



RESEARCH ARTICLE

FIELD MODE AND PHOTON MODE OF EM ENERGY TRANSMISSION THOUGH FREE SPACE

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ABSTRACT

Light photons are considered mass-less. The gravity bends light due to its relativistic mass. But this innovative paper and the author's previous papers referred in this article, reveal that, the light photons have rest-mass: Its rest-mass remains as it is at its speed c. How it happens is also explained w.r.t. Author's previous paper given in below description (The Light Photon, Black Matter...). All experiments performed give speed of light w.r.t. its source and not w.r.t. the observer. Not any experiment give speed of light w.r.t. observer. The speed of light w.r.t. observer decreases as the relative speed between the observer and the source of light increases. If the relative speed is v then the speed of light w.r.t. observer is $(c^2-v^2)^{1/2}$. It is proved here. Experiments are also performed to verify the speed of communication radio waves; and it is declared that, the radio waves also travel at speed of light. But actually deep perusal of those experiments will reveal that, all those experiments give the speed of light of the source electrons which are free in conduction band of either field-radiating conductors or field-signal-receiving conductors. But, as verified by the author, in the experiment described in this article; the speed of radio waves up to Microsoft frequencies is infinity in free space. But, from infra-red above frequency radiations they travel at light speed in free space. These radiations consist of discrete, ultimate, eternal Dark Energy Particles in periodical bunches called photons known as Bosons. These photons are released from excited orbital electrons of an atom electro-magnetically. And hence, take it granted for that, Light is not electromagnetic radiation but, it is emitted electro-magnetically. There is a lot of difference in these two nomenclatures of the light on the basis of generation of the light. Lastly, there are two modes of transmission of energy by electromagnetic phenomena; the Field-Mode and the Photon-Mode, quite different from each-other.

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INTRODUCTION

Since Maxwell, the concept had been rooted firmly that, the light is nothing but, oscillations of electric and magnetic fields perpendicular to each other in space. But, not any explanation is found about, why light don't exhibit, the properties of electric and magnetic fields. The similar case is with the speed of electro-magnetic radiations throughout its complete range. It is accepted that, all electromagnetic waves including light; all travel in free space at the said ultimate speed c. The Author has innovated above existed considerations, remaining very perceptual; innovative with original research-full consciousness in this article. It is found that, very basically, very originally, there are two modes of transmission of energy electro-magnetically; the Field Mode and the Photon-(particle) Mode.

The Light Photon And The Dark Energy Connection:- The Scientists world over, have spent 20th century on studying energy transfer in free space by the Light.

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They performed many laboratory experiments, Field experiments to reveal the speed of light in free space and, found it equal to the well known constant speed $c=3 \times 10^8$ m/s. Please note that, in each and every experiment to measure the speed of light the source of light and the Observer (instrument) both are in the same attached frame and there is not any Relative Motion w.r.t. each other between the two. Hence the result cannot be stated as, "The speed of light in free space is constant equal to c irrespective of any frame and its relative motion. All the results found by all experiments performed to determine the speed of light doesn't involve relative speed between the light source and the observer. The constancy of light speed is limited to one inertial frame common to both the source and the observer. ("An innovative Review of Kennedy-Thorndike Experiment" published in 'scirj', volume V, Issue V, May 2017) Simultaneously, experiments were performed to find out the nature of light. It was found that, the light behaves both way; as a particle and as a wave. But for wave nature; the medium for waves could not be proved. The pleaders of ether try to prove ether existence on the basis of wave nature of light; a wave needs a material medium. Some think there can't be void; hence a fine material they think to be filling the voids. Quantum Physics does not need any medium for travel of light except free space. Light is affected by gravity. But, for travel

of light as Plank's mass, no medium is required. With these two properties light photons have also gravity. Therefore the light bending due to Gravitational bending is observed. The General theory of Relativity is mostly related to gravity at every point in space. Hence space is filled up with very fine gravity material. The existence of Dark Matter and the Dark Energy (Matter) which have property of gravity are proved to exist. Hence, light photons are dark matter particles moving in space at linear direction and dark matter has particles vibrating at different directions in micro-domains of space continuously in all directions. Because, empty space is full of energy and energy is moving mass particles in space. Einstein's special Relativity cannot consider the free space as an empty space. He required it to consider free space filled of fine gravity material calling it Gravitational ether. After all it is the Dark-energy-particle-material. (please refer the article of this Author titled, " The Light Photon, Dark Matter And The Whirling of Dark Matter, The Theory of The Birth of Universe." published in *IJCR Vol. 9, Issue, 09, pp.xxxxxx, September, 2017*) The linear motion like light may not be applied to it directly.

