the short waves like X- and gamma rays show corpuscularity. As the transition from one part of the electromagnetic spectrum to the other is continuous, its '**wave-quantum unity**' is inescapable

From origin to the terminus, the 0-spin sharmon-packet energy quantum per unit frequency cycle is propagated, as a wave-quantum UNITY, along a transverse electromagnetic wave in the sharmon medium contiguously via 1-spin sharmons, which do not physically move but only provide a physical carrier. The 1-spin sharmons participating in the process of propagation return to their 0-spin state on transferring the wave energy quantum to the contiguous neighbour in the sharmon medium and finally the last 1-spin sharmon transfers its energy to the target and returns to its 0-spin state.

After emission and before absorption it is always the energized 1-spin sharmon, which in deference to convention and for continuity is still called 1-spin "**photon**". But Unified Theory denies the existence of conventional 'photon'.

Since the spin of an emitter does not fall by 1 and/or that of an absorber does not increase by 1, what is emitted or absorbed is NOT the 1-spin photon as a whole but only its energy comprising 0-spin sharmons. However, the transmission, always and throughout, is of the energy of the 1-spin photon as a wave-quantum UNITY. The 1-spin photon as such is **not** emitted, propagated or absorbed. The Wave-Quantum unit is a 'pulse' one wavelength ($\lambda$) long, wherein 'Quantum' is not a sizeless point. A spherical wave-front or a lengthy EM wave comprises innumerable such Wave-Quantum pulses one wavelength $\lambda$ long. Approximating 'photon' as a sphere of closely packed cosminos of radius $r_c$ the photon radius becomes $r = r_c.(2hc/\lambda)^{1/3}$ .

The **Quantum Theory** (QT) [15] could not satisfactorily explain why the electromagnetic radiation behaves sometime as a wave and at other time as a particle. Moreover, it also wrongly split the coexistent intrinsic *wave-quantum **unity*** of radiation into *wave-or-quantum **dualities***.

In fact both radiation and moving material particle have intrinsic **wave-quantum unity** of Unified Theory (UT), which appears as **wave-or-quantum duality** (of QT) due to experimental limitations to observe only one of the two coexistent characters at a time, not both simultaneously. Einstein was conspicuous for ignoring and not addressing the wave-quantum unity of radiation and moving material particles. His theories [3-5] did not and in fact could not provide any explanation for these phenomena. He even did not elucidate the physical mechanisms for the propagation of the electromagnetic and gravitational waves in the 4-D spacetime continuum. The freely moving particulate photon of his corpuscular theory [3] could not avoid sharing the source-observer motion. Hence its velocity could not be invariant to source-observer motion, as required by his own theory of special relativity.

But interestingly, both the particle and wave aspects for both low intensity light and stream of electrons have been demonstrated [16] simultaneously in one and the same experiment. This provides experimental support to Unified Theory's **wave-quantum <u>unity</u>** much against Quantum Theory's **wave-or-quantum <u>duality</u>**.

## 4.4 *The Unified Theory explanation of photoelectric effect*

Einstein [3] explained the photoelectric effect by postulating that light is propagated as quanta and the energy of one particulate photon is imparted to one electron, which overcomes the force or energy binding it to the metal surface.

In Unified Theory the energized sharmon replaces the photon. If w is the energy binding the electron with the metal surface or the work function of the metal, $\nu$ the frequency of the incident ultraviolet light and hence $h\nu$ the energy of the energized sharmon, the kinetic energy E of the ejected photoelectron is given by

$$E = h\nu - w.$$

This is exactly the well-known Einstein equation [3] already verified by experiments.

## 4.5 *Constancy & invariance to source & observer motion of the light velocity*

The special relativity [4] was based on these two axiomatic postulates, which Einstein did not explain but are now explained realistically from Unified Theory. However this Unified Theory (UT) explanation does not in any way validate the theory of Special Relativity (SR). Moreover, Unified Theory can even explain the actually observed variability of light velocity c, which otherwise invalidates both the special and general theories of relativity.

