RADIATION

'Radiation' generally signifies the process of outward and radial transmission of effects from a central point. On the basis of effects transmitted, radiations are categorized and adapted to various phenomena. This chapter deals only with radiations of light (and similar radiations of matter) and electromagnetic waves, in general. All explanations pertain to conceptual aspects of radiation rather than mathematical analysis.

6.1. Matter-field:

A 3D matter-particle (larger than primary particles) or a macro body contains millions of unstable photons arranged and moving in a systematic order, within limits of its body-dimensions. Since movements of these photons are controlled and directed, their inertial-pockets are always unstable and continuously interact with latticework-structures of surrounding 2D energy-fields. Linear speeds of unstable photons, with respect to universal medium, are not different from critical constant speed of stable photon. Their matter-cores remain stable.

However, constant changes in direction of their motion, under actions of external efforts, make them unstable, by their inertial-pockets. Inertial-pockets, carrying matter-cores of unstable photons, have continuously varying velocity (usually at constant rate). Inherent nature of universal medium tends to stabilize photons' motion along a straight-line direction. As actions of external efforts are of permanent nature, stabilization attempts require continuous modifications in distortions in photons' inertial-pockets. This amounts to constant interaction between unstable photon and universal medium.

Interactions with unstable photons cause distortions in latticework-structures of surrounding 2D energy-fields. That is, additional distortions are created around inertial-pockets and/or distortion-densities and extents of inertial-pockets are changed suitably. They produce additional strain and changes distortion-density in universal medium. Therefore, 2D energy-fields contained within the space, defined as a macro body, and its immediate surroundings are always under strain and are at different distortion-densities, compared to free space.

Magnitudes and directions of additional distortions in the region of space about a macro body depend on parameters of macro body. Distorted part of universal medium or 3D block of 2D energy-fields about a macro body is its 'matter-field'. Depending on size and structure of various types of 3D matter-bodies, distorted regions of universal medium about them are termed differently. A photon has its inertial-pocket about its matter-core.

A primary / fundamental 3D matter-particle has its distortion-field about its composite 3D matter-body. A macro body has its matter-field about its composite 3D matter-body.

Inertial-pockets of photons have directional distortions in their latticework-structures, so that matter-cores of photons are moved in same linear and spin directions. A macro body has millions of photons in it, moving in various directions. Each of them introduces additional distortions, in universal medium, appropriate to its own directions of motion. Therefore, magnitudes and directions of distortions in latticework-structures of 2D energy-fields vary widely near unstable photons in matter-field of macro body.

Deformations of latticework-squares in 2D energy-fields about a macro body are required to maintain integrity, physical state and state (of motion) of composite macro body. Deformed parts of all 2D energy-fields in universal medium, in all directions and passing through a macro body, together constitute its matter-field. Matter-field is a three-dimensional entity, associated with 3D matter-particles of a macro body. In each plane, matter-field is part of corresponding 2D energy-field. Because of latticework-structure of 2D energy-fields, distortions in a matter-field extend outside borders of a macro body and diminish gradually in magnitudes, outside Constituent 3D matter-particles (photons) of macro body are sparsely distributed within its matter-field. Hence, matter-field within spatial body-dimensions of a macro body, its immediate surroundings in universal medium and constituent 3D matter-particles contained within body-dimensions, together, constitute (effective) 3D composite macro body. Space, defined by macro body's body-dimensions and its immediate surroundings, define its matter-field.

Matter-field is essential for stable existence of matter-content of macro body. As long as no changes in rest mass of a macro body are made, number and matter-content of unstable photons, constituting it, do not change. All other changes of macro body are changes to its matter-field. Changes in matter-field of a macro body are nothing but development or transfer of additional work, done elsewhere (energy), into or out of its matter-field or transfer of additional work away from its matter-field. They are transfer of additional distortions in latticework-structures of 2D energy-fields. Changes in matter-field of a macro body change its state (of motion).

Temporary and cyclic changes, which take place within matter-field of a macro body, for its sustenance and integrity, may be ignored for the time being. As they are required to maintain the integrity of composite macro body, these changes do not constitute a change in state of (motion of) macro body. A change in the state of (motion of) macro body is produced by a permanent change in distortion-density of its (overall) matter-field.

Nature of matter-field of a macro body depends on arrangements, movements and matter-content of its constituent unstable photons. Hence, matter-field of macro body of each material differs and is unique to that material. Matter-field is neither homogeneous nor isotropic. Distortion-density, and stress in any part of a matter-field, in any direction

depends on proximity and movements of constituent unstable photons of macro body. Matter-field, being a block of universal medium under stress, is elastic but depending on direction and nature of distortions in latticework-squares of its 2D energy-fields, its elasticity in different directions may vary.

However, for general explanations, resultant distortions in matter-field about an ordinary composite macro body may be considered as omni-directional or of no particular direction and of average distortion-density. Result of this type of non-directional distortions is compression of latticework-structures of 2D energy-fields in the region of macro body, as shown in figure 6.1. In this case, average magnitudes and directions of compressive distortions and general shapes of latticework-squares in matter-field are considered, rather than their instantaneous magnitudes or directions.

Reduction in lengths of constituent quanta of matter makes latticework-squares in 2D energy-fields of the region, smaller in size. Figure 6.1 shows part of matter-field (in a plane perpendicular to surface) of a macro body near its outer periphery. Dotted line is periphery of macro body. Latticework-structure, shown in figure, represents part of one 2D energy-field in a plane passing through macro body. Region below dotted line shows part of macro body. Latticework-squares, within limits of body-dimensions are deformed almost uniformly. Their sizes are much smaller than latticework-squares far away from macro body. Sizes of latticework-squares increase gradually; from periphery of macro body until all deformations are lost and sizes of latticework-squares reach their full size in free space. Distance through which deformations in latticework-squares gradually change is the extension of macro body's matter-field, outside its body-surface.
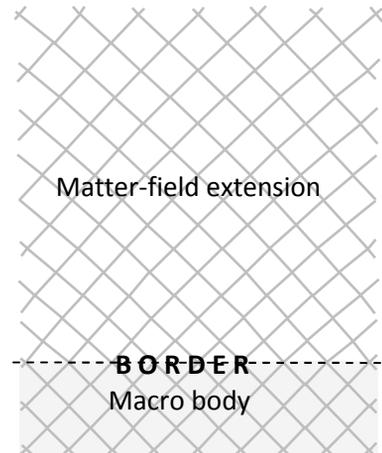

Matter-field extension

BORDER

Macro body

Figure 6.1

6.1.1. Distortions in matter-fields:

When two macro bodies meet, it is their matter-fields, which come into contact. During contact between two matter-fields (macro bodies), latticework-squares of their latticework-structures (in each plane) collapse further and transfer their distortions to each other, in their own planes. A 2D energy-field passing through two macro bodies has parts of its latticework-structure in matter-fields of both macro bodies. Hence, same 2D energy-field contains parts of both matter-fields. When two macro bodies meet, their matter-fields are brought near to bear upon each other. There are no changes in common 2D energy-fields. Distortions in one part of latticework-structure of 2D energy-field

(matter-field of one macro body) join with distortions in another part of same latticework-structure (matter-field of other macro body).

Depending upon magnitudes of distortion-densities in matter-fields, bearing on each other, distortions are transferred or shared by them. This is the mechanism of transfer of work (or transfer of energy) between macro bodies in contact. This process takes place separately in latticework-structures of every 2D energy-field, common to both macro bodies (matter-fields). All through explanations on various phenomena, related to actions on or about macro bodies, distortions required for stability and integrity of macro body and its constituent 3D matter-particles are ignored and not shown in figures. Only those specific distortions, which are related to the phenomenon in discussion are presented.
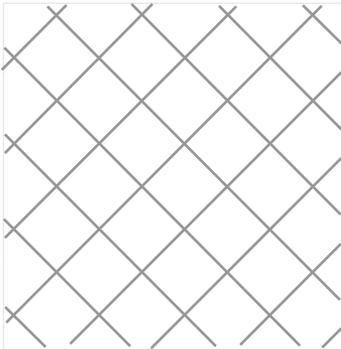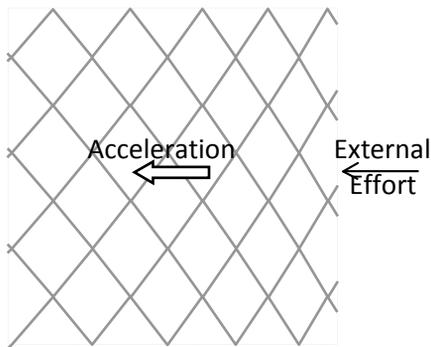

Figure 6.2

Figure 6.2, represents part of matter-field of a static macro body. Latticework-structure in the plane has no distortions. All its latticework-squares are symmetrical and without deformations.

Acceleration   External Effort

Figure 6.3

Figure 6.3 shows additional distortions in latticework-structure (in a plane) of macro body's matter-field, during action of an external effort, as shown symbolically by black arrow. As additional distortions are transferred into matter-field by external effort from right-hand side, latticework-squares are compressed to left. Compression of latticework-squares is progressively transferred to left.

Additional distortions introduced by external effort accelerate macro body, in the direction of external effort, as shown by block arrow. During transfer of work (additional distortions), states of participating macro bodies ('force-receiving body' and 'force-applying mechanism') are changed to correspond to magnitudes of modified additional distortions in their matter-fields. Such interactions can introduce inertial actions and reactions in matter-fields of both 'force-receiving body' and 'force-applying mechanism'. Distortion-fields in matter-fields of two macro bodies, interacting between them, may also produce inertial actions in their matter-fields, in somewhat similar manner.

Figure 6.4 shows additional distortions in latticework-structure (in a plane) of macro body's matter-field, moving at a constant linear velocity. Distortion-density in its matter-field is highest at macro body's middle region. Distortion-density gradually reduces in
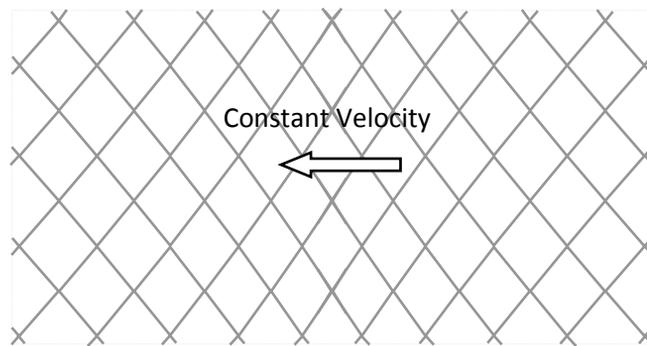

Figure 6.4

both directions, towards front and rear of macro body. Distortion-density of its matter-field, at any part, remains constant with respect to macro body for constant velocity. Gradients of distortion-density on either side of middle region are identical. Therefore, impetuses on all matter-particles of macro body are equal and whole of macro body moves at a constant velocity.

Because of contraction of latticework-structures, towards macro body's middle region, overall length of matter-field shrinks. Macro body's length contracts in the direction of its linear motion, with corresponding enlargement of body-dimensions in perpendicular direction to its linear motion.

Figure 6.5 shows additional distortions in latticework-structure (in a plane) of macro body's matter-field, under actions of two equal external efforts from opposite directions. Actions of external efforts compress latticework-squares in its latticework-structures, in directions of their actions. Additional distortions, introduced by both external efforts add to each other to form resultant additional distortions in matter-field. Stress developed in the matter-field gives rise to internal pressure of macro body. Since magnitudes of distortions in both directions are equal, macro body (as a whole) does not develop linear motion.
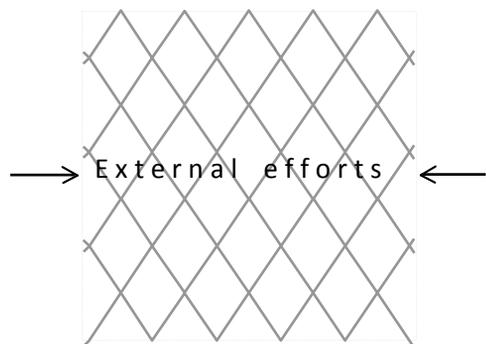

Figure 6.5

However, because of contraction of latticework-structures, overall length of matter-field shrinks, in the direction of external efforts. Macro body's length contracts in the directions of external efforts, with corresponding enlargement of its body-dimensions in perpendicular direction to action of external efforts. If external pressure on macro body acts all around it, its matter-field shrinks in 3D space.
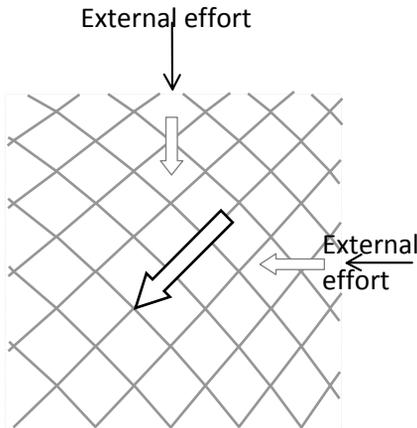
Figure 6.6 shows additional distortions in latticework-structure (in a plane) of macro body's matter-field, under actions of two external efforts, shown by black arrows, in perpendicular directions to each other. Block arrows in dotted line show directions of accelerations of constituent matter-particles of macro body, corresponding to external efforts. Both, external efforts introduce additional distortions of their own, in latticework-structures of matter-field. Additional distortions due to each of the external efforts, being in different directions, superimpose to form resultant additional distortion in the matter-field. Macro body develops inertial motion in the resultant direction of additional distortions, as shown by block arrow in bold line.