Maxwell's Electro-Magnetic Theory declared light as electro-magnetic waves; and electro-magnetic waves can travel through free space without any medium. Then, the Plank's Quantum Theory was introduced. According to Quantum Theory of Light; light is considered in the form of 'energy packets/particles called Quanta. They couldn't find Rest-Mass of light photon; but, they believe in momentum of light-photon but not in its rest-mass. Photon has rest mass. The Author says confidently. Further its relativistic mass in its speed doesn't increase beyond its rest-mass as other elementary particles. It is the truth noted by the Author. A photon has very the smallest mass of the order of $7.3 \times 10^{-51} \text{Kg}_m$. The Dark Energy Matter Particles occupy 72.8% of the total matter of the Universe. It is very rare. Its density works out to 10^{-27}Kg/m^3 . It gives 1.4×10^{14} particles per mm^3 . It is very ultimate basic particle in Universe. Hence any smallest force speeds it up to 'c' instantly. In the same rest-frame any particle cannot be speeded beyond the speed c by source w.r.t. which the photon is moving c. Because, any particle cannot attain, speed greater than c, w.r.t. its source. If it is tried the particle assumes electrical charge equivalent to energy applied to speed up the particle; and any incremental speed rise beyond c w.r.t. the source, the charge produces opposing magnetic force-field to obstruct the speed rise beyond c anymore w.r.t. its speed-imparting source. We are in illusion that, radiation energy is electro-magnetic oscillations in space. But they are only in inside space of the atom releasing energy electro-magnetically. *As per Author, radiation energy is not electro-magnetic energy but it is electro-magnetically released energy.* Further, please note that, when the Author says, Dark-Energy Matter-Particles, he doesn't mean baryonic matter; but it wants to indicate that the space is full of the smallest ultimate mass particles each of $7.3 \times 10^{-51} \text{Kg}_m$ spaced a bit greater than Planks Length. Any moving mass is energy in motion. Till a moving photon transfers its full energy to some other mass; it can't come to rest. When it comes to rest it has energy due to its position in Universe as well as its dancing continuously with some other coupled similar particles in micro-space domains. Now the light photon had become the Dark-Energy Matter-Particle. Please see my article, 'THE LIGHT PHOTON, DARK MATTER AND THE WHIRLING OF DARK MATTER, THE THEORY OF THE BIRTH OF UNIVERSE', available at open access, of *International Journal of Current Research (scirj)*, Vol. 9, Issue, 09, pp.xxxxxx, September, 2017 . They

don't find light photons at rest. Hence they deny rest mass of photons. While doing so they ignore the energy in space is due to dancing of Dark-Energy Matter-Particles in space-micro-domains. They are also, not serious about; how the momentum is transferred from source to a photon (here it is an electron or a proton). They are not ready to think How, does the energy conversion relation $E=mc^2$ actually works. In-fact, it is not the conversion of mass into energy but, it is the transformation of internal energy of mass into radiant energy; the basic ultimate mass particles remain intact as carriers of radiations. And when radiation energy is absorbed by some mass they also attach themselves to that mass or if reflected, they are received by Dark-Energy Matter-Particles when they pass through effective zones of the Dark-Energy Matter-Particles and become part of Dark Energy. Thus, Dark-Energy Matter-Particle is the eternal route cause of the Universe whether existing as materialistic Universe or Empty Universe. Empty in the sense the space not containing any matter particles except the Dark-energy Matter-Particles.

Types/Modes/Natures of Radiations

At present, the modern physics, considers that, Energy is transmitted at far distance in the form of 'quanta', the energy packets having properties of particles and the waves as well, both travelling at speed c, the speed of light. There is much discussion on α , β , γ , radiations, conduction, convection, radiation as types and modes and nature of radiation. But, all are falling under one category of 'the particle-photon radiation' as per the Author. A group of waves is defined as a photon with the help of Maxwell's Electromagnetic Theory of Radiation as photon having no rest mass but with momentum, as a stored energy. Thus, rest mass-less nature of energy photon is accepted. The second hypothetical thing is the speed of electro-magnetic radiations. A lot of experimentation is being performed since a century ago to find speed of light. And it is c; in its source's attached frame, the Author adds. All experimentation is done for radiations above micro-waves. But, from those experiments the speed c is also attached to radiations below infra red waves from micro-waves to all frequency- electro-magnetically released waves. At the point of speed, the Author differentiates between the wave nature and particle nature of energy packets/Quanta. As per Author, there are two ways of transmission of Electro-Magnetically released energy. They are, (1) Field-Line mode and, (2) Photon-Particle mode. Around 2000 year, the Author, when searching on webs and asking the Physics Professors here and there; could not get the speed measurement of light in laboratory by a mechanical way; like determining speed of a train moving on straight rails at constant speed, by noting the timings of the railway passing by two stations on its straight route, the distance between whose is known; with the help of well synchronized similar watches and then calculating the speed mathematically. So, in parallel to this thinking, the Author, devised an experiment below with the help of testing equipments at his Hydro-Project Site; on Service Bay of the Power station and then in open area on hill top to avoid any reflections and inductions.

Instruments

Following instruments were used.

Double channel scientific oscilloscope with its probes and having least count of $0.02 \mu\text{s}$ per main division on time scale.

27.47 MHz transmitting dipole antenna along-with two nos. of additional dipole antenna. Single core screened cable for signal probing.

The instruments are connected as shown in the figure-1 below. The idea of measuring speed of communication wave arose from desire to measure speed of light directly in laboratory. Directly in the sense, measuring time required to travel a certain distance by a light pulse actually physically. It was somewhat around the year 2000. As the experiment was being designed for; two German scientists measured it in lab in a very sophisticated way. Then, just curiously author designed and measured speed of communication wave by performing this experiment. The result of the experiment is astonishing. For, it gives speed of communication wave like infinity. The speed of communication field-wave is infinitely great through free space. It suffers from phase shift due to reflection from ions, metals, walls, hills. Its phase shift speed due to reflection from ionosphere is as known in respect of radio, television waves is also very greater than c.

The speed of communication field waves in this experiment is not the phase speed. Therefore, it should not be mistaken as phase speed. During experiment, leading phase shift up to $[2/3 \pi^\circ]$ was observed in respect of sent and received waves and it remained always constant irrespective of distance between transmitting and receiving antenna. It was due to R L C factors of the equipments. I have accepted it as fixed error in measurement. While manipulating final results it has to be taken care of. Connections were made as shown in the below figure-1.a.

