LINEAR SPEED OF LIGHT

According to 'MATTER (Re-examined)'

Nainan K. Varghese, matterdoc@gmail.com
http://www.matterdoc.info

Abstract: Light is flow of three-dimensional matter-corpuscles, each corpuscle accompanied by separate set of distortions in universal medium. Together, they constitute radiation of photons. For existence, it is essential for matter-core of a photon to move at the highest possible linear speed, at which universal medium can move it. This limit endows light with constancy of its linear speed. Constancy of linear speed is related to and hence depends on nature of universal medium in region of space, where light is radiated. This essay very briefly describes mechanism of light's motion and stabilizing mechanism of its linear speed, as envisaged in alternative concept, presented in the book, 'MATTER (Re-examined)'. For details, kindly refer to same [1].

Keywords: Universal medium, light, photon, corpuscles of light, speed of light.

Introduction:

Light is observed to have linear motion in space at constant linear speed. Matter is inert. It has no ability to move or act, on its own. Therefore, light being a composite 3D matter-body, it has to have an external moving agency. Since light is independent of all other known agencies and moves anywhere in space, the moving agency of light has to exist in and fill entire space. Such an agency is the universal medium. To act on light and produce its motion, universal medium has to be a real entity. To be real, universal medium has to be made of matter.

Since an observer or 'source-body of light' may move at any speed in any direction, constancy of light's speed cannot be related to them. Other entity that is present everywhere in space (and acts on light to move it) is the universal medium. Therefore, universal medium should be the agency that moves light and motion of light should always be in relation to and through universal medium. [We shall consider only linear motion of light, in this article]. Universal medium should not only move light but it should also stabilise any variation and maintain its linear speed, at constant magnitude, irrespective of any influence that may tend to vary its linear speed. Universal medium should provide mechanisms for all other properties of light as well.

An alternative concept:

Alternative concept, presented in book 'MATTER (Re-examined)' is based on a single assumption that 'Substance is fundamental and matter alone provides substance to all real entities'. Matter, in its unstructured state, exists in the form of minute particles, called quanta of matter. Unstructured matter in a quantum of matter tends to reduce its spatial dimensions to minimum. Free quanta of matter tend to form quanta-chains in straight-lines. Quanta-chains in perpendicular directions in a plane form two-dimensional latticework-structures, called 2D energy-fields. Each 2D energy-field extends infinitely, in its plane, in all directions.

2D energy-fields in all possible planes in space, together, form universal medium. 2D energy-fields are able to co-exist at their intersections and thus fill entire space, outside 3D matter-particles. Due to its latticework-structures, universal medium has all properties of ideal fluid. Distortions in universal medium constitute 'work' and stress due to work (distortions) is energy. Frequent local breakdowns of universal medium ensure availability of free quanta of matter and ample opportunities for them to migrate into latticework-structures of universal medium. This keeps quanta-chains of universal medium under compression, even without a definite container. They are continuously under stress to expand.

Local breakdown, in any part of universal medium, releases quanta of matter from latticework-structures and forms a gap. Universal medium from all around (being under compression) moves towards centre of gap to re-establish continuity. Due to inward radial movement, universal medium presses on any disturbance (3D matter-particle) present in the gap and compresses it. Presence of a disturbance in latticework-structure of a 2D energy-field breaks its continuity. As far as 2D energy-field is concerned; space, occupied by disturbance, remains a gap in it. 2D energy-fields from all around continue to thrust themselves into this space and keep the disturbance under compression. Application of pressure, by universal medium on a disturbance, is gravitation. Latticework-structures of universal medium impose certain restrictions on gravitational actions. Gravitation is unable to act on flat surfaces or straight perimeters of disturbances. Magnitude of gravitational action on a disturbance is proportional to extent of 2D energy field, in the direction, away from disturbance and magnitude of convex curvature of its perimeter.

Gravitational action, by universal medium, on 3D disturbance is through direct contact between them. During this action, latticework-structures of surrounding 2D energy-fields are distorted. Distorted region in universal medium around 3D disturbance is its 'inertial-pocket'. All actions by universal medium on 3D disturbance is through inertial-pocket. Gravitational action tends to reduce disturbance(s), in universal medium, to minimum. This is achieved either by combining disturbances present or by ejecting them from 2D energy-fields of their existence. Side of a disturbance, with larger convex curvature experiences greater gravitational effort, compared to side of same disturbance with lesser convex curvature. Resultant of these efforts tends to push the disturbance in the direction of greater gravitational effort.