Figure 6.6

When external efforts cease, macro body continues to move at a constant velocity appropriate to resultant additional distortions, created in matter-field due to displacements of 3D matter-particles in resultant direction. Original distortions will be lost from matter-field. Distortions present in matter-field will be similar to distortions in matter-field of a macro body, moving at constant linear speed.
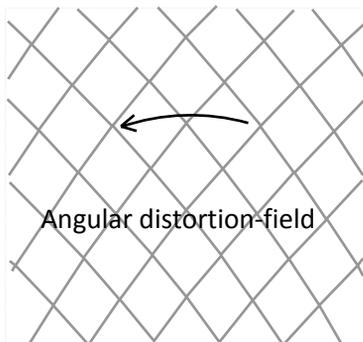
As there are no means to produce a angular inertial effort, they cannot be produced artificially. All angular distortion-fields are produced by unstable photons, moving in curved paths. Resultant distortions in matter-fields of a macro body, moving in circular path may appear as angular in nature. However, their apparent angular nature is the result of continuous combination of two or more linear distortions. Apparent angular nature will last only as long as constituent linear distortions are present.

Angular distortions in latticework-structures of 2D energy-fields are produced only in immediate

Figure 6.7

vicinity of primary / fundamental matter-particles. Angular distortions about all primary matter-particles, together, form intrinsic matter-field of macro body to sustain its integrity and state of absolute rest in universal medium. Figure 6.7 shows part of latticework-structure of a 2D energy-field of an angular distortion-field, about a primary 3D matter-particle. Direction of angular distortions depends on orientation of primary 3D matter-particle. Since, angular distortions, produced about a primary 3D matter-particle has uniform distortion-density all around (at same radial distances), it produces no inertial motion in its independent state, either of primary 3D matter-particle or of macro body.

Figure 6.8 shows an angular distortion-field acted upon by linear additional distortions, introduced by an external effort, in latticework-structure of 2D energy-field in a plane of matter-field. Curved arrow shows direction of angular distortions. Shapes of latticework-squares in latticework-structures of matter-field are modified to suit resultant of both, angular distortions and additional linear distortions.
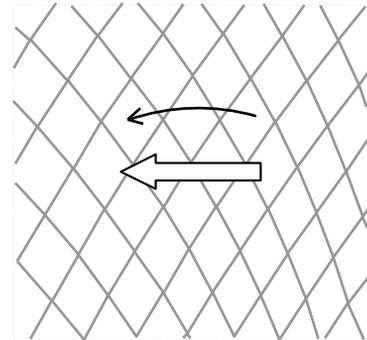

Figure 6.8

However, their angular component maintains constant angular distortion-density about each of macro body's 3D matter-particles. Linear component of resultant distortions have varying distortion-densities, as suitable for macro body's linear motion in the direction, shown by block arrow. All 3D matter-particles and macro body, as a whole, can develop motion only in linear direction. They cannot develop rotary motion.

Figure 6.9 shows outward radial distortions in a part of matter-field, in a plane. Outward radial distortions are produced in outward nuclear fields or in a region of universal medium, where its latticework-structures are augmented at very high rate by additional structural formations. Two arrows, in figure pictorially represent causes of outward radial distortions and their directions from a central point.

Figure 6.9

However, due to very small sizes of nuclear fields, their presence is limited within fundamental 3D matter-particles. Due to very large sizes of regions, producing radial distortions by augmentation of latticework-structural formations, their radial nature is

often not apparent and they appear as linear distortions, with respect to a small region in space.

Figure 6.10 shows inward radial distortions in a part of matter-field, in a plane. Inward radial distortions are produced in inward nuclear fields or in a region of universal medium, where its latticework-structures are depleted at very high rate by loss of structural formations or by gravitational actions on a disturbance. Two arrows, in figure pictorially represent causes of inward radial distortions and their directions towards a central point.
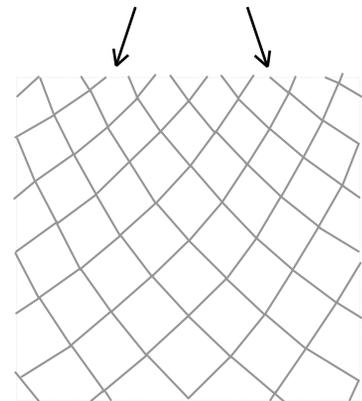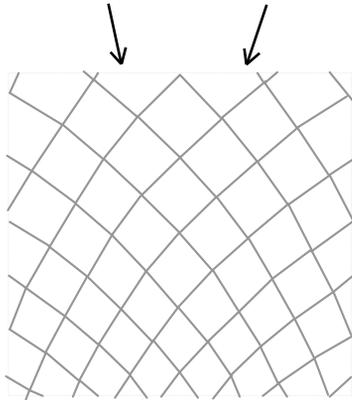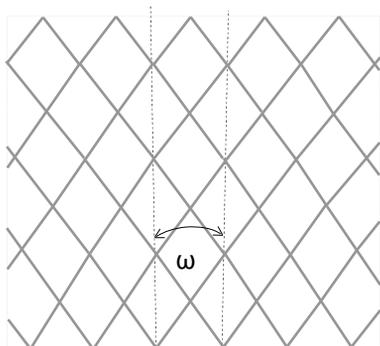

Figure 6.10

Figure 6.11

However, due to very small sizes of nuclear fields, their presence is limited within fundamental 3D matter-particles. Due to very large sizes of regions, producing radial distortions by depletion of latticework-structural formations, their radial nature is often not apparent and they appear as linear distortions, with respect to a small region in space. Due to extremely small sizes of disturbances, radial distortions by gravitational actions can be visualized only around matter-cores of photons.

Figure 6.11 shows distortions in part of latticework-structure in a 2D energy-field, where latticework-squares are linearly distorted with a gradient in distortion-density. Magnitude of distortion-density in upper part of figure is less than magnitude of distortion-density in lower part. Distortion-density increases gradually towards lower part of latticework-structure in figure. Difference in distortion-density between upper and lower parts of latticework-structure shown in figure is indicated by angular difference between vertical dotted lines. Magnitude of action / reaction by higher distortion-density region will be greater than magnitude of action / reaction by lower distortion-density region. Usually, distortion-density in matter-field, near the surface of a macro body, is greater than distortion-density in same matter-field, farther from surface of macro body. Distortion-density in matter-field, about surface of a macro body, also depends on quantity of matter it has. Therefore, total matter-

content (rest-mass) of a macro body and/or its matter-density also influence certain actions on or near surface of a macro body.

Every macro body has its matter-field extending outside its body-dimensions. Reach of this extension depends on matter-density and total matter-content of macro body. A large macro body has universal medium, towards its exterior and immediately outside its border, collapsed towards macro body's surface. In this region, a horizontal straight-line connecting isotropic points in a spherical macro body's matter-field is a (curved) line in space and parallel to macro body's surface. Curvature of horizontal line decreases as distance from macro body's surface increases. In this sense, functional entity called space around a large macro body may be considered as curved.

6.1.2. Directional classification of distortions:

Usually, all observable (apparent) interactions between two matter-bodies occur outside their body-dimensions. Hence certain directional properties of their matter-fields, outside their outer surface are also important. Depending on type of material of macro body, resultant distortions in its matter-field, outside body-surface, may exhibit certain directional property, which is unique to each material, irrespective of macro body's size or shape. Directional property of distortions in matter-field (outside body-surface of a macro body) is related to type of material and magnitude of distortions is related to total matter-content (mass) of macro body. Distortions in matter-field, of different origins or directions, have no separate existence. They superimpose on each other and become part of whole matter-field of macro body.

Depending on orientation of primary 3D matter-particles, near surface of a macro body, distortions of latticework-squares in its matter-field on outer side of surface, exhibit certain directional properties. Distortions in matter-field of a homogeneous macro body, as they appear on its surface may generally be classified into 'normal-distortion' (vertical to surface) and 'parallel-distortion' (parallel to surface). Directions of distortions, in this classification, are with respect to surface of macro body.

When similar classification is used for distortions in a distortion-field, which has no related surface of a macro body or when distortions are considered independently, directions of distortions are related to orientation of observer. Therefore, as orientation of an observer changes, it is possible for same distortion-field to change its class.

Distortions in matter-field at the surface of a macro body may not be distorted purely in either way. Not all 2D energy-fields (encompassing same surface) in different directions or in different planes are identically distorted. Resultant (average) distortions in matter-field, at the surface of a macro body, over and above compressed state of matter-field are considered in this chapter.

Depending on nature of distortions, normal and parallel distortions are also directional, as shown in figures 6.12, 6.13, 6.14 and 6.15. Directions of distortions in matter-field near macro body's surface correspond to direction of motion of unstable photons (in subatomic particles) in it. Higher magnitude of distortions per unit space increases distortion-density of matter-field. Distortion-density in matter-field of a macro body decreases gradually as outward distance from its surface increases. Within a macro body, variations in distortion-density of matter-field are created by locations and motions of its 3D matter-particles. There are no constituent 3D matter-particles, outside the surface of a macro body, affecting distortion-density of its matter-field. Hence, distortion-density of matter-field becomes more uniform outside its borders.

For following explanations, surfaces of a macro body that has matter-field with pure normal-distortion and pure parallel-distortion are chosen. We shall consider part of latticework-structure (in one plane perpendicular to macro body's surface) of matter-field, just outside macro body's surface and in contact with it. Surface of macro body, here, means its outermost layer of constituent atoms or molecules. Due to regular movements of constituent photons (in subatomic 3D matter-particles) near surface of macro body, average distortions in parts of matter-field in these places are more or less steady and alike. Distortions in 2D energy-fields in different directions but passing through same point need not be similar. In following sections, a part of matter-field is represented with definite borderlines but in actual cases, they have no definite border; distortions in latticework-structures gradually diminish as distance from macro body's surface increases and disappear altogether, after certain distance. This distance depends on total matter-content and matter-density of macro body.

Normal-distortion:

In normal-distortion of a matter-field, latticework-squares in 2D energy-fields appear as compressed in a direction perpendicular to surface of macro-body. Latticework-squares are flattened towards macro body's surface, as shown in figure 6.12. Figure 6.13 shows details of distortions in a small region of 2D energy-field, in perpendicular plane near macro body's surface. Diagonals of latticework-squares, perpendicular to macro body's surface, are shorter and diagonals of latticework-squares, parallel to macro body's surface,

Matter-field

BORDER

Macro body

Figure 6.12

are longer. Constituent quanta of matter of matter-field, under normal-distortion become more inclined from vertical to macro body's surface. There are fewer latticework-squares and junction-points of 2D energy-field in any given length along macro body's surface.
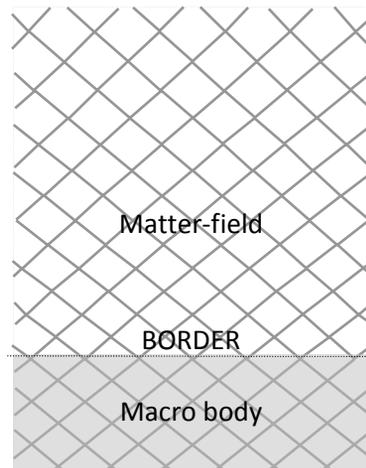
Distances between junction-points of latticework-squares in 2D energy-field, in perpendicular direction to macro body's surface are shorter and hence quanta of matter in latticework-structures are held under compressive stress towards macro body's surface. Reaction from this type of strain in matter-field, when released, acts in direction away from macro body.
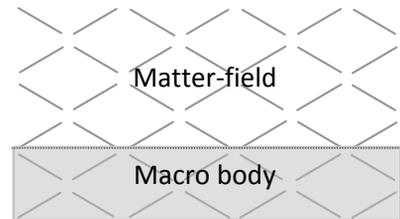
Latticework-squares in matter-field are already pressed towards macro body's surface and hence it reduces ability of matter-field under normal-distortion to absorb additional distortion (work) in vertical direction to macro body's surface. Due to distortions already present in latticework-squares of matter-field, external effort acting on macro body, in vertical direction to its surface is less effective and response to external effort by matter-field is quicker. Efficiency of external effort on macro body reduces and macro body appears more rigid.

