UNIFIED THEORY REPLACES RELATIVITY

Rati Ram Sharma, Retired Professor & Head, Department of Biophysics & Nuclear Medicine, Postgraduate Institute of Medical Education & Research, Chandigarh, India; Residence: # 615, Sector 10, Panchkula-134113, India; Phone: 0091-172-2563949; rrjss615@gmail.com ; http://www.geocities.com/drratiram_sharma/; http://www.sharma-upt.com

ABSTRACT: A wave exists only in its propagating medium but Einstein erred to discard the physical medium for light wave and to introduce the non-existent 4-D spacetime continuum instead. It denied him the chance to address the intrinsic wave-quantum Unity of light and predict the new entity of 'basic substance' to compose all forms of E & m so compellingly demanded for the inter-conversions of E & m by the eqn. E=mc^2, which is now re-derived. Unified Theory gives cogent arguments and experimental support for the existence of a real physical medium in space, the all-composing & all-pervading 'sharmon medium' as Basic Substance. It propagates light as a wave-quantum UNITY, the particle aspect showing up at short wavelength e.g. from ~ 7000 A^o downward in photochemical effects and below ~ 3000 A^o in photoelectric effects. The non-substantive abstract concepts of space & time evolve from our perceptions of successive motions & changes in the surrounding objects and cannot fuse into any concrete spacetime continuum. If existent it would retard motion of heavenly bodies, which is not actually observed. Any non-composite static spacetime cannot undulate to transmit light. Various multidimensional spacetime continua are mere mathematical constructs bereft of physical existence and theories based on them unrealistic. Unified Theory explains from sharmon medium the constancy & invariance to source-observer motion, the two pillar postulates of Special Relativity without validating SR. It explains the Michelson-Morley and Sagnac experiments as also the observed variability of light velocity and superluminality, which invalidate Relativity Theories. Lorentz transformations do not describe any natural motion since no velocity can vary (like v) with, and be invariant (like c) to, a source-observer motion at the same time. The actual length of an object, viewed by say, 100 differently moving observers cannot undergo 100 different objective contractions at the same time, making 'contraction of length' an unrealistic concept. So is 'dilatation of time'. Unified Theory derives from sharmon medium the Maxwell equations and the time containing and time free equations for the propagation of wave-quantum unity in gravitational and electromagnetic radiation. The Schrodinger wave equation is also derived. It explains the photoelectric effect. Explanation of the bending of light in a gravitational field shows that photon has mass and gravitation is not a curvature in 4-D spacetime. All particles and energy-quanta have definite mass & size.

Standard Model is the conceptual soul for the body framework of a theory. One can identify the 'Einstein Model' as an inseparable conceptual foundation of Special Relativity Theory, 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].

1 The Maxwell Model

In his theory of electromagnetic radiation, Clark Maxwell [2] derived the velocity of electromagnetic waves as

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

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

The value of c (= 2.997×10^{10} cm/sec) calculated for his theory from the known values of e_o (= 8.85×10^{-12} Farad/meter) and μ_o (=1.26×10^{-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 was believed to travel mostly in vacuous space Maxwell declared that light is an electromagnetic **wave** propagated in empty space. 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 and conclusions of his theory. These are:

(a) Light is an electromagnetic wave.

(b) The electromagnetic waves, including light, are propagated in the free space without any real physical medium.

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

(d) Since the electric permittivity e_o and magnetic permeability μ_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_ν for frequencies between ν (Greek, new) and $\nu+d\nu$, is

$$E_\nu = (8\ \pi\nu^2/c^3)\ KT.$$

Here K is the 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 [3] 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

$$E = h\ \nu.$$

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

$$E_\nu = (8\ \pi\ h\nu^3/c^3)/(e^{\ h\nu\ KT} - 1).$$

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 ν are now widely separated.

This represents the spectrum of the electromagnetic radiation filling the space. 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 σ (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 the phenomenon of emission the Planck Model essentially connotes that the electromagnetic radiation is emitted and absorbed as quanta of energy $E = h\ \nu$.

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

Einstein [4-6] adopted the Maxwell and Planck Models in a somewhat extended and modified form.