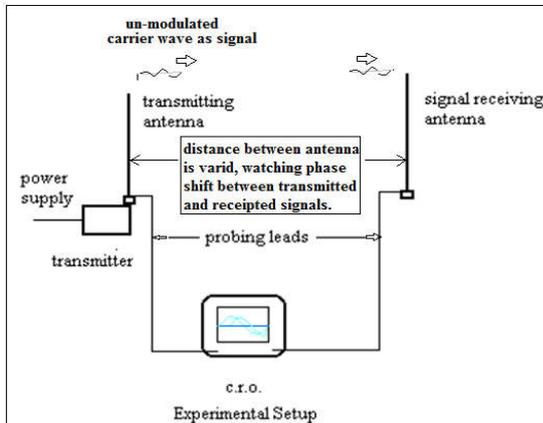


Figure 1.a. Verification of Space Speed of EM Wave

The transmitting antenna signal and receiving antenna signal probing lengths are taken equal to 30 mtrs. each to avoid the phase difference due to the different cable lengths. The experiment is carried out at high level all clear place in the signal range to avoid reflected waves and inductions.

C.R.O. Settings

27.47 MHz transmitter frequency gives the wave period equal to $0.0364 \mu\text{s}$. i.e. 9.1 small divisions on time scale of c.r.o. It corresponds to the wave length equal to 10.9 mtrs.

Procedure and Observations

The supply is made on. Only the carrier wave is used. It being a communication transmitter of 5 km range the carrier wave is considered a power wave within 50 meters.

Both the antennas are brought sufficiently near to each other. Phase reversal between transmitted and received waves was observed. It was reverted to match the both waves, by c.r.o. control phase reversal switch. Then, the peak points of first positive wave-halves of transmitted and the received waves were carefully seen and marked on the c.r.o. screen stand still display. Then receiving antenna was smoothly and slowly moved away from the transmitting antenna. During above movement, shift in noted-peaks of both the waves was observed. The receiving antenna was moved up to 17 meters away from the transmitting antenna. During this movement, the marked peaks of transmitted and received signals were watched for their mutual relative displacement. But, not any phase shift w.r.t. distance variation between them was seen. In next phase of the experiment two numbers of receiving antenna were used one fixed and other being shifted. No phase shift was observed between the two received signals at various positions of the two receiving antenna. The observed and practical displays are shown in the figure-1.b below. The figure-1.c below is about expected display. It is seen from the figure that, there is appearing a constant phase shift between the two signals irrespective of distance between both the antennas. This phase difference is due to some different but constant characteristics of the probes, the electronics of the two channels, and the two antennas. The dotted wave, represent the expected received signal when the receiving antenna is half wave-distance away from the transmitting antenna.

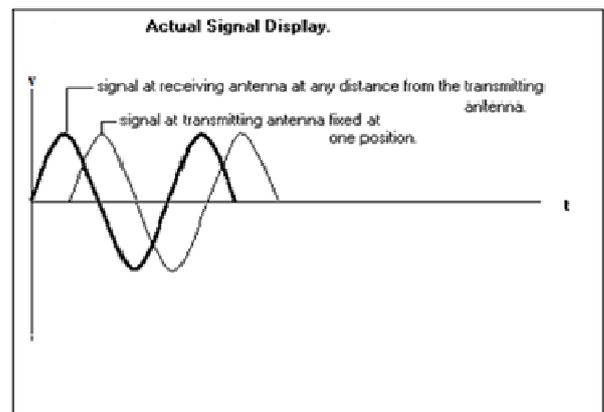


Figure: 1.b. Display of transmitted and received waves. Comparison of Received Wave with

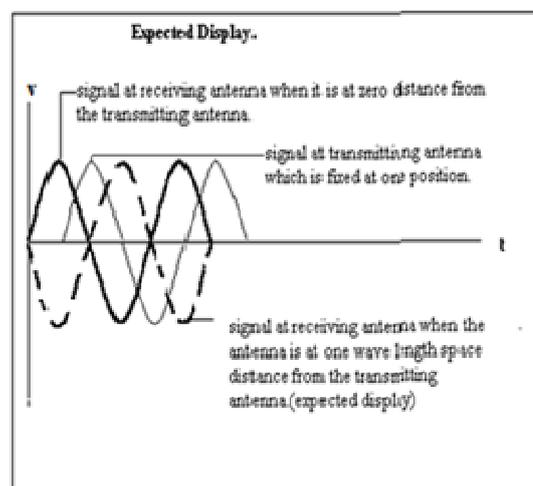


Figure: 1.c Display of transmitted and received waves. Comparison of Received Wave with Expected Wave.

The experiment was conducted by the author a dozens of time under varied conditions to verify the results. Still the results were the same.

Laboratory measurement of speed of light by the two German Scientists were viewed by the author on a web that time (Now there are good many laboratory experiments to verify speed of light is c ; but, they also prove speed of light c w.r.t. its source only) and found very satisfactory. As seen from these two experiments' results, author pleads that, there are two modes of transmission of E.M. signals.

Presently only photon mode of transmission is considered all over the frequency-range of E.M. waves. A field line is also considered nothing than rare charge distribution along the line. But the Author pleads existence of field line to be separate. Regarding energy transfer by field line, the present concept is that, the transmitter generates field wave groups corresponding to signal to be transmitted. These waves then after travel at speed c in free space irrespective of its source. If it were so; then, in this performed experiment, field wave space speed would have been seen. But, it is not existed as seen in this experiment. The experiment tells us that the complete field line from source to receiver vibrates in free space like a rigid bar giving infinitely high signal transmission speed.