The 'origin' of an electromagnetic wave is not its source and its 'terminus' is not the target. The electromagnetic wave energy quantum, after emission from the source is initially received by a 0-spin sharmon in the medium, which rises to its 1-spin state and thus marks the effective '*origin*' of the electromagnetic wave. And the last 1-spin sharmon of the medium, which finally transfers the wave energy quantum as a 1-spin photon to the target and itself returns to the 0-spin state, marks the '*terminus*' of the wave. Both origin and terminus of the electromagnetic wave are situated in the sharmon medium.

Light begins creatively at the 'origin' and ends vanishingly at the 'terminus' both in the sharmon medium. The particulate photon energy comprising 0-spin sharmon aggregate per unit frequency cycle is carried along the transverse electromagnetic wave from origin to terminus as a wave-quantum unity via

contiguous mechanisms.

Due to creative beginning of the light wave at the 'origin' in the sharmon medium the light velocity c is invariant to the source motion and vanishing end of the light wave at the 'terminus' in the sharmon medium makes c independent of the observer motion. The constancy and invariance to source-observer motion of c [= $(e_o.\mu_o)^{-1/2}$] also follow from the fact that the $e_o$ & $\mu_o$ of the sharmon medium are constant and not affected by the motion of the source or observer. This can explain the Michelson-Morley and Sagnac experiments.

### 4.5.1 *Sharmon medium as the absolute reference frame*

By implication from the above section the light propagation in the sharmon medium emerges as the '***absolute motion***'because it is NOT relative even to the motion of its source and target/observer. And the light propagating sharmon medium emerges as the '***absolute reference frame***'. This is in stark contrast to the conceptual foundations of Relativity vide sec. 3.4 above according to which there is no absolute motion and no absolute reference frame. Since all motions are relative.

### 4.5.2 *Sound wave versus light wave*

However, a longitudinal sound wave comprising compressions and rarefactions needs a gross material medium (solid, liquid, molecular gas). It 'originates' at its *vibrating source* and 'terminates' by setting the *not-vibrating* target into vibrations. Source's motion toward or away from the observer compactifies or disperses the compressions and rarefactions to increase or decrease the sound-frequency. The observer moving toward or away from the source receives the compressions and rarefactions more or less often thereby increasing or decreasing the frequency. This is the Doppler effect. The velocity of sound is set by the square root of the ratio of the adiabatic elasticity and mass density of the medium. The source–observer velocity toward or away from each other is added or subtracted from this intrinsic sound velocity to give the net value. Since the sharmons of $1.6 \times 10^{-33}$ cm dia. can pass through inter-atomic space a longitudinal wave in the sharmon medium cannot interact with a material source or a receiver to produce an audible sound.

### 4.6 *The observed variability of c and superluminality invalidate relativity theories but are consistent with Unified Theory*

Even the observed variability of c [17-19] and superluminality [20] (light velocity exceeding c), which invalidate the theories of Special and General Relativity, also follow from Unified Theory by merely affecting $e_o$ & $\mu_o$ and refractive index $\mu_r$ of the propagating sharmon medium ***locally.***

It may be re-emphasized here that not only in free space but also within any gross material medium, the light does and can propagate only through the pervading subtle sharmon medium whose local $e_o$, $\mu_o$ determine the velocity of light in that medium.

The sharmons in the medium, which propagate light and the propagated sharmon-composed photons are ultimately made of the electrically charged ±ve cosminos. The sharmons have both electric and magnetic dipole moments. All this gives rise to $e_o$ & $\mu_o$ of the sharmon medium and photon's orthogonal electric and magnetic fields. The $e_o = 8.85 \times 10^{-12}$ Farad/meter and $\mu_o = 1.26 \times 10^{-8}$ Henry/ meter customarily assigned to vacuum are actually of the sharmon medium in free space. Hence c = $(e_o.\mu_o)^{-1/2} = 2.9979 \times 10^{10}$ cm/sec is the phase velocity for individual photons in free space.

The group of photons comprising the light pulse and other conditions in experiments of Wang *et al.* [20] affect the shape of the pulse and $e_o$ & $\mu_o$ of the propagating sharmon medium.

This affects the phase and group velocities ($v$, $v_g$) as well as the refractive index ($n_g = c/v_g$) in the gross medium. As against L/c = 0.2 ns to cover L = 6 cm in free space, the observed 62 ns time lead means that time lag = - 62 ns = (L/$v_g$ - L/c ) = ($n_g$ - 1)L/c. That is ($n_g$ - 1) = -310 for the light pulse inside the 6 cm cell with atomic cesium gas. Therefore, the refractive index $n_g$ is -309 and the group velocity $v_g$ is -c/309. This explanation adversely affects special relativity and quantum theory by necessitating a light medium but not the causality principle.