3.1 *The Newton's corpuscular theory revived*

Einstein [4] extended the Planck Model and postulated that the electromagnetic radiation, including light, of frequency ν and wavelength λ is not only emitted and absorbed but also propagated as quanta. of energy E = hν and momentum p = h/λ. 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 [4] explained the 'photoelectric effect', which won him the Physics Nobel Prize in 1921. But see sec. 4.4 below for Unified Theory explanation of the photoelectric effect.

3.2 *The theory of special relativity*

In accord with the Maxwell and Planck Models Einstein [4-6] stated that the light photon [4] and the electromagnetic [4, 5] and gravitational [6] waves are propagated in the free space without a physical medium.

He discarded the light medium as superfluous for his mathematical theories and went further to introduce the 4-dimensional spacetime continuum instead to propagate electromagnetic light [5, 6].

The constancy of light velocity in Maxwell Model was upgraded as the pair of two postulates of the theory of Special Relativity [5]. 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.

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/β 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 = Δx = l'/β at rest in the stationary frame (Δt =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 [7] 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 Δt' between two events at the same site (Δx' =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.

The kinetic energy E of a particle of mass m moving at a velocity v is E = mc^2 (1/β -1) and not ½mv^2.

The 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≥c.

The expression for the total energy

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

predicted the massless (m = 0) particles, like photon, moving at velocity c with momentum p and kinetic energy E = pc. The neutrino likewise is massless as it moves at velocity c.

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 [8]. 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 Electro Dynamics, all elementary particles like electron, proton, neutron &c are sizeless points

3.3. *The theory of General Relativity*

The theory of General Relativity [6] 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 [5] is defined by the relation

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

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 [6], 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 [6] treats the 4-dimensional 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 θ 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. Later Einstein changed it to $4GM/Rc^2$.

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" [6] 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 ν and wavelength λ, is not only emitted and absorbed but also propagated as freely moving particles or quanta of energy E=hν and momentum p= h/λ.

(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 move with a velocity v ≥ 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 (UPT) [1] the space and time are not real physical entities having substance but are mere 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 'then, now, then'. Movement of the 'time arrow' only forward and never backward arises because of the irreversibility of the underlying natural processes of change. These two concepts of space & time are too intangible and abstract to fuse into any tangible spacetime continuum. In fact the multidimensional continua, if existent would retard the motions of fundamental particles, material bodies, planets and galaxies &c, through them. And there would have been no free motion, not even of the photon to propagate light at constant velocity. But none of such speed retardations has ever been actually observed to contradict Newton's first law of motion. Moreover, a non-composite static spacetime cannot undulate to propagate the light wave. 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 [5, 6] and others [9-13] based on them are unrealistic.

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

James DeMeo [14] gives a comprehensive and up-to-date review of the experimental work on measuring the ether drift. 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)

Dyton Miller's '*positive*' results yielded more-than-zero ether drift as evidence for the existence of 'ether' or a light-propagating physical medium in space.

The work of Young and Fresnel by 1827 and of Sagnac in 1913 on interference and/or diffraction of light established the wave nature of light suggesting a physical medium to propagate it.

Numerous observations of the inter-conversions of various forms of energy among themselves and/or with mass and the equation $E=mc^2$ compellingly force the inescapable conclusion about the existence in real Nature of a 'Basic Substance' composing all forms of energy and mass, otherwise E & m could not inter-convert. Since the electromagnetic radiation or light is a wave propagated in a physical space-medium and compositionally a wave and its medium are one and the same, the light propagating '*Sharmon Medium*' emerges as the all-composing & all pervading Basic Substance, composed by the non-composite basic 'elements'. Since light is a transverse EM wave, sharmon is polarizable and composed by a +ve *positrino* and a -ve *negatrino*, the two non-composite elements, which compose all forms of energy, mass, energy quanta,

particles of matter and antimatter in the Cosmos, hence given the common name '*cosmino*'. The Sharmon Medium marks the end of subtlety and cosminos the end of divisibility & subtlety.