Further, in the above experiment for distance 50 m. maximum; and frequency 50 MHz radiation field is only prominent much beyond the distance of 0.159λ i.e. equal to $1.59\lambda/6=9.54$ m. Induction field almost vanishes from 20 m. beyond. Hence, the result obtained in 50 m distance variation between transmitting and receiving antenna; are reliable. As the radiations in respect of light are from inside of an atom; the orbital periphery of electron remitting radiations and the wavelength correspond well with each other. But, the field oscillations from microwave below are due to conduction band electrons in a conductor i.e. an antenna; complete field line oscillations take place like a oscillating rigid bar connected between source and the receptor. In this case, an electron in sending end antenna will show its, to and fro or up and down vibrations as sine-wave w.r.t. time in c.r.o. Similarly the electron of receiver antenna will be following the sending end antenna respective electrons which are attached to each other by the field strait line linked between the two. If the receiving end antenna's free electron motion is compared on the two channel c.r.o. and the distance between both of the antenna is varied, the observation won't show any phase shift, meaning by, the speed of field line is infinite in free space. And it is observed in the above practically performed experiment. In figure-2 below, how a field line of transmitting antenna's electron drives the receiving end antenna's free electron; is shown.

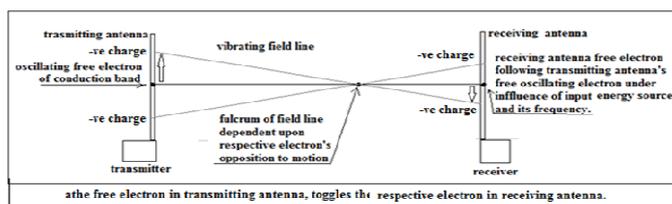


Figure: 2. An Oscillating Field Line Transmitting EM Energy

A free electron in conduction band moves in the conductor, at the maximum speed c . In straight dipole antenna, the transverse movement of the field-line; do not exceed speed c . Hence the information is carried from transmitting antenna to receiving antenna at infinite speed.

Electric field line Signaling and signal analyzing equipments operating on electric field line, may be developed to catch present information from any far distances in space and also to send the information to far distant launched satellites and space stations in near future.

Many experiments are performed to find the speed of electric and magnetic fields in free space after 1998. Please verify. If earlier efforts are found, bring them to my notice. Since around that time, the Author has initiated the process by asking here and there about the subject matter under discussion here. Conveyed his experimental findings worldwide, asking for their findings. As the experiments to find speed of light; included an error that, speed of light is constant c irrespective of any frame and source and any observer; similarly, in experiments to find out speed of electric and magnetic field all those related experiments erred by mistaking the speed of oscillating free conduction electron to be the speed of electric or/and magnetic field.

Excuse me, but I must tell the truth; that, *whatever particles are present in the Universe; each one has its field originally existing with it; duly established in all direction. A particle has a field and a field has its source particle. So, when we talk about the speed of field; it has to mean the speed of change in field.* Straight line field, travels through free space which have no ions in field-path, at infinite speed. More correct to say; the field lines are up to infinity already originally in free space when source appeared and they transfer information signals immediately. The information is stored in their transverse motions which produce, motions in conduction band electrons of the receiving antenna.

Wave nature of Radio waves is observed in respect of curved antennas; that are with mobile phones, smart phones; like helical antenna. Mobile phones use frequencies in MHzs range. Wavelength in that range is of the order of a meter. A half wavelength antenna will mean, antenna corresponding conductor length of the order of half a meter. Hence in mobiles and that like apparatus, coiled antennas are used. In a curved antenna; a conduction band electron will be oscillating along a circular helical path; forward and reverse at the different speeds and up to different lengths decided by the signal. I repeat again that, *the field as such of a particle always exists up to infinite distance. It is the change in a field line that produces kinks, curves and such like any other changes; that travels through free space at speed much greater than that of light w.r.t. the distance between the source-antenna i.e. the transmitting antenna and the receiving antenna.*

In a curved antenna, oscillating conduction electron's field oscillates at angular velocity of the radius of its peripheral path of oscillations. The linear speed of a conduction electron is less than c ; hence, the point on the radial field line of the electron, moving at the speed of light is a bit outside of the circular path of the conductor. Please see the figure-3 below. In its first view, the curved circular path ab of oscillating electron e in transmitting antenna is shown.

The end positions of the electron as decided by the signal to be transmitted are g and h as shown in view 1 and 2 respectively in the figure. When the electron is at its mean position e ; its field line passes through the free space straight up to infinite distance. There is receiving antenna df in the path of the field line.

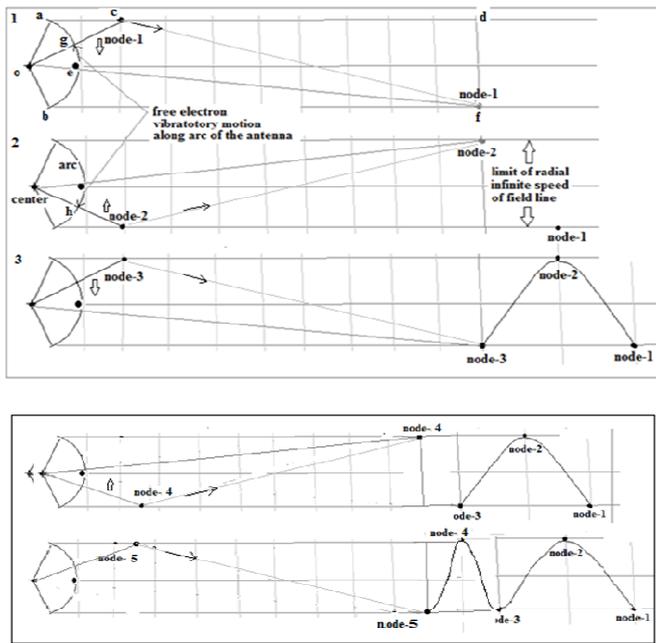


Figure: 3. Field wave propagation in Free Space

Therefore, the free electric charge in the conductor at its center between d and f, gets engaged with it (not shown). Let the electron move towards point g. When the field passes through point d of the receiving antenna; the field line cuts the geometrical line ad. The field line up to od remain radial and beyond od it moves parallel to od at transverse speed c; because the permittivity and permeability of space limits its motion to speed c. When, the line reaches the point g, it cuts the line od at c and reverses its transverse speed describing a kink at point c named node-1 on line od. Now during the travel of field line, from point g towards point h, the node-1 travels at speed c towards the receiving antenna and meets it at point f. then after the nodal point returns back towards point h on the periphery of path of motion of the electron. On this return path, the nodal point returns to node-2 where the field line speed limit c is reached.

