

LINEAR SPEED OF LIGHT

(According to “Hypothesis on MATTER”)

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Abstract: Light is a flow of basic three-dimensional matter corpuscles, accompanied by work (electromagnetic energy) radiation. A corpuscle of light is a basic 3D matter particle, called photon. Matter-part of light corpuscle and its accompanying energy-part, together, constitute a photon. They support each other for sustenance and stability of the photon. Matter-core of a photon is a disc-shaped body, spinning about one of its diameters. Electromagnetic wave-like entity, about a photon’s matter core-body, is work in the form of distortions in universal medium. Two-dimensional energy fields, constituted by latticework structures by quanta of matter, fill entire space outside basic 3D matter particle to form an all-encompassing universal medium. Region of universal medium, around photon’s core-body that contains sufficient distortions to sustain integrity and state of a photon’s core-body is its inertial pocket. At every instant, matter-core of a photon is ejected out of 2D energy fields of its existence at highest (constant) linear speed, by gravitational actions. Linear and spin speeds of a photon are limited by the ability of 2D energy fields to allow photon’s passage, without breaking down themselves. Attempt to change linear speed of a photon changes its matter content (frequency) rather than its linear speed. Linear speed of light near a large macro body is a critical constant with respect to matter field of that body. Light, being stream of corpuscles of matter, obeys all laws of motion irrespective of its direction of radiation. Linear speed of light is not a universal constant; depending on the nature of universal medium, it varies from region to region in space.

Keywords: Quantum of matter, universal medium, 2D energy field, light, photon, corpuscles of light, electromagnetic wave, speed of light, inertial pocket, matter field, quanta of matter, sagnac effect, Hypothesis on MATTER.

Introduction:

Light is an entity with physical attributes. It exists and moves in space. Only real objects can exist and move in space. To have objective reality and positive existence in space, light has to be a physical entity. Substance provides objective reality to a physical entity. Hence, light should have substance as its content. Matter is the only substance in nature and it alone can provide objective reality and positive existence to an entity. Therefore, light has to be made up of matter. As light can be simultaneously observed in more than one plane, it has to be constituted by three-dimensional matter. Light, being constituted by 3D matter, has to have all associated physical attributes (mass, inertia, quantity, size, etc) of three-dimensional matter, like any other 3D matter-body.

Light, being a physical object made up of 3D matter, it has to have certain structure and definite process and mechanism of creation. Nothing can be made out of nothing. 3D matter for creation of light has to be provided from pre-existing matter in space. There has to be an agency that provides matter for creation of light. Same agency, through natural process, should create and regulate various parameters of created light. This agency should exist outside light and as light can be created and exist anywhere in space, the agency should fill the entire space. An entity that fills the entire space outside light is a universal medium. An agency that fills the entire space cannot provide matter from an external source but from itself. Hence, universal medium should be made up of matter. Under suitable conditions, universal medium should provide sufficient quantity of matter for creation of light from itself and provide a logical mechanism for creation of light.

Since universal medium fills the entire space, outside corpuscles of light (or similar radiations), there can be only two types of real entities in nature – corpuscles of light and universal medium. All other physical bodies, larger than corpuscles of light, have to be constituted by corpuscles of light. Mechanism for their creation has to be provided by universal medium. Corpuscles of light are smallest and only stable 3D matter particles in nature. Under suitable conditions, corpuscles of light of appropriate parameters should be able to constitute larger composite 3D matter bodies, under natural process, to form all other fundamental 3D matter particles and macro bodies in nature. Same mechanism should account for diverse properties of macro bodies and various physical phenomena related to them.

Light is observed to have linear motion in space at constant speed. Matter is inert. It has no ability to move or act on its own. Therefore, light being a 3D matter-body 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 up of matter.

Linear speed of light is observed to be of constant magnitude. 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 the light should always be in relation to and through the universal medium. 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 linear speed of light. Universal medium should provide mechanisms for all other properties of light as well.

Light is observed to have many similarities with electromagnetic waves. In fact, light is currently considered as pure electromagnetic wave in most theories. Light is also understood to exhibit certain properties of corpuscles under certain conditions. In order to satisfy these diverse properties, particles of light should exhibit both these properties simultaneously. Core-body of light-particles (made up of matter) can provide light with its corpuscular nature. At the same time, moving-mechanism of light-corpuscles by the universal medium that has cyclic variations (in any plane about the corpuscle) can provide light with its electromagnetic wave-characteristics. These two characters, together, can provide light (or similar radiations) with its dual nature.

A single model, with only one type of postulated matter particles, which may be able to satisfy all above given requirements, is proposed by the author in an alternative concept.

An alternative concept:

‘*Hypothesis on MATTER*’ describes an alternative concept, which is still at speculative stage. In it: matter content of a three-dimensional body and energy about the body are distinctly separate. Its matter content is total quantity of three-dimensional matter in it. Energy is the stress developed due to ‘distortions’ in the natural arrangements of basic matter particles in and about a body in universal medium. Matter content and energy content of a body cause and support each other for their existence and stability. Matter content is the real part and energy is the functional part of a body. They are not convertible into each other.

Entire space is filled with universal medium called ‘2D energy fields’, two-dimensional latticework structures by basic single-dimensional quanta of matter. 2D energy fields, in various directions and planes, passing through a point, co-exist. 2D energy fields, made up of quanta of matter, have all properties of an ideal fluid. Parts of 2D energy fields, within and about the body-dimensions of a macro body, contain sufficient distortions to sustain integrity and stability of the macro body in its current state. This part of 2D energy fields is ‘matter field’ of the macro body. Distortions in a matter field constitute ‘work’ and it determines state of (motion of) a macro body. All apparent interactions between 3D matter particles (and macro bodies) take place through universal medium of 2D energy fields. 2D energy fields are in direct contact with every basic 3D matter particle in nature. This avoids the assumption of ‘actions at a distance through empty space’. Irregular associations of quanta of matter, including basic 3D matter particles, within 2D energy fields are ‘disturbances’.