A cosmino has the diameter Planck length lp = 1.6156×10^{-33} cm, mass = 2.596×10^{-48} gm, electric charge = $\pm 1.3729 \times 10^{-30}$ esu, and spin = $\pm\frac{1}{2}$. The direction of spin is not specific of the kind of charge. A cosmino can have a right handed + ve or left handed -ve spin. Two positrinos or two negatrinos of opposite spin can produce a 0-spin Cooper pair 'diad'.

The neutral sharmon is composed by a +ve positrino and a –ve negatrino. The opposing ½ -spins of the constituent cosminos produce its 0-spin scalar state and the co-directional ½ -spins yield the 1-spin vector sharmon. The oppositely charged cosminos in the sharmon do not mutually annihilate, unlike the electron-positron pair, because the cosminos themselves are the indivisible non-composite micromost elements. Therefore both the scalar 0-spin sharmon and the vector 1-spin sharmon are stable and dynamic structures and can inter-convert.

The constituent +ve & -ve cosminos of the sharmon having mass and electric charge not only spin but also vibrate along the common axis, imparting an electric as well as an orthogonal magnetic dipole moment to the sharmon. The gravitational and electromagnetic properties of the sharmon generate those of the material particles, of the photon and of the sharmon medium, which they compose.

The Bosonic condensation of sharmons is supported by the close distance gravitational and electric attractions among constituent ±ve cosminos and imparts gregarious properties to sharmons, which can aggregate to compose energy and neutral mass of material particles. The neutral mass is composed by the 0-spin sharmons and electrically positive or negatively charged mass of the charged particles is composed by the respective positive or negative cosminos. No particle or energy quantum is therefore massless, sizeless or "virtual" (i.e. unreal). The neutron, proton, electron, neutrinos, photon, graviton &c have more-than-zero definite mass and size, as against Special Relativity.

The sharmon medium is irremovable from any enclosed space by any means since the tiny sharmon of $\sim 10^{-33}$ cm diameter can pass through spaces not only between molecules and atoms of even the densest solid but also between orbital electrons.

Due to its nature as a kinetic gas, the sharmon medium approximates as a '**kinetic continuum**' effectively obliterating the interstices between randomly moving constituent sharmons in fleeting contacts. 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. Its time-averaged inter-sharmon distance of $\sim 10^{-5}$ cm compares with the Mean Free Path for the real gasses (e.g. for Hydrogen 1.12×10^{-5} cm, Oxygen 0.64×10^{-5} cm, Nitrogen 0.595×10^{-5} cm).

The sharmon medium contains $\sim 10^{15}$ sharmons per cm^3. And its average mass density is 0.519×10^{-33} gm.cm^{-3}, vis-a-vis 3×10^{-31} gm.cm^{-3} for the Steady State Cosmology and 1.293×10^{-3} gm cm^{-3} for air. The sharmon medium is viscous, with a viscosity constant $\eta = 0.57 \times 10^{-22}$ dyne.sec/cm^2.

4.3 *The gravitational & electromagnetic static forces/fields*

The positrino and negatrino composing the sharmon have mass and electric charge (+ve, -ve). Due to the spin and vibration of the constituent cosminos the sharmon acquires electric and orthogonal magnetic dipole moment.

The $\sim 10^{-33}$ cm diameter sharmons of the sharmon medium kinetic gas enter a mass body to have close distance gravitational and electromagnetic interactions with the cosminos and sharmons composing the mass body. The gravitostatic, electrostatic and magnetostatic forces between the test mass body and the local surrounding sharmon medium are therefore proportional to the corresponding total charge (mass, electric charge, magnetic pole) of the body and are omni-directional. The field intensity, as the line of force area density on the $4\pi r^2$ spherical surface around the test charge, is inversely proportional to the square of distance. A mass body thus interacts with its surrounding sharmon medium and through it with all other bodies. The above three kinds of static forces between two bodies therefore comprise the two component forces acting separately between the two bodies with their respective local surrounding sharmon medium. The forces between two bodies are proportional directly to the product C_1C_2 of the two charges and inversely to the square of the intervening distance r^2 to obey the famous law

$$F = K\, C_1C_2/r^2.$$

The physical constant K of the sharmon medium (gravitational constant G, electric permittivity e_o or magnetic permeability μ_o) depends on the nature of the charge (gravitational, electric, magnetic) and units of measurement.