After reaching the point h, the field line again starts its reverse to just now previous motion towards point g. Again the phenomena repeats and node-2 reaches the point d of the receiving antenna. During its motion from d to f to d and continuous further, the field line drives the free electron in the receiving antenna. In actual, the field line driving the free electron in the receiving antenna, is not a straight line but it is a curved line the curvature being convex facing to direction of the motion of the field line, because of tendency of the driven electron to oppose the change in its position according to natural law; 'every event source opposes change in its any state.' It is the most general version of Newtons first Law of motion originally first quoted by the Author. along the distance ad or bf the node point travels at infinite speed directly coupling the driving electron in transmitting antenna to corresponding charge in the receiving antenna. The travel of field line beyond points d and f determines the speed of radio signal in free space and it is greater than c. Because of field line linked between transmitting antenna and receiving antenna, directly drives the receiving antenna electron. From this explanation, it can easily be understood, why in ionosphere the phase shift speed of radio waves is too much high. Thus, communication with dipole straight antenna is at infinite speed in free space. Hence, *Electric Field*

Concentrated Beams are required to be developed which can travel up to the edges of the Universe. Then we will be able to get the information at far distances which now take millions and billions of light-years; within a very short time of a few seconds to a few hours. This time is on account of the diffraction of the field lines due to ions present in the path of the field lines. One more basic property of a field; which is not yet seen microscopically ; the Author originally reveals here. That is, " the respective field lines of its source appear in space up to infinity in free space in radial direction w.r.t. the source, instantly, immediately. As an ion appears its field is established in space up to infinity with its appearance. It is the change in field that has speed. A change in field travels at speed of light along the field line in free space. When a change in electric field takes place; magnetic field circles appear around the direction of the change immediately. It is not that, a point magnetic dipole appears and it traces the field line by moving along the circular path at speed c and generates the magnetic field line circular. Thus a shift in position of a field lines in transverse direction, strengthening of magnetic field in its own direction travel at speed c.

The fact that, a straight magnetic field line transfers em energy through free space at infinite speed and as the number of nodes are involved in the line, due to the electric permittivity and magnetic permeability, its speed decrease as the number of node increase. Still it remains higher than c. We say radio wave speed is equal to speed of light and prove experimentally also; but, all the experiments in that respect performed measure the speed of oscillating electrons in the antenna conductors which is nearing c. Speed reversal of electrons during their oscillations take place very immediately from say +c to -c to +c and so on.the speed change is not like +c to zero to -c and like that ahead. It is because, the light particle has ultimate the smallest rest mass of the order of 7.3×10^{-51} kg . Inertia due to it is as good as nill. It is derived mathematically from mass to energy transformation and radiation energy dependency on radiation frequency.[$e=mc^2$ and, $e = hv$].

Existence of Speeds Faster than Light Speeds:- For generations, physicists believed there is nothing faster than light moving through a vacuum - a speed of 186,000 miles per second. But in an experiment in Princeton, N.J., physicists sent a pulse of laser light through cesium vapor so quickly that it left the chamber before it had even finished entering. The pulse traveled 310 times the distance it would have covered if the chamber had contained a vacuum. As per the Author; the explanation of the phenomena is included in the fact that electric radial or straight field (lines) travel, at infinite speed in free space. Electrical field of cesium atom works here. It is explained below.

Please refer the figure-4 & 5 below. It explains the above event.

Figure 5-a, explains, how an orbiting electron is excited by a photon sent by an external agency and within an instant, it is released in space by bringing itself to its original normal state. Figure 5-b, explains; how this process is carried out with the help of field of electron engaged with nucleus of its mother atom, by a awing of its field form the nucleus to outside of the atom in free space and back to nucleus. Figure-5-c explains, how the swinging field transfers energy into the incident light pulse, immediately, through cesium-vapor-gas chamber to outside of it in free space.

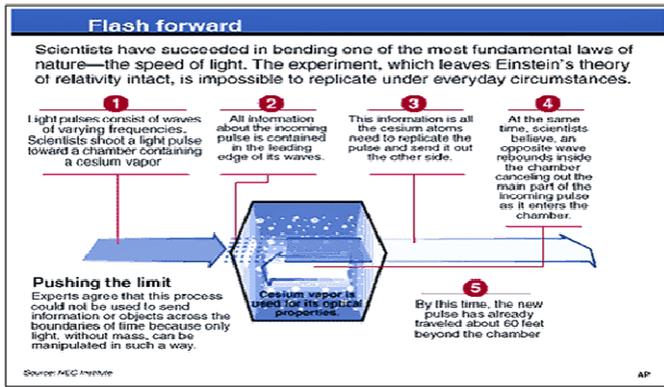


Figure 4. The Speed of Light is Exceeded in Lab.