Variation in 3D disturbance's shape, from a perfect circle in various planes, produces unevenness in gravitational compression on it, from all around. In order to establish 2D energy-field's homogeneity, distortions tend to move from region of high distortion-density to region of low distortion-density. 3D disturbance, held within the gap in distorted region of 2D energy-field (inertial-pocket) is also carried along with distortions towards the direction of lower distortion-density. This phenomenon produces inherent linear motion of every basic 3D matter-particle in space. In their stable state, matter-core of 3D disturbance and its inertial-pocket, together, form a photon.

Photon:

Matter-core of a photon, being a disturbance in universal medium, is ejected out of each of 2D energy-fields of its existence. This is the mechanism of motion of photons through universal medium. As photon moves forward, latticework-structures of 2D energy-fields in front are parted to create passage and latticework-structures at rear joins back to restore continuity of universal medium. Pressure (resistance) from front, due to collision between matter-core of photon and quanta of matter in the

latticework-structures of 2D energy-fields, is balanced by ejection on it from rear. This balancing action maintains linear speed of photon at highest possible level in universal medium.

Most fundamental property of a photon is motion of its matter-core at constant linear velocity (for general description on light's speed, in this article, we will not consider spin motion of photon's matter-core at angular speed proportional to its matter-content). In fact, a photon exists in stable state only because of motions of its matter-core at constant velocities, with respect to universal medium. It is a necessity of universal medium to maintain linear velocity of photon's matter-core at this critical level. Hence, we can say that stable photon maintains its linear velocity at a critical constant value. Universal medium's continuous gravitational actions, on photon's matter-core, overcome instability in its linear speed. [Here, motions are assigned to photon's matter-core for clearer understanding. In reality, photon's matter-core, being a corpuscle of matter, is incapable of any actions or movements on its own. It is the inertial actions of universal medium about it, which move photon's matter-core]. Inertial-pocket, in universal medium (similar to electromagnetic wave) about photon's matter-core, is photon's moving-part that carries its matter-core.

Difference between instantaneous convex curvatures at front and rear parts of photon's matter-core determines resultant gravitational action that moves photon's matter-core in its linear path. Inertial-pocket of photon continuously moulds its (spinning) matter-core, so that magnitude of convex curvature of forward surface is always less than that of rearward surface. Gravitational actions on spinning matter-core of a photon regulate its instantaneous shape, so that latticework-structures in universal medium are not damaged and at the same time external and internal pressures about matter-core of photon remain in balance. Under this condition, a photon moves at a critical constant (maximum) linear speed through universal medium (space).

Stabilizing mechanism:

We shall examine the principle of linear motion of matter-core of a photon, while (for the present) ignoring its spin motion. Let us assume matter-core of a photon as a stretchable balloon filled with unattached but flexible marbles. Flexible marbles represent quanta of matter in their 3D status. Balloon represents gravitational pressure, holding constituent quanta of matter together and compressing them into 3D states; thus making photon's matter-core a 3D matter-particle. Let us also assume that matter-core of photon is disc-shaped with slightly bulging faces. [Following description is about linear motion of photon's matter-core in perpendicular direction to its disc-plane. Linear speed is controlled by difference in curvatures of forward and rearward disc-faces. When direction of linear motion is not perpendicular to disc-plane, difference in curvatures of forward and rearward surfaces of perimeter also comes into play].

Radial size of photon's matter-core is limited within critical limits by latticework-structures of universal medium. Its periphery (being disc-shaped) has convex curvature. Gravitation continuously acts all around periphery to compress matter-core. Stable radial size of photon's matter-core is a critical constant. Any variation is immediately stabilised by varying gravitational efforts at periphery. In the meantime, variation in radial size of photon's matter-core stabilises changes in its linear speed.

Figures 1, 2 and 3 show cross sections of matter-core of a hypothetical photon (that does not spin) in a plane passing through its spin axis and perpendicular to line of photon's linear motion. Figures are not to scale. Sizes and bulges are highly exaggerated. They are intended to show principle of stabilisation of a photon's linear speed only. Grey figures show matter-core. Block arrows represent average magnitudes of gravitation in the form of various efforts acting on matter-core. Red outlines in figures 2 and 3 show relative sizes and shapes of matter-core of the same photon, for comparison, when it is moving at its critical linear speed.

