Chapter FOUR

# PHOTON

Chapter four describes creation of 3D matter by universal medium from free quanta of matter. Quanta of matter may be released from latticework-structures of 2D energy-fields for various reasons. These free quanta of matter are gathered and compressed to 3D status to create 3D matter by universal medium. Mechanisms of creation and sustenance of basic 3D matter-particles (photons) and nature of light are explained.

## 4.1. Contraction of larger disturbance:

A larger disturbance (with more quanta of matter in it), under contraction, has a different destiny compared to a small disturbance, as described in last chapter. While size reduction of gap in latticework-structure of 2D energy-field continues under gravitational pressure, scattered quanta of matter in its plane are collected together and compressed to form a disturbance. As quanta of matter, in the disturbance are brought nearer, matter-density of disturbance, in its plane, increases.

Reaction (resistance) to self-constriction of quanta of matter in the disturbance provides internal pressure in disturbance. Resistance, offered by disturbance, to compression by external gravitational pressure is experienced as internal pressure in disturbance (within the gap) in 2D energy-field. Development of internal pressure in a larger disturbance, under contraction, is in two stages.

### 4.1.1. Internal pressure of disturbance:

Quanta of matter in a disturbance have no particular arrangement. As they are collected together, they are oriented at random, in same plane. Many of quanta of matter in disturbance are compressed along their major axes from their ends in their own spatial dimension. Compression along major axes reduces their length and increases width against natural tendency to self-elongate. Enlargement in width increases curvatures of their sides and reduces curvature of their end points. Self-constriction and self-elongation efforts within matter-contents of quanta of matter are reduced. Shapes of quanta of matter develop towards their critical equilibrium states of perfect circles.

Approaching critical equilibrium circular shape, in turn, apparently reduces quantum of matter's internal pressure. Structure-less state of matter-content in quantum of matter does not change. Hence no real internal pressure can develop within matter-content of a quantum of matter. However, becoming closer to its critical stable shape tends to reduce its outward activity. Reduction in outward activity may be considered as apparent reduction in its internal pressure. This is the first stage in development of internal

pressure and this stage lasts until neighboring quanta of matter in the disturbance start to make bodily contact with each other.

Growth of quanta of matter, in width, reduces gaps between them. Adjacent quanta of matter make bodily contact in same spatial dimension. Bodily contacts restrict their growth in directions of contacts. Reduction in gaps, between quanta of matter, increases matter-density of disturbance. As matter-density of disturbance increases, each of its constituent quanta of matter tends to press against its neighbors. Peripheries of quanta of matter lose their curvature and tend to become straight. Lowering curvature of perimeter segments increases self-constriction effort in quantum of matter. Each quantum of matter, making bodily contacts with more than one quanta of matter, tends to assume appropriate shape that has more than two straight sides and as many end points.

Straight sides of a quantum of matter cause very high self-constriction. End-points gradually convert to corners. Curvature of a corner is very high. Due to high curvature of end-points, self-elongating efforts at corners become very high. Matter-content in each quantum of matter tends to expand into any gap available in its spatial dimension. This tendency, to grow outwards at corners, produces reaction against (resistance to) external gravitational pressure and appears as increasing internal pressure of disturbance. In this second stage, external gravitational pressure acts against increasing resistance offered to further compression of disturbance.

Due to compression from their ends, quanta of matter reduce their magnitude in first spatial dimension (length) and grow into second spatial dimension (width). Ultimately, all constituent quanta of matter in disturbance become two-dimensional objects. Their measurements in first spatial dimension (lengths) are reduced, with corresponding increase in second spatial dimension – breadths. When all quanta of matter in a disturbance have grown fully into second spatial dimension, this closely packed 2D matter-body constituted by 2D quanta of matter makes the disturbance a two-dimensional circular sheet of pure matter, in a plane. Matter-content of 2D disturbance is no more structure-less in its plane. It is structured by number of quanta of matter in close-fitting arrangement.

At the same time, each quantum of matter in 2D disturbance keeps its separate identity, by each one becoming an independent (probably, hexagonal) 2D quantum of matter. With respect to each quantum of matter, its structure-less nature is maintained. Shapes of their matter-contents are such that they fit close with each other without gaps between them. They continuously strive to attain their stable free state in single spatial dimension by reducing in width and expanding or spreading-out in length. This tendency of quanta of matter produces resistance against gravitational pressure acting on 2D disturbance from all around periphery of its composite matter-content.

Gravitational pressure is the root cause for production of resistance by 2D disturbance. Resistive pressure, produced by 2D disturbance, gives rise to its 'internal pressure'. Internal pressure of 2D disturbance does not increase matter-density of quanta of matter in it. Attempt to increase internal pressure compels quanta of matter to grow into higher spatial dimension. Gaps between quanta of matter in a disturbance are filled up first. After disturbance has reached its 2D state, further attempt to increase its internal pressure compel constituent quanta of matter to grow into third spatial dimension.

Horde of constituent free quanta of matter, bestows disturbance with its matter-content. Matter-content of a 2D disturbance is, more or less, distributed evenly within its area. In 2D spatial system, relation between matter-content of a disturbance and its area is its matter-density. During initial stage of compression, quanta of matter in a disturbance are not closely packed. There are gaps between adjacent quanta of matter. Matter-density of disturbance increases as adjacent quanta of matter are moved nearer, during its contraction, until all quanta of matter are closely packed. At this stage, matter-density of 2D disturbance is equal to matter-density of a quantum of matter, which is the highest density of matter in nature.

A 2D disturbance may reach its stable state only when its internal pressure, developed due to compression of its constituent quanta of matter, balances external gravitational pressure on it. Due to convex curvature of (circular) 2D disturbance's perimeter, magnitudes of internal and external pressures required, for a balanced state, are not equal. Internal pressure required is greater than external pressure. (Similar to difference required between internal pressure of a liquid droplet and external pressure on it for balanced state). Difference between them, required for a stable state, increases as diameter of circular 2D disturbance shrinks.

### 4.1.2. Very large disturbance:

A very large 2D disturbance, in a plane, being a big circular object, has low convex curvature at its perimeter. Difference, required to balance between internal pressure of 2D disturbance and external pressure by gravitation on it, at its perimeter, is relatively small. Therefore, internal and external pressures of a large 2D disturbance are nearly equal and difference is very less. Gravitational pressure on 2D disturbance may not be able to compress it or rate of compression may be too slow to make appreciable changes in spatial dimensional state of 2D disturbance. Gradually, many of its constituent quanta of matter escape from 2D disturbance and join latticework-structure of 2D energy-field, until size of 2D disturbance is greatly reduced to increase curvature of its perimeter.

Quanta of matter from peripheral area of very large 2D disturbance, one by one, will find suitable places in surrounding 2D energy-field and become part of quanta-chains in its latticework-structure. This process continues until size of 2D disturbance has come down, sufficiently, so that its peripheral curvature is of required level to commence

further contraction. Nature of 2D energy-field in universal medium, in a region of space, also affects limits for contracting stages of 2D disturbances. Inability of universal medium to continue development of very large 2D disturbances prevents natural formations of 'basic 3D matter-particles' with very large matter-contents.

However, in a region of space, where gravitation is comparatively higher than usual, very large disturbances may be developed into basic 3D matter-particles with unusually very high matter-content. During very large natural upheavals, large quantity of 3D matter is reverted to free quanta of matter. With no definite breakdown of latticework-structures in 2D energy-fields, free quanta of matter cannot form disturbances. Instead, large numbers of free quanta of matter in the region, tend to infiltrate into latticework-structures of 2D energy-fields in the region.

Migration of large numbers of quanta of matter is as good as forming new latticework-structure to supplement existing latticework-structure. Existing latticework-structure (more or less) is pushed outward to create space for newer development. Although 2D energy-fields have no outer border, its immense vastness delays stability and spread of compression. This phenomenon, in conjunction with existing compression in universal medium, enhances magnitude of gravitation available at the region. Development basic 3D matter-particle of very high matter-content in this region of space will also be identical to development of optimum sized disturbance in other regions of space.

### 4.1.3. Disturbance of optimum size:

As size of a very large disturbance reduces by purging of quanta of matter from it, disturbance becomes smaller and curvature of its periphery increases. Most of its constituent quanta of matter are in their advanced stage of full-conversion into 2D state. Conversion of quanta of matter into second spatial dimension increases curvatures of their sides and reduces internal pressure of disturbance. Lower internal pressure helps the disturbance to contract at a faster rate. As radial size of disturbance further reduces, jamming effect of latticework-structure of 2D energy-field (as explained in case of very small disturbances) also come into effect.

As matter-contents of neighboring quanta of matter in disturbance make contact and press into each other, their sides are straightened. This increases self-constriction and self-elongation effects within the quanta of matter. Both these effects tend to move matter-contents of quanta of matter to fill up all possible gaps in disturbance and thereby increase its matter-density and internal pressure. Increasing internal pressure and declining external pressure (due to jamming effect of 2D energy-fields) limits size reduction of disturbance, when they are in balance, to a definite size. For a steady nature of universal medium, radial size of a 2D disturbance, at which internal and external pressures balance, is constant.

As and when radial size of 2D disturbance reaches optimum magnitude / size (or if 2D disturbance is of smaller size, but not too small), its further development will cease. Because curvature of its perimeter may not be large enough to provide required pressure difference for further reduction in its radial size.

2D disturbance behaves like a liquid drop with respect to its internal and external pressures. If a 2D disturbance has just sufficient matter-content to produce a 2D matter-body of highest matter-density, when its internal pressure is balanced by the external pressure on it, it may be said to have a 'critical radial size'. At its critical radial size, matter-density of a 2D disturbance is equal to matter-density of a quantum of matter. All quanta of matter in a critical-sized 2D disturbance are converted to their 2D states and there are no gaps in it. Thus, this disturbance becomes a saturated 2D matter-particle. A saturated 2D disturbance / matter-particle is circular in shape. It exists in the plane of a 2D energy-field. It has highest possible matter-density in 2D spatial system (which is the same as matter-density of a quantum of matter, in all spatial systems).

### 4.1.4. Creation of 3D matter:

If radial size of a saturated 2D disturbance (collection of quanta of matter) is larger than critical radial size of a 2D matter-particle, pressure difference at its perimeter is more. Internal pressure is lesser than that is required to balance comparatively higher external pressure. Higher external pressure overcomes lower internal pressure. Hence, saturated 2D disturbance is further compressed by gravitational actions until internal and external pressures are in balance.

Magnitude of a disturbance is length of its perimeter. In order to reduce its magnitude, universal medium has to reduce radial size a 2D disturbance, in its plane. However, all constituent quanta of matter in the 2D disturbance have converted fully to their 2D state to fill up entire 2D space within the disturbance and its matter-content has already reached minimum possible radial size in 2D spatial system. Since matter-density within 2D disturbance has reached its highest value, it cannot be contracted any more in 2D spatial system, unless part of its matter-content is removed from the plane of 2D disturbance. Quanta of matter, growing into third dimensional space can remove part of their matter-content from 2D spatial system.