The cosminos with mass and electric charge composing the sharmons of the sharmon medium provide the common origin and mediator for the gravitostatic, electrostatic and magnetostatic forces and fields propagated and operated through the sharmon medium..

The 'action-at-a-distance' is ruled out.

4.4 *The wave-quantum unity of electromagnetic radiation in Unified Theory*

4.4.1 *The wave nature of light*
The interference and diffraction of light cannot be explained by Newton's Corpuscular theory even in its Einstein's revived form [4] or by the Quantum Theory [15]. Huygens-Fresnel Wave theory does account for them but the existence of its 'extremely more rigid than air' ether to propagate light (wrongly assumed as an elastic wave like sound) is in doubt, creating a conceptual impasse. The Unified Theory explanation in sec. 8 of the NPA profile paper "Unified Theory Replaces QT & Uncertainty Principle" for the phenomenon of interference from the realistic sharmon medium can be extended to the phenomenon of diffraction.

4.4.2 *The quantum or particle nature of light*
For this the Unified Theory presents explanations for the radiation emission and photoelectric effect in sec. 4.6 below. Explanation for Compton scattering is given in sec. 7 of the NPA profile paper "Unified Theory Replace QT & Uncertainty Principle".

4.4.3 *The Wave-Quantum Unity*
The 'origin' of light wave is not the conventional emitting electron in the source of light but the first 0-spin sharmon in the sharmon medium, which receives the wave-energy quantum and rises to its 1-spin state. Similarly, the 'terminus' of the light-wave is not the target but the propagating last 1-spin sharmon, which transfers the wave-energy quantum to the target and returns to its 0-spin state. From origin to the terminus, the 0-spin sharmon-packet energy quantum per unit frequency cycle is propagated, as "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 medium or finally to the target. The varying orthogonal electric & magnetic fields remain normal to the direction of wave motion to satisfy the right handed Poynting vector.

4.4.4 *The nature of Photon and Wave-Quantum Unity*
After emission and before absorption it is always the energized 1-spin sharmon. Unified Theory [1] gives six reasons to deny the existence of conventional 'photon'. Energized 1-spin sharmon replaces the conventional 1-spin photon but in deference to convention and for continuity is still called 1-spin "**photon**".

Since the spin of an emitter does not fall by 1 and of an absorber does not rise by 1, what is emitted or absorbed is NOT the energized 1-spin sharmon as a whole but only its energy comprising 0-spin sharmons. The 1-spin photon or 1-spin sharmon as such is **not** emitted, propagated or absorbed. However, the transmission, always and throughout, is of the energy of the 1-spin sharmon along the transverse EM wave as a wave-quantum UNITY via 1-spin sharmons of the sharmon medium by contiguous mechanisms.

The Wave-Quantum unit of energy $h\nu = h/t$ and momentum h/λ is a 'pulse' of one cycle (t) duration and one wavelength (λ) long, wherein 'Quantum' is not a sizeless point. A spherical wave-front or an extended EM wave comprises innumerable such Wave-Quantum pulses one wavelength λ 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 EM radio waves are largely wavelike but the γ and X-rays show particle aspect significantly. Since the transition from one end of the spectrum to the other is continuous the EM radiation is a Wave-Quantum Unity throughout. Manifestation of the particle nature is facilitated at relatively short wavelength depending on the contextual phenomenon as for example from ~ 7000 A^o downward in photochemical effects and below ~ 3000 A^o in photoelectric effects. Both Einstein and Heisenberg admitted that they were unclear about the wave-quantum unity of light.

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 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 [4-6] 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 waves in the 4-D spacetime continuum. The particulate photon of his corpuscular theory [4] 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 [5].

Interestingly, both the particle and wave aspects for both low intensity light and stream of electrons have been demonstrated by Tonomura et al. [16] simultaneously in one and the same experiment. This provides experimental support to UT's wave-quantum unity against Quantum Theory's wave-or-quantum duality.