Figure 1 shows status of cross section of a stable photon's matter-core, moving rightward. Gravitational actions all around disc-shaped matter-core, shown by representative vertical block arrows, maintain its critical radial size. Magnitudes of gravitational efforts, acting on disc faces, depend on magnitudes of their convex curvatures. Rear face of matter-core bulges outward by greater degree and thus provides greater convex curvature, compared to front face. Gravitational effort from rear is greater

and hence in the figure it is marked as 'ejection' effort. Front face, having lesser convex curvature, receives less gravitational effort. This, being in opposite direction to linear motion of photon, it is marked as 'resistance' effort. Resultant of ejection and resistance efforts acts to move matter-core of photon linearly. As long as parameters of matter-core does not vary, in a homogeneous universal medium, magnitudes of efforts from all sides remain constant and maintain photon's linear speed at constant magnitude, with respect to surrounding universal medium.

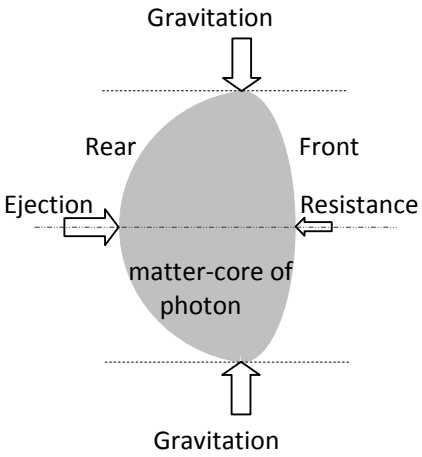

Figure 1

Various efforts, mentioned above, do not act as we consider normal 'forces' in mechanics. It is the transfer of distortions in universal medium, which acts to move matter-core, along with them. Movement is directly imparted to matter-core rather than by external 'force' acting on it to move. Hence, phenomena of acceleration, velocity, motion, etc. do not apply in the case of photon's linear motion. A photon's matter-core gets displaced in space with respect to universal medium, which fills entire space. In fact, matter-cores of photons do not move at all with respect to their surrounding distortions (inertial-pockets) in universal medium. Transfer of distortions within universal medium carry photon's matter-core with them, thereby affecting photon's displacement in space. Distortions in inertial-pocket, surrounding photon's core-body, tend to re-distribute every instant, so that universal medium re-gains its homogeneity. During re-distribution of distortions, inertial-pocket is transferred in the direction of region of lesser distortion-density from region of higher distortion-density, while universal medium (as a whole) does not move. In reality, redistribution of distortions around photon's matter-core is a continuous process so that at any instant matter-core's size, shape, linear speed and spin speed are maintained at critical values. Internal and external pressures at every point on surface of matter-core remain in balance.

Inertial-pocket in universal medium (surrounding photon's matter-core) is creation of matter-core's shape. Therefore, wherever matter-core moves in universal medium, similar distortions surround photon's matter-core. In other words, as long as photon's matter-core is in existence, surrounding universal medium has similar distortions in inertial-pocket, which carries matter-core at a constant linear speed, indefinitely. As matter-core of photon moves along with surrounding distortions in steady universal medium, we may relate photon's motion to steady universal medium. Magnitude of its linear speed depends on parameters of photon's matter-core and nature of universal medium in any region of space. As long as these remain steady, linear speed of light (or similar radiations of matter) remains constant with respect to absolute reference, provided by universal medium.

To understand the mechanism of stabilisation of actions about a photon, let us consider reduction in matter-content of a stable photon, which was moving at a constant linear speed through a homogeneous region of universal medium. Envelop of a photon's matter-content is provided by surrounding gravitational pressure. In stable photon, external pressure at any point on surface of its matter-core is always balanced by internal pressure of photon's matter-core. Pressure difference, required to maintain balance between internal and external pressures depends on curvature of interface between them. Reduction in matter-content in matter-core reduces its internal pressure, during the time before gravitational efforts commence their action on matter-core. Gravitational pressure all-around matter-core asserts and reduces radial size of matter-core, as shown in figure 2. Compare radial size of matter-core shown in grey with its original radial size shown in red outline.