Further contraction of 2D disturbance can take place, only when its constituent quanta of matter grow into third spatial dimension to pave way for a reduction in its area in the plane. That is, under further application of higher external pressure, quanta of matter and 2D disturbance constituted by them now grow in thickness. Consequently, 2D disturbance is converted into a 3D disturbance – a 3D matter-particle. In our (3D world) sense, it is now, that a 'real matter-particle' (3D matter) is created from 'functional' matter-particles. 3D matter-particle became 'real' due to our ability to measure its parameters by using standards of 3D spatial system. Until it was converted into a 3D

matter-particle, all its parameters were intangible to us. A 3D matter-particle is a disturbance with respect to universal medium. Hence, it may be called as a '3D disturbance' or as a '3D object'.

Once a disturbance has developed into third spatial dimension, it has certain thickness and it simultaneously exists in planes of more than one 2D energy-fields. When disturbance is a 2D matter-body, it exists in its own plane and co-exists in all other planes, which are at an angle to its disc plane. In its 3D state, disturbance and constituent quanta of matter are not only part of more than one 2D energy-fields but they break continuity of all 2D energy-fields in which the 3D disturbance exists. Its presence is real in all 2D energy-fields, passing through its volumetric space.

All quanta of matter in their functional state (constituents of universal medium), which happen to be at the place of formation of 3D matter-particle, withdraw themselves out of volumetric space, where 3D matter-particle is being formed. Since 2D energy-fields can act (mainly) only on curved surface of a disturbance, most interactions between universal medium and 3D disturbance are limited to its circumference, where its curved perimeter is situated.

As soon as a 2D disturbance is converted into a 3D object, by growing in thickness, continuity of all 2D energy-fields in planes passing through it are broken. In this condition, thickness of newly formed 3D object is more than the distance between two adjacent parallel 2D energy-fields.

Growth in thickness facilitates further reduction of 2D disturbance's area in original 2D plane. Matter-content of 2D disturbance, which was limited to its area in 2D plane is now being distributed into volumetric space in 3D spatial system. Due to their growth into 3D spatial system, sizes of constituent quanta of matter (within 2D disturbance), including those in other spatial dimensions can now be further reduced. 2D disturbance's area (dimensions in first and second spatial dimensions - length and breadth) reduce and its thickness (into third spatial dimension) increases.

Gravitational pressure is now applied on 3D disturbance by all 2D energy-fields in which it exists, each one in its own plane. However, their actions are limited mainly to planes, where the disturbance has curved perimeter. As contraction proceeds, matter-content of 3D disturbance continues to grow in thickness into adjacent 2D energy-fields. Each quanta of matter in 3D disturbance, keeps its individuality and grows in thickness towards becoming a (spherical) body of pure matter. In their closely packed state, shapes of quanta of matter become more like cubes or other irregular shapes than spheres.

Not all quanta of matter in a 2D disturbance transform simultaneously. They change at random, depending on their orientation and direction of compression on them. They also may get rearranged to redistribute evenly within the disturbance. Process of

transformation continues until radial size of 3D disturbance (in its main disc planes) reaches critical radial size.

Similar processes take place, simultaneously in all planes passing through the gap in 2D energy-fields. Parts of 3D disturbance in all 2D energy-fields of its existence jointly form a single 3D object. If quanta of matter in 3D disturbance are sufficiently large in numbers, in a hypothetical case, this process will continue until 3D disturbance achieves a spherical shape of critical radial size, circular in each of the planes passing through it. In balanced condition of conversion, it may continue to stay in its present status as a 3D disturbance until it is assimilated into another 3D disturbance under gravitational attraction or until certain other parameters, which can ensure its independent existence, are developed about it.

**4.1.5. Creation of higher-dimensional matter:**

Creation of higher-dimensional matter, beyond 3D matter, is a hypothetical case, envisaged by carrying previous argument, forward. This is to be taken only in speculative sense. Generally, thickness of a basic 3D matter-particle is so small that thickness at its circular perimeter subtends much less than one degree of arc at its centre. Therefore, creating even a spherical 3D disturbance is impossible in nature.

Should volume (radial size) of a 3D disturbance-sphere is more than critical radial size, its surface curvature may produce enough pressure difference between its internal and external pressures to continue its compression by gravitational pressure. Further compression of 3D disturbance is possible only if its volume, which is already at its highest matter-density, can be reduced. Reduction in volume of 3D disturbance is possible only if part of its matter-content can be removed from 3D spatial system. If resultant pressure on 3D disturbance is sufficient, quanta of matter in 3D disturbance might start to grow into (speculative) fourth spatial dimension. Growth of 3D disturbance into fourth spatial dimension allows reduction in its 3D volume until internal and external pressures can be balanced. 3D disturbance may continue its growth into fourth spatial dimension until its radial size in 3D space system reaches critical diameter.

If matter-content of 4D disturbance is sufficiently large, similar process may repeat for conversion of its matter-content into higher-dimensional spatial systems. Since we know nothing about higher-dimensional space systems, beyond 3D spatial system, this is a hypothetical case in the development of matter. We cannot venture to hypothesis on properties of matter in its 4D state.

'Time', a functional entity, which is presently regarded by many as fourth dimension, is not a dimension of space. A spatial dimension has to define space. We may realize fourth spatial dimension only when we are able to partition space by four mutually perpendicular planes.

### 4.1.6. Critical radial size:

Consider a 3D disturbance as a disc, made of pure matter, whose thickness is more than thickness of two planes. Radial size of a stable 3D disturbance, in each disc-plane, is of critical value. At its critical radial size, internal pressure due to (highest possible) matter-density and external pressure on it by gravitation (moderated by jamming effects) from each 2D energy-field in its own plane, balance each other.

As radial size of 3D disturbance decreases, in any plane, passing through it, its internal pressure increases due to compression of matter-content against self-constriction of constituent quanta of matter. At the same time, external pressure, by gravitation from universal medium, diminish due to jamming effect of latticework-structure. Curvature of 3D disturbance's perimeter determines pressure difference required for balance of external and internal pressures. Internal and external pressures balance at critical radial size of a 3D disturbance.

At critical radial size, matter-density of all 3D disturbances in nature is same and it is of constant value. This is the highest matter-density for 3D matter in universe and it is equal to matter-density of a quantum of matter (in all spatial dimensional states). In an impossible situation, where matter-density of a spherical 3D disturbance tends to increase beyond this value, due to its larger radial size, its matter-content might start growing / converting into an object in fourth spatial dimension, about which we can only speculate.

We have, so far, considered gravitational pressure only on curved perimeter of a contracting 2D/3D disturbance. In each of the planes of its existence, a 3D disturbance is acted upon on its curved perimeter by 2D energy-field of that plane. Magnitude of gravitational pressure by universal medium on flat surface of a 3D disturbance is negligible. Applications of gravitation on all surfaces are similar but its actions are limited to curved surfaces only. A flat surface on a 3D disturbance is made of straight-line perimeters in each of 2D planes passing through it. These planes are oblique to mean disc plane of 3D disturbance.

Directions of gravitational efforts, on curved surface – circumferential perimeter of a 3D disturbance in every plane (2D energy-field) – are inward, towards centre of its matter-content. They compress 3D disturbance and maintain its critical radial size. Disc faces of 3D disturbance, being (almost) flat, are not affected by gravitation on them by 2D energy-fields, which are at an angle to plane of disturbance-disc. Very small gravitational pressure, available on its flat faces, balances internal pressure of 3D disturbance. Hence, there is no resultant effort applied at flat surfaces of a 3D disturbance, to produce motion. Only a variation of disturbance's internal pressure can produce appropriate resultant effort at flat surfaces and cause changes in curvature of surface or produce its linear motion.

### 4.1.7. Molding a 3D disturbance:

Assuming there is no other external effort on a 2D disturbance, and it has sufficient number of quanta of matter in it, its contracting process continues until all quanta of matter in it are converted to 3D spatial state. Quanta of matter in 2D disturbance's plane have grown into third spatial dimension and gained thickness. All quanta of matter in the disturbance are now shaped like cubes or other volumetric shapes that fit close with each other, rather than spheres. 2D disturbance, as a whole, has grown in thickness to become a disc-shaped 3D object or 3D disturbance.

Corners of 3D disturbance-disc, where its faces meet cylindrical surface, have very high curvature (because surfaces are at right angle to each other). 2D energy-fields in planes other than disc planes of 3D disturbance, now act on these corners. Gravitational pressure on corners tends to flatten them. This process compels 3D disturbance to reshape towards spherical shape. If sufficient time and plenty of quanta of matter were available for this process, by the time all quanta of matter of a 3D disturbance have converted to 3D matter; 3D disturbance would have assumed spherical shape of critical radial size. It would have become a sphere of pure 3D matter.

Normally, availability of quanta of matter in a 3D disturbance is limited, that it will not be able to grow into even a reasonably thick disc. 3D disturbance grows into a thin disc of 3D matter before other external efforts influence it. Development of 3D disturbances of high matter-content may take place by amalgamation of more than one 2D or 3D disturbances (or those containing exceptionally large quanta of matter).

It may be noted that matter-content of a 3D disturbance is quantified in terms of number of quanta of matter in it. Its matter-content may be varied only in terms of integral numbers of quanta of matter. Due to variations in matter-contents of different quanta of matter, matter-content of a basic 3D matter-particle may not always correspond to number of quanta of matter in it. Nevertheless, magnitude of 'real' matter-content of a disturbance (3D matter-body) changes gradually due to gradual conversion of functional quanta of matter into 'real' matter.

Matter-density of all basic 3D matter-particles in our universe is the same as that of a quantum of matter. Creation of real 3D matter, from 2D disturbances formed in single planes, is explained above. Usually, disturbances or gaps developed in universal medium exist simultaneously in many planes. Actions of creation of real 3D matter are identical in all these planes and they take place simultaneously and in association with each other.

## 4.2. Ejection effort:

During its contraction, a 2D disturbance grows into adjacent 2D energy-fields and thus attains thickness to become a disc-shaped 3D disturbance. 3D disturbance has two faces situated in different (parallel) planes (2D energy-fields). Each of disc-faces and their

perimeters, depending on their curvature, may exist simultaneously in one or more 2D energy-fields. During this stage of development, 2D disturbance is neither homogeneous nor isotropic. Lack of isotropy causes asymmetry in its internal pressure. Internal pressure of 2D disturbance is more due to arrangements of its constituent quanta of matter than due to differences in compression. Areas, at disc-faces, with higher internal pressure bulge outwards into adjacent planes.