Since the mass and electric charge of the cosminos inseparably co-exist the *electromagnetic & gravitational forces/fields/waves* are propagated contiguously in the sharmon medium at the same velocity of light $c = (e_o.\mu_o)^{-1/2}$ where e_o (= 8.85×10^{-12} Farad/meter) is the electric permittivity and μ_o (= 1.26×10^{-8} Henry/meter) the magnetic permeability of the sharmon medium (not of the vacuum as current theories wrongly assume). The velocity V_g (=c) = $(e_r / d_s)^{1/2}$ of the transverse gravitational wave likewise, is separately set by the rigidity or shear elasticity $e_r = 4.687 \times 10^{-12}$ dyne/cm^2 and mass density $d_s = 5.19 \times 10^{-34}$ gm/cm^3 of the sharmon medium itself.. Their propagating bosons (1-spin photon, 2-spin graviton) comprise multiple sharmons of more-than-zero definite mass.

The cosminos with mass and electric charge composing the sharmons of the sharmon medium emerge as the common origin and mediator for the gravitational, electric, magnetic and electromagnetic forces, fields and waves.

4.4.5 *Propagation of wave-quantum unity in electromagnetic radiation*

Using E = energy, p = momentum and the relations:

$$c = \nu\lambda = E/p \text{ and } c^2 = c\nu\lambda = \nu^2\lambda^2 = E^2/p^2$$

in the general wave equation:

$$\nabla^2\varphi - 1/c^2 \ \partial^2\varphi/\partial t^2 = 0$$
$$\text{with } \nabla^2 = \partial^2/\partial x^2 + \partial^2/\partial y^2 + \partial^2/\partial z^2$$

we get the new time-containing wave equations

$$\nabla^2\varphi - 1/c\nu\lambda \ \partial^2\varphi/\partial t^2 = 0, \ \nabla^2\varphi - p/cE \ \partial^2\varphi/\partial t^2 = 0, \text{ and}$$
$$\nabla^2\varphi - 1/\nu^2\lambda^2 \ \partial^2\varphi/\partial t^2 = 0, \ \nabla^2\varphi - p^2/E^2 \ \partial^2\varphi/\partial t^2 = 0.$$

This represents the unity of the two coexistent wave and quantum characters during propagation of the radiation within the sharmon medium in free space at velocity $c = (e_o.\mu_o)^{-1/2}$ set by the electrical permittivity e_o and magnetic permeability μ_o of the sharmon medium. For a homogenous medium its phase velocity w replaces c in the above wave equations. And

$$\nabla^2\varphi - \mu_r/c\nu\lambda \ \partial^2\varphi/\partial t^2 = 0, \ \nabla^2\varphi - p\mu_r/cE \ \partial^2\varphi/\partial t^2 = 0, \ \text{ and}$$
$$\nabla^2\varphi - \mu_r /\nu^2\lambda^2 \ \partial^2\varphi/\partial t^2 = 0, \ \nabla^2\varphi - \mu_r \ p^2/E^2 \ \partial^2\varphi/\partial t^2 = 0,$$

describe the continued propagation of the wave-quantum unity in a refractive medium with $\mu_r = c/w$ as the refractive index, w being the radiation velocity in the medium and c that in the free space. In a dispersive

medium the energy E (frequency ν) and momentum p (wave length λ) of the radiation depend on the velocity w and the refractive index μ_r. For the free space $\mu_r = 1$.

A physically admissible monochromatic (single ν) or mono-energetic (single E) solution of the above wave equations would also conform to the differential equation for a harmonic function of time t for its emission from the source,

$$\partial^2 \varphi / \partial t^2 = -4\pi^2 \nu^2 \varphi = -4\pi^2 \Delta E^2 / h^2 \varphi.$$

This leads to the following time-free versions of the above time-containing wave equations:

$$\nabla^2 \varphi + 4\pi^2 / \lambda^2 \varphi = 0, \quad \nabla^2 \varphi + 4\pi^2 p^2 / h^2 \varphi = 0, \quad \text{and}$$
$$\nabla^2 \varphi + 4\pi^2 \mu_r / \lambda^2 \varphi = 0, \quad \nabla^2 \varphi + 4\pi^2 p^2 \mu_r / h^2 \varphi = 0.$$