Figure 2 represents actions of gravitational pressures on matter-core of a photon that has lost part of its matter-content. Gravitational action reduces size of matter-core from all around until external and internal pressures are balanced at every point on its surface. Radial size and thickness of matter-core reduce due to deduction in quantity of matter it contains. Internal pressure of matter-core is restored to its original value. However, reduction in radial size necessitates increase in curvatures of disc-faces.

Increase in curvatures of forward and rearward faces off-set balances between external and internal pressures at respective faces. Increase in curvatures increases magnitudes of gravitational action at disc-faces.

Rearward face, which has higher curvature, experiences greater increase in gravitational action. Internal pressure throughout matter-core is same. As curvature of rearward face is greater compared to front face, it requires greater external pressure to balance internal pressure. (Similar to 'Gibbs-Thomson effect' with respect to relation between vapour pressure and surface curvature of a droplet). Greater change in curvature of matter-core's rear face increases magnitude of gravitation by greater margin, compared to lesser increase in magnitude of gravitation due to lesser increase in curvature of its forward face. Resultant of increased gravitational actions, on rearward and forward faces of matter-core, attempts to move photon at greater linear speed. This increases resistance to photon's linear motion.

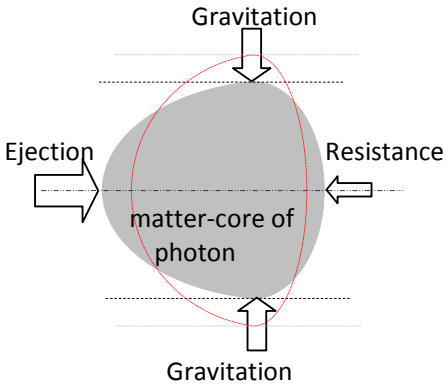

Figure 2

However, gravitational actions from both front (resistance) and rear (ejection) have increased. These two, together, compress matter-content of photon to increase its radial size, back to original value. As radial size of matter-core increases to its critical size, matter-content of photon re-shapes to bring down additional ejection and stabilise photon's linear speed by reducing curvatures of disc-faces. Lose of matter-content would result only in reduction of matter-core's thickness. By the time external and internal pressures are in balance, relation between ejection and resistance would have changed to provide right magnitude of resultant action to move photon at its critical linear speed.

Let us consider an increase in matter-content of a stable photon, which is moving at a constant linear speed through a homogeneous region of universal medium. Increase in matter-content enhances matter-core's radial size and thickness. Gravitational pressure all-around matter-core is off-set to increase matter-core's radial size, as shown in figure 3. Compare radial size of matter-core, shown in grey, with its original radial size, shown in red outline.

Gravitational actions increase size of matter-core until external and internal pressures are balanced at every point on its surface. Radial size of matter-core increases and reduces curvatures of both rearward and forward disc-faces. As curvature of rear face is greater, compared to front face, it requires greater external pressure to balance internal pressure. (Similar to 'Gibbs-Thomson effect' with respect to relation between vapour pressure and surface curvature of a droplet). Greater reduction in curvature of its rear face reduces magnitude of gravitation by greater margin, compared to lesser reduction in magnitude of gravitation due to lesser reduction in curvature of its front face. Resultant of actions tends to move photon at slower linear speed.

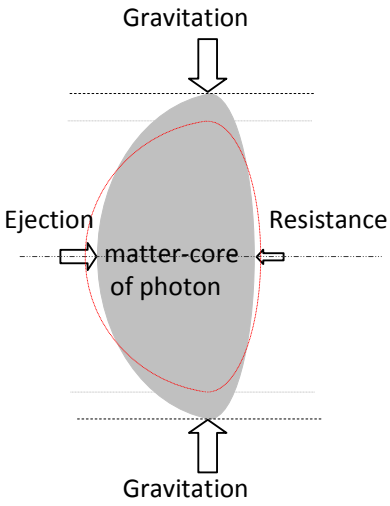

Figure 3

However, gravitational actions from front (resistance) and from rear (ejection) have reduced. Reduction in these two, together, let gravitational action at disc's periphery to compress matter-content and thereby reduce radial size of matter-core back to its critical radial size. As radial size of matter-core reduces to its critical value, matter-core of photon re-shapes to bring down reduction in ejection and stabilise photon's linear speed. Gain of

matter-content would result only in an increase of matter-core's thickness. By the time external and internal pressures are in balance, relation between ejection and resistance would have changed to provide right magnitude of resultant action to move photon at its critical linear speed. Similar actions take place in every other plane, as matter-core spins.