When a disturbance is situated in only one 2D energy-field, asymmetry in its internal pressure will not have appreciable effects on disturbance other than to introduce linear motion, in certain cases. A 3D disturbance, existing simultaneously in many 2D energy-fields, is affected by asymmetry in its internal pressure in a different way. Asymmetry in internal pressure of a 3D disturbance causes unevenness in its thickness and shape of its disc-faces. Depending on internal pressure, certain areas on disc-faces of 3D disturbance may bulge inward or outward. Places of such unevenness depend on mutual orientations of quanta of matter in 3D disturbance, during their compression by gravitation.

Figure 4.1 shows cross section of a 3D disturbance (greatly enlarged), whose thickness is equal to thickness of few planes. Consider part 'A' (between the dashed lines) of 3D disturbance across thickness of its disc-shaped matter-content. It contains a convex bulge at one side due to higher internal pressure of matter-content in that part of 3D disturbance. Both ends of part 'A' have different curvatures. Left-side end is flat but right-side end has a convex curvature. Difference in curvature produces asymmetry in gravitational efforts at end surfaces of this part. Left-side end being flat, it is not acted upon by gravitation but right-side end having a convex curvature has higher gravitational effort on it. Thus, part 'A' of 3D disturbance has a resultant lateral effort on it, as shown by block arrow G.

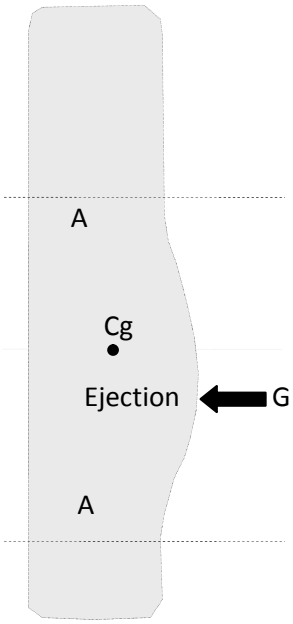


Figure 4.1

During formation of a 3D disturbance, there may be many such resultant efforts applied at different places on its disc-faces. Resultant of all these efforts, acting on a disturbance or part of it, as and when it can overcome natural adhesion of latticework-structures of 2D energy-fields, gives that part of 3D disturbance a linear impulse across 2D energy-fields of its creation, which are in its disc-planes.

As shown in figure 4.1, section A of 3D disturbance is likely to be displaced in the direction of thick arrow G. Latticework-structure of 2D energy-fields in the direction of displacement parts, to facilitate motion of moving-part

of 3D matter through. Partition in latticework-structures of 2D energy-fields rejoin after passage of moving-part of 3D matter. Direction of resultant effort G is across disturbance-disc. This effort is another aspect of gravitation and may be called 'ejection effort' on 3D disturbance.

There are great many 2D energy-fields on the way of displacement of moving-part of 3D matter, which is being ejected. Ejected part of 3D disturbance does not apply any effort on 2D energy-fields to part their latticework-structures. An effort can be applied to 2D energy-field only in its plane. Direction of motion of ejected part of a 3D disturbance passes through only very few 2D energy-fields, which contain its path. Resistance to its motion is experienced only from these 2D energy-fields. Gravitational effort from rear pushes at moving part of 3D matter to open passage in latticework-structure of 2D energy-field, in front. Creating a passage in front provides resistance to motion of moving part of 3D matter.

Moving part of 3D matter moves across all other 2D energy-fields. Their latticework-structures part on their own to pave way for ejected part of 3D matter. As soon as ejected part of 3D matter makes contact with a 2D energy-field, few quanta of matter in its latticework-structure are being violated. At that instant, each of these quanta of matter withdraws to either side of moving part of 3D matter to produce a gap for existence of 3D matter.

Since gap required is, in most cases, is larger than length of a quantum of matter, quanta-chains in 2D energy-field experience axial displacements. Displacements of quanta of matter require certain effort. Required effort, in each plane, is supplied by 2D energy-field in that plane to move itself out of the way of moving part of 3D matter. Effort, supplied by a 2D energy-field, will be returned to same 2D energy-field, during return of its quanta-chains to original states.

Moving part of 3D matter does not push at latticework-structures of 2D energy-fields, but its mere presence compels latticework-structure to open passage. Hence, there is no resultant effort or work (energy) spent by 2D energy-fields to open and close gap for moving part of 3D matter's passage through them. As soon as most of 3D matter moves away from a 2D energy-field, its quanta of matter return to their original places to close the opening in its latticework-structure.

Whatever be the radial shape of ejected part of a disturbance, gravitation from surrounding 2D energy-fields on its periphery, immediately transform it in circular shape with critical radial size. During stabilization of critical radial size, thickness and curvatures of disc-faces of ejected part may vary to accommodate and distribute available quanta of matter in it. Ejection effort and resulting linear motion of ejected part of 3D matter are (initially) directed perpendicular to its disc-face. Spin motion of ejected part of 3D matter changes direction of ejection effort with respect to direction of its linear motion. This is

rectified and direction of linear motion is maintained almost steady by further stabilizing actions by universal medium on ejected part of disturbance.

## 4.3. Spin effort:

Asymmetry of gravitational actions on disc-faces of a 3D disturbance or part of a 3D disturbance causes ejection effort on it. Resultant ejection effort on a part of 3D disturbance, which is being ejected may not be symmetrical about its 'center of matter-content'. ['Centre of mass' of a macro body is an imaginary point, for theoretical purposes, at which whole mass of macro body may be assumed to concentrate. Centre of matter-content is also similar, except that instead of mass, matter-content is considered]. Asymmetry of ejection effort, about center of matter-content of ejected part of disc-shaped 3D matter, produces a couple and torque about one of its diameters. This torque imparts a turning movement to ejected part of 3D matter. Part of ejection effort, producing the couple of effort, is 'spin effort' on disc-shaped moving part of 3D matter.

Axis of spin of ejected disc-shaped 3D matter is always at right angle to direction of ejection. Purpose of spin effort is only to initiate spin motion of ejected part of disc-shaped 3D matter, about one of its diameters. Thereafter, its spin motion is developed and maintained at appropriate level by natural stabilization process, by universal medium on it. As purpose of spin effort is only to initiate spin motion, as long as it can initiate spin motion, its magnitude is of no consequence. Relative location of point of application of resultant ejection effort with respect to centre of matter-content determines directions of spin axis and spin motion.

Now, ejected part of disc-shaped 3D matter has two independent motions, a linear motion in space and a spin motion about one of its diameter. During natural development of a 3D disturbance, its growth into third spatial dimension takes place simultaneously in many planes. Ejection efforts on part (or whole) of 3D disturbance may not develop in all planes of its existence, simultaneously or equally. Ultimately, it is the resultant ejection effort on an ejected part of 3D disturbance that determines its stable directions of linear and spin motions. Spin effort is another aspect of gravitational pressure on a 3D disturbance.

## 4.4. Photon:

Ejected disc-shaped part of 3D disturbance, moving out of 2D energy-fields of its creation, soon adjusts its radial size and shape, with the help of gravitation from surrounding universal medium, to stable conditions. In case, enough ejection effort does not develop on disc-face, a very large 3D disturbance will go on reducing its radial size to 'critical disc-size' while growing into third spatial dimension and approaching towards spherical shape.

Critical disc-size is the radial size of a 3D disturbance, at which its internal pressure due to compressed quanta of matter and external compression by gravitation balance each other. It is the delay in developing the required ejection effort during contraction period of a 3D disturbance, which contributes towards the ejected (part of) disc-shaped 3D disturbance becoming thicker. More delay in ejection makes ejected part of 3D disturbance thicker and hence the ejected part of 3D disturbance will have higher matter-content. After ejection, ejected part of a 3D disturbance becomes an independent 3D disturbance.

There is no definite mechanism to control or limit development of sufficient ejection effort on disc-face of 3D disturbance. Consequently, shape of ejected 3D disturbance, magnitude of its matter-content or radial size of ejected part of 3D disturbance are arbitrary. However, status of surrounding universal medium and rate of availability of free quanta of matter (during formation of a 3D disturbance) have certain effects on development and magnitude of ejection effort. Hence, majority of ejected 3D disturbances in a particular external environment may have similar (average) matter-content level. Normally, changes in external environment (status of universal medium) vary the pattern of matter-content in ejected 3D disturbances. This also ensures that other than in specially conceived artificial environment, a group of ejected 3D disturbances may include 3D disturbances with different magnitudes of matter-contents in them.

Ejection effort imparts linear motion to ejected part of 3D disturbance (initially) at right angle to its median disc-plane. Since all 3D disturbances are very thin, median plane of a 3D disturbance, referred here, generally means plane of a 2D energy-field passing through its center and median to planes of its disc-faces. Spin effort initiates spin motion of ejected part of 3D disturbance, about one of its diameters in median disc-plane. After initial impulse, spin motion of disc-shaped 3D disturbance is stabilized and sustained by surrounding universal medium. Spin motion gives mechanical stability to ejected 3D disturbance, in space.

Gravitation, around circular periphery of ejected 3D disturbance, maintains circular shape and radial measurements to critical values. Gravitation on disc-faces of ejected 3D disturbance (these faces being almost flat surfaces), comes into effect only if matter-density decreases from its highest critical value for a 3D matter-particle. Should matter-density of ejected 3D disturbance fall, gravitation from universal medium, all around its periphery, acts on it to compress and develop its internal pressure and matter-density to critical maximum value.

### 4.4.1. Centrifugal action in 3D disturbance:

As ejected part of (disc-shaped) 3D disturbance starts to spin about one of its diameter and move away from parent 3D disturbance or region of its development,

spinning disc of 3D disturbance becomes a separate individual entity, in its own right. Once, disc-shaped 3D disturbance develops spin motion, original ejection effort is no more perpendicular to its disc-face. Since ejection effort is produced by 2D energy-fields, its direction is related to relative direction of universal medium and bulge disc-surface. It is the ejected 3D disturbance that turns with respect to direction of ejection effort.

Ejection effort can be considered to be composed of two components. Whenever disc-face of 3D disturbance is at an angle to line of its linear motion, one component of ejection effort acts in the direction of its linear motion. Other component of ejection effort acts along a diameter of disc-shaped 3D disturbance. Due to spin motion of disc-shaped 3D disturbance, component of ejection effort, along its diameter, tends to push its matter-content towards (instantaneous) forward edge.

During every half spin of disc-shaped 3D disturbance, its forward and rearward edges reverse relative positions. Hence, matter-content of a spinning disc-shaped 3D disturbance has a tendency to concentrate towards its forward and rearward edges. This tendency may be taken as equivalent to 'centrifugal action' of matter-content in a spinning disc-shaped 3D disturbance. Accumulation of matter-content of disc-shaped 3D disturbance, towards forward and rearward periphery (in the plane of its rotation) produces an illusion of action by certain effort, such as to move 3D disturbance's matter-content away from its spin axis (center of rotation).

Movement of matter-content within a 3D disturbance is caused by push action of ejection effort, which is manifestation of gravitation by universal medium. For following explanations, we may attribute apparent centrifugal action that causes displacement of matter-content within a spinning 3D disturbance as action of a real effort. This will avoid frequent mentioning relative displacement of matter-content within a 3D disturbance due to ejection effort on it.