For a particle of mass m, moving with velocity u, momentum p, total energy T and potential energy V, $p^2 = m^2 u^2 = 2m(T - V)$. This with the above wave equation follows [1] the famous Schrodinger Wave Equation of Wave Mechanics

$$\nabla^2 \Psi + (8\pi^2 m / h^2)(T - V)\Psi = 0.$$

4.5 *Displacement charge & current in sharmon medium*

Polarizability of the sharmon renders the sharmon medium polarizable under an electric field E to induce a charge $\pm q$ and an electric dipole moment $p_e = ql$ of arm l. The deforming force $F_1 = Eq$ and the restitution force $F_2 = q^2 / e_o l^2$, e_o being the electric permittivity of the sharmon medium. Since $F_1 = F_2$, $q = e_o E l^2$ and $p_e = e_o E l^3$. Invoking spatial symmetry in the sharmon medium, the 2-dimensional Displacement Charge Density $D = q/l^2 = e_o E$ and the Displacement Current Density $I_d = dD/dt = e_o dE/dt$.

This provides [1] the much needed physical bases to Maxwell's displacement charge and displacement current in free space which he used only as mathematical exigencies without any physical carrier.

4.5.1 *Maxwell equations for electromagnetic radiation in Unified Theory*

The above realistic deductions justify Maxwell's assumption that the displacement current is solenoidal and gives rise to a magnetic field H like conduction current [1]. Therefore

$$\text{div } I_d = 0 = \text{div } dD/dt$$
$$\text{and curl } H = dD/dt = e_o dE/dt. \qquad \text{..... (a)}$$

Likewise the other two equations are

$$\text{div } H = 0 \qquad \qquad \text{..... (b)}$$
$$\text{curl } H = -\mu_o dH/dt. \qquad \text{.....(c)}$$

Here μ_o is the magnetic permeability of the sharmon medium.

Thus, Maxwell's original equations for the free empty space or vacuum are the same as now for Unified Theory's real physical sharmon medium.

On curling eqn. (a) we get

$$\text{curl curl } H = (\text{grad.div} - \nabla^2) H = e_o \text{ curl } dE/dt$$

where $\nabla^2 = (\partial^2/\partial x^2 + \partial^2/\partial y^2 + \partial^2/\partial z^2)$ is the Laplace operator.

This with time differential of eqn. (c) gives

$$\text{grad div } H - \nabla^2 H = -e_o \partial^2 H / \partial t^2,$$

which with eqn. (b) leads to

$$(\nabla^2 - e_o.\mu_o \; \partial^2/\partial t^2 \;) \; H = 0.$$

So the propagation velocity for magnetic field H is

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

Similar relations follow for E, D and p_e which all are propagated with the same velocity $c = (e_o.\mu_o)^{-1/2}$ of light, where e_o is the electric permittivity and μ_o the magnetic permeability of sharmon medium.

4.5.2 *Conduction of electromagnetic waves in sharmon medium*

The electric field E, magnetic field H and the dipole moment p_e induced in the sharmon medium, have the same frequency ν of Simple Harmonic Variation decided and impressed by the source. The direction of energy flow is given by the right handed Poynting radiant vector R = E.H, normal to the plane containing E and H oscillating at right angles to each other.

A plane electromagnetic wave of wavelength λ may therefore be described by

$$E = E_o \cos 2\pi(\nu t - x/\lambda)$$
$$H = H_o \cos 2\pi(\nu t - x/\lambda)$$
$$p_e = p_{eo} \cos 2\pi(\nu t - x/\lambda)$$

The propagation velocity $c = (e_o.\mu_o)^{-1/2}$ is determined by electrical permittivity e_o and magnetic permeability μ_o of the sharmon medium.

4.6 *The Unified Theory explanation of photoelectric effect*

Einstein [4] 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 UT [1], 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, ν 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 [4] already verified by experiments.

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

The special relativity [5] was based on these two axiomatic postulates, which Einstein did not explain but are now explained realistically from UT. However this UT explanation does not validate the theory of Special Relativity (SR). Not only this, the UT can even explain the actually observed variability of light velocity c, which invalidates both the special and general theories of relativity.