Figure 6.13

Parallel-distortion:

In the parallel-distortion of a matter-field, latticework-squares in 2D energy-field appear as compressed in direction parallel to macro body's surface. A representation is shown in figure 6.14. Figure 6.15 shows details of distortions of latticework-squares in a small region of 2D energy-field in a plane perpendicular to macro body's surface. Diagonals of latticework-squares in matter-field, perpendicular to macro body's surface, are longer and diagonals of latticework-squares in matter-field, parallel to macro body's surface, are shorter. Constituent quanta of matter, in latticework-structure of matter-field, under parallel-distortion become less inclined to vertical to macro body's surface.
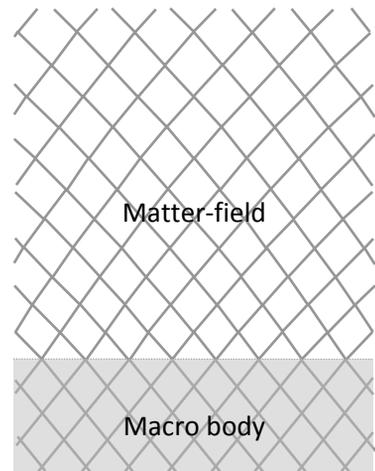
Distances between junction-points of latticework-squares in 2D energy-fields are shorter along a line parallel to macro body's surface. In a given length of macro body's surface, there are more junction-points of latticework-squares and hence quanta of matter in latticework-structures are held under dilated stress along vertical to macro body's surface. Reaction from this type of strain in matter-field, when released, acts in direction vertical to surface of macro body.

Figure 6.14

Latticework-squares in matter-field are already held in dilated state towards macro body's surface and hence it increases ability of matter-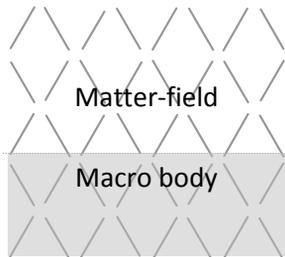field under parallel-distortion to absorb additional distortion (work) in vertical direction to macro body's surface. It is able to absorb more work in direction perpendicular to the surface of macro body by absorbing more additional distortions from incoming action. Due to distortions already present in latticework-squares of matter-field, external effort acting on macro body, in vertical direction to its surface is more effective and response to external effort by its matter-field is slower. Efficiency of external effort on macro body increases and macro body appears less rigid.

Figure 6.15

External effort, applied in perpendicular direction to macro body's surface; first, tends to remove existing distortions by bringing latticework-squares in 2D energy-field to their natural shape. Only then, further distortions take place in latticework-squares, towards normal-distortion. Reactive efforts of constituent quanta of matter in latticework-structures, about their stable relative positions (from macro body's surface) are lesser.

An external effort (perpendicular to macro body's surface), applied to a matter-field with parallel-distortion, tends to take constituent quanta of matter in latticework-structures of 2D energy-field towards their stable position, and reaction in this direction tends to reduce. Matter-field with parallel-distortion absorbs large quantity of additional work (energy), to be delivered back, while returning to its original state. Distorted latticework-squares in matter-field, with parallel-distortion, tend to apply their reaction parallel to macro body's surface, thus increasing its ability to absorb additional work (energy) perpendicular to its surface, without breaking down latticework-structures of 2D energy-fields. An external effort, acting on macro body's surface in perpendicular direction is highly effective but slower in its action.

6.2. Radiation:

'Corpuscular theory of light' was unable to satisfactorily explain all phenomena of light. Hence, it became necessary to depend on 'wave theory of light' for explanations on certain phenomena. However, wave theory could not explain some other phenomena of light, satisfactorily. Therefore, 'quantum theory of light' was adapted for the purpose. Quantum theory itself is not able to explain some of phenomena of light satisfactorily or logically. Consequently, at present there is no single theory, which logically explains all phenomena of light on same basic principles. This concept reintroduces corpuscular nature of light (radiation of matter). By differetiating between radiations of matter and energy, it is able to provide logical explanations to all phenomena of light.

Light – radiation of matter and energy – is presently assumed as of wave and particle (corpuscular) natures, separately and simultaneously. This assumption is based on the fact that light exhibits properties of both, waves and particles. There are many theories trying to explain dual nature of light. So far, not one of them provides a logical conceptual explanation for this mysterious property. Concept, given in this book, re-introduces corpuscular nature of light with few modifications and shows that all phenomena of light (radiation of matter and energy), including its dual nature, can be satisfactorily explained. Following explanations are natural development of reasoning based only on single basic assumption and only one type of postulated matter-particle, based on basic assumption, given in chapter 2.

'Radiation of energy', as is understood today, is the transfer of 'energy' through large distances without a medium of transmission. Energy is often assumed as reverted matter, which is in turn assumed as accumulation of energy. All types of radiations are generally placed under the heading 'radiation of energy'. However, this concept shows that radiation may be of two types. In one type of radiation: 3D matter-particles are transmitted through an all-encompassing universal medium by associated distortions in universal medium. Since, distortions in universal medium, associated with transmission of basic 3D matter-particles, have many (mathematical) properties in common with electromagnetic waves; they are generally included in the category of electromagnetic waves. In other type of radiation, only energy (associated with work) is transmitted in the form of electromagnetic waves in universal medium.

For both types of radiations, transfer of distortions in universal medium is a common feature and medium of transmission is universal medium, formed by 2D energy-fields in all possible spatial planes. In case of radiation of matter, distortions in universal medium are transferred from one place in space to another, along with associated basic 3D matter-particle. In case of radiation of electromagnetic waves, magnitudes of distortions in universal medium (along line of transmission) are varied about a mean value in cyclic order. Variations in magnitudes of distortions are then sensed by 3D matter-particles at a distance to create identical distortions in universal medium about them.

Universal medium composed of 2D energy-fields in all possible planes (in this concept) replace well-known and mysterious 'aether' in 'aether theories'. Universal medium fill entire space. Unlike aether, universal medium has definite constituents, structure, characteristic properties and ability to act as explained in second chapter of this book.

6.2.1. Radiation of matter:

Radiation of light (or any other similar radiation of matter) is a continuous flow of independent photons. Photons are the basic 3D matter-particles. A photon has two distinct components. It has an inert matter-core of 3D matter. Photon also has an

associated sphere of distortions (inertial-pocket) in surrounding universal medium and enclosing its matter-core. Inertial-pocket of a photon performs transmission of its matter component. Inertial-pocket stores and carries work (and associated energy) required for transmission of photon's matter component. Work-done in association with photon's matter-core is in the form of distortions in universal medium (inertial-pocket) and associated energy is the stress produced in latticework-structures of 2D energy-fields, due to presence of work.

Due to spin motion of linearly moving photon, distortions (work) in its inertial-pocket have rotary motion about its matter-core. Combined motion (of linear and rotary motions) generates wave like motion of distortions and associated energy-part of photon (with respect to line of radiation) in universal medium. Although energy-content of inertial-pocket is steady, due to combined motion of linear and rotary motions of inertial-pocket, magnitude of work (energy) appearing in any one 2D energy-field (plane along path of photon) varies in cyclic order and appear as (transverse) wave.

Distortions in photon's inertial-pocket and associated energies have wave characteristics in each plane, at same frequency, as those of photons' spin motion. With respect to an external reference, changes in magnitude of distortions about linearly moving matter-core, in any plane, appears like wave motion. Thus, a radiation of light has both, particle nature provided by matter-cores of its photons and wave nature provided by associated by spinning inertial-pocket. They support and sustain each other.

Distortions in spinning inertial-pockets of photons are generally equated to electromagnetic waves, associated with photons. An electromagnetic wave, associated with a photon, is slightly different from ordinary electromagnetic waves associated with other forms of radiations, which transmits only work (energy).

Inertial-pocket around matter-core of a photon not only moves in linear direction but it also revolves around photon's matter-core. It is this revolving action, which produces spin motion of photon's matter-core. Hence, distortions around a photon's matter-core (in each plane), simultaneously, have two types of motions. They move forward and laterally at the same time. Their lateral motion is oscillatory about line of linear motion of photon. Photon's matter-core spins about an axis perpendicular to direction of its linear motion. Thus, distortions present in inertial-pocket about a photon appear to oscillate in transverse plane, during their motion in linear direction.

Total magnitudes of distortions (work) and associated energy in an inertial-pocket do not vary. Depending on phase of a photon with respect to a reference point, energy in inertial-pocket, in each plane, about a straight line shows cyclic variations. Because of these variations, they appear similar to electromagnetic waves produced by periodical variations in magnitudes of distortion-fields. In case of electromagnetic waves, associated

with photons, there are no (real) cyclic variations in energy-content. However, rotary motion of inertial-pocket produces appearance of cyclic variations.

Total energy-content of an inertial-pocket, associated with a photon, is of constant magnitude. It depends on frequency of photon. It is the rotary motion of inertial-pocket about photon's matter-core that produces appearance of a wave, in each plane. Instantaneous energy-content in any perpendicular plane along the direction of photon's linear motion varies and depends on relative phase of photon's disc-shaped matter-core.

It is inherent nature of photons to move at a constant critical linear speed through universal medium. Associated inertial-pockets, of photons' 3D matter-cores, provide constancy of their linear speed. Critical constant linear speed of a photon is the highest speed at which universal medium can transfer distortions in latticework-structures of 2D energy-fields. 'Radiation of matter' is a flow of photons through space. Heat rays, light rays, X-rays, gamma rays and cosmic rays are different names given to radiation of matter, classified according to magnitudes of their matter-contents (frequency). Other than, for magnitudes of matter-contents of constituent photons, all these radiations are identical in all respects. They exhibit identical properties under all conditions.

Radiation of matter carries 3D matter (which has rest mass) in the form of matter-cores of photons, as well as, certain associated work (energy) – in photons' inertial-pockets. Since inertial-pockets have many properties in common with electromagnetic waves and wave nature of light is well established, henceforth in this text, name 'electromagnetic wave' is interchangeably used for inertial-pockets of photons, when considering wave nature of light. Associated electromagnetic wave of a photon is transfer of distortions in universal medium and associated matter-content of photon is carried by associated electromagnetic wave. Magnitude of 3D matter transferred by this type of radiation depends on magnitudes of matter-contents of its constituent photons.

Photons, in 3D spatial system, have enormous variations in magnitudes of their matter-contents. Theoretically their rest mass can vary from almost nil to about 4.8 grams (approximate result by calculation using present-day assumptions and units), energy equivalent of which is about 4.3×10^{14} joules. This corresponds to a frequency variation from about almost nil to about 3.3×10^{47} Hz. However, photons of very low frequencies (below 10^{10} Hz) and photons of very high frequencies (above 10^{20} Hz) are not stable and are likely to disintegrate or convert themselves to photons of more stable frequencies. Magnitude of energy, transferred by a radiation of matter, depends on rest masses of its constituent photons, which are proportional to frequencies of photons in radiation of matter.

Frequency of (majority of) photons of a radiation is 'intensity of radiation'. It is the rate of transfer of matter / energy. It signifies matter-density (and energy-density) of

radiation. This corresponds to matter-contents of constituent photons of radiation. For same rate of transfer of (number of) photons, matter-content transferred is higher for higher-frequency radiation.

Direction of spin of photons' disc-shaped matter-core with respect to a reference is 'polarity of radiation'. Directions of spin axes of photons in a radiation are always in planes perpendicular to direction of their linear motion. It can be in any direction within this plane, determined during photons' formation / reformation. Since an ordinary ray of radiation consists of millions of photons, no common polarity can be assigned to a ray of radiation. Each photon of a ray has its own polarity. Only in artificially controlled rays of radiation, where polarity of all constituent photons of radiation are similar, ray of radiation can have a common polarity.

'Phase of radiation' is related to its electromagnetic wave component. This component appears to have wave nature. Hence, all properties of electromagnetic wave also may be assigned to light. Relative angular position of a photon's matter-core, in its spin motion, with respect to an external reference is its phase.