Most significantly, the sharmon medium as a kinetic gass carries the possibility of local variations in its number density sharmons/cm$^3$, mass density gm/cm$^3$, $e_o$, , $\mu_o$ , c = $(e_o.\mu_o)^{-1/2}$ and even of the gravitational constant G.

4.7 *Unreality of the Lorentz transformation formulae*

Lorentz arrived at his formulae to explain the null results of Michelson-Morley experiments and to save the ether. Einstein discarded the ether but derived the same formulae. Unified Theory explains the MMX results from first principles based on the light propagating Sharmon Medium and rejects the Lorentz formulae as unrealistic, un-necessitating the work of Lorentz and Einstein both.

The velocity of light c is constant and invariant to source-observer motion but that of a material particle or of a reference frame v is not so. Thus the kinematics of a light photon and a material particle are too exclusively different for giving same status to c and v in a formula to describe any real motion.

The velocity of no real object can vary (like v) with, and also be invariant (like c) to, the source-observer motion at the same time. Therefore the Lorentz transformations of Special Relativity [4] do NOT describe any actual motion in the real Nature. Their leading conclusions viz. 'contraction of space' and 'dilation of time' are the unrealistic demands on Nature to change to fit their mathematics.

Even otherwise, the actual length of an object, viewed by say, 100 differently moving observers cannot undergo 100 different objective contractions at the same time, making the 'contraction of length' an unreal concept. Likewise, 'dilation of time' too is unrealistic.

4.8 *Basic flaws in General Relativity*

The General Relativity is flawed for using Reimannian differential geometry of a non-existent 4-D 'spacetime' continuum. It as a theory of gravitation and its equivalence of a gravitational field with a uniformly accelerated frame is incomplete since no coordinates' transformations of no non-inertial frame can eliminate the actual centripetal gravitational fields. However the fields to which non-inertial systems are equivalent vanish on transformation to an inertial system.

4.9 *Bending of light in a gravitational field in Unified Theory*

A photon comprising sharmons of non-zero mass, experiences the acceleration due to gravity $g = GM/R^2$ of the heavenly body of mass M and radius R. Light from a distant star goes past the body in time $t = 2R/c$, to fall by the distance $s = \frac{1}{2}gt^2 = \frac{1}{2}(GM/R^2).(2R/c)^2 = 2GM/c^2$. For a distance D the light bends by the angle

$$\theta = s/D = 2GM/Dc^2 \text{ radian.}$$

This is exactly the Einstein formula for the bending of light in a gravitational field verified by Arthur Eddington during total solar eclipse on 29 May 1919. It supports the Unified Theory (Unified Physical Theory) because the 4-D spacetime is non-existent vide sec. 2.4.1 above. Later Einstein had revised the above formula to $\theta = 4GM/Dc^2$ radian. Unified Theory also can provide for this increase.

4.10 *The Gravity Probe-A to test General Relativity vis-à-vis Unified Theory*

Gravity Probe A (GP-A) was a satellite-based experiment performed jointly by the Smithsonian Astrophysical Observatory and the National Aeronautics and Space Administration (NASA). On June 18, 1976 a Hydrogen MASER (Microwave Amplification by Stimulation Emission of Radiation) was launched on top of a Scout rocket into space to measure the rate change of a MASER clock in lower gravity with high precision. It remained in space for 1 hour and 55 minutes, as intended and then crashed into the Atlantic Ocean. The rocket was launched "nearly vertically upward" to cause a large variation in the "local" gravity seen by the MASER, reaching a height of 10,000 Km (6200 miles). With height the gravity lowers but gravitational potential rises. It decreases the frequency and increases the wavelength of the MASER causing a redshift. The Unified Theory has shown that if $U_2$ is the gravitational potential around the higher point and $U_1$ for the observer on earth, the resultant red (increment of wavelength) shift would be $(U_2 - U_1)/c^2$. The Gravity Probe A experiment has thus supported the Unified Theory.