As clarified in sec. 4.4 above the effective 'origin' of the light wave is NOT the emitting electron in the light source but the first 0-spin sharmon in the sharmon medium which receives the wave energy quantum and rises to its 1-spin state. Similarly the effective 'terminus' of the wave is the last propagating 1-spin sharmon which transfers the wave energy quantum to the target. 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 via contiguous mechanisms.

Due to creative beginning of the light wave at the origin in the sharmon medium the light velocity c is independent of the source motion and vanishing termination at the terminus makes c independent of the target/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 & μ_o of the sharmon medium are constant and not affected by the motion of the source or observer. .

These conclusions from Unified Theory explain the results of the Michelson-Morley experiments and also the Sagnac experiment. In the 1913-experiment performed by French physicist Georges Sagnac a platform rotated uniformly around a vertical axis at 1-2 rotations per second. In an interferometer mounted on the platform, two interfering light beams moving in opposite directions produced interference fringes recorded photographically. Sagnac observed a shift of the interference fringes every time the rotation was modified. This is tied to the relative time delay dt with which the two light beams reach the interferometer. Considering his experiment conceptually similar to the Michelson-Morley one, Sagnac announced the proof of a space medium for light waves.

According to the Unified Theory the velocity of light for the two oppositely moving beams being invariant to the motion of the source and the target interferometer is equal and same $c = (e_o.\mu_o)^{-1/2}$ and not $(c + v)$ or $(c - v)$. Therefore the time difference for the two interfering beams is $dt = 2\pi rn/c$, r is radius of the rotating platform and n the rotations per second. Modifying n would shift the fringes by changing the time difference dt, actually observed by Sagnac as evidence for a real physical medium in space, like sharmon medium. None of the over a score other explanations of Sagnac effect is so satisfactory and natural.

4.7.1 *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***' and the light propagating sharmon medium as the '***absolute reference frame***'. This is in stark contrast to the conceptual foundations of Relativity vide sec. 3.4 (b) above according to which there is no absolute motion and no absolute reference frame. Since all motions are relative.

4.8 *Observed variability of c and superluminality invalidate relativity theories but support UT*

Nay, even the observed variability of c [17-19] and superluminality [20] (light velocity exceeding c), which invalidate the theories of Special & General Relativity, also follow from UT by merely affecting e_o & μ_o and refractive index μ_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 whatever, the light does and can propagate only through the pervading subtle sharmon medium whose local e_o, μ_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 moments. All this gives rise to e_o & μ_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 & μ_o of the pervading/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.

4.9 *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 at the same time. 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 and using them in a formula to describe any real motion. The speed of a real body cannot at the same time be variant (like v) and invariant (like c) to the source-observer motion.

Therefore the Lorentz transformations of Special Relativity [5] do NOT describe any actual motion in the real Nature. Their leading conclusions viz. 'contraction of space' and 'dilatation 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' as unreal concept. Likewise 'dilatation of time' too is unrealistic.

4.10 *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.

4.11 *Bending of light in a gravitational field*

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 [1]. 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, providing support to the Unified Theory. It, as against Relativity, shows that photon has gravitational mass.

4.12 *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 1.6156×10^{-33} cm, mass 2.596×10^{-48} gm and electric charge $\pm 1.3729 \times 10^{-30}$ esu. These are themselves non-composite but compose the sharmon and all forms of energy, energy quanta and particles of matter and antimatter including all the elementary particles of the Modern Standard Model in the Cosmos, hence given the common name *cosmino*.

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

Interestingly on 5th June'98, 120 Japanese and American Physicists of Super-Kamiokande collaboration [21], 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 3.43×10^{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 (7.249×10^{-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.

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 and/or sharmon compose all forms if energy and mass.

The radiant energy E composed of 0-spin sharmons is associated with mass and momentum E/c = $(E/c^2).c$ = mass (E/c^2) x velocity (c), relating 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 [8] 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 ← mc^2 or of energy into mass m ←E/c^2 is not 100% when a part of energy changes into unavailable form. Moreover, in an irreversible process the forward and backward basic reactions or changes are not equally efficient. And most natural processes are irreversible.

4.14 *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, in sec. 14.2 of Chapter-14 of the 2008-eBook [1] 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.