Number of photons, flowing through a reference-cross sectional area in unit time is 'amplitude' or 'brightness of radiation'. Amplitude of radiation corresponds to total magnitude of matter-content transferred and brightness of radiation corresponds to photon-density in radiation. Amplitude of a radiation is not related directly to matter-contents of individual photons of radiation. Hence, amplitude of a radiation and its intensity are not directly related.

Amplitude of matter-content, radiated in a ray, can be increased either by increasing frequency (intensity / matter-content / color) of its constituent photons or by increasing number of photons (brightness) radiated in the ray in unit time. Therefore, amplitude of radiation and magnitude of 3D matter transferred in a radiation are different. Variation in magnitude of a radiation changes number of photons flowing in unit time and changes its brightness. Variation in amplitudes of matter-contents of photons in a radiation changes frequency of light and changes its color. Variation in amplitude of a radiation can be produced either by changing its magnitude or by changing its intensity. In both cases, the total matter-content transferred in unit time changes.

Because of its latticework-structure, a 2D energy-field simultaneously exhibits properties of (high density) solid and (ideal) fluid material. Thus, it is capable to transmit both longitudinal and transverse wave motion in 3D spatial system. However, it may be noted that distortions are transferred in latticework-structures of 2D energy-fields and such transfer can be done only in 2D spatial systems. Electromagnetic wave, associated with a photon, has an 'on the spot' or 'in the plane' existence at every point along the direction of motion of photon and in 3D space system its nature appears as transverse. Work-done in latticework-structure of 2D energy-field is carried in an oscillatory motion in

transverse directions (in 3D space system) about line of linear motion of photon. It has no continuity or independence as long as the matter-content of the photon is in existence.

Each photon is a single unit (corpuscle of 3D matter with one wavelength of associated electromagnetic wave of corresponding frequency). Associated electromagnetic wave of a photon may be assumed to have its continuity in space. It can be visualized to move along with matter-core of photon. At any instant, only one wavelength of assumed electromagnetic wave is in existence and it has only an instantaneous magnitude. Its constant displacement through space along with matter-core of photon endows it with a character of continuous wave in space. Matter-content and associated energy of each photon is concentrated in and about its matter-core. A collection of such photons moving together (in processional formations), through space, constitutes a ray of radiation of matter– light, etc.

6.2.2. Radiation of energy:

Transmission of (periodically varying magnitude of) work (energy) through space is called 'radiation of energy'. It transmits work associated with electric and magnetic phenomena. Because of its associations with electric and magnetic phenomena, it is generally called 'electromagnetic wave'. Energy is functional counterpart of work. Energy, being the stress produced in universal medium as a result of work done in it, it is always present with work. Contemporary physics ascribes higher prominence to energy than work. Therefore, we may label 'radiation of work' as 'radiation of energy'.

Region of universal medium, where varying magnitudes of distortions (work) are produced by one or more distortion-fields, remains static in space. Magnitude of distortions is varied by changing magnitude of distortion-field(s) periodically about a medium value. It is this variation in magnitudes of distortion-field(s), which creates electromagnetic wave associated with energy radiation. Only energy part of variations in distortions is transmitted, through universal medium and no transfer of 3D matter or distortion-fields takes place during radiation of energy.

Since work develops energy by stress produced in latticework-structures of 2D energy-fields, this type of radiation transfers work (energy) (or its sympathetic information) from one source to another, at a distant place in space. Radiation of energy takes place in the form of changes in magnitudes of distortions in latticework-structures of 2D energy-fields.

Creation or changes in magnitude of additional distortions is an inertial action in universal medium. Hence, radial speed of electromagnetic wave is governed by inertial delay. Transfer of variations in distortion-fields in universal medium is governed by speed limit of transfer of distortions in latticework-structures of 2D energy-fields. This limit is

the linear speed of light. Hence, electromagnetic waves transfer energy at the speed of light.

Changes in magnitudes of distortions in latticework-structures of 2D energy-fields are transferred through universal medium. Change of distortion in a latticework-square of a 2D energy-field is directly transferred to its neighbor in the direction of transmission of electromagnetic wave. Such a chain of actions transfer variations in energy-content of a deformed latticework-square (at a place in 2D energy-field) to a latticework-square in another part of same 2D energy-field.

Due to latticework-structure of 2D energy-field, distortion in one of its latticework-squares cannot be confined; distortions spread automatically to its neighbors. Spreading of distortions in latticework-squares from one part of latticework-structure to another is transfer of work. Distortions develop stress and related energy at every point in a distorted 2D energy-field. Hence, in radiation of energy, work-done on (additional displacement of) certain quanta of matter in latticework structure of a 2D energy-field are transferred to other quanta of matter in another part of same 2D energy-field and related energy is developed at any point due to distortion in 2D energy-field. Since transmission of work through space, transfers stress in 2D energy-field along with work, it can be understood as radiation of energy.

Due to inertial properties, variations in distortions, introduced into a 2D energy-field, tend to be transferred from one part of space to another without loss of (total) power. However, due to latticework-structure of 2D energy-fields, this type of transfer of work (unless it is associated with 3D matter-particles) tends to spread out in latticework-structure of 2D energy-fields, creating a wave front. Work (energy), transmitted in this way and varying periodically, is called 'electromagnetic radiation' or 'electromagnetic waves'. Distortions, set up in latticework-structure of a 2D energy-field, are perpendicular to the direction of transmission of an electromagnetic wave. (For details see section 14.11).

In order to distinguish between two types of radiation, hereafter in this book, term 'radiation' is primarily used to denote radiation of matter in the form of photons, with associated energy (work in the form of distortions in their inertial-pockets) and term 'electromagnetic wave' is used to denote radiation of energy (work in the form of distortions) in universal medium. Electromagnetic waves are no associated with 3D matter during their radiation. Energy is also transmitted from one point (3D matter-body) to another point (3D matter-body) directly by inertial efforts. Since inertial actions are always associated with macro bodies, there are some differences in the behavior of their transmission due to structure of macro bodies. (Refer section 5.3). In this chapter, radiations of matter in the form of photons with their associated inertial-pockets are discussed.

6.3. Velocity of radiation:

(Velocity or) speed is relation between displacement and time. Distance being departure between two points in universal medium, is a real entity. Time, being a functional entity, has no positive existence. Consequently, speed is a relation between a real entity and a functional entity. Hence, speed is a functional entity, representing a mathematical relation. Functional entities satisfy functions assigned to them. Therefore, values of time and speed may be varied, as we please, to suit their relationship with distance.

Distance is the only real entity; we have, to base all other measurement systems. To make this suitable to produce a scale, speed of light is assumed as a universal constant (with certain reservations) with status of real entity. Distance and speed of light, becoming real entities, their relation (time), keeps constant relations with them. For this relation, to be universally true, a change in either distance or speed of light should be accompanied with a corresponding change in the other. Usually, this factor is overlooked.

Scale of distance measurement, as related to earth's surface is considered invariable. With this attitude, speed of light determined for different regions of space appear different. Differences, in speed of light noticed with respect to different regions of space, are then (illogically) assigned to either a change in speed of light or to a change in scale of time. In reality, as explained in section 2.3.3, a change in speed of light also changes scale of distance measurement. Relation between them is unique for each region of space. If these facts are accepted, many paradoxes, related to light, will disappear.

Unless mentioned, in following sections, only linear motions of photons are considered for explanations. Radiation (of matter) is flow of photons. Therefore, linear speed of photon is linear speed of radiation. Linear speed of a photon is always with respect to surrounding universal medium. Absolute linear speed of a radiation is with respect to universal medium in free space.

In free space, universal medium is devoid of all disturbances or 3D matter-bodies (other than the one photon whose linear speed is considered), producing strain in it. In such a region, a photon, by its inherent nature, maintains a constant critical linear speed and velocity (In case of photons, speed and velocity are slightly different. This will be explained in next section). To maintain its serenity, it is essential for universal medium to move photons at this maximum possible linear speed through it. In addition, the very existence of photons depends on their movements at critical speeds. Absolute linear speed of a photon is absolute (linear) speed and absolute velocity of radiation.

Absolute linear speed or velocity of radiation or electromagnetic wave in free space is with respect to homogeneous and isotropic universal medium. Universal medium in any region of space can be under influence of distortions, induced by presence of 3D matter-

bodies in and about it. Presence of 3D matter-bodies set up strain in latticework-structures of 2D energy-fields and thereby, varies distortion-density of universal medium in that region of space. Linear speed of radiation, determined in distorted region of space (this corresponds to gravitational-fields in present-day theories), is valid only for that region of space and in relation to the distorted region of universal medium in that region.

Magnitude of photon's linear speed, with respect to distorted region of universal medium, when related to region of universal medium outside this region may differ in magnitude. However, in either case, linear speed of photon with respect to (constituent quanta of matter in latticework-squares of) 2D energy-fields does not change. Considering time as non-variable entity, magnitude of displacement of photon in unit time, in this region of space with respect to an outside reference point, differs from magnitude of its displacement in free space in unit time.

Linear motion of photon results in its displacement in space, which is tangible. Absolute linear speed of a photon being a critical constant and displacement of photon in space is tangible; they are related by a functional entity 'time' (See section 17.1). If nature of universal medium in any region of the space, where a photon moves, is different from nature of universal medium in free space, relation between linear speed and displacement of a photon also differs. If we ignore changes in nature of universal medium (producing changes in scale of distance), in order to account for difference in magnitude of displacements, either linear speed of photon or unit of time has to be considered as variable. (We do not recognize universal medium, yet). This is our current understanding.

Without an ideal universal medium (at present), we are unable to account for necessity to consider either linear speed of photon or unit of time as variable. In order to overcome this difficulty and since we prefer to keep (only on faith) value of linear speed of radiation (photon) as an absolute constant, in most cases, unit of time is considered as variable. How or why this is done, has no satisfactory explanation yet. This is how we came to consider that time moves at different speeds at different parts of universe and under different conditions in space. In view of the fact that time is neither (directly) tangible nor it is an absolute measurement (time is only a relation), this has no meaning. Time cannot dilate, contract, move at different speeds or reverse. It has no direction. It is purely a scalar and functional quantity. Variation of (unit of) time indicates certain variations in structure of universal medium in a region of space, where a radiation is taking place.

In some other cases, we do consider linear speed of radiation as variable. This is when we are considering radiation through a transparent medium. We do this, because, the medium through which radiation passes is normally smaller, compared to the region of space where observer lives and operates and in relation to which our standard of time is set. We are not interested to change our standard of time every time we come across a

radiation being transmitted through a transparent medium. It is more convenient for us to shift variability to linear speed of radiation from unit of time. Generally stating, we consider unit of time as variable, when we are within the same region of space where radiation is taking place and we consider linear speed of radiation as variable, when we are outside the region of space, where radiation is taking place. This is merely a convenience, not science!

6.4. Light:

Term 'light', in this section, includes all radiations of 3D matter in the form of photons. 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, an entity has to be a physical object. Light has both, objective reality and positive existence in space. Therefore, light is a physical object.

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. [Foundational assumption of this concept]. 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 3D matter. Light, being constituted by 3D matter, has to have all associated physical attributes (mass, inertia, quantity, structure, size, shape, etc) of 3D 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 entire space. An entity that fills entire space outside light is 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 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 and combination 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 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. Matter-cores of photons (of light) made of 3D matter can provide light with its corpuscular nature. At the same time, moving-mechanism of corpuscles of light by the universal medium that has cyclic variations (in any plane about corpuscle) can provide light with characteristics of electromagnetic wave. These two characters, together, can provide light (or similar radiations) with its dual nature.

A 3D disturbance (matter-particle), maintained as an integrated matter-body, is matter-core of a photon. A photon is the smallest 3D matter-particle. Particle nature of light – matter component of photon in the form of its matter-core – cannot exist without its associated inertial-pocket. Both natures of light, particle nature and cyclically varying distortions (in each 2D energy-field about a photon), exist together and simultaneously with every photon, flowing in a light beam. Such a flow of photons is radiation of light (or radiation of matter).

Depending on, which feature of light is considered, either of these properties show up during an experiment with light and other property is neglected. So far, only apparent wave nature of light is widely recognized (generally, its corpuscle nature is ignored other than for few phenomena). All contemporary theories are formulated to suit wave-property of light. This is why inconsistencies prop up during logical consideration of these theories.