2D energy fields are inherently held under compression. Should there be a gap in their structures, 2D energy fields from all around the gap closes-in to fill the gap and restore their homogeneity. This is gravitational action. Because of their latticework structure, formed by quanta of matter making sides of square formation, perimeter-shapes of disturbances have large effect on the magnitude of gravitation experienced by them. Disturbance with flat surface/straight line perimeter experience no gravitational effort. Disturbance (or its part) having surface/perimeter with concave curvature experiences negative gravitational effort. Disturbance (or its part) having surface/perimeter with convex curvature experiences positive gravitational effort. Magnitude of gravitational effort experienced by a disturbance is proportional to curvature of its surface/perimeter and extent of 2D energy fields in the direction away from its surface/perimeter.

Gravitational action tends to reduce any disturbance(s), in 2D energy fields, to minimum. This is achieved either by combining disturbances present or by ejecting a disturbance from 2D energy fields of its existence. Side of a disturbance, with larger convex curvature experiences greater gravitational effort compared to side of the same disturbance with lesser convex curvature. Resultant of these efforts tends to move the disturbance in the direction of greater gravitational effort. Gravitation is always a push effort. Extent of 2D energy fields between two basic 3D matter particles is always less than extents of 2D energy fields on their outer sides. Therefore, gravitational efforts on these basic 3D matter particles are lesser from in between them than gravitational efforts on them from their outer sides. Resultant of these efforts tends to push these basic 3D matter particles towards each other. This phenomenon is the (apparent) gravitational attraction between them. (Apparent) gravitational attraction between matter bodies is (comparatively) a minor by-product of gravitation.

2D energy fields fill the entire space. They are aether-like entities, but with definite structure and properties. Excess stress, due to imbalances or high-speed movements of quanta of matter in 2D energy fields, may cause their local break-down. During a local break-down, quanta of matter in the region are liberated from their latticework structure. Attempt by surrounding 2D energy fields to close-in on the gap (formed by the break-down) gathers the liberated quanta of matter to form 2D disturbances in each plane. Disturbance is then compressed by gravitational action of 2D energy fields to create 3D matter-core of a basic 3D matter particle – the photon (corpuscles of light or similar radiations). Photons of very high matter and energy contents, in various combinations, make up all other superior 3D matter particles and macro bodies, we observe in nature.

All conclusions expressed in this article are taken from ‘*Hypothesis on MATTER*’ [1]. For details on structure, development and actions about universal medium and corpuscles of light, kindly refer to the same. We shall deal only with linear motion of corpuscles of light, in this article. Adjective, ‘inertial’ signifies something related to motion of 3D matter bodies in space.

Universal medium:

‘Hypothesis on MATTER’ envisages an all-encompassing universal medium, which fills the entire space outside basic 3D matter particles (photons), called ‘2D energy fields’. They have definite constituents, structure and a logical mechanism of development and stabilization. The concept has only one type of postulated matter particles – ‘quanta of matter’. There are infinite numbers of quanta of matter, sufficient to fill the entire space.

2D energy fields are made up of latticework structure formed by 1D quanta of matter. Free quanta of matter in direct contact with each other, by mutual adhesion between their matter contents, form end-to-end chains in space. Number of such chains, perpendicular to each other in the same plane completes the structure of a 2D energy field. Four quanta of matter may form a stable junction in the latticework structure. Quanta of matter arrange themselves, separately in each plane, as sides of squares to create 2D energy fields. Each plane in 3D space has a separate 2D energy field and it extends infinitely in all directions in its own spatial plane. 2D energy fields fill the entire space (outside basic 3D matter particles). They have definite structure and properties, derived from their constituents – the postulated quanta of matter. In this concept, 2D energy fields substitute for the imaginary aether with assumed properties [1]. 2D energy fields are isotropic, homogeneous and generally steady in space. It is their inherent property to maintain their serenity and stable state in space.

In a stable part of a 2D energy field, quanta of matter, forming a junction in the latticework are held at right angle to each other, in the same plane. Since lengths of quanta in the latticework vary very little, we can say that the latticework of a 2D energy field constitutes numerous squares in a plane, with each quantum of matter forming a side of the square. Distortions in the latticework formation cause instability at junctions. To restore stability at the junctions and regain serenity of 2D energy field, distortions in the latticework formation is transferred from one junction to the next, successively, in the direction of original effort that produced the distortion. [A force is nothing but the rate of investment of distortions (work) into the matter field of a body]. This tendency on the part of 2D energy fields transfers distortions in it, with the 2D energy fields themselves remaining steady in space, until they are absorbed by distortions about another disturbance or they produces a local in a 2D energy field.

2D energy field:

A 2D energy field can remain stable only if it is unbroken. Local break-down in a 2D energy field liberates number of quanta of matter into space. Immediately, 2D energy field all around the location of break-down will close-in on the gap formed, to restore continuity. During such action, gap created by break-down, is reduced in size. All quanta of matter, liberated due to break-down of 2D energy field, will not be able to regain their places in the latticework structure. 2D energy field, closing-in from all sides, gathers free quanta of matter in the region of gap into a single cluster (disturbance) in its plane. If size of break-down is large, it may encompass many 2D energy fields in various directions in the same region. Disturbances formed, simultaneously in many 2D energy fields about a point, compressed together, form a 3D disturbance.