5 **The emerging scenario**

'Science' is the creation of the scientists but not their exclusive 'property'. After publication every piece of research becomes a common property. 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 to the general reader. Nay, sometime, even the 'scientists' find it difficult to comprehend.

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. The unrealistic and nonexistent 4-D spacetime of relativity theories [5, 6] was soon followed by a host of theories [9-13] based on spacetime continua of higher and higher dimensions wrapped in more and more abstruse mathematics and shrouded in increasing fantasy of (un)natural philosophies.

Thus, Einstein [4-6] set the trend for unrealistic Physics others followed and carried it forward to make twentieth century as the *century of unrealistic Physics*. A host of these unrealistic concepts adding to some others coming from the quantum and string theories have turned the modern Physics so unrealistic that even the most celebrated physicists cannot explain the objective reality the way one would like to through easily understood language and visualizable concepts. Incalculable amounts of funds and intellectual wealth of so many brilliant physicists have been wasted. Four-five generations were taught unrealistic Physics in the classrooms. Innumerable textbooks were written and articles published in scientific journals and lay press to

spread the message wide. The Geneva based Large Hadron Collider will not find the non-existent mass-generating Higgs boson nor the wrapped up extra dimensions of space.

I am constrained to make these remarks under the impulse of the concern for the development of realistic science. But no doubt, I have the greatest 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 the light photon yet carried, the bold mathematical logic of his belief in the 'constant c in the 4-D spacetime', with courage of conviction, to the two (Special & General) theories of relativity with so many astounding conclusions, which though unrealistic in nature are still holding the sway even after a century.

On 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 [22]. The UN, by and large, is a political world body. It has pronounced a well-meaning innocent judgment, on behalf of all its member countries, on a controversial scientific subject.

The discussions in this paper, however, unravel the truth and help the readers themselves to see that the UN has exceeded its functional scope because the ill-informed UN members innocently and wrongly believe that Einstein was flawlessly right. In fact Unified Theory provides a realistic alternative replacement for the theories of Special and General Relativity.

References

[1] Sharma, Rati Ram *Realistic Foundations of Physics & Cosmology,* Abhishek Publications,
   Chandigarh, 2002; 2008-eBook: UNIFIED THEORY *With Realistic Foundations of* Science &
Philosophy; http://www.geocities.com/drratiram_sharma/; http://www.sharma-upt.com; http://wbabin.net/
; http://vixra.org/ .

[2]. Maxwell, J.C., *Treatise on Electricity & Magnetism*, Vol.2, Chap.9, 1873.

[3]. Planck, M., *Verh. d. deut. physik.Gesell.* **2** (1900) 237; *Ann. der Physik* **4** (1901) 553.

[4]. Einstein, A., *Ann. d. Physik* **17**(1905)132; **20**(1906)199.

[5]. Einstein, A., in *The Principle of Relativity,* Dover (1923) 35.

[6]. Einstein, A., in *The Principle of Relativity*, Dover (1923) 109.

[7]. Lorentz, H.A., in *The Principle of Relativity,* Dover (1923) 1, 9.

[8] Einstein, A., in *The Principle of Relativity*, Dover (1923) 67

[9]. Minkowski, H., *Proc.80th Assem.Ger. Nat. Scient. Physicians*, Cologne (21Sep 1908); in *The
   Principle of Relativity*, Dover (1923) 75-91.

[10]. Kaluza, Th., *Sitz.d .Preuss. Akad .d. Wiss*. (1921)966.

[11]. Klein, O., *Z. Phys.* **37** (1926) 895.

[12]. Waldrop, M.W., *Science* **222** (20 Sep 1985) 1251.

[13]. Green, W.B., *Scient. Amer*. **255** (Sep 1986) 44.

[14]. James DeMeo, http://www.orgonelab.org/miller.htm.

[15] Heisenberg, W. *Physical Principles of QuantumTheory*, 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] Super Kamiokande Collaboration, Y. Fukuda et al., *Phys. Lett*. B **433** (1998) 9.

[22] Press Trust of India news: The Tribune, Chandigarh, 12 June 2004, 'World' page, last column.