Light has dual nature and there is no paradox about it. Both, particle nature and wave nature of light coexist. This will become clear only when structure of photon is recognized as envisaged in this concept. Presence of 3D matter-cores in association with spinning inertial-pockets, moving linearly at constant linear speed, bestows light (radiation) with its dual nature. Each of these natures is the result of a separate component of light. Light cannot exist without both these natures being present simultaneously, in its constituent photons.

6.4.1. Speed of light:

Light is constituted by 3D matter-particles. 3D matter is inert. It has no ability to move or act on its own. Light is observed to have linear motion in space. Therefore, light 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. Only a real entity, universal medium made of matter, can act on light and produce its linear motion.

Linear speed of light is observed to have 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 observer or source-body. Therefore, universal medium should be the agency that moves light and motion of light should always be in relation to and through universal medium. Universal medium should not only move light but it should also stabilise any variation in it 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. Linear speed of radiation and velocity of electromagnetic waves (with respect to universal medium) have slightly different meanings.

Photon has a 3D matter-core as its physical structure. Its matter-core is surrounded by universal medium. Distortions, in universal medium, move matter-core of photon at highest possible linear speed. Highest possible linear speed is limited due to inability of quanta of matter in latticework-structures of 2D energy-fields to move faster (without breaking down latticework-structure). Speed, at which quanta of matter in latticework-structures can move, is limited by ability of quanta of matter at junction-points to hold onto each other.

If quanta of matter in latticework-structure of a 2D energy-field are compelled to move faster, its latticework-structure would break down. As a result, movement of photon's matter-core becomes impossible and photon will disintegrate. Hence, this is the highest possible linear speed at which a 3D matter-body can be moved or an electromagnetic wave can be transmitted in universal medium. No real entity can move at speeds higher than this linear speed and yet remain stable. Speeds of macro bodies are limited to still lower limit due to other considerations. (See section 9.5).

Inertial actions of universal medium sustain highest linear speeds of photons, by carrying photons' matter-cores in their inertial-pockets. It was seen in section 4.9 that production of photon's motions and maintenance of its linear speed at critical constant level are inertial actions of universal medium. Distortion-field about a photon (its inertial-pocket) moves at a critical constant linear speed (which has a highest value), in a straight line. Photon's matter-core is carried inside inertial-pocket. Therefore, it is the distortions in latticework-structures of 2D energy-fields, which are transferred at this highest constant linear speed. Cause of distortions in inertial pocket –photon's matter-core – is carried along with distortions.

Linear speed of radiation indicates relative displacement of matter-cores of its photons with respect to universal medium. Universal medium is everywhere and in all directions. Hence, direction of motion of light does not matter in anyway to determine

photon's linear speed with respect to universal medium. To remain stable (by its matter-content), photons in a light beam need only to keep their linear speed at critical constant level with respect to universal medium. Light could be transmitted in any direction or change directions during its transmission.

Absolute linear speed of a photon (with respect to absolute reference – universal medium) is a universal constant. Its value is the same as linear speed of a photon in free space, where universal medium is devoid of all other disturbances, other than the single photon under consideration. Such a condition is difficult to achieve, particularly because of presence of electromagnetic fields, which have their continuity in space. A region of space without presence of electromagnetic field is very rare.

Constancy of linear speed of a photon is related to ability of quanta of matter in latticework-structures of 2D energy-fields to move. In other words, constant critical linear speed of a photon depends on nature of universal medium. Linear speed of light, determined in one region of the space is valid for other regions of space also, provided, state of universal medium is identical or where corresponding change in scale of distance is accepted. Since states of universal medium vary from region to region and corresponding changes in scale of distance are not accepted, linear speed of radiation is unique to every region of space. Critical constant linear speed of light may be different in different regions of universal medium.

Looking at light, from an external reference point, a constituent photon needs to move slower in denser universal medium and a photon needs to move faster in rarer universal medium to maintain its linear speed a constant, with respect to latticework-structures of 2D energy-fields in universal medium. Direction of motion of the photon does not matter. It is the number of (latticework-squares of) quanta of matter traversed by photon (its matter-core) in unit time, which determine its linear speed. Hence, the term 'speed' is more appropriate to matter-core of photon. Since universal medium is (almost) homogeneous in every direction, photon's linear motion in any direction is identical. Motion of matter-core of a photon, to maintain its stability, is not related to direction of motion. Stability of photon's matter-core is related only to magnitude of displacement in terms of latticework-squares of 2D energy-fields, traversed in unit time. It could be in any direction within universal medium but at right magnitude.

Distortion-field (inertial-pocket) of a photon moves through universal medium due to its inertia. It has no independent existence. Displacement of an inertial-pocket is motion of distortions in a part of universal medium. Distortions are set up in latticework-structures of universal medium and are transferred through them. Constituent 2D energy-fields of universal medium, themselves, do not move. Distortions in each plane are separate and. they have to follow definite paths as provided by structure of universal medium. Inertial-pocket of a photon has to remain always in association with its matter-

core, as well. Matter-core of photon is held as a single unit by gravitational pressure from universal medium. Matter-core of photon cannot spread out. Therefore, inertial-pocket of a photon (in its stable state) and its matter-core move in synchronism as a single composite unit. Unless influenced by external efforts, directions of their motions are in straight lines.

Therefore, (apparent) electromagnetic wave component in conjunction with a photon always tents to move in a straight line. Combination of 3D matter-core and inertial-pocket gives radiation, its sense of direction. Hence, the term 'velocity' is more appropriate to photon as a whole body – its matter-core with associated inertial-pocket. Rate of displacement of a matter-field along with its associated 3D matter-body is an object's 'velocity'.

With respect to standard of distance, determined in a region of universal medium, linear speed of light varies in inverse proportion to distortion-density of universal medium in the region, where light is being transmitted. Omni-directional distortions in a 2D energy-field make its latticework-squares smaller. Region of universal medium appears compressed. This increases matter-density of universal medium in the plane of corresponding 2D energy-field. We can say that distortion-density of universal medium has increased.

If (omni-directional) distortion-density in (a bock of) universal medium could reach highest possible matter-density, a photon in it could be standing still with respect to its surroundings. This condition develops only within basic 3D matter-particles, whose matter-density is equal to photon's matter-density. Theoretically, within such a 3D matter-body, a photon is unable to move.

6.4.2. Velocity of electromagnetic wave:

Electromagnetic waves are periodically reversing (or varying) development of angular distortions in latticework-structures of 2D energy-fields in universal medium, about a mean magnitude. In nature, electromagnetic actions are produced by unstable photons, moving in circular paths to form 3D primary matter-particles (in fundamental 3D matter-particles of atoms). Development of electromagnetic field and variations in magnitude during its development are inertial actions. They are subjected to inertial delay.

Changes in magnitude of electromagnetic fields about 3D primary matter-particles require development of additional distortions in latticework-structures of surrounding 2D energy-fields. As magnitude of resultant angular distortions in latticework-structures about 3D primary matter-particles increases, space occupied by angular distortion-field about composite 3D matter-particle increases in size. Enlargement of angular distortion-field's size increases its effective distance from source-element, producing angular distortion-field. Extension of effective distance of angular distortion-field is understood as

transmission of electromagnetic energy or wave from source-body to a receiving element in space.

No new electromagnetic fields are ever set up, unless new 3D primary matter-particles are formed. Electromagnetic field about a primary matter-particle is developed during its formation. Magnitude or direction of an angular distortion-field (we may call it as resultant electromagnetic field) may be varied by combining more than one electromagnetic field, as required. Development of additional angular distortions in latticework-structures of 2D energy-fields, required to modify strength or direction of an existing resultant electromagnetic field, causes apparent motion or transmission of an electromagnetic wave. Magnitude of additional angular distortions, added or removed periodically, in a resultant electromagnetic field, determines magnitude and direction of an electromagnetic wave.

Transfer of development of additional angular distortions takes place at linear speed of light. Hence, speed of electromagnetic (waves) radiation in universal medium corresponds to linear speed of light. Linear speed of electromagnetic wave has no direct link with linear speed of light. They are equal due to the fact that linear speeds of light and electromagnetic wave are determined by ability of quanta of matter in latticework-structures of universal medium to move. In both cases, linear speeds are highest that universal medium can provide. Changes in nature of universal medium or matter-fields of different distortion-densities, forming transparent media, affect linear speed of electromagnetic waves of different frequencies identically.

Inertial-pocket of a photon and electromagnetic waves radiate distortions in latticework-structures of 2D energy-fields in universal medium. Inertial-pockets of photons transfer distortions by their translational motion. Electromagnetic waves transfer angular distortions by consecutive changes in magnitude of resultant electromagnetic field, starting from source-body.

When actions of distortions in inertial-pocket of a photon, in a plane, are compared with an electromagnetic wave, most properties appear common to both. Hence, inertial-pocket about a photon, separately in each plane, also may be regarded as an electromagnetic wave. This will help mathematical analysis. Thus, for certain purposes, a photon may be considered as a 3D matter-particle accompanied by its associated electromagnetic wave. Energy part of photon is made up of stress produced due to distortions (work) in latticework-structure of its inertial-pocket (separate electromagnetic wave in each plane), acting against inherent restoring efforts in universal medium.

Since there is no mass or matter-content, associated with an electromagnetic wave (except during its production), its linear velocity cannot vary from critical constant value of speed of light at any time. Combination of electromagnetic waves in opposite directions may reduce magnitude of resultant and combination of electromagnetic waves

in same direction may increase magnitude of resultant electromagnetic wave. Nevertheless, its linear velocity remains constant. Linear velocity of an electromagnetic wave is a critical maximum with respect to universal medium, through which it is transmitted. Changing nature of universal medium in a region of space varies linear velocity of electromagnetic radiation through that region.

Paths of independent electromagnetic waves (those, which are not linked with 3D matter-particles), transmitted through universal medium, are wave fronts. Due to lack of matter-content in transmission, variations in angular distortions in latticework-structures of universal medium spread out radially outwards in all directions (as per natural tendency of distribution of distortions in a self-stabilizing latticework-structure). Electromagnetic fields and nuclear fields are also transmitted in this fashion, under certain conditions (as explained later).

6.5. Relative velocity of radiation:

Velocity of a photon is with respect to surrounding universal medium. It is determined for a region in space and is normally valid only for that region of space. This is because; standard of time set for a region in space is unique and valid only for that region. Velocity of radiation, determined in this way, depending on unit of time set up for a region in the space, is 'relative velocity of radiation' in that region of space.

Relative velocity of radiation for our region of space in universe is experimentally determined as 2.998×10^8 meters in one second. This value is true and valid only for the region of space near and about the planet earth, in its present state. Therefore, if we are considering relative velocity of radiation in some far out place, in space, its value may be different. Should nature of universal medium in the region of earth change, relative velocity of radiation also will change, unless scale of distance measurement is modified, accordingly.

Since radiations of 3D matter and energy, basically, depend on inertial properties of universal medium, they obey all inertial laws. Thus, all radiations of 3D matter and energy have their relative velocities with respect to a moving observer (who can move independently of surrounding universal medium), when traveling in different directions. Magnitude of these relative velocities depends on velocity of observer. Since no observer is free to move independent of universal medium surrounding him, this is only a hypothetical case. Human beings or any other macro bodies (instruments) will not be able to visualize differences in relative velocities of light in different directions with respect to a moving observer.

When relative velocity of a photon is checked with respect to observers moving in different directions, no difference is noticed. This is due to fact that absolute velocity of observer is very negligible compared to absolute velocity of a photon. Consequently, even

if observer is moving at reasonably high linear speed in any direction, he will not be able to notice difference in linear velocities of radiations in different directions.

A large macro body has numerous unstable photons (in 3D primary matter-particles) moving in various directions, which produce distortions in its matter-field. As a whole, inherent distortions in a large macro body's matter-field have no particular resultant direction. However, due to distortions in various directions, distortion-density in its surroundings increases.

An observer is a large macro body. A static observer and his surroundings are within matter-field of macro body, where observer is situated. Observer is static only when considered in relative reference frame with respect to macro body, where observer is situated, 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 surrounding latticework-structures of universal medium and depends only on distortion-density of matter-field of that 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 light, with respect to matter-field of the region, is a critical constant. This is essential for integrity and stability of its photons.

If observer (experimental laboratory) and matter-field about him develops linear motion with respect to matter-field of macro body, where observer is situated, 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 and he has no separate matter-field of his own, he will be moving at same (critical constant) speed as other photons in surrounding 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 can see other photons in relation to himself. Each of other photons will appear to move at linear speeds relative to his linear motion. A photon moving in opposite direction will appear to observer, as moving at double the critical linear speed and a photon moving in his own direction of linear motion 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 with observer's own state of motion.