Presence of a disturbance in a 2D energy field breaks its continuity. As far as 2D energy fields are concerned, space occupied by a 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 the 2D energy fields on a disturbance, is ‘gravitational action’. Magnitude of gravitational action on a disturbance is proportional to the extent of 2D energy field, in the direction away from the disturbance and magnitude of convex curvature of its perimeter.

Detailed structure, properties, mechanisms of development and motions of basic 3D matter particles are too elaborate to be included in this article. They are explained in the book ‘Hypothesis on MATTER’. Briefly: A 2D disturbance, in a plane has a (maximum) critical radial size, determined by gravitational capabilities of 2D energy field of its existence. If number of quanta of matter in the disturbance is more than that is required to create the critical radial size of a 2D disturbance, gravitational compression causes the disturbance (its quanta of matter) to grow into third spatial dimension. This is ‘creation of 3D matter’, resulting in a 3D disturbance (real 3D matter particle). A 3D disturbance exists, simultaneously, in more

than one 2D energy field. Gravitational compression, in each plane, acts against the natural tendency of quanta of matter, within the disturbance, to expand. Gravitational compression around the 3D disturbance reduces as outward distance, from its perimeter, increases. Because of latticework structure of 2D energy field, reactions are absorbed by quanta of matter in the latticework resulting in reduction of their lengths. Quanta of matter nearer to the disturbance become shorter. Quanta of matter in contact with the disturbance are shortest and lengths of quanta of matter in the latticework gradually increase as outward distance from the perimeter of disturbance increases, until lengths of quanta of matter at certain distance from the disturbance have no change and the latticework is in its natural state of homogeneity. Part of the latticework structure around a disturbance, where compression exists, is distorted with respect to rest of the 2D energy field. This distorted part of 2D energy fields is ‘distortion field’ of a disturbance. 2D energy fields’ latticework structure also limits their capability to reduce radial size of a gap in them, containing a disturbance.

A larger (macro) body consists of numerous basic and superior 3D matter particles. Each of these 3D matter particles has its own distortion field. In a composite macro body, distortion fields of all its constituent 3D matter particles combine to form ‘matter field’ of the composite macro body. Hence, matter field of a macro body has highest distortion-density within and nearest to the macro body and distortion-density reduces as outward distance from the macro body increases. Matter field of a macro body contain enough distortions in it, to maintain macro body’s integrity and its current state (of motion). Distorted region of a 2D energy field contains more number of latticework squares compared to the undistorted region of the same 2D energy field. Presence of higher number of quanta of matter, in unit volume of 2D energy fields, increases distortion-density of matter field in that region. Hence, matter field of a macro body is denser towards the macro body and becomes rarer as the distance from the macro body is increased. Matter field may be compared with the ‘gravitational field’, used in some of the current theories.

Basic 3D matter particles are disturbances with respect to 2D energy fields. 2D energy fields, all around a disturbance, continue to close-in on a basic 3D matter particle in them, in an attempt to restore their continuity and thereby compress the disturbance. In order to shove themselves into the gap, the 2D energy fields remain distorted around the disturbance. Gravitational action on the disturbance is the result of reactions due to distortions at junctions in 2D energy field latticework. Magnitude of gravitational action depends on the shape of a disturbance’s perimeter. Shape of a disturbance determines its existence in each of the 2D energy fields. It is very improbable for a 3D disturbance to have true circular shape in all the planes of its existence. Variation in a 3D disturbance’s shape, from a perfect circle in a plane, produces unevenness in the gravitational compression applied on it, from all around. In order to establish 2D energy field’s homogeneity, distortions tend to move from high distortion-density region to low distortion-density region. 3D disturbance, held within the gap in distorted region of 2D energy field is also carried along with the distortions towards the direction of lower distortion-density. This phenomenon produces inherent linear motion of every basic 3D matter particle in space.

Basic 3D matter particle (matter-core of a photon), being a disturbance in 2D energy fields, is ejected out of each of the 2D energy fields of its existence. This is the mechanism of motion of basic 3D matter particles through 2D energy fields. As a basic 3D matter particle moves forward, latticework of 2D energy field in front is parted to create a path and the latticework at the rear joins back to restore its continuity. Pressure (resistance) from the front, due to collision between core-body of the basic 3D matter particle and quanta of matter in the latticework structure of 2D energy fields, is balanced by ejection on the core-body of a photon from the rear. This balancing action maintains the speed of a basic 3D matter particle (photon) at the highest possible level in 2D energy fields.

Light:

Light (or similar radiations) is constituted by numerous matter-corpuscles moved by associated (electromagnetic wave-like) distortions in 2D energy fields. Together they are called photons. Matter body of a photon, being a disturbance, is continuously ejected from 2D energy fields, where it happens to be at any instant. This continuous ejection causes a photon’s constant magnitudes of motions. Distortions, formed in 2D energy fields, to maintain and move a photon’s matter body, are transferred at (highest) constant magnitudes of speed (both linear and angular) that 2D energy fields can provide, without its own break-down. Matter-core of a photon is carried by latticework-distortions, which are transferred through

2D energy fields. Magnitudes of speed of transfer depend on the nature of 2D energy fields in any region of space.