### 4.4.2. Creation of photon:

Centrifugal action within a spinning disc-shaped 3D disturbance exerts outward pressure against gravitational pressure on its circular periphery, about equatorial region. Radial size of a spinning disc-shaped 3D disturbance stabilizes when its internal pressure and centrifugal action, together, balance external pressure due to gravitation on its periphery. In this state, disc-shaped 3D disturbance tends to bulge outward at its equator and shrink inwards at its poles and spin axis.

[Further on, we shall call spinning disc-shaped 3D disturbances as basic 3D matter-particles. Since all basic 3D matter-particles in nature are made of spinning disc-shaped 3D disturbances, we may omit mentioning their shapes, unless specifically required].

Radial size of a 3D disturbance, in its stable state, is critical. Critical disc-size is equal for all independent stable 3D disturbances. Since all basic 3D matter-particles in nature

are made of 3D disturbances, we can say that critical disc-size of all basic 3D matter-particles in 3D spatial system is equal to critical disc-size of a stable 3D disturbance. Basically, there are no stable 3D matter-particles whose radial size is larger or smaller than (or different from) critical disc-size of a stable 3D disturbance. They may differ only in quantity of their matter-contents and corresponding thickness at their equatorial regions. All other parameters are identical. All other 3D matter-bodies, found in nature, are formed by union of two or more of this type of basic 3D matter-particles in their unstable states.

Gravitational pressure on circular periphery of a 3D disturbance further helps to adjust its thickness in proportion to quantity of matter it contains. Difference in magnitudes of gravitational efforts at various points on its surface (disc-faces and circumference) provides required ejection and spinning efforts for 3D disturbance's natural motions. Shapes of its disc-faces continuously vary for this purpose. Linear speed of 3D disturbance develops into a constant magnitude and its spin speed develops into a magnitude proportional to its matter-content. This disc of saturated 3D matter, moving at a constant linear speed and spinning at a speed, proportional to its matter-content, is matter-core of a basic 3D matter-particle ('photon'). All movements of matter-core are with respect to surrounding universal medium.

Envelope formed by distortions in universal medium, surrounding the matter-core, is called 'inertial-pocket'. Inertial-pocket moves continuously in universal medium, carrying enclosed matter-core. Linear and rotational transfers of distortions in inertial-pocket (associated with matter-core) through universal medium; (a) carry and spin matter-core, (b) sustain integrity of matter-core, (c) stabilize size and shape of matter-core and (d) maintain linear and spin speeds of matter-core at critical values. Hence, distortions in universal medium, associated with matter-core are integral part of basic 3D matter-particle. Both, matter-core and associated distortions in universal medium, together, form a basic 3D matter-particle called 'photon'.

A photon essentially has a 3D matter-core in the shape of a disc, spinning about one of its diameters, through centre of matter-content. Distortions in latticework-structures of 2D energy-fields in surrounding universal medium are required to sustain integrity and stability of matter-core of photon and its continuous motions in 3D spatial system.

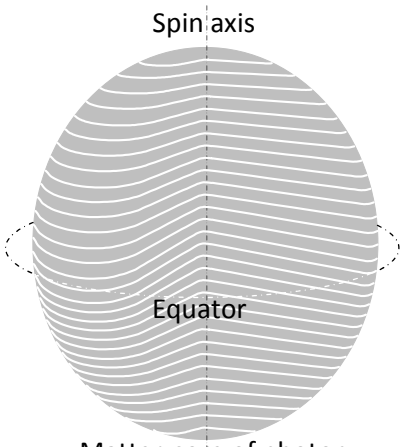
Whenever a 3D disturbance is formed in a region of space, distortions are produced in latticework-structures of 2D energy-fields in all planes passing through that region. Distortions in latticework-structures of all 2D energy-fields passing through that region together form a region of distortions in 3D spatial system. Interactions between 3D disturbance and each of the 2D energy-fields in the region are similar but separate and independent. Hence, conversion of matter into its 3D status takes place simultaneously in all 2D energy-fields passing through that region.

Each of the planes, in universal medium, may have varying numbers of free quanta of matter within gap in it. After their conversion to 3D status in each of the planes, all of them together constitute a 3D disturbance in 3D spatial system. A 3D disturbance exists simultaneously in as many planes as planes pass through it. Ejection and spinning efforts on a composite 3D disturbance are resultants of efforts in all planes of its existence. However, in following sections, interactions between part of 3D disturbance in a plane and one representative 2D energy-field in that plane are described. Since a 3D disturbance simultaneously exists in several 2D energy-fields, similar actions take place in all 2D energy-fields of its existence, separately and simultaneously. Combination of all these actions form resultant action on the disturbance.

**Shape of photon:**

Because of rapid movements and constant shifting of matter-content within its matter-core and rotation of its inertial-pocket, a photon cannot have a permanently fixed shape. However, Figures 4.2 and 4.3 show (imaginary) instantaneous shapes of matter-core of a stable photon.

Figure 4.2 shows isometric view of matter-core of a photon. It is disc-shaped with maximum thickness at its equatorial region and minimum thickness at polar and axial regions. Contour lines, on the surface of photon's matter-core, are shown only to highlight its shape. We may say that a photon's matter-core generally has a segmented spherical shape. Its diameter in median plane, about which photon spins, is its 'spin axis'. Ends of spin axis are photon's 'poles'. Considering a photon's matter-core as a part of an imaginary sphere, its 'equator' passes through its curved surface, midway between poles, as shown by dashed ellipse (not touching photon's matter-core) in figure.



Matter-core of photon
Figure 4.2

Figure 4.3 shows face view, cross sectional plan view and side view of a stable photon's matter-core. Matter-core has two segments on either side of spin axis. Segments of matter-core are not identical in size or shape. Each segment bulges to rear in relation to direction of instantaneous motion. Depending on magnitudes of convex bulges, gravitational actions (shown by arrows in cross sectional view in figure) vary to regulate photon's linear and spin motions. Contour of outer surfaces of segments are regulated by universal medium to provide required impetus for photon's motions, while balancing between internal and external pressures at every point in matter-core.

Each quantum of matter, in photon's matter-core, maintains its independence and separate identity. Though quanta of matter in a photon's matter-core are packed together, they have no mutual attraction other than feeble affinity between their matter-contents, in contact with each other. In their 3D status, within photon's matter-core, each quantum of matter is (somewhat) cubical or similar multi-faced volumetric shape and they have no definite ends in appearance. 2D plane for actions during its 2D status and axis for actions during its 1D status are chosen during reversion of quantum of matter into lower spatial states. Shapes of matter-contents of quanta of matter may vary as shape of photon's matter-core varies. At any instant, shape of photon's matter-core depends on balance between internal and external pressures around its outer surface.

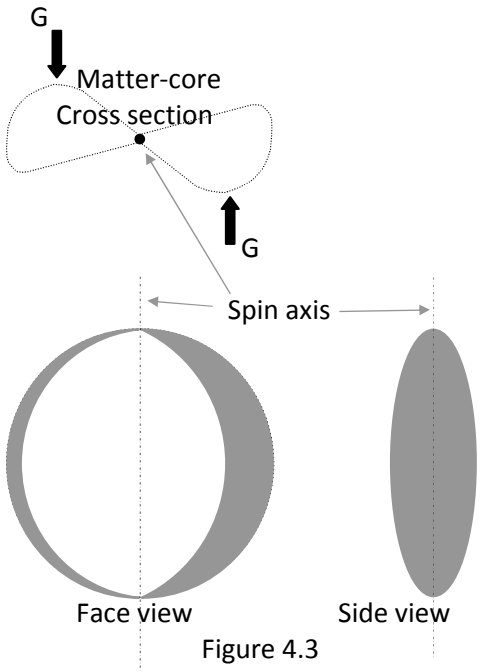


Figure 4.3

Quanta of matter in photon's matter-core are not arranged or linked in orderly fashion. Due to their independence, quanta of matter within a photon's matter-core continuously try to expand, spread-out and link together to form latticework-structure and be parts of 2D energy-fields. Quanta of matter in their 3D spatial states constitute a photon's matter-content. In a photon's matter-core, quanta of matter are held together by gravitational pressure on its outer surface.

Matter-core of photon is like stretchy balloon filled with flexible marbles. Marbles represent independent quanta of matter in their 3D state and gravitational pressure, all around photon's matter-core, provides the balloon. Because of this, matter-content of photon has fluid behavior within boundary of its matter-core. Depending on variations in gravitational pressure on its surface, shape of photon's matter-core is easily changed.

As a photon builds up its linear and spinning motions, its matter-content re-distributes and assumes appropriate shape as per physical laws, under action of external pressure, applied by universal medium. Shape, assumed by a photon's matter-core at any instant, is such that internal and external pressures always tend to remain in balance on every point on its surface. A photon, in its stable state, is free of any adhesion (mutually interactive effort) with 2D energy-fields of its existence. Should internal or external

pressure dominate, interaction develops between photon's matter-core and surrounding 2D energy-fields, to act as an adhesion between them. Parts of 2D energy-fields, in immediate neighborhood of photon's matter-core (inertial pocket), contain all necessary distortions, required for photon's sustenance as a stable and integrated 3D matter-particle.

Photons are generally classified according to quantity of matter, they contain. All radiations of matter – heat, light, X-rays, gamma rays and cosmic rays – are in the form of continuous flow of photons. Other than, for quantity of their matter-contents, matter-cores of all photons are identical in shape and radial size. Variations in quantities of matter-content produce differences in thickness of segments of photons' matter-cores. Photons may be further classified into clockwise spinning and anti-clockwise spinning photons, with respect to an external reference.

**Concepts of photon:**

Current concept of a photon is quite different from what is explained above. At present, a photon is considered as a quantum of energy or electromagnetic wave or particle (?) with zero rest mass. Mass of a matter-body depends not only on its matter-content (rest mass) but also on its linear speed. Hence, a photon moving at the speed of light should have infinite mass. In order to overcome this illogical result, it has become necessary to arbitrarily assume a photon as a mass-less entity.

Since photon is presently considered to have no rest mass, its mass should always remain zero irrespective of its linear speed. Momentum of a matter-body is related to its mass. Momentum is essential for a matter-body to do work. Yet, photons are found to do work on collision. In order to overcome these contradictions, even though they possess no rest mass, in mathematical equations, photon is also considered (simply) to possess certain momentum (in some cases, enough momentum to knock out orbital electrons from some atoms!). A photon is assumed to have no matter-content but carries only (undefined) energy, which can do work.

Contemporary theories also assume that matter is vested only in subatomic particles and larger matter-bodies, which have rest mass. How or from where this matter came into being is not explained. Hence the search for mysterious particles, which are believed to endow property of mass to matter-bodies.