Entire space is filled with 2D energy-fields (universal medium). There is no empty space. Air or other 3D 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 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.

Linear motion of light is with respect to universal medium, which is static in space. Number of latticework-squares in latticework-structures of 2D energy-fields, traversed by

a constituent photon of light beam, in (absolute) unit time, is a constant. If any part of universal medium in a region of space is distorted, number of latticework-squares traversed by a photon (in unit distance), in any direction, in a distorted region of universal medium is greater than number of latticework-squares traversed by it in (absolute) unit distance in un-distorted region of universal medium.

Hence, distance moved by a photon in distorted region of universal medium (in a denser matter-field) compared to un-distorted region in universal medium, in unit time, is lesser. Absolute speed of light, in any region of space, depends on distortion-density of in that region (matter-field). Therefore, absolute linear speed of light may be variable from region to region in space. Matter-field near very large macro bodies is denser in distortions than matter-fields near smaller macro bodies.

Absolute speed of light appears slower near very large 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. Due to circular logic (by which we define time); unit of time within matter-field of a macro body also depends on distortion-density of universal medium in 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 un-distorted region of universal medium.

Although unit of time and linear speed of light are constants 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 mass is not equal to mass of earth) should not be compared with linear speed of light on or near surface of earth, using units of distance and time, determined on or near the surface of earth.

Photon is radiated at its absolute linear speed in regions of space, far away from any other macro bodies, where surrounding universal medium is free of any distortions in its latticework-structures, other than those are required to maintain photon in consideration, in its stable state. In all other regions of space, linear speed of a photon is determined with respect to distorted universal medium in that region. For constant magnitude of distortions in latticework-structures of universal medium, linear speed of a photon (light) and unit of time in it are constants.

Photons (light) radiating in any region of space 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 very large macro body, moving with and is a part of the surrounding matter-field, 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 denial of relative motion of light and 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 from a 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. This misleading result is a consequence of ignorance of mechanism of motion of light.

If an observer places himself outside the region of a matter-field, where 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 (optically) denser refractive media. We have no hesitation to accept this fact. All refractive media usually have denser matter-field compared to air near surface of earth. Observer, being outside the region of denser matter-field, where light is being radiated (inside refractive medium) and measuring linear speed of light by using 'distance-measurements' determined for his own region of space (air), correctly finds that light has slowed down. He does not take differences in natures of media, where light is being transmitted, into account.

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 assumed constancy of linear speed of light. Instead, we prefer to mysteriously dilate functional entity of 'time'. However, no questions are raised how a functional entity with no structure or form can dilate or contract. General (unscientific) rule followed at present is that: in denser optical media, light slows down and in rarer optical media, 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 surface of a large macro body), relative linear speed of a small free 3D matter-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 speed of smaller bodies, moving near earth's surface, depends on magnitude of 'force' acting on (or energy stored in) it.

In relative reference frame, we do not consider linear motion transferred to smaller macro body by earth's motion. In case of photons, external effort propelling a photon 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. A change in magnitude of distortion-density 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 massive macro body, its critical linear speed (and unit of time) is lowered due to higher distortion-density of matter-field in the region. More massive a macro body is, lower is critical constant linear speed of light, in that region of 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 a critical constant linear speed with respect universal medium, around it. Number of latticework-squares of 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 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 will be same critical constant value.

Should 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 floating 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 relative linear speeds of floating bodies are 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 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].

Velocity of radiation in any direction appears as a critical constant to us, irrespective to our motion. We, the observers are moving along with earth, solar system, galaxy, etc. Our motion is along with earth's matter-field, which surrounds us. Earth is moving through universal medium. On a large scale, universal medium is steady. Yet, distortions formed in it due to earth (earth's matter-field) move along with earth. As earth moves in

its path, additional distortions in universal medium in and about earth are continuously transferred through universal medium. This is as good as certain component of universal medium is carried along with the earth.

For a photon, traveling through this moving matter-field, effect is same as universal medium, where photon is traveling, are moving at absolute velocity of earth. For an observer on surface of earth and moving along with earth, motion of earth's matter-field has no relative motion with respect to him. Hence, velocity of radiation in any direction appears to observer as a critical constant. Motion of universal medium in a region should be understood in terms of matter-field under inertial motion.

For photons themselves, within any region of universal medium, their mutual relative velocity varies (depending on their relative direction) according to ordinary physical laws. We, as observers, cannot see relative velocity of light because of our large-sized body. Therefore, we assume that light has no relative velocity (difference), with respect to us as moving observers in different directions. This is only because of our inability to observe such variations in 'relative velocity' of light.

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 experiment' are not satisfactorily explained. In figure 6.16, AB and CD are two arms of a U-shaped glass tube. A transparent fluid is pumped through glass tube, entering at C and leaving at A. Direction of flow of liquid is shown by parallel arrows in bold lines. Parts of a light ray are allowed to pass through both arms in same direction as shown by arrows in dashed lines.
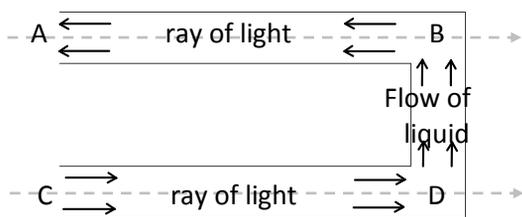

Figure 6.16

Fluid columns in tubes move corresponding to inertial motions, provided by additional distortions in its matter-field. Fluid enters at end C of glass tube and leaves at its end A. Additional distortions in latticework-structures of its matter-field, corresponding to motion of liquid in arm CD moves from C to D. Fluid is carried from C to D. Additional distortions in latticework-structures of its matter-field, corresponding to motion of liquid, in arm AB moves from B to A. Fluid is carried from B to A.

Split a light beam into two and transmit each part of light beam, as shown by arrows in dotted lines, through arms of tube in same direction, from A to B in the arm AB and from C to D in the arm CD. Part of light beam in arm AB is radiated in opposite direction to transfer of distortions in matter-field of flowing fluid. Critical speed of light beam is with

respect to these moving distortions. While, light in arm AB, moves at its critical constant speed with respect to matter-field of fluid in the arm AB, to an observer outside (glass tube), speed of light beam appears to have slowed down by a value equal to the speed of flow of fluid.

Part of light beam in arm CD is radiated in same direction as transfer of additional distortions in matter-field of flowing fluid. Critical speed of light beam is with respect to moving additional distortions. While, light in arm CD, moves at its critical constant speed with respect to matter-field of fluid in the arm CD, to an observer outside (glass tube), linear speed of light beam appears to have increased by a value equal to linear speed of flow of fluid.

Part of light beam in arm AB is radiated in opposite direction to transfer of additional distortions in matter-field of flowing fluid. Critical speed of light beam is with respect to moving additional distortions. While, light in arm AB, moves at its critical constant speed with respect to matter-field of fluid in the arm AB, to an observer outside (glass tube), linear speed of light beam appears to have reduced by a value equal to linear speed of flow of fluid.

Although, linear speeds of light in both arms of glass tube in above given example corresponds to its critical constant linear speeds with respect to matter-fields through which they are transmitted, to an observer outside glass tube, linear speeds of light-beams in both arms appears to have changed. In contemporary context, with linear speed of light assumed as critical constant, this could be interpreted as time has dilated in arm AB of glass tube and time has contracted in arm CD of glass tube. This is unscientific thought.

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

Critical linear speed of a photon, explained above, is with respect to universal medium of uniform distortion-density. Should there be a gradient in the distortion-density of universal medium, in the direction of photon's linear motion, inertial-pocket of photon continuously interact with latticework-structures of 2D energy-fields to stabilize photon's speed to its critical value. If photon is moving towards region of lower distortion-density, to an outside observer, linear speed of light would appear to increase. If photon is moving towards region of higher distortion-density, to an outside observer, linear speed of light would appear to reduce.

Consider a photon that is moving through a region of universal medium with a gradient in its distortion-density, in a direction perpendicular to direction of photon's linear motion. (For the time being, we are neglecting spin motion of photon's matter-

core). As matter-core of photon moves through distorted universal medium, one side of matter-core moves through higher distortion-density region and other side of matter-core moves through lower distortion-density region.

Matter-core of photon experiences different magnitudes of ejection efforts at different points on its rear surface and different magnitudes resistances at different points on its forward surface. A point, corresponding to higher resistance from the front, experiences lesser resultant ejection effort. Similarly, a point, corresponding to lower resistance from front, experiences higher resultant ejection effort.

Part of photon's matter-core in a region of lower distortion-density tends to move faster compared to part of photon's matter-core in a region of higher distortion-density in universal medium. Different displacements of different parts of photon's matter-core tend to deflect photon's path towards the region of higher distortion-density in universal medium. This phenomenon gives rise to the phenomena of reflection and refraction of radiation (light).

6.5.1. Velocity of radiation in medium:

Velocity of radiation in free space is an absolute constant and may be considered as certain number of latticework-squares of 2D energy-field, traversed by radiation in unit time. Conversely, a unit of time may be considered as the interval during which radiation travels certain fixed distance, defined by number of latticework-squares in latticework-structures of universal medium

Consider a ray of radiation, passing through a region of space, where latticework-squares in universal medium are distorted or compressed. Only an observer outside this region of space can make this observation. There are more quanta of matter or more latticework-squares (in each plane) of 2D energy-fields (in terms of distance scale, set outside this region and used by observer, latticework-squares are smaller, compared to latticework-squares about the observer) per unit distance along the direction of radiation. In this region of space, in the direction considered, universal medium has higher distortion-density – like within matter-fields of 3D matter-bodies or near very large macro bodies, to where its matter-field extends. Although velocity of radiation, passing through this space, maintains its critical constant value with respect to universal medium within this region, to an outside observer using his scale of distance, velocity of radiation within this region of universal medium appears different.

In a region of space, where universal medium has higher distortion-density, 2D energy-fields (in each plane) have more latticework-squares per unit space (length of space considered at the scale of observer), in the direction considered. If a photon travels at the same velocity as in free space with respect to an outside observer's distance scale, it will be traversing more latticework-squares of 2D energy-fields in unit time. When a

photon enters region of universal medium with higher distortion-density, external pressure on its matter-core from front becomes higher to correspond with higher distortion-density in universal medium. In order to balance internal and external pressures, photon's matter-core slows down to a velocity appropriate to distortion-density of universal medium in the neighborhood.

With respect to this region of universal medium, photon's velocity remains at its critical level. To an outside observer, using a distance scale not appropriate for the region of radiation, there appears to be a reduction in photon's velocity. This is due to the observer's inability to observe change in distortion-density of universal medium. Actually, photon has only adjusted its linear speed so that it traverses through same number of latticework-squares of 2D energy-fields in unit time. Reason for this apparent reduction of photon's velocity is a change in the nature of universal medium, in that region. Observer, being outside the medium (region of space) and uses a distance scale appropriate to his region of space, considers that velocity of radiation has changed in a (transparent) medium. During such variations in the velocity of a photon, internal pressure of matter-core does not change and hence there is no effect on its matter-content.

Variation of velocity, as explained in the above section, is mentioned in relation to a photon or a radiation of matter. Actually (photon's matter-core cannot move on its own), it is its inertial-pocket (carrying photon's matter-core) that changes photon's velocity. Because of additional distortions, already present in universal medium with higher distortion-density, inertial effects of photon's inertial pocket introduce fewer additional distortions in new surroundings. Hence, velocity of inertial-pocket is reduced correspondingly. This, in turn, brings about a reduction in linear speed of photon's matter-core. All interactions attributed to photons, in these sections, should be understood in similar terms.

Universal medium in free space, in its stable state, has least (or nil) distortion-density and it cannot get rarer and yet remain homogeneous. It means that there is no optical medium, which has less distortion-density than universal medium in free space, in any direction. Therefore, radiation of matter (light) can never exceed its absolute velocity in free space and remain stable.

Reduction in velocity of radiation in a transparent medium, apparent to an outside observer, depends on distortion-density of its matter-field in the direction of transmission of radiation. Distortion-density of matter-field is a characteristic nature of body-material of transparent medium. Matter-field interacts with all photons, moving in same relative direction, identically under all conditions. With respect to its linear speed, every photon that enters space of a transparent medium is affected identically, irrespective of its rest mass or other parameters. As a result, frequency of radiation has no effect on reduction in relative velocity of radiation in a transparent medium. Currently, in order to explain

phenomenon of refraction, it is wrongly assumed that velocity reduction of a radiation in a transparent medium is proportional to frequency of radiation.