Electromagnetic waves are transfer of periodically varying distortions through 2D energy fields (universal medium). Spin motion of the photon's matter-body creates cyclically varying distortions about it. Distortions in 2D energy fields (formed about a photon's spinning core-body), in transverse (perpendicular to its spin axis and direction of its linear motion) plane appears as wave-like motion. They have many properties in common with electromagnetic waves. Hence, they may be considered as the electromagnetic wave-parts of photons. A single pulse of this electromagnetic wave and the spinning disc-shaped matter-core, together, form a photon. Rotating distortion field about a photon, in transverse plane, appears as wave motion in space, which is same as an electromagnetic wave.

Continuous flow of corpuscles of light (photons) is a ray of light. It consists of 3D matter particles as cores of photons and associated distortion fields. As it is the matter content that is transferred in a light ray, the process may be called radiation of matter. All similar radiations of matter by means of displacement of photons in space are radiations of matter. Depending on the quantity of matter in constituent photons of a radiation, radiation of matter may be classified into; Heat ray, infra-red, visible light, ultra-violet, x-ray or cosmic radiations. Quantity of matter, a photon contains, is indicated by its spin speed (frequency). Frequency of a photon is directly proportional to its matter content.

2D energy field distortions, associated with each corpuscle of matter-radiation rotate about photon's matter-core, while it is being transferred in a straight-line path. Linearly-moving, rotating-distortions carry matter-core of the photon at critical linear speed of light. It is the properties of transfer of distortions in 2D energy fields, which is instrumental for parameters of speed of light.

Photon:

Most fundamental property of a photon is its motion at constant linear velocity (for general description on light's speed, in this article, we will not consider photon's spin motion at angular speed proportional to its matter content). In fact, a photon exists in stable state only because of its motions at constant velocities, with respect to 2D energy fields about it. A stable photon maintains its linear velocity at a critical constant value. It is a necessity of the 2D energy fields to maintain linear velocity of a photon at this critical level. Any instability in a photon's linear speed is overcome by 2D energy fields' continuous gravitational actions. [Here, the motions are assigned to the photon for clearer understanding. A photon, being a corpuscle of matter, is incapable of any actions or movements on its own. It is the inertial actions of 2D energy fields about a photon, which move photon's matter-body]. Distortions in 2D energy fields (electromagnetic wave) about a photon are the moving-part that carries its matter-body.

A 3D disturbance (matter particle) constituted by number of quanta of matter (in their 3D status), maintained as an integrated 3D matter body, is a photon's core-body. A photon is the smallest and basic 3D matter particle. All other superior matter bodies are made up of various self-sustaining combinations of photons.

Matter-part of a photon has segmented spherical (disc) shape that spins about one of its diameters. Quanta of matter, constituting the matter content of a photon, are held together to form an integrated matter-body, by all-around compression by the gravitational actions on it. Gravitational actions are effective only on convex curved surfaces of a 3D disturbance. Gravitational actions around circular periphery of photon's core-body maintain a photon's radial size at constant magnitude. Difference between instantaneous convex curvatures at front and rear faces of a photon's disc-body determines resultant gravitational action that move the photon in its linear path. Inertial pocket of a photon continuously moulds its (spinning) core-body so that magnitude of convex curvature of forward facing disc-face is always less than that of rearward facing disc-face. Gravitational actions on the spinning matter-core of a photon regulate instantaneous shape of its core-body, so that 2D energy fields are not damaged and at the same time external and internal pressures about matter-core body of the photon remain in balance. Under this condition, a photon moves at a critical constant (maximum) linear speed through 2D energy fields (space).

Distortions in 2D energy fields about core body of a photon are photon's 'inertial pocket' (distortion field). Inertial pocket of a photon contain enough distortions (work) in 2D energy fields to sustain integrity,

instantaneous shape and motions of the photon at constant speeds. Stress produced due to distortions in inertial pocket, about matter-core, is the energy-part of a photon. Inertial pocket, being distortions in 2D energy field, has many properties similar to those of an electromagnetic wave, which is also made up of moving distortions in 2D energy fields. Hence, this part of a photon may be understood as a segment of an electromagnetic wave of frequency corresponding to its spin speed. Spinning disc of matter-core body, together with surrounding inertial pocket, is a 'photon'. Photon, being a combination of a matter-core body and accompanying inertial pocket (electromagnetic wave), provides light with its dual nature – simultaneously being a 3D matter body and an electromagnetic wave. Unfortunately, in present theories, these characters are looked upon and used separately for different purposes.

All photons (basic 3D matter particles) are of the same radial size. All 3D matter in nature is in the form of photons. There are no basic 3D matter particles, radially larger or smaller than the photons. Photons may have different quantities of matter contents, indicated by their frequencies.

Stabilizing mechanism:

We shall examine the principle of linear motion 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 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 their 3D states; thus making photon's core-body a 3D matter particle. Let us also assume the matter-core of the photon is disc-shaped with slightly bulging faces.

Radial size of photon's matter-core is limited within critical limits by 2D energy fields' latticework structure. Periphery of photon's core-body, being disc-shaped, always has convex curvature. Gravitation continuously acts all around the periphery to compress the matter-core. Stable radial size of a photon's matter-core is a critical constant. Any variation is immediately stabilised by varying gravitational efforts at the periphery. In the meantime, variation in radial size of photon's core-body stabilises variation in photon's linear speed.

Figures 1, 2 and 3 show cross sections of hypothetical core-body of a 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 only the principle of stabilisation of a photon's linear speed. Gray figures show core-body. Block arrows represent average magnitudes of gravitation in the form of various efforts acting on the core-body. Red outlines in figures 2 and 3 show relative sizes and shapes of core-body of the same photon, when it is moving at its critical linear speed, for comparison.