Photon, in this concept, is a 3D matter-particle that has definite matter-content indicated by its rest mass. It also has associated work (energy, as explained in the following sections) which was instrumental to its creation and sustains its matter-core or which can do external work, on photon's disintegration. This part of associated energy is considered as mathematical equivalent of electromagnetic wave of same frequency as spin speed of photon's matter-core.

Distortions (equated to electromagnetic wave), associated with a photon, exist within surrounding universal medium but coupled with matter-core of each photon. Matter-core of photon is made of 'real' 3D matter. Matter-core of a photon and its associated inertial-pocket (distortions in surrounding universal medium) are developed and maintained by mutual actions.

Photon is the smallest 3D matter-particle that can exist independently and in reality. It is a physical (materialistic) entity that has objective reality in space. It is a corpuscle of light or any other similar radiation. All other 3D matter-particles and macro bodies are made of combinations of photons.

In this text, matter-part and distortion-part of photon are often treated separately. In such cases, term 'photon' is generally used to represent 3D matter-core of photon and term 'inertial-pocket' is generally used to represent distortions in surrounding universal medium, associated with photon's matter-core.

**Polarity of photon:**

Matter-core of a photon is a spinning disc of 3D matter. Axis of its spin is one of its diameters passing through center of matter-core. Direction of spin axis with respect to an external reference is 'polarity of photon'. End points of spin axis are photon's 'poles'. Spin motion of photon, about its spin axis, may be in either direction, clockwise or anti-clockwise, with respect to a reference. Hence, photons may have clockwise polarity or anti-clockwise polarity.

Polarity of a photon is set during formation or re-formation of its matter-core. External efforts may change it, during photon's unstable (by its matter-content) state. Photon's matter-core is most unstable at the instant of reflection from a reflecting-surface. By producing distortions in matter-field of reflecting-surface, at the point of incidence, polarity and direction of spin of a photon can be changed, during its reflection. Strong magnetic field applied at the place of reflection is found to change polarity of photon – similar to 'Kerr effect'..

For convenience, we may classify photons according to their direction of spin with respect to an external reference into 'clockwise spinning photons' and 'anti-clockwise spinning photons'. Depending on chosen reference, class of a photon may change.

In its unstable state (by matter-content), spin axis of a photon may develop independent turning motion in any plane under action of external efforts. Spin motion of photon provides its matter-core with rigidity in space (gyroscopic inertia). An external effort on its axis is likely to precess its axis instead of turning it. However, due to extremely small size of matter-core and very high spin speed of a photon, in most cases, external efforts may be considered as acting through its centre of matter-content, where precessional action does not develop.

## 4.5. Motion of photon:

Since space is only a functional entity, there can never be 'absolute motion' with respect to space. We cannot use intangible and unreal space as a reference. A reference point is real and no reference point can be located on unreal or imaginary entity. To define absolute motion, it is imperative to have an absolutely steady real entity as reference. When space is understood as entirely filled by universal medium, functional space is substituted by real universal medium. Universal medium (a combined real matter-body of infinite number of 2D energy-fields in all possible directions), being a real entity that fills entire space, can provide steady and real references to define absolute motion.

Every material body in universe moves with respect to some other material body. If universal medium is used as a reference, it can give us absolute motion of any 3D matter-body, with respect to a steady material body. Drawback with using universal medium as a reference is that universal medium is intangible by 3D spatial standards and unobservable by rational beings. However, there are absolutely steady reference points in universal medium (e.g.: centre of rotation of stable galaxy), which may be used to define displacements of large-scale macro bodies. For theoretical purposes, universal medium may be used as an assumed steady reference to relate displacements of smaller matter-bodies.

Due to their fluid nature, normally, 2D energy-fields themselves are not absolutely steady in universal medium. However, there are no large-scale movements of latticework-structures of 2D energy-fields. Due to moving distortions in latticework-structures of 2D energy-fields, there may be local movements of constituent quanta of matter within latticework-structures of 2D energy-fields in small regions of space. Usually, constituent quanta of matter of universal medium moves in place during their actions. Large-scale movements of latticework-structures of 2D energy-fields may be noticed during very large natural upheavals.

Nevertheless, 2D energy-fields in different directions, together, can provide a reference, as close as possible to an absolute reference in space. Nearest approximation to absolute motion that can be reached in nature is by a single photon moving through an absolutely homogeneous and isotropic region of 2D energy-fields. (Such a region may be found somewhere in the vast inter-galactic space, which is devoid of all other matter-particles, including 2D disturbances, electromagnetic radiations and photons (light radiations) other than the one photon considered).

Even after a photon leaves 2D energy-fields of its creation, it is acted upon somewhat in similar manner by other 2D energy-fields, of its existence at any time. A photon is a 3D matter-particle that is moving continuously and a plane of its matter-content exists in few 2D energy-field only for an instant. During this instant, matter-content in each of these

planes is moved through a small distance until ejection effort in that plane is balanced by reaction from distorted latticework-structure of 2D energy-field, on opposite side.

During next instant, same plane of matter-content occupies another 2D energy-field and its motion is repeated by ejection effort and reaction from latticework-structure of 2D energy-field in that plane. Similar repeated motions of matter-core (in all planes, passing through its matter-core) provide photon with its continuous motions in 3D space. Since space is filled with 2D energy-fields in all directions, matter-core of a photon, moving in space, can never escape being in few of the 2D energy-fields in universal medium and being acted upon by them.

Quanta of matter, contained in matter-core of a photon and converted into 3D status, are (real) 3D matter. Since a photon has matter-content, it has mass and obeys all inertial laws under all circumstances, like any other macro body. Unions of photons in various numbers and combinations make all other 3D matter-particles and macro bodies in nature. Since photons have mass, representing its matter-content, macro bodies also have mass due to their constituent photons. Consequently, there are no 'mass-less real bodies' in nature.

Matter-core of a photon is made of compressed quanta of matter. Quanta of matter have ability to revert to lower-dimensional spatial systems and to expand in their first-dimensional spatial system. Reversion from 3D state to 2D state increases their area by reduction in volume. Reversion from 2D state to 1D state increases their length by reduction in area. Tendency of quanta of matter (constituting a photon's matter-core) to expand into 1D spatial state is overcome by compression by gravitational pressure from universal medium, surrounding photon's matter-core. Therefore, matter-core of a photon, as a composite body of 3D matter, has no ability to move or to do any thing else on its own. It is an inert entity formed by 3D matter. So are all other 3D matter-bodies. Only external efforts can move them. External efforts for all actions on matter-cores of photons are provided by 2D energy-fields, each one in its own plane.

There are no singular 3D matter-bodies larger than photons. All other matter-bodies in nature are formed by groups of photons in various combinations. Following explanations deal with actions of one 2D energy-field on 3D matter-core of a photon, in its own plane. Similar actions take place in all 2D energy-fields in planes passing through a photon's matter-core. Actions, in all these planes together, constitute action on a photon in 3D space by universal medium. However, at many places in following explanations, actions are attributed directly to photons or other 3D matter-bodies, only for clarity of explanations. All movements and other actions attributed to photons, other 3D matter-particles or macro bodies in following sections are to be understood as actions by 2D energy-fields on matter-cores of photons (or on matter-cores of photons, constituting larger 3D matter-bodies).

### 4.5.1. Linear motion of photon:

All interactions between matter-core of photon and surrounding universal medium (outside photon's matter-core) explained below, are as they happen in any one plane, corresponding to a 2D energy-field, through which photon's matter-core moves during an instant. Simultaneous actions in all other planes, passing through photon's matter-core, are similar but they are separate in each of the planes.

Due to resultant ejection effort on its disc-face, ejected part of a 3D disturbance develops linear motion in a direction perpendicular to one of its disc-faces and transforms itself into matter-core of a photon. Once a photon becomes an independent entity and starts its spin motion, its linear displacement is no more perpendicular to its disc-face. Hence, we shall examine principle of linear motion of photon, while (for the present) ignoring its spin motion.

Let us assume matter-core of a photon as a stretchable balloon, filled with unattached flexible marbles. Flexible marbles represent quanta of matter in their 3D status. Balloon represents gravitational pressure holding constituent quanta of matter together and compressing them into their 3D states; thus making photon's matter-core a 3D disturbance (matter-particle). Let us also assume the matter-core of the photon is disc-shaped with slightly bulging faces.

Radial size of photon's matter-core is limited within critical limits by gravitation from latticework-structures of 2D energy-fields. Photon's matter-core being disc-shaped, its circular periphery always has convex curvature. Gravitation acts continuously all around circular periphery to compress photon's matter-core. Stable radial size of photon's matter-core is critical constant. Any variation is immediately stabilised by varying resultant of gravitational efforts at its circular periphery and internal pressure in matter-core.

Part of photon's matter-core in a plane is a 3D disturbance in the corresponding 2D energy-field. Due to difference in curvature of its disc-faces, a resultant gravitational effort (ejection effort) is felt by 3D disturbance. 3D disturbance tends to move in the direction of ejection effort. Forward displacement of 3D disturbance produces additional distortions in latticework-structure of 2D energy-field, in front. Due to (relative) flatness of forward disc-face, these additional distortions are unable to act (or magnitude of action is relatively lesser) on 3D disturbance.

As ejection effort on rear disc-face increases, distortions in latticework-structure of 2D energy-field in contact with 3D disturbance's forward disc-face increase. As and when ejection effort is able to provide sufficient impetus to move 3D disturbance by parting latticework-structure of 2D energy-field in front, it pushes 3D disturbance through a tear in latticework-structure of 2D energy-field in front of it. This push action is the result of 2D

energy-field's ability to act only at curved surfaces. Distortions in front of 3D disturbance are unable to act on flat forward surface of 3D disturbance, while distortions at its rear surface are able to act on 3D disturbance due to convex curvature of rear surface. 2D energy-field remains steady in space while 3D disturbance is pushed forward through tear in its latticework-structure.

Tear in the fabric of 2D energy-field is not a result of external effort on 3D disturbance. External (ejection) effort provides only a tendency for 3D disturbance to move forward. As soon as 3D disturbance gains tendency to move forward and intrudes into latticework-structure of a 2D energy-field, its constituent quanta of matter, which are being violated, withdraw from the path and produce gap for the 3D disturbance to pass through. As soon as 3D disturbance has passed through, gravitational actions in 2D energy-field compels latticework structure to restore its continuity.

As 3D disturbance's linear motion develops, parts of its matter-core (other than those parts where ejection effort is directly acting) lags behind. This produces continuous convex curvature on whole of rear side of 3D disturbance's matter-core, irrespective of direction of disc-faces. Increased convex curvature enhances gravitation on matter-core's rear side and thereby increases resultant ejection effort in forward direction. Matter-core now moves faster in same direction and this in turn increases ejection effort on it. In this manner, a newly created photon increases linear speed at an increasing rate (Term 'acceleration' is not applicable to displacement of a photon), until its linear speed reaches highest possible value that latticework-structures of 2D energy-fields can provide without causing their own breakdown.