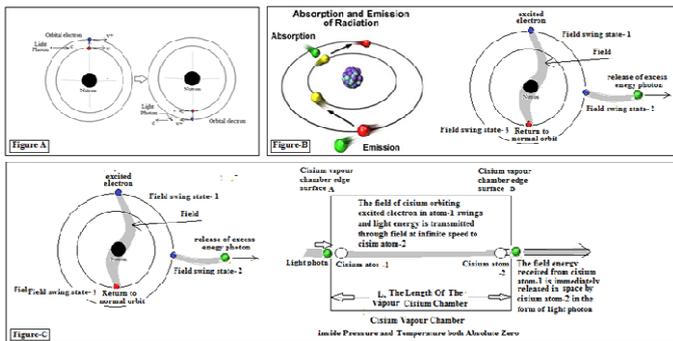


Figure 5. How The Speed Limit of Light c is Broken

Field swing, 3 states are shown in figure-5-c. The field of electron and positron is fully engaged in state-1 shown. The field swings around the electron and releases extra energy outside the atom in free space during state-2. Then after in state-3 the electron field returns to its original normal position in state-3; the orbiting electron returns to its normal orbit from its excited orbits. Thus, Electric Field travels at very high speed that is much greater than c . The light pulse speed through the vapor cesium chamber is not infinite but it is 310 times of c . It is because, In the travel of length L of the chamber, the light pulse absorption time period taken by cesium atom there at chamber surface A, then releasing the light energy in electrical field form towards the chamber surface B; absorption of that field energy and getting excited by the cesium atom at surface B of the chamber and releasing it into space as light pulse; all these events take their own time periods described by speed c . Because, the process of accepting light photons' energy as momentum by orbiting electron of cesium atom-1, till starting its field swing to transfer the energy by field mode to other end cesium atom-2 and from accepting the fed energy by the other end cesium atom-2 to ejecting it out of chamber-wall B as light; run at speed c . The total of these speeds c during above corresponding orbital path distances gives a measure to the speed of light pulse passing through the chamber. Rest of the distance between cesium atoms 1 and 2 is travelled by the electric field at infinite speed. Thus, it proves that, speed of an electric field is infinite in free space in radial direction of its source. This is the solution of the question; why light through low pressure cesium gass travel at speed very much greater than c .

The figure-5 is developed with the help of my article, " The Light Photon, Dark Matter and the Whirling of Dark Matter, The Theory of The Birth of Universe", published in

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PHOTON MODE

In this transmission mode, an E.M. signal is transmitted by energy packets called photons. The source of E.M. energy is an excited orbital electron. The electric field of an orbital, in normal case is directed towards the nucleus of its host-atom containing positrons stationed on protons in the nucleus, please see figure-5. Still the orbital does not fall in the nucleus because of its linear speed in its orbit causing a centrifugal force on the orbital in opposite direction to the mutual force of attraction between the electron and corresponding positron attached to proton in the nucleus. The orbital electron revolves around its positively charged nucleus, under electrical force directed towards the centre of the respective atom. There are number of electrons orbiting in different orbits around the nucleus of the atom. Therefore, an orbital electron experiences regular periodic changes in centripetal electro-magnetic force. The orbital electrons are distributed with even arc-radian distances. Therefore, an orbital electron, describes round path around its axis. The farther peaks of sine wave of the electron are with higher energy w.r.t. outer space. How does the revolving electron dissipate its energy. It does not do it, under normal condition. When its energy increases it takes it from its nucleus and due this intake, its speed increases as per sine wave. At the peak of sine wave, it is at speed c . At speed c energy cannot be imparted to the orbital electron to increase its speed. But, revolving electron is under the force of atomic internal force and electro-magnetic internal atomic force. The atomic internal force moves orbital towards center of the atom. Revolving orbital electron, when it is directed towards nucleus, that's the centre of the atom, its tangential component of speed to respective orbit increases; causing increase in centrifugal force on the electron driving it in higher orbit. This motion against inter-atomic force, does work which is stored in the electron as potential energy.

When it reaches with reduction in its speed to higher or outer orbit, it again start falling back towards the nucleus transferring its stored previous energy to nucleus and occupying lower orbit. Again the happenings repeat and repeat continuously as shown in Figure-6. Now, the electron returns the energy back to the nucleus and reaches the trough of the sinusoidal wave. In other way, every event in nature, suffers from inertia of its kind. Thus, under equal and opposite to each other forces, the moving electron under its constant linear speed revolve continuously around its nucleus maintaining its angular momentum constant inside the atom. No work is done by revolving electron in its orbit. Because, work appears when, a force moves overcoming any opposition to its motion. There is no force opposing the linear motion in its revolution or that opposing its angular motion. Also there is not any force opposing to force of attraction between electron and nucleus except equal and opposite to it radially outward directed force and vice vis. Electrons orbit under balanced inter-atomic and centrifugal forces equal and opposite to each other.

Further, though those forces seem to be moving; the direction of motion of them is perpendicular to the forces. Hence, no work is performed by those forces. In case any two electrons happen to cross their electric fields; field-repulsive forces appear and they does work. That work is internal to the atom. Internal atomic energy of lower orbital electron is greater than

outer orbital electron. Therefore, in above process lower orbital does work on outer orbital and therefore, transfer of energy takes place from lower to higher orbital electron. Hence, outer orbital jumps to lower sub-orbit and lower orbital to outer one. This process is continuous inside an atom in respect of all the orbital electrons. Therefore, there is no work done outside the atom by the constituents of an atom by means of its internal stored energy. Inter-atomic forces keep an orbital in suitable orbit dependent upon its energy content. In an atom, internal atomic forces are much stronger than the gravitational forces in between the atomic particles. An electron in its atomic energy structure as above behaves as below in respect of external energy if enter into an atom. Resultantly, the motion of orbital follow circular sinusoidal path as shown in the figure-6 below.