Stability of photon's linear speed:

Universal medium cannot move 3D matter-bodies at linear speeds, higher than linear speed of light. Hence, linear speed of light is ultimate linear speed of any 3D matter-body. As linear speed of 3D matter-bodies approach linear speed of light, they break-down into inferior constituents. At linear speed of light only photons can survive.

Due to inertial properties of universal medium, efficiency of external effort, acting on 3D matter-bodies, reduces as their linear speed increases. When linear speed of 3D matter-body approaches linear speed of light, efficiency of external effort on it (in the direction of its motion) reduces to zero. External efforts are unable to act on 3D matter-bodies, moving at linear speed of light in same direction. [This phenomenon is often interpreted as infinite relativistic mass]. Therefore, no external effort can act on a photon in the direction of its motion and change (increase) its linear speed. However, linear speeds of photons are susceptible to changes (reduction) under action by external efforts in directions other than direction of their linear motion.

Matter is inert. Transfer of distortions in universal medium (inertial-pockets) carry basic 3D matter particles (matter-cores of photons) and affect displacements of photons in space. Transfer of distortions (inertial-pocket) in universal medium, surrounding matter-core of a photon, causes a photon's linear (and spin) motion(s). Since it is the distortions that carry matter-core, it is imperative that both matter-core and inertial-pocket move in synchronism with each other. A misalignment between them affects stability of photon.

Photon's inertial-pocket, being distortions in universal medium, has only one steady linear speed in space. This is the linear speed of electromagnetic waves. Depending on structural parameters of universal medium in a region, speed of transmission of free distortions (which are not linked to superior 3D matter particles) is limited to highest linear speed, possible without damaging universal medium. As long as a photon's matter-core moves in synchronism with surrounding distortions, universal medium causes no resistance to motion of photon's matter-core or its stability. Tendency of relative displacement between a photon's inertial-pocket and matter-core creates instability to photon's motion. Forward displacement of photon's matter-core with respect to its inertial-pocket (by which matter-core tends to push at front of inertial-pocket) may be considered as an increase in photon's linear speed. Rearward displacement of photon's matter-core with respect to its inertial-pocket (by which matter-core tends to push at rear of inertial-pocket) may be considered as reduction in photon's linear speed.

Increase in ejection effort from rear, without corresponding increase in resistance from front, tends to increase photon's linear speed. Photon's matter-core is pushed forward (by distortions at rear) on to latticework-structures in distorted region of universal medium at front. This can happen, when photon is moving in a region of universal medium with gradient in distortion-density, in a direction towards lower distortion-density. In this case, universal medium at rear of its matter-core has higher distortion-density, compared to its forward part. Correspondingly, ejection effort remains more than that can be balanced by lower resistance and photon has a tendency to increase its linear speed.

Increase in photon's linear speed moves its matter-core forward, with respect to inertial-pocket, to cause additional forward compression. Matter-core may be assumed to rub or collide bodily into forward part of latticework-structure of inertial-pocket. This may cause excessive external pressure (resistance) from front on photon's matter-core and result in few quanta of matter (from latticework-structure) piercing into matter-core of photon to be (converted into 3D status and) assimilated into matter-core. Increased ejection, during this process, effectively compresses photon's matter-core to increase its radial size. Change in radial size of photon's matter-core initiates stabilisation process of photon's linear speed (by use of curvatures of its forward and rearward faces) as described above.

Quanta of matter, assimilated into photon's matter-core, increase its matter-content. Increased matter-content (rest mass) of photon's matter-core, requires higher ejection from rear, to move it at same linear speed, as it was moving earlier. Since ejection effort from rear is already higher, increased bulk of photon's matter-core would compensate for higher ejection from rear and restore its linear speed to critical constant value. As linear speed of matter-core reduces to its critical value, excessive pressure between it and inertial-pocket is relieved. Thus, an attempt to increase linear speed of photon results in the photon gaining additional matter-content (with corresponding increase in its energy-content) from surrounding universal medium, instead of increasing its linear speed. Increase in matter-content is indicated by increase in photon's spin speed - frequency or colour. Any attempt to increase linear speed of photon (light) results in increasing its frequency (colour of light) rather than its linear speed.