4.11 *The Gravity Probe-B to test General Relativity vis-à-vis Unified Theory*

On 21st April 2004 the US$700m Gravity Probe-B (Gp-B) was launched [21]. Its primary task was to use four ultra-precise gyroscopes to measure directly two effects predicted by general relativity. One is the

*geodetic effect*—the amount by which the mass of the Earth warps the local 4-dimensional spacetime continuum in which it resides. The second effect, called *frame-dragging*, is the amount by which the rotating earth drags local spacetime around with it. Because the spacecraft is in a polar orbit, the two effects occur at right angles to each other, giving a clean separation between them. Furthermore, the gyros are arranged such that each measures both effects. It is a tribute to the preparation, knowledge and skill of the Stanford-NASA-Lockheed Martin development team. The website http://einstein.stanford.edu/ presents the details and updates. The website http://einstein.stanford.edu/highlights/status1.html gives Spring 2008 Status Update. It states: "As experimentalists, we make no a priori assumptions that Einstein's predictions represent the bull's eye. Rather, we have collected data, we are doing everything humanly possible to achieve the greatest precision and accuracy in analyzing it. Once this has been accomplished, we will announce the results. If they match Einstein's predictions, then once again-to the achieved level of precision and accuracy-Einstein's theory will be upheld. If they don't, this could be evidence of a breakdown of the theory".

However, a sharmon $1.616 \times 10^{-33}$ cm across and $3.23 \times 10^{-33}$ cm long can pass through inter-atomic spaces and between the orbital electrons in the densest solid. Therefore the sharmon medium is irremovably present in the high vacuum of Gp-B. The sharmon medium is viscous, with a viscosity constant $\eta = 0.57 \times 10^{-22}$ dyne.sec/cm$^2$. In Unified Theory the sharmons mediate gravitational and electromagnetic fields, forces and phenomena including light. Therefore ***sharmon medium can account for all the effects that General Relativity ascribes to the 4-D spacetime continuum, which propagates electromagnetic light and gravitation.*** The *geodetic effect* is the gravitation related curvature of the sharmon medium and the *frame drag* is the 'sharmon medium drag' due to viscosity combined with gravitation. It, for example, is a common experience that a body rotating and/or moving in a viscous medium distorts the medium and carries it along. The earth spins on its axis as it revolves around the sun. The Gp-B cannot differentiate 'frame-drag' from the 'sharmon medium drag' of Unified Theory. The two are the same. However, the 4-D spacetime continuum is non-existent (sec. 4.1 above), and so is the 'frame-drag'. But 'sharmon medium' and hence the 'sharmon medium drag' is real (sec.4.2 above). So, what the Gp-B proposes to measure in the name of 'frame drag' is only the 'sharmon medium drag'. It is also the 'ether drag' measured by Dayton Miller [14].

### 4.12 *Earth's motion distorts surrounding 'sharmon medium'*

Further, the Nature Physics Portal, 28 October 2004 webpage http://info.nature.com/cgi-bin24/DM/y/eQuV0Bhe3V0Ij0UsQ0Ad refers to Mark Peplow's article published online in the news@nature.com on 20 Octo'04 [22] regarding 'frame-dragging'.. It declares, "Spinning Earth twists space. Laser measurements confirm Einstein's general theory of relativity".

Ignazio Ciufolini at the University of Lecce, Italy and Erricos Pavlis at the University of Maryland in Baltimore charted the path of two NASA satellites, LAGEOS and LAGEOS 2, over 11 years with laser range-finders with the precision of a few millimeters. The satellite's orbits were 'dragged' out of position by about 2 meters each year. Researchers say that their result is 99% of the value predicted by relativity, with an error of up to 10%. But as discussed above, it only uses laser light to study the distortion, due to earth's rotation, of the surrounding viscous 'sharmon medium', which propagates light and gravitation.

The earth moves through the viscous 'sharmon medium' while it spins and revolves around the sun. It distorts the surrounding viscous sharmon medium in which lie the orbits of the two NASA satellites, LAGEOS and LAGEOS 2, attracted by earth's gravity.

In fact it is an evidence for the existence of a gravity propagating and viscous medium, much against the founding postulate of both the special and general theories of relativity, which discards any physical medium for light and gravitation.