As distortion-density of universal medium in the direction of a radiation increases, relative velocity (with respect to an outside observer) of radiation decreases. This is the reason why light rays appear (to an observer situated outside) to be moving slower in a transparent medium or near very large macro body with matter-field of very high distortion-density. In a region of universal medium with very high distortion-density, in the direction of radiation, photons in a light ray appears (to an outside observer) to move very slowly – even by conventional standards – may be few kilometers per second. However, velocity of a radiation cannot be reduced to such extent as to reduce internal pressure of photon's matter-core. Relative velocity is one of the factors governing internal pressure of photon's matter-core. Hence, a photon can never be in a state of rest with respect to universal medium.

If an observer is placed within a transparent medium or in a region of universal medium with higher distortion-density, all interactions between 3D matter-bodies around observer take place in relation to reduced relative velocity of radiation (with respect to external reference point). Hence, observer does not notice any difference in velocity of radiation, in his neighborhood. As he is within the region of universal medium with higher distortion-density, his scale of distance is automatically changed appropriately. Another observer, viewing from an external reference point, may say that as far as observer within the region of universal medium with higher distortion-density is concerned, time moves slowly. Observer can make this judgment only as long as he himself is outside the region of universal medium with higher distortion-density.

At saturated matter-density (same as that of quanta of matter) in 3D space system, like within a photon's matter-core, velocity of radiation is zero. That is, radiation of matter or energy cannot pass through an object of matter-density of a quantum of matter. There are no such 3D matter-bodies, larger than photons' matter-cores.

6.6. Properties of radiation:

Because of many similarities between radiation of matter (heat, light, etc.) and radiation of energy (electromagnetic waves and other field efforts), it is wrongly assumed that all radiations are in the form of electromagnetic waves. Since electromagnetic waves are already thoroughly studied and all phenomena about them are well explained by contemporary theories, only a few passing remarks are made about them, in this text. Mainly, points of difference between radiation of matter and radiation of energy are highlighted. These differences, give simpler explanations to many phenomena in the behavior of radiations of matter (light). Radiation of matter is transmission of 3D matter

along with its associated energy (work). Radiation of energy or electromagnetic radiation is development and transfer of work, only.

Radiation of matter is in the form of flow of photons. It has both matter-content and energy (work, in inertial-pockets) associated with photons. Since photons have rest masses, they obey all inertial laws. Each photon has its 3D matter-core (rest mass) and an inertial-pocket (matter-field) associated with it. Inertial-pocket stores and carries work (energy) associated with photon's matter-core. Inertial-pocket of a photon moves at the velocity of light and appears like an electromagnetic wave, in any plane passing through it. 3D matter-core of photon is carried along with its inertial-pocket at same linear speed. They strive to be in synchronism with each other.

Since, energy is the only component of radiation of matter that can do work (in fact, energy is equivalent to work), at present, most attention is given to this component of radiation of matter. Even existence or difference between matter-component and energy-component of radiation is not recognized yet. For these reasons, matter-component of radiation is often confused with its energy-component and both parts of radiation are assumed to be the same and generally looked upon as electromagnetic waves. This is the reason for confused state of nature of light, as particle (of matter) in some cases and as waves in some other cases. When differences between matter-part and energy-part of radiation are recognized, it would provide simpler answers to many phenomena, which appear as puzzling now. Properties of radiation explained in following sections are with respect to radiation of matter only. Radiation of matter has matter-components as well as associated electromagnetic waves, in each plane.

Radiation of matter is classified according to matter-content – frequency – of its constituent photons into 'heat rays', 'light rays', 'X rays', 'gamma rays' and 'cosmic rays'. In following sections, light is taken as a representative of radiation of matter. Radiation itself is represented by probable cross-section of 3D matter-core of a single photon in its median disc plane. Latticework-structure of a 2D energy-field in the plane of photon's cross-section represents matter-field of a macro body. Distortions in latticework-structure, in only one latticework-structure of a 2D energy-field in the plane of paper, are considered for explanations. 3D matter-core of photon is assumed as analogous to a 'balloon' filled with fluid of high-density matter and its inertial-pocket is likened to a fluid body whose density depends on nature of macro body's material.

Although bold lines are used in figures to show borders of matter-fields, distortions in matter-field, actually, become less dense, away from surface of macro body until all distortions due to macro body (its 3D matter-particles) in universal medium gradually vanish, at a distance from its surface, where peculiarity of macro body's material (projected in its matter-field) fades out.

Even in their 3D state, quanta of matter (within matter-core of photon) preserve their individuality. Constituent quanta of matter of photon's matter-core are held together by gravitational pressure from universal medium, acting on matter-core, from all around. Gravitational pressure on photon's matter-core works as a sac, in which great many individual quanta of matter (in their 3D states) are held together. Quanta of matter of photon's matter-core have no affinity to each other, other than feeble attraction due to self-adhesion of matter-contents between quanta of matter in direct contact. Therefore, together they behave like number of pebbles held inside a rubber balloon. This gives matter-core of a photon, nature of fluid within a stretchable balloon.

6.7. Reflection of light:

Atoms, which constitute larger macro bodies, are (at present) assumed spherical in shape. Most flat or smoothest surface of a macro body has to be made by arranging these spherical atoms in a plane or as a layer on macro body's surface. Even then (considering from scale of photons being corpuscles of matter, or light being electromagnetic wave) this surface is made up of dimples and humps (bulges and dents). Surface of a macro body cannot be made any smoother than this.

A beam of light, falling on this uneven surface, cannot be reflected as a coherent ray. Consequently, any explanation on reflection of light from surface of a macro body, (light being considered as particles or waves) based on smoothness of a reflecting surface cannot be very correct. Such an explanation can be correct only on condition that a particle of light is very much larger than atoms, which form macro body's smooth surface. None of present theories is sure about this.

When a reflecting surface is flat enough and macro body is very thin (only one or few atoms thick), light easily passes through the macro body. Therefore, very thin macro bodies of any material are unable to reflect light. Instead, light is transmitted through very thin macro bodies. Most part of incident light passes through a very thin macro body as if macro body does not exist or with slight variations in its parameters. This further strengthens above point that phenomenon of 'reflection of light' is not based on smoothness of macro body's reflecting surface.

In order to account for phenomenon of reflection of light, from physical point of view, it is necessary that a reflecting macro body posses a smooth surface. Since constituent atoms on macro body's surface cannot provide a smooth surface by themselves (due to their non-flat nature), a smooth surface has to be provided just outside these atoms, on or near the surface of reflecting macro body. Within borders of a macro body, incident photons of a light beam may come under influence of other moving 3D matter-particles, which are constituents of macro body and direction of reflected light may be greatly altered.

However, extension of macro body's matter-field, outside its borders, has no 3D matter-particles in it and it contains distorted regions of latticework-structures of 2D energy-fields in universal medium. Since this region of matter-field differs in its distortion-density, compared to universal medium farther from borders of macro body, it offers a transparent medium of transmission for light, with different distortion-density.

A macro body is mainly a region of space filled with its matter-field. 3D matter-particles (unstable photons) in macro body are scarce and they move around in circular paths (within fundamental 3D matter-particles of macro body) within the space occupied by macro body, in an orderly manner. Matter-field of a macro body extends outside its borders and is relatively uniform and flat enough to provide a reasonably smooth surface. A smooth surface is provided to macro body by smooth leveling of isotropic points in extension of its matter-field.

Down to the scale of photons, matter-particles (photons) constituting a macro body, are scanty within its body-dimensions, compared to sizes of inter-particle spaces. This makes a macro body extremely porous to flow of photons in a ray of light. It is macro body's matter-field, as it becomes gradually denser towards surface of macro body from outside, which produces a reflecting surface. When a macro body is very thin, its matter-field is not thick or dense enough to produce a reflecting surface and hence any material, when very thin or of very low matter-density, becomes transparent to light rays. For the same reason, all transparent (to radiations of various kinds) macro bodies have either porous structure of their 3D matter-particles or their matter-fields have very low (rare) distortion-density.

A photon, in a ray of light, approaching a macro body makes its contact, first, with matter-field of macro body, outside borders of body-dimensions. Matter-field of a macro body extends outside its borders into its immediate surroundings. A denser matter-field offers higher resistance to passage of photon. Rarer matter-field offers lesser resistance to passage of photon. If rate of change in distortion-density of matter-field is small and gradual, photon adjusts its relative velocity and pass through macro body (the medium) – provided that, photon on its way does not come very close to any other photon (in macro body's 3D matter-particles) within macro body.

Normally, what we consider as media of transmission of light or reflecting surfaces are those macro bodies with definite borders. Hence, change in matter-density at border between two macro bodies is abrupt. A photon entering a matter-field with higher distortion-density (denser medium) from matter-field with lower distortion-density (rarer medium) faces a sudden increase in magnitude of resistance from front of its matter-core. Matter-core of photon is pressed between increased resistance from front and current ejection effort from rear. Matter-core of photon loses its shape and become a blob of 3D matter. Photon's matter-core becomes much longer to front.

Similarly, a photon entering a matter-field with lower distortion-density (rarer medium) from a matter-field with higher distortion-density (denser medium) finds itself with sudden reduction in magnitude of resistance from front of its matter-core. Ejection effort from its rear, at that instant, is suitable for much higher magnitude of resistance from front. Loss of resistance from front helps ejection effort to throw matter-content of photon's matter-core forward. Matter-core of photon loses its shape and become a blob of 3D matter. Photon's matter-core becomes much longer to rear. Hence, whenever a photon traverse border between two matter-fields with definite borders, its matter-core is deformed and later stabilizes its shape, gradually, through natural stabilizing actions of its inertial-pocket.

If distortion-density in matter-field of a macro body is dense enough to slow down matter-core of a photon to a halt, before it immerses itself deep into macro body's matter-field, that macro body is capable of reflecting photon (light). A photon is made up of its matter-core, in the shape of a spinning disc, and its energy in the form of stress in surrounding inertial-pocket. Parts of 2D energy-fields, which carry distortions in their latticework-structures, required for sustenance of stability and integrity of photon, constitute its inertial-pocket. Consequently, overall size of a photon is much larger than the size of its matter-core.

When an approaching photon makes contact with surface of matter-field of a reflecting macro body, distortions in latticework-structures of its inertial-pocket combine with distortions in latticework-structures of macro body's matter-field, in same planes. In other words, parts of original inertial-pocket of photon are gradually lost into matter-field of reflecting macro body. In the absence of a stable inertial-pocket, matter-core of photon is unable to move or maintain its stability or integrity. At this instant, the photon's matter-core has no (or little) motion towards reflecting macro body. Both, its matter-core and inertial-pocket are in unstable states. The photon, as a whole, is in its most unstable condition and is very vulnerable to external influences.

Further movement of photon's matter-core may be considered as two components. Component of photon's movement, perpendicular to macro body's surface feels full change in distortion-density of macro body's matter-field. Perpendicular components of distortions in latticework-structure of inertial-pocket are not present any more, about photon's matter-core. Matter-core of photon can move in perpendicular direction to reflecting surface, only after developing required distortions in latticework-structures of macro body's matter-field to form photon's inertial-pocket, around its matter-core.

Component of photon's movement, parallel to macro body's surface feels no (or little) change in distortion-density of macro body's matter-field. Components of distortions in latticework-structures of photon's inertial-pocket, parallel to macro body's reflecting surface, are not quantitatively much affected. Although they are transferred to

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matter-field of macro body they remain in association with photon's matter-core. These distortions try to maintain motion of photon's matter-core, parallel to reflecting macro body's surface. Inertial-pocket of photon may be renewed either from distortions in latticework-structures of reflecting macro body's matter-field or by fresh distortions produced about its matter-core by universal medium, within reflecting macro body's matter-field.

If matter-field of reflecting macro body returns all distortions, received by it from latticework-structures of photon's original inertial-pocket, during their contact and these distortions are sufficient to re-create photon's new inertial-pocket to send photon on its way, there is no permanent work (energy) transfer between photon and reflecting macro body.

If photon's inertial-pocket receives additional distortions from latticework-structures of reflecting macro body's matter-field to re-create itself, certain quantity of work (energy) remains transferred from reflecting macro body's matter-field to photon's inertial pocket.

If distortions received from latticework-structures of reflecting macro body's matter-field is not sufficient to re-create photon's new inertial-pocket and additional distortions required are produced and supplied by gravitational actions of universal medium, part of work (energy), lost from photon's original inertial-pocket remains transferred to reflecting macro body's matter-field, which retains it.