Figure 1 shows status of cross section of a stable photon's core-body, moving rightward. Gravitational actions all around disc-shaped core-body, shown by representative vertical block arrows, maintain its critical radial size. Magnitudes of gravitational efforts, acting on disc faces, depend on the magnitudes of their convex curvatures. Rear face of core-body bulges outward by greater degree and thus provides greater convex curvature, compared to front face. Gravitational effort from the rear will be 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 the photon, it is marked as 'resistance'. Resultant of ejection and resistance acts to move core-body of photon in linear path. As long as parameters of core-body 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.

Various efforts, mentioned above, do not act as we consider normal 'forces' in mechanics. It is the transfer of

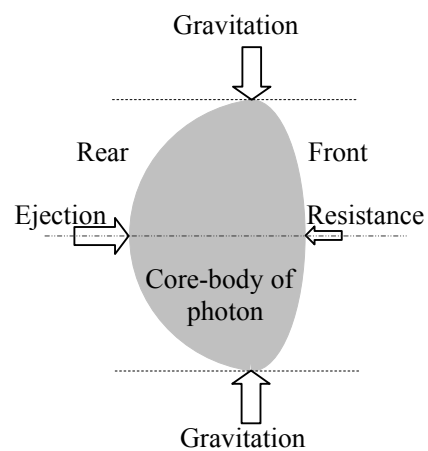


Figure 1

distortions in universal medium, which acts to move the core-body, along with them. Movement is directly imparted to core-body 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 core-body gets displaced in space with respect to 2D energy fields, which fills the space. In fact, photons do not move at all with respect to their surrounding distortions in universal medium. Transfer of distortions with in the universal medium carry photon’s core-body with them, thereby affecting photon’s displacement in space. Distortions, surrounding photon’s core-body, tend to re-distribute, so that the universal medium can re-gain its homogeneity. During this re-distribution, distortions are transferred in the direction of lesser distortion-density region from higher distortion-density region, while the universal medium itself does not move. In reality, redistribution of distortions around photon’s core-body is a continuous process so that at any instant core-body’s size, shape, linear speed and spin speed are maintained at critical values.

Distortions in universal medium (surrounding photon’s core-body) are creation of core-body’s shape. Therefore, wherever core-body moves in the universal medium, similar distortions will be surrounding the core-body. In other words, as long as photon’s core-body is in existence, surrounding universal medium will have similar distortions and these distortions will carry core-body at a constant linear speed, indefinitely. As core-body of the photon moves along with surrounding distortions in steady universal medium, we may relate photon’s motion to steady universal medium. Magnitude of linear speed will depend on parameters of photon’s core-body 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) will remain constant with respect to absolute reference, provided by universal medium.

To understand the mechanism of stabilisation of actions about a photon, let us consider a 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 a stable photon, external pressure at any point on the surface of its core-body is always balanced by internal pressure of photon’s core-body. Pressure difference, required to maintain balance between internal and external pressures depend on the curvature of interface between them. Reduction in matter content in core-body will reduce internal pressure of photon’s core-body, during the time before gravitational efforts commence their action on the core-body. Gravitational pressure all-around the core-body will assert and reduce size of the core body, as shown in figure 2. Compare radial size of core-body shown in gray with its original radial size shown in red outline.

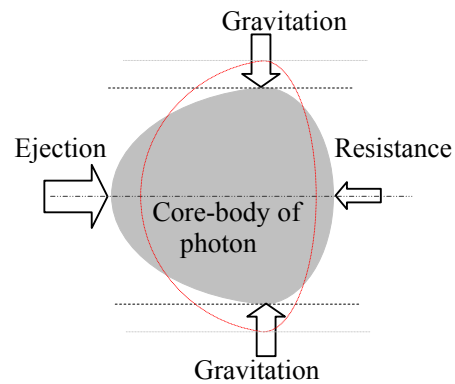


Figure 2

Figure 2 represents actions of gravitational pressures on the core-body of a photon that has lost part of its matter content. Gravitational action reduces size of the core-body from all around until external and internal pressures are balanced at every point on its surface. Radial size and thickness of the core-body are reduced due to deduction in quantity of matter it contains. Internal pressure of the core-body 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 the 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 the core-body is the same. As curvature of rearward face is much smaller compared to front face, it will require 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 [3]). Greater change in curvature of core-body’s rear face will increase magnitude of gravitation there by greater magnitude, compared to lesser increase in magnitude of gravitation due to lesser increase in the curvature of its forward face. Resultant of increased gravitational actions on rearward and forward faces of core-body will attempt to move the photon at greater linear speed. This will increase resistance to photon’s linear motion.

However, gravitational actions from both the front (resistance) and rear (ejection) have increased. These two, together compress the matter content of the photon to increase its radial size back to its critical radial size. As radial size of the core-body is increased to its critical size, matter content of the photon will re-shape to bring down additional ejection and stabilise photon's linear speed by reducing their curvatures. Lose of matter content would result only in a reduction of core-body'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 the photon at its critical linear speed.

Let us consider an increase 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 a stable photon, external pressure at any point on its surface is always balanced by internal pressure of photon's core-body. Increase in matter content will enhance core-body's radial size and thickness.

Gravitational pressure all-around the core-body will be offset to increase core-body's radial size, as shown in figure 3. Compare radial size of core-body shown in gray with its original radial size shown in red outline.

Gravitational actions increase size of the core-body until external and internal pressures are balanced at every point on its surface. Radial size of the core-body is increased. This will reduce curvatures of both rearward and forward disc-faces. As the curvature of rear face is much smaller compared to front face, it will require 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 [3]). Greater reduction in curvature of its rear face will reduce magnitude of gravitation by greater magnitude, compared to lesser reduction in magnitude of gravitation due to lesser reduction in the curvature of its front face. Resultant of actions will tend to move photon at slower linear speed.