Uneven curvature or different bulges of 3D disturbance's rear side may introduce differences in ejection effort at different parts. Push efforts of different magnitudes, felt by corresponding parts of matter-core in 3D disturbance, may cause those parts to move forward by additional displacement to produce curvature at 3D disturbance's forward side. Curvature at its forward end invites gravitational actions. Certain magnitude of ejection effort is produced at this end in opposition to linear motion of 3D disturbance. We may call this ejection effort as reaction from front, which acts as a resistance to motion of 3D disturbance under ejection effort from rear. Liner speed of a 3D disturbance is determined by resultant of ejection effort from rear and reaction or resistance from front.

As 3D disturbance is displaced forward through tear in latticework-structures of 2D energy-fields, quanta of matter in quanta-chains of latticework-structures of 2D energy-fields in front withdraw to either side of approaching 3D disturbance to make way for it to pass. Simultaneously, due to displacement of 3D disturbance in 2D energy-field, a gap is likely to be formed in its wake. However, gravitational effect of 2D energy-field compels its latticework-structure to close-in and fill up this gap, as it is being formed.

Due to convex curvature of 3D disturbance's rear end, latticework-structures of 2D energy-fields, closing-in to fill the gap in the wake of forward moving 3D disturbance, remain distorted. Distortion in 2D energy-field in conjunction with convex curvature of 3D disturbance continues to provide ejection effort to 3D disturbance as before. Gravitational effort remains active on rear side of matter-core of 3D disturbance, continuously. Ejection effort and linear motion of 3D disturbance continues indefinitely at a steady rate, appropriate to magnitude of distortions at the rear of 3D disturbance and its convex curvature. In case of photons, this linear speed is the highest that universal medium is able to provide.

Ejection effort on matter-core of a moving photon is always present. Should any part of photon's matter-core lags behind, with respect to other parts, the lagging part bulges backward to increase its convex curvature. Increased convex curvature causes higher ejection effort from the rear. In this way, changes in the shape of photon's matter-core, automatically corrects and maintains linear speed of its whole matter-core through universal medium (space).

Spin motion of a photon requires constant shifting of its matter-content within its matter-core. Constant shifting of matter-content necessitates continuous stabilization of its shape and linear speed. Constancy of photon's linear speed is maintained by regulating (resultant) convex bulge of rear surface of its matter-core. 2D energy-fields adjust their formation and distortions to regulate gravitation at any point on the surface of photon's matter-core. Latticework-structures of 2D energy-fields in universal medium are the sole agency, which produces and regulates motions of photons. Matter-content of photon provides a platform for actions by universal medium.

Another factor, controlling photon's linear speed is ability of 2D energy-fields to increase photon's speed. There is a limit to speed of movements of arms of latticework-squares of 2D energy-fields. Therefore, as linear speed of a photon increases, ability of 2D energy-fields to apply ejection effort onto photon's matter-core is reduced. This reduces efficiency of ejection effort to act. At certain critical maximum linear speed of photon's matter-core, with respect to universal medium, 2D energy-fields is unable to apply ejection effort onto photon's matter-core in the direction of its linear motion. At this stage, ejection effort stops acting on photon's matter-core. Photon's matter-core temporarily stops moving. As soon as this happens, ejection effort become fully effective and acts on matter-core to restore its linear speed. In this way, matter-core regulates photon's linear speed to a critical value. As long as photon continues to move at a critical maximum speed, ejection effort from its rear remains just sufficient to maintain its critical linear speed.

System of efforts, on matter-core of a photon, reach stable state only when external and internal pressures on every point on its surface balance each other. In this condition,

effective ejection effort on matter-core of photon is just sufficient to neutralize resistance to its motion from front and sustain its linear motion at highest possible (critical constant) linear speed.

Effectiveness of ejection effort is related to speed of photon. In its stable condition, speed of photon is little less than critical maximum speed. This difference is able to produce required efficiency of ejection effort to overcome resistance from front. This is how, a photon moves at a critical constant linear speed. Its magnitude is constant; only because that linear speed happens to be the highest possible linear speed, at which universal medium is capable to move a 3D matter-particle in it.

Should linear speed of photon's matter-core reduce, efficiency of ejection effort automatically increases to enhance photon's linear speed, even without an increase in ejection effort. Similarly, an increase in linear speed of photon's matter-core automatically reduces efficiency of ejection effort on matter-core to reduce photon's linear speed. Reduction in efficiency of ejection effort may be understood as increase in efficiency of resistance. Supremacy of resistance lowers linear speed of photon, even without a reduction in magnitude of ejection effort.

Direction of gravitational pressure on (circumferential) curved periphery of photon's matter-core is perpendicular to direction of its linear motion. Hence, it (and similar components of any other external efforts in directions differing from direction of photon's linear motion are not able to affect photon's linear speed. Gravitational pressure on curved periphery of photon's matter-core tends to compress its matter-content. Since matter-content of a photon is in fully converted 3D status, there are no gaps between its constituent quanta of matter. Matter-density of photon's matter core is equal to that of a quantum of matter. Consequently, its internal pressure is a constant.

As disc-size of photon's matter-core is reduced, jamming effect in latticework-structures of 2D energy-fields gradually reduces efficiency of gravitational pressure on it. It is at critical disc-size that reduced external pressure balances internal pressure of photon's matter-core. At this stage internal pressure of photon's matter-core is the highest in 3D spatial sysyem. Critical (radial) disc-size is common to matter-cores of all photons in nature, irrespective of their matter-content. It is the endeavor of gravitational actions on a photon to maintain its disc-size at the critical level at all times.

Photon's matter-core is pushed through all 2D energy-fields in front of it. Owing to latticework-structure of a 2D energy-field, movements of constituent quanta of matter in latticework-structures are transmitted to other quanta of matter all around, in latticework-structure of same 2D energy-fields. Limited movement of a part of 2D energy-field in any direction is transmitted through latticework-structure and back to the point of origin of motion. When such a transmission is completed, quanta of matter all around the point of original movement would have temporarily attained a stable condition.

This stable state is achieved either by transmitting relative motion of quanta of matter towards another part of latticework-structure of 2D energy-field in the direction of original motion or by canceling original motion, introduced into latticework-structure by moving quanta of matter, back to their original states. It is analogous to a macro body moving in a liquid. As the macro body moves forward by parting liquid, liquid at its rear closes-in to cover its track. Though macro body moves in liquid, there is no permanent translational motion of liquid in any direction.

Movement of a quantum of matter within latticework-structure of 2D energy-field moves neighboring quanta of matter also in same direction (axially or angularly). All movements of quanta of matter in 2D energy-field are against stabilizing reactions from its latticework-structure. As displacement of a quantum of matter is transferred to its neighbors, natural stabilizing efforts tend to bring them back to original relative positions. They may return to original places after transferring equal displacements to their neighbors. Thus, quanta of matter in a latticework-structure of a 2D energy-field remain in place while their displacements (movements) are transferred to their neighbors, in latticework-structure, one after the other.

Since effort (work) is already invested into universal medium by ejection effort to move photon in certain direction, relative motions of quanta of matter are also transferred along with photon's matter-core. Therefore, once photon has attained a stable state of linear motion, no further investment of work (energy) is required to maintain its motion at constant speed, through latticework-structures of 2D energy-fields. Required ejection effort on photon's matter-core is continuously supplied by distortions (maintained about it) in 2D energy-field. All motions and displacements of quanta of matter in latticework-structure, required to facilitate motion of the photon, are transmitted through universal medium along with matter-core of photon. No part of universal medium moves along with photon's matter-core, but only the distortions in latticework-structure are transferred.

There are numerous 2D energy-fields at different angles to direction of photon's linear motion. Photon's matter-core needs to move through them also. Since photon's matter-core is a 3D disturbance, during its passage through space, 2D energy-fields are parted for photon's matter-core. Leading edge of matter-core's periphery tends to divide quanta of matter, which happen to be on its path by intruding into their 1D matter-content. At the same time, quanta-chains in various directions move away from matter-core to widen the slit. As soon as such intrusion is about to take place, these quanta of matter by their inherent ability to withdraw to side of larger segment, moves away from photon's matter-core and opens a slit for photon's matter-core to pass through. Photon's matter-core passes through this slit.

Linear speed of photon is high enough so that distortions introduced into latticework-structures of 2D energy-fields (due to their parting) have no time to spread out much, before matter-core of photon moves out of them. Immediately after photon's matter-core passes through the slit, displaced quanta of matter in latticework-structure regain their places, to close partitions in 2D energy-fields and to restore their continuity, without affecting latticework-squares, far from passage. Effects in 2D energy-fields are retained in close proximity of photon's matter-core.

At steady linear speed, average curvature on rear (disc) surface of a photon's matter-core is just enough to create sufficient ejection effort to overcome resistance to its linear motion, due to curvature of its forward surface. Critical magnitude of linear speed of a photon is such as to receive required ejection effort from 2D energy-fields of its existence. It is slightly less than maximum possible speed of motion of quanta of matter in latticework-structures of 2D energy-fields.

After state of constant linear speed is attained, photon's matter-core may be considered to have no further interaction with 2D energy-fields of its existence. All distortions, produced in 2D energy-fields is association with matter-core of a photon, to create conditions for its stable existence and constant speed motion, move along with photon's matter-core at same linear speed. It may be noted that it is this 'pocket of distortions' in universal medium (apparent electromagnetic wave), within which matter-content of photon exists and which is being transmitted along the direction of photon's linear motion. Matter-core of the photon is carried within this pocket at a steady linear speed.

Therefore, (linear) motion of photon is an action of universal medium and not an action of matter-content of photon. Distortions in latticework-structure of 2D energy-fields are produced and transferred through universal medium, due to presence of 3D disturbance. Matter-content of 3D disturbance is carried along with these distortions. Matter-content of 3D disturbance − (photon's matter-core) − is the reason for distortions and it provides platform for actions of distortions. Other than changes in its physical shape, matter-core of a photon does not undergo any other changes. Matter-core acts as a catalyst for actions of universal medium.

We can say that, once stable conditions are reached, a photon moves at a constant linear speed under its own inertia. Inertia of photon is provided by its own inertial field, called 'inertial-pocket'. Inertial-pocket of a photon is the region in universal medium, where distortions (in latticework-structures of 2D energy-fields) required for creation and maintenance of photon's matter-core is stored. In stable condition, photon does not interact with 2D energy-fields (beyond its immediate neighborhood) and thus serenity of universal medium is restored. All distortions created in universal medium, for the sake of photon's creation, stability and motion, move together with photon's matter-core. As

long as no instability develops, no further modification is done on inertial-pocket (other than its own periodical variations).

Distortions in latticework-structures of 2D energy-fields, forming inertial-pocket of a photon, are transferred through universal medium at very high linear speed, at which they are unable to spread out in universal medium. Photon would have passed through a 2D energy-field before this can happen. It is as if the 3D disturbance, which caused production of distortions in universal medium and converted itself into a photon is altogether removed from universal medium. Thus, aim of universal medium's inherent property to reduce any disturbance within itself to minimum (on a large scale) is fulfilled by creating and maintaining a photon.