As a photon enters matter-field of a reflecting macro body and comes to a halt (in its motion in perpendicular direction to reflecting surface), kinetic energy of incoming photon (in this direction) is absorbed by matter-field of reflecting macro body. Depending on magnitude of distortions, already existing in reflecting macro body's matter-field and their direction, in relation to direction of entry of photon, latticework-squares of reflecting macro body's matter-field get additionally distorted (by absorbing distortions from original inertial-pocket (kinetic energy) of photon.

If photon loses all its kinetic energy (for its motion in vertical direction to reflecting surface) before its matter-core deeply immerses itself within reflecting macro body's matter-field, photon's matter-core comes to a stop in its motion in vertical direction to surface of reflecting macro body's matter-field, just outside reflecting macro body's border (body-dimension). Now, photon's matter-core is partially immersed in denser part of reflecting macro body's matter-field, with its motion parallel to reflecting surface unaffected. Photon's matter-core tends to move parallel to reflecting surface at its original speed, in that direction.

Due to lack of distortions in vertical direction in its (destroyed) inertial-pocket, photon's matter-core cannot move, towards or away from reflecting surface, until after a

new driving mechanism is developed. Now that the photon's matter-core does not have momentum in vertical direction, kinetic energy absorbed by matter-field of reflecting macro body is released by expansion of latticework-squares in 2D energy-fields of universal medium between photon's matter-core and reflecting surface. This is reactive effort applied by latticework-squares of reflecting macro body's matter-field, during regaining their original shapes.

New ejection effort, applied by reactive effort from reflecting macro body's matter-field onto photon's matter-core, restructure an inertial-pocket around photon's matter-core to eject it out of reflecting macro body's matter-field, on the same side of its incidence. This phenomenon is 'reflection of radiation' from macro body's reflecting surface.

Figure 6.17 shows the instant of reflection of a photon in three parts. Region above thick dotted line, in figure shows extension of reflecting macro body's matter-field, outside its border. Distortion-density of macro body's matter-field gradually increases nearer to macro body's surface. Thick dotted line shows reflecting macro body's border, which is the reflecting surface. Oval/circular discs, about the point of incidence, O, show instantaneous shapes of median disc plane of photon's matter-core.

Only changes in shape of photon's matter-core and reflecting actions of its median plane are discussed. Similar reflecting actions take place in all other planes passing through photon's matter-core. Magnitudes of reflecting actions correspond to shapes of photon's matter-core in each plane. XX is a horizontal reference line parallel to reflecting surface. Lines, OY, are normal to reflecting surface at point of photon's incidence. AO is direction of incident ray of light and OB is direction of reflected ray of light. Arrows within circular/oval discs represent work, producing motions of photon's, matter-core and its resolved components.

Part I of figure 6.17 shows probable shape of median plane of matter-core of a photon in incident ray of light, during incidence at reflecting surface, just before completion of incidence. Photon approaches reflecting surface in the direction AO. Angle AOY is angle of incidence of light ray. Magnitude of angle of incidence is very small. As photon approaches reflecting surface, work held in its inertial-pocket is gradually transferred to reflecting macro body's matter-field. Work, received by reflecting macro body's matter-field, is used to in crease distortion-density in it.

Let arrow PR in part I of figure is total work held with inertial-pocket in median plane of photon's matter-core for photon's motion as part of incident ray of light. This can be resolved into two parts. Parallel component, SR, suffers little change in its magnitude during incidence. Perpendicular component of work, PS, gradually reduces until whole of it is transferred to reflecting macro body's matter-field and photon's matter-core comes to a halt with respect to its motion in perpendicular direction. Whole of work, transferred

to reflecting macro body's matter-field, increases distortion-density in macro body's matter-field between photon's matter-core and reflecting macro body's border. By their inherent property of stabilization, distorted latticework-squares in 2D energy-fields tend to regain their stable state by expanding, back to their original shape and size.

This instant, when matter-core of the photon is in a state of rest with respect to its motion in perpendicular direction, is the instant of reflection. In this condition, photon's matter-core has no motion in perpendicular direction and its motion in parallel direction remains unaffected. This instant is represented in part II of figure 6.17. Shape of photon's matter-core is greatly altered. Its perimeter-curvatures and partial inertial-pocket (remaining in matter-field of reflecting macro body) corresponds only to photon's linear motion in parallel direction.

Figure 6.17

Arrow, SR, in figure represents existing work, in association with photon's matter-core, within reflecting macro body's matter-field (partially destroyed inertial-pocket) and direction of motion of photon's matter-core. This is the most unstable condition of a photon by its matter-content as well as by its inertial-pocket. Matter-field between photon's matter-core and reflecting macro body's surface is fully compressed, as far as incidence of photon can compress it.

2D energy-fields act to remove additional distortions in latticework-structures of reflecting macro body's matter-field. This can be done by expansion of latticework-squares, compressed due to incidence of photon. During their expansion, latticework-squares release stress in them and produce reactive efforts on photon's matter-core and surface of reflecting macro body. As reflecting macro body (usually) is enormously larger than a photon, it can be considered as immovable. Whole of reactive effort due to expansion of compressed latticework-squares in latticework-structures of reflecting macro body's matter-field acts on photon's matter-core to push it away from reflecting macro body's surface. This is the instant of reflection.

Part III of figure 6.17 shows matter-core of a photon immediately after instant of its incidence and at the instant of commencement of its reflection. Whole of original additional work, transferred from its inertial-pocket to reflecting macro body's matter-
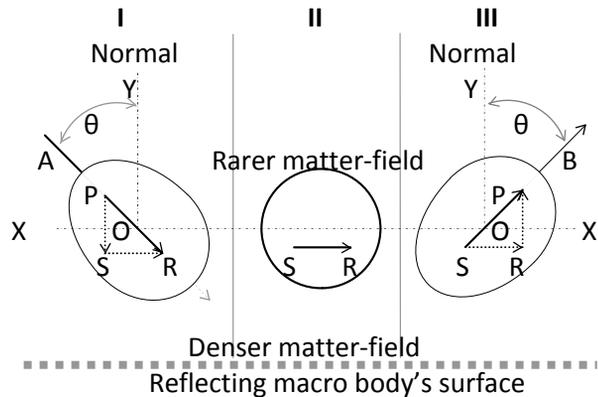
field is now gradually returned to form a new inertial-pocket about matter-core of photon. Magnitude of additional work, represented by arrow, RP, received by photon to re-create its inertial-pocket is equal to additional work, PS, lost from its original inertial-pocket during incidence. Resultant of additional works, PR and SR, shown by arrow SP represents total additional work in photon's inertial-pocket (in the plane, considered) and its corresponding resultant linear speed, after deflection. Angle YOB is angle of reflection of photon.

Matter-field of reflecting macro body regains its original distortion-density and shape, as photon is reflected out of it. Photon undergoes its natural stabilization process and gradually regains shape of its matter-core, inertial-pocket, linear and spin speeds and other parameters, after instant of reflection. All additional distortions in latticework-structures of original inertial-pocket, transferred into matter-field of reflecting macro body are now returned to develop photon's new inertial-pocket about its matter-core. In ideal reflection, no additional work (energy) is lost from photon's inertial-pocket or remains permanently transferred to matter-field of reflecting macro body. No additional matter-content or energy is gained by photon. A photon is reflected without any change in its parameters other than its polarity.

Normally, reflection of radiation is fast enough that during the process of reflection, internal pressure of photon's matter-core does not change. It is maintained by reaction from additional distortions, transferred to latticework-structures of reflecting macro body's matter-field. Hence there is no loss of matter-content from photon's matter-core. Pressure energy, stored in photon's matter-core, remains within and continues to balance external gravitational pressure applied on matter-core. Whole of kinetic energy of photon, absorbed by matter-field of reflecting body, is returned to photon on its reflection and hence there is no loss of energy from a photon during its reflection. In normal cases of reflection, matter-content and hence frequency of reflected photon does not vary from that of incident photon.

However, there are some materials, structure of whose matter-field is such that it takes longer time for a photon to be reflected. In such cases, a photon being in a state of lower linear speed than at its critical linear speed, for a longer time, it may lose part of its matter-content. Consequently, radiation, reflected from surfaces of such macro bodies, is of lower frequency than incident radiation.

Photons of very low matter-content (frequency) may not have enough momentum to cause production of required ejection effort by reflecting macro body's matter-field. Such photons cannot be reflected from macro body's surface. Photons in very low frequency (infra-red region) radiation transfer whole of their momentum to matter-field of reflecting body and thereby lose their inertial-pockets, permanently. Matter-field of macro body is unable to produce soon enough reflecting effort to push out photons'

matter-cores or to develop new inertial-pockets about them, by returning energy absorbed from original inertial-pockets. Therefore, matter-cores of photons in very low-frequency radiations come to a halt within outer surface of matter-field of reflecting macro body.

Alternatively, matter-cores of photons in low-frequency radiations move (comparatively) very slowly during reflection, until natural stabilization processes develop their inertial-pockets fully. In the mean time, matter-cores of photons, being in condition of very slow linear speed, their internal pressures fall and most of their constituent quanta of matter escape from photons' matter-cores. It may cause disintegration of photons, which constituted low-frequency radiation.

It is also possible that any of constituent unstable photons of macro body, passing nearby, absorb remnant of disintegrating matter-core of photon into its own matter-core. This is the mechanism, by which a macro body absorbs low-frequency radiations (See section 5.17 heat rays) to heat up.

During every instance of reflection, a photon's inertial-pocket undergoes renewal or major restructure. Direction of spin of reflected photon is determined by rotation of re-created inertial-pocket. Due to breakdown and restructure of inertial-pocket, during reflection, it is not necessary that sense of rotation of inertial-pocket is maintained, especially if matter-field of macro body, at the point of incidence, is distorted in a different fashion, compared to matter-field of a macro body of same material in its neutral state.

In natural state of matter-field at reflecting surface of a macro body, polarities of all reflected photons in a ray are changed identically. However, if nature of distortions at the point of incidence is modified by external interference, additional distortions in macro body's matter-field in all planes may not correspond to original natural distortions. Different styles of additional distortions in different (directions) planes may cause changes in polarity of some or many of reflected photons. Changes in polarities of photons need not be identical in magnitudes and directions.

During normal reflection, matter-content of photon does not vary and it is not renewed. There is no absorption and re-radiation of photons (or their matter-content) at reflecting surface. Matter-cores of photons undergo changes in their shapes, spin and linear motions. However, quantities of 3D matter in them remain steady. Photons' inertial-pockets are absorbed by matter-field of reflecting macro body's surface and it is re-created during their reflection. Hence, we can say that incident photon and reflected photon are the same 3D matter-particle.

All interactions between matter-field of reflecting macro body's surface and photon take place in each of spatial planes, separately, where both photon and reflecting surface

exist, at any instant. Independent interactions in all spatial planes, together, execute action of reflection in 3D spatial system.

Although, directions are assigned to transfer and actions of additional distortions in macro body's matter-field and inertial-pocket, they are merely for the sake of explanation. Distortions are relative movements of quanta of matter in latticework-structures of 2D energy-fields. They have no resultant directions and 2D energy-fields do not move. An effort, exerted and transferred by additional distortions in 2D energy-field has direction. Direction and magnitude of effort of interaction between 2D energy-field and photon's matter-core depends on magnitude and direction of curvature of its matter-core's perimeter in any plane.

Direction of incident ray of light, with respect to reflecting macro body's surface, bears a definite relation to direction of reflected ray of light. Angle of incidence and angle of reflection (with respect to normal at point of incidence) are equal. In order to get a coherent ray of reflected radiation, it is necessary to have a smooth and uniformly varying matter-field at macro body's surface. Otherwise, reflected photons of radiation may be scattered in different directions and reflected ray of radiation will no more be visible or coherent.

All laws, with regard to radiation of light, are based on coherent visible parts of light rays. [*At present, it is determined that mean threshold stimulus for a light ray to be sensed with 60% accuracy by human eye, at least about 100 photons should fall on the eye within a time span of 100 ms*]. Those parts of light, which become invisible due to reduced amplitude, are not taken into consideration for making physical laws, related to optics. Here, in this concept, no such distinction is made and general explanations about various phenomena, related to transmission of radiation, are given. These encompass both visible coherent rays and invisible scattered rays. . . . .

Respected reader,

Thank you very much for your attention. I greatly appreciate your patience and endurance in reading this alternative concept, so far. If you think chain of my reasoning is logical and it is worth following the concept further, kindly ask your librarian to provide full book (in two volumes). You are welcome to contact me on any queries regarding this concept.

Thanking you again and with regards,

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