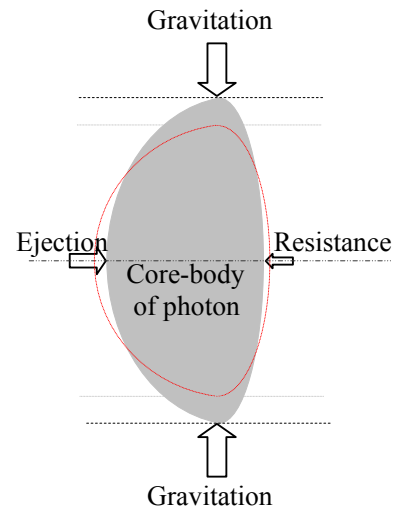


Figure 3

However, gravitational actions from the front (resistance) and from the 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 core-body back to its critical radial size. As radial size of the core-body is reduced to its critical size, matter-core of the photon will re-shape to bring down reduction in ejection and stabilise photon's linear speed. Gain of matter content would result only in an increase of core-body'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 the photon at its critical linear speed.

Stability of a photon's linear speed:

Matter is inert. Transfer of distortions in 2D energy fields carry basic 3D matter particles (core-bodies of photons) within their region and affect displacement of photons in space. Transfer of distortions (inertial pocket) in universal medium, surrounding core-body of a photon, causes a photon's linear (and spin) motion(s). Since it is the distortions that carry the core-body, it is imperative that both the core-body and the inertial pocket move in synchronism with each other. A misalignment between them affects stability of photon.

Photon's inertial pocket, being distortions in 2D energy fields, has only one steady linear speed in space. This is the linear speed of electromagnetic waves. Depending on the structural parameters of 2D energy fields in a region, speed of transmission of free distortions (which are not linked to superior 3D matter particles) is limited to the highest linear speed, possible without damaging universal medium. As long as a photon's core-body moves in synchronism with surrounding distortions, 2D energy fields causes no resistance to the motion of photon's core-body or its stability. Tendency of relative displacement between a photon's inertial pocket and core-body creates instability to the motion of photon by 2D energy

fields. Forward displacement of photon's core-body with respect to its inertial pocket (by which the core-body tends to lead to the front of the inertial pocket) may be considered as an increase in photon's linear speed. Rearward displacement of photon's core-body with respect to its inertial pocket (by which the core-body tends to lag to the rear of the inertial pocket) may be considered as a reduction in photon's linear speed.

An increase in ejection from the rear, without corresponding increase in resistance from the front, tends to increase photon's linear speed. Photon's core-body is pushed forward by distortions at the rear on to latticework structure of distortions at the front. This can happen, when a photon is (apparently) attracted towards another matter body from the front by gravitational or other types of attractions. These attractions have their own set of distortions induced at the rear of photon's core-body to enhance its ejection and in the front to reduce resistance. Since photon's inertial pockets are not 3D matter particles, they cannot be (apparently) attracted towards any other body. An increase in photon's linear speed moves photon's core-body forward with respect to inertial pocket to cause additional forward compression. The core-body 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 the front on photon's core-body and will result in few quanta of matter (from latticework structure) piercing into the matter body of the photon to be (converted into 3D status and) assimilated into photon's core-body. Increased ejection, during this process, effectively compresses photon's core-body to increase its radial size. Change in radial size of photon's core-body initiates stabilisation process of photon's linear speed (by the use of curvatures of its forward and rearward faces) as described in last paragraph.

Quanta of matter, assimilated into photon's core-body, increase photon's matter content. This increase, in the matter content (rest mass) of photon's core-body, requires higher ejection from the rear, to move it at the same linear speed, as the photon was moving earlier. Since ejection from the rear has not increased correspondingly and photon's core-body is bulkier, linear speed of the photon gradually slows down to restore its linear speed to critical constant value. As linear speed of photon reduces to its critical value, excessive pressure between its core-body and inertial pocket will be relieved. Thus, an attempt to increase linear speed of a photon results in the photon gaining additional matter content (with corresponding increase in its energy content) from surrounding 2D energy fields instead of an increase in its linear speed. Increase in matter content is indicated by an increase in photon's spin speed - frequency or colour. Any attempt to increase linear speed of a photon (light) results in increasing photon's frequency (colour of light) rather than its linear speed.

A reduction in ejection from rear, without corresponding reduction in resistance from the front, tends to reduce photon's linear speed. Compression on photon's core-body tends to reduce. Photon's core-body is (apparently) pulled rearward by reduction in distortion-density at the rear. This can happen, when a photon is (apparently) attracted towards another matter body from the rear by gravitational or other types of attractions. These attractions have their own set of distortions induced (in opposite direction) at the rear of photon's core-body to reduce its ejection and in the front to increase resistance. Since magnitudes of changes are related to curvature of disc-faces, magnitude of change in ejection at the rear disc-face will be much greater than the magnitude of change in resistance at the forward disc-face. As photon's inertial pockets are not 3D matter particles, they cannot be (apparently) attracted towards any other body. Due to greater reduction in ejection, compared to reduction in resistance, photon's core-body tends to shift rearward relative to its inertial pocket. The photon tends to slow down. A reduction in photon's linear speed moves photon's core-body rearward with respect to inertial pocket to relieve internal compression of the core-body. The core-body expands in volume to fill the inertial pocket. All constituent quanta of matter of core-body take part in this expansion. During this process, few (randomly oriented but rightly placed) quanta of matter expand rapidly and escape from the core-body to join latticework structure of 2D energy fields. Matter content of photon reduces, while core-body's volume increases. Radial size and thickness of core-body increase. Having larger radial size initiates stabilising process of photon's parameters and its linear speed, in relation to curvatures of photon's disc-faces as described in earlier paragraph.