In order to maintain its detachment from universal medium, it is necessary for matter-core of a photon to maintain instantaneous variations of its shape as required to move at a constant linear speed and to spin at an angular speed proportional to its matter-content. This is achieved by periodical variations, introduced into its inertial-pocket. Motion of a photon is with respect to universal medium and depends only on the nature and density of universal medium, through which it is moving at any time.

Inertial-pocket, carrying a photon's matter-core, is transferred through universal medium. In this, it is the distortion-field (inertial-pocket) in universal medium that is being transferred and not any part of universal medium. Hence, universal medium is steady and only matter-core of photon is pushed through universal medium by the moving inertial-pocket. This is analogical to current explanation on method how pressure or 'energy' is transmitted through a medium in the form of waves. No part of medium has translational motion but waves appear to move in the direction of transmission of 'energy' and pressure.

**Stabilizing mechanism:**

Figures 4.4, 4.5 and 4.6 show cross sections of matter-core of a hypothetical photon (that does not spin) in a plane passing through its spin axis and perpendicular to and containing line of photon's linear motion. Figures are not to scale. Sizes and bulges are highly exaggerated. They are intended to show only the principle of stabilisation of a photon's linear speed. Gray figures show cross sections of matter-core of photon. Black arrows represent average magnitudes of gravitation in the form of various efforts acting on matter-core. Dashed outlines in figures 4.5 and 4.6 show relative sizes and shapes of matter-core of same photon, when it is stable and moving at its critical linear speed, for comparison.

Figure 4.4 shows status of cross section of a stable photon's matter-core, moving to the right. Gravitational actions all around disc-shaped matter-core, shown by representative vertical black arrows, maintain critical radial size of matter-core.

Magnitudes of gravitational efforts, acting on disc-faces, depend on magnitudes of their convex curvatures. Rearward disc-face of matter-core bulges outward by greater magnitude and thus provides greater convex curvature, compared to forward disc-face. Gravitational effort from rear is greater and hence in figure it is marked as 'ejection' effort. Forward disc-face, having lesser convex curvature, receives less gravitational effort. This, being in opposite direction to linear motion of photon, it is marked as 'resistance'. Resultant of ejection effort and resistance acts to move matter-core of photon in linear path. As long as parameters of photon's matter-core does not vary, in a homogeneous universal medium, magnitudes of efforts from all sides remain constant and maintain photon's linear speed at constant magnitude, with respect to surrounding universal medium.

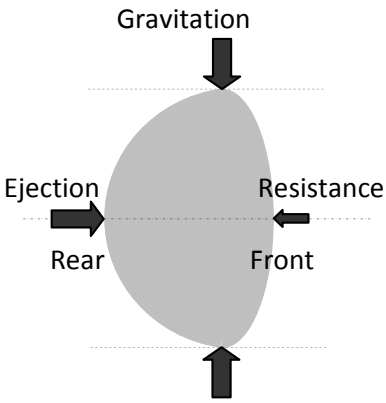


Figure 4.4

Various efforts, mentioned above, do not act as we consider normal 'forces' in mechanics. It is the transfer of distortions in universal medium, which acts to move photon's matter- core, along with them. Movement is directly imparted to matter-core rather than by external 'force' acting on it to move. Hence, phenomena of acceleration, velocity, motion, etc. do not apply in case of photon's linear motion, in the same sense as we use in mechanics.

A photon's matter-core moves in space, with respect to universal medium, which fills entire space. In fact, photons do not move at all with respect to their surrounding distortions in universal medium. Transfer of distortions (inertial-pockets) within universal medium carry photon's matter-core with them, thereby affecting photon's displacement in space.

Distortions, surrounding photon's matter-core, tend to re-distribute, so that universal medium can re-gain its homogeneity. During re-distribution, distortions are transferred in the direction of region with lesser distortion-density from region with higher distortion-density, while universal medium itself does not move. In reality, redistribution of distortions around photon's matter-core is a continuous process so that at any instant matter-core's radial size, shape, linear speed and spin speed are maintained at critical values.

Distortions in universal medium (in inertial-pocket, surrounding photon's matter-core) are creation of matter-core's shape. Therefore, wherever photon's matter-core moves in universal medium, similar distortions are surrounding it. In other words, as long

as photon's matter-core is in existence, surrounding universal medium will have similar distortions and these distortions carry matter-core at a constant linear speed, indefinitely. As matter-core of the photon moves along with surrounding distortions in steady universal medium, we may relate photon's motion to steady universal medium, outside its inertial-pocket. Magnitude of linear speed depends on parameters of photon's matter-core and nature of universal medium in that region of space. As long as these remain steady, linear speed of photon (light or similar radiations of matter) remains constant with respect to absolute reference, provided by universal medium.

To understand mechanism of stabilisation of linear motion of a photon, let us consider deliberate reduction in matter-content of a stable photon, which was moving at a constant linear speed, through a homogeneous region of universal medium. Envelope of a photon's matter-core is provided by surrounding gravitational pressure. In a stable photon, external pressure at any point on surface of its matter-core is always balanced by internal pressure. Pressure difference, required to maintain balance between internal and external pressures depend on curvature at interface between them. Reduction in matter-content in matter-core reduces internal pressure of photon's matter-core, (at the instant) just before gravitational efforts commence their action on it. Gravitational pressure all-around matter-core assert all-around and reduce radial size of matter-core, as shown in figure 4.5. Compare radial size of matter-core shown in grey with its original radial size shown in dashed outline.

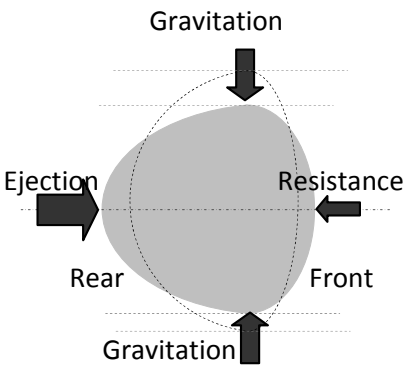


Figure 4.5

Figure 4.5 represents actions of gravitational pressures on photon's matter-core that has lost part of its matter-content. Gravitational action reduces radial size of matter-core from all around until external and internal pressures are balanced at every point on its surface. Radial size is reduced due to deduction in quantity of matter it contains. Internal pressure of matter-core is restored to its original value.

Reduction in radial size reduces areas of disc-faces of matter-core, which in turn, reduces ejection effort and corresponding resistance. Resultant effort, moving photon's matter-core, reduces. Photons matter-core tends to slow down. Actions from latticework-structures of 2D energy-fields tend to restore linear speed of photon by re-shaping its matter-core. This necessitates increase in curvatures of disc-faces, as shown in figure. Increase in curvatures of forward and rearward faces off-set balances between external and internal pressures at respective disc-faces. Increase in curvatures increases magnitudes of gravitational action at disc-faces.

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

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

Let us consider deliberate increase in matter-content of a stable photon's matter-core, which was moving at a constant linear speed through a homogeneous region of universal medium. Envelope of a photon's matter-content is provided by surrounding gravitational pressure. In stable photon, external pressure at any point on surface of its matter-core is always balanced by internal pressure in it. Increase in matter-content enhances matter-core's radial size and thickness.

Increase in radial size increases areas of disc-faces of matter-core, which in turn, increases ejection effort and corresponding resistance. Resultant effort, moving photon's matter-core, increases. Photons matter-core tends to move faster. Actions from latticework-structures of 2D energy-fields tend to restore linear speed of photon by re-shaping matter-core. This necessitates reduction in curvatures of disc-faces, as shown in figure. Reduction in curvatures of forward and rearward disc-faces off-set balances between external and internal pressures at respective disc-faces. Reduction in curvatures reduces magnitudes of

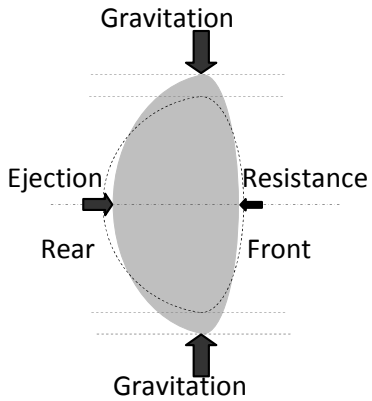


Figure 4.6

gravitational action at disc-faces. Gravitational pressure all-around matter-core is off-set to increase matter-core's radial size, as shown in figure 4.6. Compare radial size of matter-core shown in grey with its original radial size shown in dashed outline.

Radial size of matter-core increases. Radial enlargement reduces curvatures of both rearward and forward disc-faces. As curvature of rearward disc-face is much greater, compared to curvature of forward disc-face, it will require greater external pressure to balance internal pressure. Greater reduction in curvature of its rearward disc-face reduces magnitude of gravitation by greater magnitude, compared to lesser reduction in magnitude of gravitation due to lesser reduction in curvature of its forward disc-face. Resultant of actions tends to move photon at slower linear speed.

Gravitational actions from front (resistance) and from rear (ejection effort) have reduced. Reduction in these two efforts, together, let gravitational action at matter-core's circular periphery to compress matter-content and thereby reduce radial size of matter-core back to its critical radial size. As radial size of matter-core is reduced to its critical size, matter-core of photon re-shapes to reverse reduction in ejection effort and stabilise photon's linear speed. Gain of matter-content would result only in an increase of matter-core's thickness. By the time external and internal pressures are in balance, relation between ejection effort and resistance would have changed to provide correct magnitude of resultant action to move photon at its critical linear speed.

If variations in linear speed of a photon are beyond capability of gravitational stabilizing actions to restore or lasts for more time, quantity of matter-content in its matter-core may be manipulated as given in section 4.7.

### 4.5.2. Spin motion of photon:

Asymmetry of ejection effort about center of matter-content of a 3D disturbance initiates its spin motion about one of its diameter, during its conversion to a photon. As photon's matter-core starts to spin, centrifugal action moves matter-content towards its equatorial circumference, until centrifugal action is balanced by gravitational pressure on matter-core's circular periphery. Since radial size of stable photon's matter-core cannot increase beyond critical disc size, thickness at its equatorial circumference increases to accommodate photon's matter-content.

Photon's disc-shaped matter-core is segregated into two segments about its spin axis. In due course of its stabilization, matter-core of a photon acquires a segmented spherical shape. Thicknesses of its segments are negligibly smaller compared to their radii. Each segment has maximum thickness at equatorial circumference and minimum thickness at poles and along spin axis. Spread of matter-content – thicknesses at equatorial circumference – is proportional to matter-content in matter-core. If photon was without its linear motion, each segment of matter-core would tend to balance efforts on them by

reshaping and attain a constant angular velocity, irrespective of its matter-content, depending on nature of surrounding universal medium.