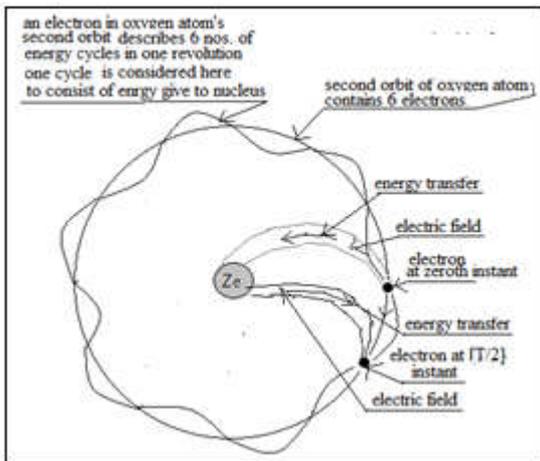


Figure: 6. Path of Orbital Electron

Light emission:- As perceived and explained in my article, "The Light Photon, Dark Matter, And The Whirling Of Dark Matter, The Theory Of The Birth Of Universe" published in "International Journal of Current Research "Vol. 9, Issue, 09, pp.xxxxxxx, September, 2017. Mass in Universe is an eternal quantity. In the Universal basic rest frame, it is in the form of 'Dark-Energy matter-particles, having the ultimate mass of the order of 7×10^{-51} kg_{mass}. Its each particle has energy due to position w.r.t. other particles in the Universe. Only up to 4 to 5 percent is utilized to form the existing Galaxies, and other all Bodies in the Universe. These particles are always in motion in space within micro-domain space volumes in space. Mass in motion is an energy; an energy in motion. A mass capable to initiate a motion; is energy due to position of that particle. Each mass particle has both of that energy. The basic, ultimate mass particles with most original energy the gravity of each of the mass particles construct the mass assemblies, to form bigger and bigger bodies, having gravitational property. When a mass is tried to accelerate beyond speed c in its source's frame, its speed does not increase beyond c w.r.t. its source's frame; But, the energy if it is fed directly to the moving mass at speed c; it exhibits an additional property to gravitational property, named electrical charge. The respective motion may be any either linear or a curvilinear, or a circular. Motion of a mass which have a field or fields; causes change in field in space around the mass.

A change in electric field gives birth to changing magnetic field in direction circular to the direction of the motion of the electric charge, so as to oppose the change in the electric field. This magnetic opposition at speed c is so high that it does not allow speed increase of the respective mass, beyond c, in the

rest frame of speed increasing source. Why a light has speed c as ultimate speed in its source's rest frame and why, the speed of light is dependent on relative motion of the source and the observer; lies in generation process of a light photon. It is also discussed in my above mentioned paper. In short, light has speed c w.r.t. its source; because, an excited orbital electron rotates at speed c, around its nucleus in an elevated orbit, creating imbalance in internal energy stability of an atom, through out in space at its speed c, the extra energy fed to it by an external agency, in the form of energy packet as light photon. Hence, speed of light w.r.t. its source is c. If there is a relative motion between an observer and the source of light, observer visualizes vertical motions of the source of the light photon. During relative motion between the source and the observer, the excited electron moves slanted to the line of vision of the observer at speed c. But, an observer senses any motions of point objects, in any directions in the form of their components in vertical direction to its line of vision. That vertical direction is in the plane vertical to the direction of vision of the observer. To clarify the concept of light speed change seen by observer w.r.t. relative motion between the observer and the source of light, please refer, the author's article, titled, "An Innovative Review of Kennedy-Thorndike experiment" published in 'Scientific Research Journal' (SCIRJ) Volume V, Issue V, May 2017, please.

The Generation of Light:- An orbital electron, when excited by providing energy to it, is so excited to rotate it at the speed of light; it releases that extra energy in the space as a light photon travelling in space at the speed of light. Both these actions happen very rapidly within an instant.

The cause of same speed c of light w.r.t. the light source, emitted by its source, either it is going away from or coming near to the observer; and, the speed $(c^2 - v^2)^{1/2}$ of light w.r.t. the observer is well cleared, by the generation of light process explained below.

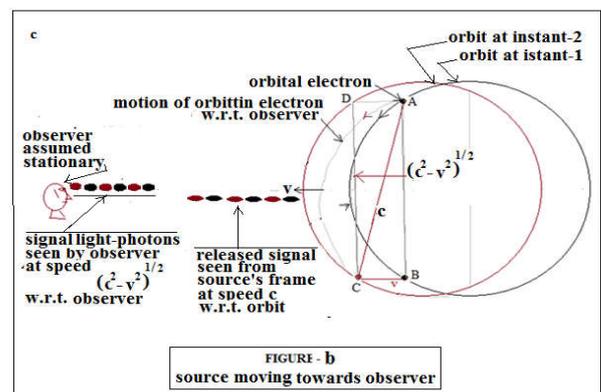
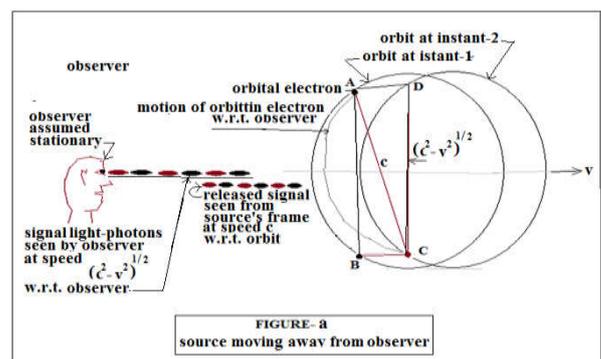


Figure: 7. Generation of Light

It is perceived in origin by the other that, below principles of vision work in relativistic perception.