### 4.13 *Interconversion of energy & mass*

The basic concept of the equivalence and inter-convertibility of energy E and mass m follows in Unified Theory very naturally from the fact that the micromost elements, positrino and negatrino, compose all forms if energy and mass.

The radiant energy E is composed by 0-spin sharmons and hence is associated with mass and momentum $E/c = (E/c^2).c = $ mass $(E/c^2)$ x velocity (c), relating radiant energy E with radiant mass $m=E/c^2$ or giving $E=mc^2$ for the equivalence and inter-convertibility of energy E (erg) and mass m (gm). Einstein [7] generalized this relation and included the rest mass energy $mc^2$ in the relativistic total kinetic energy $E = c$

$(p^2 + m^2c^2)^{1/2}$. *However the magnitude of constant k in the relation E=km would depend on the nature(s) of E and/or m and will not always be $c^2$, although the cosmino contents on two sides of the equation remain unchanged.* This is first, because the units of different energies differ. Secondly, efficiency of the conversion of mass into energy $E \leftarrow mc^2$ or of energy into mass $m \leftarrow E/c^2$ is not 100% when a part of energy changes into unavailable form. In an irreversible process the forward and backward basic reactions or changes are not equally efficient. And most natural processes are irreversible.

4.14 *No particle or energy quantum is massless or sizeless point*

The Unified Theory has two basic elements: positive (+ve) *positrino* and negative (-ve) *negatrino* of diameter $1.6156 \times 10^{-33}$ cm, mass $2.596 \times 10^{-48}$ gm and electric charge $\pm 1.3729 \times 10^{-30}$ esu. These cosminos also compose the new particle *sharmon* of the new space medium, the *sharmon medium*, which is the '**basic substance**' in the micromost compositional unity of mass, energy and radiation.

Cosmino is the unit of charged mass ($2.596 \times 10^{-48}$ gm) and charge ($1.37 \times 10^{-30}$ esu), and sharmon that of neutral mass ($5.19 \times 10^{-48}$ gm) and energy ($4.66 \times 10^{-27}$ erg or $2.91 \times 10^{-15}$ eV). All leptons contain $\pm 3.50 \times 10^{20}$ cosminos. The sharmon content of electron and positron is $3.94 \times 10^{17}$, of 105.7 MeV muon and antimuon $3.6 \times 10^{22}$ and that of 1807 MeV tau & antitau is $6.19 \times 10^{23}$. The positive up, charm and top quarks have $2.33 \times 10^{20}$ +ve positrinos. The negative down, strange and bottom quarks have $1.167 \times 10^{20}$ -ve negatrinos. The sharmon contents are: for 0.39 GeV up & down $1.337 \times 10^{23}$, for 1.55 GeV charm $5.31 \times 10^{23}$, for 0.51 GeV strange $1.749 \times 10^{23}$, for 199 GeV top $6.82 \times 10^{25}$ and for 4.72 GeV bottom $1.619 \times 10^{24}$.

Interestingly on 5th June'98, 120 Japanese and American Physicists of Super-Kamiokande collaboration [23], announced the observed mass-dependent "oscillations" in the time-related frequencies of muon-neutrino as evidence for its mass of about 0.1 eV comprising $3.43 \times 10^{13}$ sharmons. Its radius as a compact mass of cosminos is $0.8078 \times 10^{-33} \times (6.86 \times 10^{13})^{1/3} = 3.3 \times 10^{-29}$ cm. It is smaller than that ($7.249 \times 10^{-29}$ cm) of the Sodium D-line photon.

In this way Unified Theory has worked out the cosmino composition of various particles and energy quanta like photon of various energies. It can therefore be safely concluded that no particle or energy quantum is massless or sizeless point. This opposes the Einstein's conclusions that photon, graviton, gluons, neutrino and the antineutrino, which move at a velocity of light c are massless and the non-composite elementary particles like electron, proton and neutron are sizeless points.

5. **The emerging scenario**

'Science' is the creation of the scientists but not their exclusive 'property'. After publication it affects all and therefore is the concern of every body. But sometimes the core basics of the theory are wrapped in technical jargon, which is not readily and easily comprehensible. It is, for example, said that initially only three persons could understand the theories of relativity: the author Albert Einstein, mathematician Arthur Stanley Eddington and philosopher Bernard Russell. The difficulties were with the tensor mathematics of general relativity and also for the new abstract concepts about the nature of space and time. The most difficult to visualize was the unrealistic and nonexistent 4-dimensional 'spacetime' continuum, which propagates light and bends in a gravitational field.