Quanta of matter, lost from photon's core-body, reduce photon's matter content. This reduction, in the matter content (rest mass) of photon's core-body, requires lower ejection from the rear, to move it at the same linear speed, as the photon was moving earlier. Since ejection from the rear has not reduced correspondingly and photon's core-body is lighter, linear speed of the photon gradually increases to restore

its linear speed to critical constant value. As linear speed of photon increases to its critical value, reduction in internal pressure of core-body will be 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 2D energy fields, instead of a reduction in its linear speed. Reduction in matter content is indicated by a reduction in photon's spin speed - frequency or colour. Any attempt to reduce linear speed of a photon (light) results in reducing photon's frequency (colour of light) rather than its linear speed.

In this way, 2D energy fields (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 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 2D energy fields. They are created from and by 2D energy fields. 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 light radiations.

Speed of an electromagnetic wave:

Electromagnetic waves are periodically varying distortions, radiated in the 2D energy fields (universal medium). In nature, electromagnetic waves are produced by electromagnetic actions in corresponding atoms of an electric conductor. Electromagnetic actions are produced by the photons, moving in circular paths, within the primary 3D particles of the atoms. Hence, the speed of radiation of distortions (electromagnetic waves) in the 2D energy fields corresponds to linear speed of photons in their curved paths, within the primary particles of the atoms. This makes the speed of radiation of electromagnetic wave equal to the linear speed of light. Changes in the speeds of photons in any medium affect speed of electromagnetic waves identically.

Matter field (inertial pocket) of a photon and the electromagnetic waves are radiations of distortions in the 2D energy fields. Spin motion of linearly moving 3D matter-body of a photon produces wave nature of its inertial pocket. Most properties are common to both, the inertial pocket (in transverse plane) of a photon and an electromagnetic wave. Hence, for certain purposes, inertial pocket about a photon also may be regarded as an electromagnetic wave. Thus, a photon becomes a 3D matter particle accompanied by its electromagnetic wave. Core-body of a photon is made up of 3D matter. Energy part of the photon is made up of stress due to distortions (work) in its inertial pocket – the electromagnetic wave – acting against the restoring efforts inherent in 2D energy fields.

Speed of light:

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

Therefore, absolute speed of light appears to be slower near more massive macro bodies, when compared with respect to distance measurement, used in another region of space. Since the 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 2D energy field in the same region of space and absolute linear speed of light in another region of space with reference to 2D energy field in that region of space are

identical. Discrepancies develop only when absolute linear speed of light in one region of space is related to 2D energy fields in another region of space.

Due to the circular logic, we define time; unit of time within matter field of a macro body also depends on distortion-density of the 2D energy fields in the same region of space. Thus, 'absolute unit of time' in any region of 2D energy fields may be different from 'absolute unit of time' as determined in undistorted region of 2D energy fields. Although unit of time and speed of light are constant and equal in every region of 2D energy fields, discrepancy develops when unit of time or linear speed of light, determined in one region of 2D energy fields is related with unit of time or linear speed of light, determined in another region of 2D energy fields. This has given rise to many speculations about nature of time and its variations. Speed of light, in the outer space or near another macro body (whose mass is not equal to the mass of earth) should not be compared with speed of light on the surface of earth, using units of distance and time, determined on or near the surface of earth.

An observer is a large macro body. A static observer and his surroundings are within the matter field of the macro body, where the 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. The observer moves with the matter field in the region of his existence. Critical linear speed of light (motion of photons) is with respect to surrounding 2D energy fields-distortions and depends only on the distortion-density of the matter field of the region. Therefore, a photon always appears to move at the same speed within the 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 the integrity and stability of the photon.

Entire space is filled with 2D energy fields. There is no empty space. Air or other 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 an 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 2D energy fields are free of any distortions other than those are required to maintain the photon in consideration in its stable state. In all other regions of space, linear speed of a photon is determined with respect to distortions in 2D energy fields in the region. For constant magnitude of 2D energy fields-distortions, linear speed of a photon and unit of time in it are constants.

If observer (experimental laboratory) develops a motion with respect to his 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) speed as other photons in the matter field, in the direction of his own motion. Other photons moving in the region also will be moving at their critical constant linear speeds. Under this condition, observer will see other photons in relation to himself. Each of the other photons will appear to move at linear speeds relative to his motion. A photon moving in opposite direction will appear to the observer, as moving at double the critical linear speed and a photon moving in the 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 the 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 very large macro body, moving with and is a part of the surrounding matter field-distortions, he will observe all photons in the region as moving at a critical constant linear speed irrespective of their directions of motion. This 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 a constant critical value. All experiments (like Michelson & Morley experiments) were conducted within the 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 the directions of radiation, all light beams (in various directions) registered the same linear speed.

If an observer places himself outside the region of matter field, where the light beams are radiated, he will 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 air near the 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 the 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 massive macro bodies’) matter field. This fact is not recognized due to our adamant belief in the assumed constancy of linear speed of light. Instead, we prefer to mystically dilate the functional entity of ‘time’. The general (unscientific) rule followed at present is that: in denser media, the light slows down and in rarer media, the time dilates.