Reduction in ejection effort from rear, without corresponding reduction in resistance from front, tends to reduce photon's linear speed. This can happen, when photon is moving in a region of universal medium with gradient in distortion-density, in a direction towards higher distortion-density. In this case, universal medium at rear of its matter-core has lower distortion-density, compared to its forward part. Correspondingly, ejection effort remains less than that can be balanced by higher resistance and photon has a tendency to reduce its linear speed.

Compression on photon's matter-core reduces. Photon's matter-core is (apparently) pulled rearward by reduction in distortion-density at rear. Since magnitudes of changes are related to curvatures of disc-faces of matter-core, magnitude of change in ejection effort at rear disc-face is much greater than magnitude of change in resistance at forward disc-face. As photon's inertial-pocket is not 3D matter-particle, it is not (apparently) attracted towards any other 3D matter-body. Due to greater reduction in ejection effort, compared to reduction in resistance, photon's matter-core tends to shift rearward relative to its inertial-pocket. Photon's matter-core tends to slow down.

Rearward displacement of photon's matter-core, with respect to inertial-pocket, relieves compression of matter-core. Matter-core expands in volume to fill inertial-pocket. All constituent quanta of matter of matter-core take part in this expansion. During this process, few (randomly oriented but rightly placed) quanta of matter expand rapidly and escape from matter-core to join latticework-structures of 2D energy-fields. Matter-content of photon reduces, while matter-core's volume increases. Radial size and thickness of matter-core increase. Increased radial size initiates stabilising process of photon's parameters and linear speed, in relation to curvatures of matter-core's disc-faces, as described above.

Quanta of matter, lost from photon's matter-core, reduce photon's matter-content. Reduced matter-content (rest mass) of photon's matter-core, requires lower ejection from rear, to move it at same linear speed, as it was moving earlier. Since ejection from rear is already lower, reduced bulk of photon's matter-core would compensate for reduced ejection effort from rear and restore its linear speed to critical constant value. As linear speed of photon increases to its critical value, reduced internal pressure of matter-core is restored. Thus, an attempt to reduce linear speed of a photon results in the photon losing matter-content (with corresponding reduction in its energy-content) into surrounding universal medium, instead of reducing its linear speed. Reduction in matter-content is indicated by reduction in photon's spin speed - frequency or colour. Any attempt to reduce linear speed of photon (light) results in reducing photon's frequency (colour of light) rather than its linear speed.

In this way, universal medium maintains critical linear speed of photons (light or similar radiations) automatically by changing their matter-contents (frequency - rest mass), irrespective of any attempts to vary their linear speed.

Frequency of light can be varied only by changes in matter-contents of constituent photons. One way to vary frequency of light is by attempts to vary its linear speed. Corpuscles of light are related only with surrounding universal medium. They are created from and by universal medium. From the moment of their creation, they are independent 3D matter-bodies. They have no other 'source-bodies'. Hence, the assumption that parameters of light (like its linear speed or frequencies) are affected by source-bodies or receptors (macro bodies in the region of creation of photons or which receive light radiation) is not very

correct. Hence, 'Doppler effects' or similar phenomena, which affect wave motions like sound, electromagnetic waves, etc. do not affect radiations of light.

Linear speed of light:

Linear motion of photon is with respect to universal medium, which is static in space. Number of latticework-squares of 2D energy-fields, traversed by photon in (absolute) unit time, is a constant. If any part of universal medium in a region of space is distorted, number of latticework-squares of 2D energy-fields in unit distance, in any direction, in distorted universal medium is greater than number of latticework-squares in (absolute) unit distance in undistorted universal medium. Hence, distance moved by photon in a distorted region of universal medium (in denser matter-field), compared to undistorted region, in unit time, is lesser. Absolute linear speed of light, in any region of space, depends on distortion-density of in that region (matter-field). This is variable from region to region in space. Matter-field near very big macro bodies is denser in distortions than matter-fields near smaller macro bodies.