- To visualize an object perfectly; light photons from all points of the object should reach the observer's eye at the same instant of time; the observer may be either a living being or a photo-instrument.
- There exists a cumulative phase difference in light photons released from nearer to farther points on the surface of the object; and, that forms the image of the object in observer's eye. An observer is anything that visualizes, records the image.
- A curvilinear motion in vertical direction, with a perpendicular component to the line of vision and in the plane passing through the line of the motion; is seen vertical by the observer, in both cases; either the curvilinear motion has a horizontal component parallel to direction of the vision of the observer or not. This is the result of above two rules.

Now, refer above figure-7, Generation of light in respect of below explanation.

An excited electron's orbit AB is in moving away from and moving towards observer at speed v w.r.t. the observer in direction of his vision at linear constant speed v . When, there is not any relative speed between the observer and the orbit; the excited electron, releases light photons during its motion from point A to B, at speed c along its orbital periphery. The observer perceives the motion along line AB proportional to speed c . In all experiments performed till date to verify the speed of light, there is not involved relative motion between the source and the observer. Hence they measure, speed of light equal to c ; and, that is the speed of light w.r.t. its source. But, when there is relative speed v between the orbit, as a source of light and the observer; then, the situation alters. The observer perceives the electron motion from point A to C; along the periphery of the orbit in space. Relativistic-ally, Line AC is now proportional to c . (such is the beauty of relativistic mathematics.) One more Relativistic fact plays its role here; that is, an observer see vertical component of the motion, which is at an angle to the vertical w.r.t. the observer. Hence, the line AC is now proportional to c ; because, AC corresponds to speed greater than c . But, not any one found it greater than c . Because, c is not the speed limit but, it is the limit of perception imposed by the nature for perception of speed electro-magnetic-ally. (An innovative review of Kennedy-Thorndike Experiment by the Author, published in Science Research Journal Volume V, Issue V, May 2017).

If it were not there; all existence in the Universe, would have been seen in a circular flat plane. Hence, observer realizes the motion of the electron from A to B. Now it is not proportional to c ; but, it is proportional to $(c^2 - v^2)^{1/2}$. Hence, now the speed of light w.r.t. observer and for the observer is $(c^2 - v^2)^{1/2}$ i.e. less than c . Excuse me please: but I state repeatedly that, unfortunately, not any experiment is performed in that respect till yet. The experiments performed to measure speed of electromagnetic waves till now; even the different experiment performed by Heinrich Hertz verify speed of oscillating electrons, in their respective conductors and not the speed of Radio-waves in space. In my Research article "The Light Photon, Dark Matter And The Whirling Of Dark Matter, The Theory Of The Birth Of Universe", published in

"International Journal of Current Research Vol. 9, Issue, 09, pp.xxxxxxx, September, 2017 ", it is explained very innovatively and originally, How an orbital electron spins around its own two axis perpendicular to each other and therefore, what shape every light photon released by an excited atom gets; which satisfy "polarization of light and all other properties of light.

Thus, light-source speed w.r.t. an observer reduces the speed of light. In the above mentioned light photon article, photon rest mass is confirmed and 3d mentions of the basic the ultimate single photon are innovatively achieved. When Einstein said, "the speed of light is constant equal to c , i.e. 3×10^8 m/s in free space". This is the first part of his statement. It means consider the source of light and the observe at an any fixed distance between them in free space and let the observer verify the speed of light; and it will be found c . The second part of the statement is that, the light speed c in free space is irrespective of motion of the source and/or observer. There he indicated that speed c of light and anything else w.r.t. its source or its rest station from where it is speeded up to destined speed. Till then the practice was, to measure speed of anything w.r.t. its rest station from where it is speeded up to from speed equal to zero to anything possible. Hence, I am sure about that, Einstein has quoted this second part from this view point.

Conclusion

Very basically, there are two absolute modes of transfer of energy modes; (1) Field-mode and, (2) Photon particle mode. The Field mode transmits the energy by its field lines like a perfectly rigid thin line bar, at speed greater than light speed up to infinite speed directed towards receiver when, field lines oscillate parallel to their, each of one's own path. When, its source is bent; then the field line experience bends because, the field line's oscillations, experience speed limit c due to electro-magnetic field. Higher is the physical bend in source, higher is the frequency and lower is its speed in space but not less than c in free space. The photon mode transmits the energy, by emitting the ultimate, the smallest, very basic particles of dark energy matter by transferring its momentum and getting attached to the energy receiver. The speed of photons is limited to c w.r.t. its source by space electric permittivity and magnetic permeability. An energy photon, light photon, any radiation photon (as a particle), except a field photon consisting a group of frequencies or a single frequency's group; is basic fundamental Dark Energy Particle in linear motion at speed c . When one injects energy to an atom with the means of electric field; he gives the particles at speed around c . The mass of photon is some millionth of the mass of electron as per above referred my article Light Photon.... Hence, a photon injected to an atom, rides on an orbiting electron and gets a hit from comparatively heavy electron getting speed c w.r.t. the electron almost radial to the atom in outer space by donating some necessary his own momentum by dropping itself to lower orbit. At the next moment, it again returns to its original orbit, by collecting necessary momentum in the form of speed, from the outer source and reflecting the energy photon at corresponding reduced speed.

The main aim of this article is to reveal the speed of electro-magnetic or electric field lines in free space is not c ; but, it is very much higher than that c . Field Research Work will

definitely help mankind to know present position of far away terrestrial bodies in the Universe.

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