A 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 the surface of a large macro body), relative linear speed of a small free body, moving under constant inertia in the same region, is constant irrespective of its direction of motion. This common rule applies to the linear motion of photons (corpuscles of light) also. Relative linear speed of smaller bodies, moving near the earth’s surface, depends on the magnitude of ‘force’ acting on (or energy stored in) the body. In relative reference frame, we do not consider linear motion transferred to the smaller macro body by earth’s motion. In case of photons, external effort propelling the photon and its linear speed relative to earth’s surface depends on the distortion-density of earth’s matter field. Assuming that the 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. A change in magnitude of matter field-distortion in the region of radiation (like within a refractive medium or near a large macro body of different size) will change the 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 massive macro body, its critical linear speed (and unit of time) is lowered due to higher matter field-density in the region. More massive a macro body is, lower is the critical constant linear speed of light, in that region of the 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 the critical linear speed of light in that region.

However, as far as a photon is concerned, it always moves at a critical constant linear speed with respect to 2D energy fields, around it. Number of 2D energy field latticework squares, traversed during equal interval of time, is the same, irrespective of distortion-density of the matter field of the region of radiation. Matter field, with higher density of distortions, has more number of 2D energy field squares 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 the same region of space, linear speed of light does not change; it will be same critical constant value.

Should the observer develop a linear motion within a 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 an observer can attain and straight-line distance available within a 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 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 bodies is of constant value with respect to water-current, all objects within the current and linearly moving with respect to the current appear to move at constant linear speed, irrespective of directions of their motion. Relative linear speed of the fish and other moving objects within the current will come into prominence only when the fish is able to move with a speed comparable to speed of moving objects with respect to the current].

However, by choosing a rotational frame of reference, this fact is confirmed by the phenomenon of ‘sagnac effect’. Since dual nature of light is not well recognized, results of experiments, similar to sagnac’s experiments are not satisfactorily explained. In figure 4, AB and CD are two arms of a glass tube. A transparent fluid is pumped through the tube, entering at ‘C’ and leaving at ‘A’. As a whole, each of the 2D

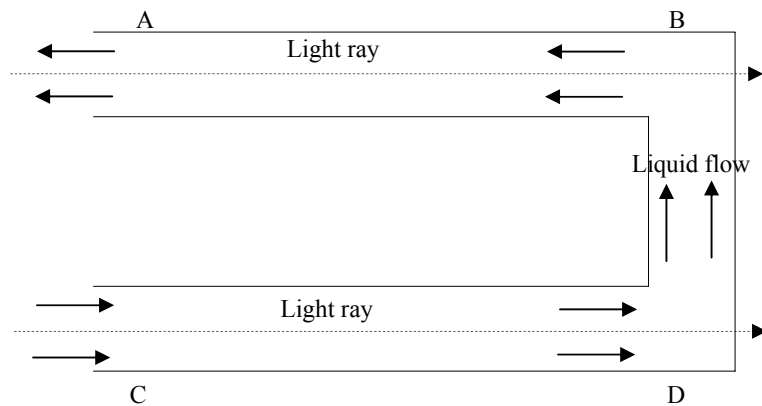


Figure 4

energy fields is static in space. Distortions in a 2D energy field are transferred in its plane. Distorted parts of 2D energy fields about a macro body constitute its matter field. As distortions are transferred through 2D energy fields, matter field of the macro body is displaced with respect to the static 2D energy fields. Motion of matter field carries 3D matter particles in the macro body. For a stable macro body, its 3D matter particles and matter field move in synchronism. Fluid columns in arms CD and BA of glass tube move corresponding to inertial motions of matter field-distortions within the glass tube. Matter field-distortions in fluid in arm CD moves from 'C' to 'D' and the fluid is carried from 'C' to 'D'. Matter field-distortions in fluid in arm AB moves from 'B' to 'A' and the fluid is carried from 'B' to 'A'.

Transmit two identical light beams, shown by arrows in dotted lines, through both arms in same direction, from 'A' to 'B' in arm AB and from 'C' to 'D' in arm CD.

Light beam in arm AB is radiated in opposite direction to transfer of matter field-distortions of fluid flowing from B to A. Critical linear speed of the light beam is determined with respect to these moving distortions. To an observer, outside (the glass tube), linear speed of light beam in glass tube AB will appear to have slowed down by a magnitude equal to linear speed of the fluid.

Light beam in arm CD is radiated in the same direction as the transfer of matter field-distortions of fluid flowing from C to D. Critical linear speed of the light beam is determined with respect to these moving distortions. To an observer outside (the glass tube), linear speed of light beam in glass tube CD will appear to have increased by a magnitude equal to linear speed of the fluid.

Fluid and glass tube in the above experiment may be replaced by a circular refractive medium of light (like an optic fibre) rotating about its centre to imitate the flow of fluid. This arrangement is used in equipments utilizing 'sagnac effect'.

Conclusion:

Beam of light is a continuous flow of photons made up of 3D matter corpuscles (matter-part of light) accompanied by their inertial pockets (energy-part of light) in the 2D energy fields. Distortions in a moving inertial pocket carry 3D matter core-body of photon at a constant linear speed. Linear speed of light is constant because that is the highest linear speed the universal medium can move any 3D matter body. Relative speed of light is a critical constant in any region of space. Magnitude of this constant value depends on the nature of 2D energy fields-distortions in the region where the light is radiated. Linear speed of light (with respect to a static observer on earth), measured on or near the surface of earth, is constant irrespective of the direction of radiation. Light corpuscles, like any other matter body, obey all laws of motion and gravity. Light has a relative linear speed with respect to moving observer within the region of space of radiation. Critical linear speed of light is not a universal constant. It depends on the distortion-density in 2D energy fields of the region of space (where radiation is taking place) and units of distance and time in that region of space.

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