Therefore, absolute linear speed of light appears slower near larger macro bodies, when compared with respect to distance measurement, used in another region of space. Since distance and time measurements are related, they vary each other for any region of space. Hence, absolute linear speed of light in one region of space with reference to universal medium in the same region of space and absolute linear speed of light in another region of space with reference to universal medium in that region of space are identical. Discrepancies develop only when absolute linear speed of light in one region of space is related to universal medium in another region of space.

Due to circular logic, we use to define time; unit of time within matter-field of a macro body also depends on distortion-density of universal medium in the same region of space. Thus, 'absolute unit of time' in any region of universal medium may be different from 'absolute unit of time' as determined in undistorted region of universal medium. Although unit of time and linear speed of light are constant and equal in every region of universal medium, discrepancy develops when unit of time or linear speed of light, determined in one region of universal medium, is related with unit of time or linear speed of light, determined in another region of universal medium. This has given rise to many speculations about nature of time and its variations. Linear speed of light, in outer space or near another macro body (whose matter-content is not equal to matter-content of earth) should not be compared with linear speed of light on surface of earth, using units of distance and time, determined on or near surface of earth.

An observer is a large macro body compared to a photon. A static observer and his surroundings are within matter-field of a macro body, where observer is situated. Observer is static only when considered in relative reference frame with respect to macro body, which may be in any state of motion. Observer moves with matter-field in the region of his existence. Critical linear speed of light (motion of photons) is with respect to distortions in surrounding universal medium and depends only on distortion-density of matter-field of the region. Therefore, a photon always appears to move at same linear speed within same region of space, irrespective of direction of macro body's (matter-field's) motion. Linear speed of photon, with respect to matter-field of the region, is a critical constant. This is essential for integrity and stability of photon.

Entire space is filled with universal medium. There is no empty space. Air or other matter-particles in a part of space may be removed to create a vacuum. This may remove refractive media from the region but it does not create empty space. Therefore, by comparing linear speed of light in vacuum and in air (or other media) we cannot determine light's absolute linear speed. A photon is radiated at its absolute linear speed in regions of space, far away from any other macro bodies, where surrounding universal medium are free of any distortions other than which are required to maintain stability of photon in consideration. In all other regions of space, linear speed of a photon is determined with respect to distortions in universal medium in that region. For constant magnitude of distortions in universal medium, linear speed of a photon and unit of time in it are constants.

If observer (laboratory) develops motion, with respect to surrounding matter-field, it will be reflected in linear speed of light, he is observing. If observer is so small that he can be accommodated on a photon,

he will be moving at the same (critical constant) linear speed as other photons in matter-field, in the direction of his own motion. Other photons moving within the region also will be moving at their critical constant linear speeds. Under this condition, observer sees other photons in relation to himself. Each of other photons will appear to move at linear speeds relative to his motion. A photon moving in opposite direction will appear to observer, as moving at double the critical linear speed and a photon moving in same direction will appear to have no linear motion at all. Photons moving in various other directions will all appear to move at their relative linear speeds. Photons (light) radiating in any region has relative motion with respect to other photons in same region. But, with respect to surrounding matter-field, all photons are moving at their critical constant linear speed. Since a static observer is a large macro body, moving with and is a part of surrounding matter-field, he observes all photons in the region as moving at a critical constant linear speed irrespective of their directions of motion. This phenomenon has led to the assumption of 'universal constancy' of light's linear speed.

This is the reason why all attempts to measure relative linear speed of light beams, moving in various directions, failed to register any difference in their linear speeds from constant critical value. All experiments (like Michelson & Morley experiments) were conducted within matter-field of earth and on light beams moving within same matter-field, by observers who were steady within matter-field of earth. Irrespective of changes in directions of radiation, all light beams (in various directions) registered same linear speed.

If an observer places himself outside the region of matter-field, where light beams are radiated, he can notice that linear speed of light is different from critical linear speed of light in his surroundings. This is how, linear speed of light is found to be slower in denser refractive media. We have no hesitation to accept this fact. All refractive media usually have denser matter-field compared to atmosphere near surface of earth. Observer, being outside the region of matter-field, where light is being radiated and measuring linear speed of light by using 'distance-measurements' for his own region of space, correctly finds that light has slowed down.

Similarly, using our standard of distance-measurements, linear speed of light is higher in outer space; away from earth's (and other large macro bodies') matter-field. This fact is not recognized due to our adamant belief in assumed constancy of linear speed of light. Instead, we prefer to mystically dilate functional entity of 'time'. General (unscientific) rule, followed at present, is that: in denser media, light slows down and in rarer media, time dilates.