Thus relativity was a conspicuous and effective beginning of the unrealistic Physics, although three decades earlier Maxwell had already postulated propagation of the electromagnetic light 'wave' in an empty space devoid of the wave-propagating medium. The unrealistic and nonexistent 4-D spacetime of relativity theories [4, 5] was soon followed by a host of theories [8-12] based on non-existent spacetime continua of higher and higher dimensions.

I have the greatest personal respect and admiration for the very bold mathematical physicist that Einstein was. Although he admitted that he never was clear and sure about the physical nature of light yet carried, the bold mathematical logic of his belief in the idea of '*constant c in 4-D spacetime*', with courage of conviction, to the two (special & general) theories of relativity with so many astounding and mind boggling conclusions, which though unrealistic in nature still hold the sway after a century.

Surprisingly on Thursday 10th June 2004 the United Nations general assembly passed a unanimous resolution declaring 2005 as the "year of Physics" and asking UNESCO to organize events to commemorate the Einstein's 'groundbreaking' papers published in 1905 [24]. The UN, by and large, is a political world

body. It has pronounced a well-meaning innocent judgment, on a controversial scientific subject. The discussions in this paper therefore have a great timely potential to create the right perspective and desired corrective impact on the open-minded intellectuals for the advancement of realistic Science and Philosophy.

**References**

1. Maxwell, J.C., ***Treatise on Electricity & Magnetism***, Vol.2, Chap.9, 1873.
2. Planck, M., *Verh. d. deut. physik.Gesell.* **2** (1900) 237; *Ann. der Physik* **4** (1901) 553.
3. Einstein, A., *Ann. d. Physik* **17**(1905)132; **20**(1906)199.
4. Einstein, A., in ***The Principle of Relativity***, Dover (1923) 35.
5. Einstein, A., in ***The Principle of Relativity***, Dover (1923) 109.
6. Lorentz, H.A., in ***The Principle of Relativity***, Dover (1923) 1, 9.
7. Einstein, A., in ***The Principle of Relativity***, Dover (1923) 67.
8. Minkowski, H., *Proc.80th Assem.Ger. Nat. Scient. Physicians*, Cologne (21Sep.1908); in ***The Principle of Relativity***, Dover (1923) 75-91.
9. Kaluza, Th., *Sitz.d .Preuss. Akad .d. Wiss.* (1921)966.
10. Klein, O., *Z. Phys.* **37** (1926) 895.
11. Waldrop, M.W., *Science* **222** (20 Sep 1985) 1251.
12. Green, M.B., *Scient. Amer.* **255** (Sep 1986) 44.
13 Podolny, R., ***Some Thing Called Nothing*** , Mir Pub, Moscow, 1986.
14. James DeMeo, http://www.orgonelab.org/miller.htm.
15. Heisenberg, W. *Physical Principles of Quantum Theory*, C.Eickort & F.C.Hoyt (Trans), Dover (1930).
16.Tonomura, A. et al., *Amer. J. Phys.* **57,** 117 (1989).
17. K. Scharnhorst, *Phys.Lett.*B **286**, 354 (1990).
18. G. Barton, *Phys.Lett.*B **237**, 552 (1990).
19. D. Mugnai , A. Ranfagni & R. Ruggeri, *Phys. Rev. Lett.* **84**, 4830 (2000).
20. L. J. Wang, A. Kuzmich & A. Dogariu, *Nature* **406**, 277 (2000).
21. Details of Gravity Probe-B on website: http://einstein.stanford.edu/highlights/hlindexmain.html
22. Mark Peplow, News@nature.com, 20 Octo'04, Ciufolini I. & Pavils E. C. *Nature*, **431,**.958 - 960 (2004), Nature Physics Portal, 28 October 2004, http://info.nature.com/cgibin24/DM/y/eQuV0Bhe3V0Ij0UsQ0Ad
23. Super Kamiokande Collaboration, Y. Fukuda et al., *Phys. Lett.* B **433** (1998) 9.
24. Press Trust of India news: The Tribune, Chandigarh, 12 June 2004, 'World' page, last column, 1998.