Photon, being a 3D matter-body, obeys all natural physical laws including laws of motion and gravitation, under all conditions. With respect to an observer (who is steady on surface of a large macro body), relative linear speed of a small free body, moving under constant inertia in same region, is constant irrespective of its direction of motion. This common rule applies to linear motion of photons (corpuscles of light) also. Relative linear speeds of smaller matter-bodies, moving near earth's surface, depends on magnitude of effort ('force') acting on (or energy stored in) them. In relative reference frame, we do not consider linear motion transferred to smaller macro bodies by earth's motion.

In case of photons, external effort propelling it and its linear speed relative to earth's surface depends on distortion-density of earth's matter-field. Assuming that distortion-density of earth's matter-field is constant throughout earth's surface and in its surroundings; linear speed of radiation of light near earth is a critical constant irrespective of direction of radiation. Change in magnitude of distortions in matter-field in the region of radiation (like within a refractive medium or near a large macro body of different size) varies value of light's critical constant linear speed, when compared with unit of distance in another region of space. Linear speed of light is not a universal constant. Light has its highest (constant) linear speed in free space, far away from 3D matter-bodies. As light approaches a very large macro body, its critical linear speed (and unit of time) reduces due to higher distortion-density of matter-field in that region. More enormous a macro body is, lower is critical constant linear speed of light, in that region of that macro body with respect to standard of distance determined for free space. If unit of time for that region of space is also varied correspondingly, there will be no change in critical linear speed of light in that region.

However, as far as a photon is concerned, it always moves at critical constant linear speed with respect to universal medium, around it. Number of latticework-squares in 2D energy-fields, traversed during equal interval of time, is same, irrespective of distortion-density of matter-field of the region of radiation. Matter-field, with higher distortion-density, has more number of latticework-squares of 2D energy-fields in unit distance as compared to matter-field, with lower distortion-density. Consequently, light appears to move slower to an observer outside that region of space. To an observer within same region of space, linear speed of light does not change; it remains same critical constant value.

Should observer develops linear motion within matter-field, where light is being radiated, his linear speed is algebraically added to critical linear speed of light to obtain its relative linear speed. Since critical linear speed of light is too high, compared to highest linear speed observer can attain and straight-line distance available within matter-field of constant distortion-density are too small compared to distance traversed by light in unit time, it is impossible to determine this experimentally. [A fish, floating in a water-current observes any other matter-body, moving with respect to water current, as moving at its true relative linear speed with respect to the current, irrespective of direction of its motion. If this relative linear speed of matter-bodies is of constant value with respect to water-current, all objects within the current and linearly moving with respect to current appear to move at constant linear speed, irrespective of directions of their motion. Relative linear speed of fish and other moving objects within the current come into prominence only when fish is able to move with a speed comparable to speed of moving objects with respect to current]. However, by choosing a rotational frame of reference, this fact is confirmed by phenomenon of 'sagnac effect' [1]. Since dual nature of light is not well recognized, results of experiments, similar to sagnac's experiments are not satisfactorily explained.

Conclusion:

Beam of light is continuous flow of photons made of 3D matter-corpuscles (matter-part of light) accompanied by their inertial-pockets (energy-part of light), in universal medium. Distortions in moving inertial-pocket carry matter-core of photon at a constant linear speed. Linear speed of light is constant because that is the highest linear speed, at which universal medium can move any 3D matter-body. Relative linear speed of light is critical constant in any region of space. Magnitude of this constant value depends on nature of distortions in universal medium in region, where light radiates. Linear speed of light (with respect to a static observer on earth), measured on or near surface of earth, is constant irrespective of direction of radiation. Corpuscles of light, like any other 3D matter-body, obey all laws of motion and gravitation. Light has relative linear speed with respect to a moving observer within the region of space of radiation. Critical linear speed of light is not a universal constant. It depends on distortion-density in universal medium in the region of space (where radiation takes place) and units of distance and time in that region of space.

References:

[1] Nainan K. Varghese, *MATTER (Re-examined)*, http://www.matterdoc.info

[2] Wikipedia, *Surface tension,* http://en.wikipedia.org/wiki/Surface_tension

* ** *** ** *