Inertial-pocket of photon produces spin motion of its matter-core. To spin photon's matter-core, distortions in inertial-pocket have to rotate around matter-core. While distortions are revolving around photon's spin axis, they carry segments of photon's matter-core with them. Spin motion of photon is mainly produced by distortions in those 2D energy-fields, which are in planes perpendicular to both photon's spin axis and direction of its linear motion. Hence, directions of motion of distortions in inertial-pocket, producing photon's spin motion, are in planes perpendicular to both its spin axis and direction of its linear motion.

While rotating about photon's matter-core, distortions in inertial-pocket also transfer in linear direction along with photon's matter-core. Combined motion of inertial-pocket (simultaneous linear and spin motions) bestows a photon with its apparent (transversal) wave characteristic.

With photon's matter-core in spin motion, gravitational pressure by universal medium, as ejection effort from rear and resistance from front of curvature along the length of cylindrical matter-core are different in magnitudes. Spin motion and subsequent apparent centrifugal actions create two segments of photon's matter-core, one on each side of its spin axis. Stabilizing actions of both segments are similar.

If a photon is devoid of its spin motion, its shape would be like a circular disc of critical disc-size (ignoring impossibility to maintain its corners). As its radial size is limited to a critical value, thickness of such a disc-shaped matter-core is proportional to its matter-content. It is cylindrical in shape. Length of cylinder is thickness of its matter-core. Corners of this cylinder, where its disc-faces meet curved surface along its perimeter, are at right angles. Curvatures of corners are too high for internal and the external pressures in matter-core to balance. Therefore, tendency of phenomenon like 'surface tension', provided by gravitational pressure, tends to flatten these corners. Surface, along length of cylindrical matter-core, has a tendency to curve outward. Hence, ends (circular peripheries) of segments of matter-core tend to become semi-circular shape.

Figure 4.7 shows cross section of matter-core of a photon, at its equatorial plane (looking from one of its poles). Rectangle in dashed line shows cross section of photon's matter-core, in its (assumed) non-spinning state. It is cylindrical in shape. Fan-blade shaped figure in dotted line shows cross section of matter-core's shape after its transformation. It has two segments on either side of its spin axis. Spin axis is shown by black point in centre (viewed from one of its end). Overall shape of matter-core becomes segmented-spherical. Grey dashed circle around transformed matter-core shows its equator. Block arrows on equator show direction of photon's spin. Black arrows show spin effort and resistance of corresponding segment.

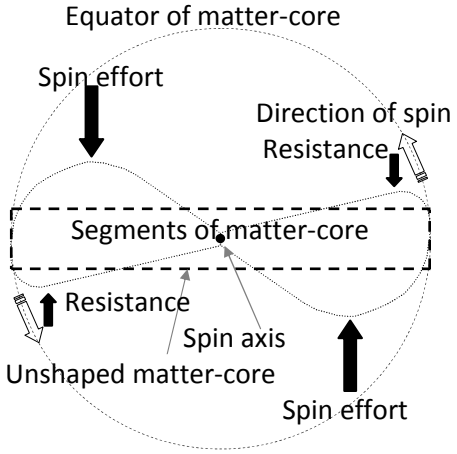


Figure 4.7

Each segment of photon's matter-core, on either side of its spin axis, undergoes identical stabilizing actions. Stabilization of both segments takes place separately and simultaneously. Ignoring linear motion of photon, actions on one of its segments are given below.

At its non-spinning stage, disc-faces of photon's matter-core being flat and photon's matter-density being at highest level, gravitational efforts cannot act on disc-faces of matter-core. When spin motion of matter-core is initiated balance of external efforts on matter-core changes. Let us consider actions on one segment of matter-core.

As matter-core starts to spin, resistance to its motion from front increases. Excess gravitational pressure applied on forward disc-face of segment tends to push matter-content rearward. Rearward movement of matter-content may cause a bulge at rear disc-face of segment and increase its convex curvature. Increase in convex curvature creates additional spin effort on photon's matter-core. Photon's spin speed increases and thereby increases gravitational pressure on forward disc-face of segment. This process continues until spin effort from rear of segment of matter-core and resistance from front reach a stable state and balance each other.

Simultaneously, centrifugal action on matter-core of photon moves matter-content towards equatorial region of its periphery. Outer edge of segment, in equatorial region, becomes thicker than region near spin axis. Corners of cylindrical disc, where circular perimeters meet disc-face, tend to flatten – angles or corners reduce to curve side of disc-shaped matter-core. Excess gravitational pressure, due to spin motion, applied on forward end of curvature (along length of cylindrical matter-core) pushes matter-content rearward and helps to enhance bulge at rear disc-face of segment. This process continues until curvature of side (length) of photon's cylindrical matter-core reaches a stable state, when spin effort and resistance to spin motion balance each other.

Centrifugal action, needed to create similar curvature along length of cylindrical surface of disc-shaped matter-cores of different matter-contents, depends on their thicknesses. Thickness of photon's matter-core is proportional to its matter-content. Hence, to attain a balanced state, photon of higher matter-content needs to spin faster than photons of lower matter-content. [This is not true for photons of excessively large

matter-content level, due to changes in shapes of their surfaces]. For all other photons, spin speed – hereafter called, 'frequency' – of a photon can be taken as proportional to its matter-content.

Photons with very high matter-content are extremely rare. They could be produced only in extremely volatile and chaotic conditions. For all practical considerations, matter-cores of photons, encountered in nature, have very small thickness. Angular size of segments of matter-core of photon of frequency of $10^{10}$ Hz is much less than one degree of arc, each. Departure of excessively high frequency photon's spin speed from being proportional to its matter-content makes it unstable and liable to disintegrate.

Frequency of photon in its stable state is such that time taken for matter-core of any photon to spin through one plane (2D energy-field) is same, irrespective of its matter-content. Hence, a photon with higher matter-content (thicker segments) has to spin faster. A photon with no matter-content (rest mass) does not spin or it has no matter-core to spin. That is, its frequency is zero.

A hypothetical photon with maximum possible matter-content in 3D spatial system, with perfectly spherical matter-core (presumably on the verge of being converted into fourth dimensional spatial system) should theoretically spin at maximum possible speed. But, since there is no segmentation in its matter-core, no spin effort can be produced about it.

Spin motion of a photon with higher matter-content, being at very high frequency, produces large centrifugal action in its matter-content. Centrifugal action causes matter-content of high frequency photon to accumulate towards its equatorial circumference and thus increasing photon's thickness at outer edges of segments. Therefore, disc-faces of photon's matter-core make large divergence angle from its median plane. Owing to large angular divergence, ejection efforts produced at these disc-faces are no more at right angle to median plane of photon. Consequently, component of ejection effort, producing linear motion of photon diminishes. Photon tends to slow down from its critical linear speed. Lower linear speed makes them unstable and encourages reversion of quanta of matter from their matter-contents, gradually, back into universal medium. Such photons are only of theoretical interest.

**Stabilizing mechanism:**

Figures 4.8, 4.9 and 4.10show cross sections of a segment of spinning matter-core of a photon, in equatorial plane perpendicular to spin axis. Figures are not to scale. Sizes and bulges are highly exaggerated. They are intended to show only the principle of stabilisation of a photon's spin speed. Gray figures show one segment each of matter-core of photon. Black arrows represent average magnitudes of gravitational effort in the form of various efforts acting on forward and rearward disc-faces of segments. Figures,

shown in dotted line in figures 4.9 and 4.10, are segments of same matter-core, in stable state of spin motion, given for comparison. Curved arrows in dashed line show direction of photon's spin.

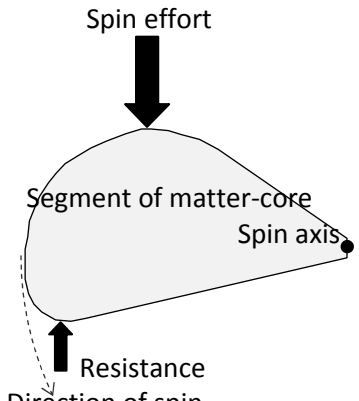


Figure 4.8

Figure 4.8 shows status of shape of cross section of a segment of anti-clockwise spinning matter-core. Gravitational actions all around segmented matter-core, including spin effort and resistance (shown by representative black arrows) maintain critical radial size of segmented matter-core. Magnitudes of gravitational efforts, on disc-faces to provide spin effort and resistance, depend on magnitudes of their convex curvatures. Rearward disc-face of segment bulges by greater magnitude and thus provides greater convex curvature, compared to bulge of forward disc-face. Gravitational effort from rearward disc-face is greater and hence in figure it is marked as 'spin' effort. Forward disc-face, having lesser convex curvature, receives less gravitational effort. This, being in opposite direction to spin motion of photon, it is marked as 'resistance'. Resultants of spin effort and resistance on both segments act to spin matter-core of photon in anti-clockwise direction (as in figure). As long as parameters of photon's matter-core does not vary, in a homogeneous universal medium, magnitudes of efforts from all sides remain constant and maintain photon's spin speed at constant magnitude, with respect to surrounding universal medium.

Various efforts, mentioned above, do not act as we consider normal 'forces' in mechanics. It is the rotational transfer of distortions in universal medium, which acts to spin photon's matter-core, along with them. Movement is directly imparted to matter-core rather than by external 'force' acting on it, to move. Hence, phenomena of acceleration, velocity, motion, etc. do not apply in case of photon's spin motion, in the same sense as we use them in mechanics.

Photon's matter-core rotates in space, with respect to universal medium, which fills entire space. In fact, photons do not spin at all with respect to their surrounding distortions in universal medium. Rotational displacements of distortions (inertial-pockets) within universal medium carries photon's matter-core with them, thereby affecting photon's spin motion in space.

Distortions, surrounding photon's matter-core, tend to re-distribute in latticework-structures of 2D energy-fields, so that universal medium can re-gain its homogeneity. During re-distribution, distortions are transferred in the direction of region of lesser

distortion-density from region of higher distortion-density, while universal medium itself does not move. In reality, re-distribution of distortions, around photon's matter-core, is a continuous process so that at any instant matter-core's radial size, shape, linear speed and spin speed are maintained at critical values.

Distortions in universal medium (in inertial-pocket, surrounding photon's matter-core) are creation of matter-core's shape. Therefore, wherever photon's matter-core spins in universal medium, similar distortions are revolving along with it. In other words, as long as photon's matter-core is in existence and spinning, surrounding universal medium will have similar distortions and these distortions rotate matter-core at appropriate spin speed, indefinitely.

As matter-core of photon spins along with surrounding distortions in steady universal medium, we may relate photon's spin motion to steady universal medium. Magnitude of spin speed depends on parameters of photon's matter-core and nature of universal medium in any region of space, in which photon exists. As long as these remain steady, spin speed (frequency) of a photon (light or similar radiations of matter) remains constant for stable magnitude of matter-content, with respect to absolute reference provided by universal medium.

To understand mechanism of stabilisation of spin motion, about a photon, let us consider deliberate reduction in matter-content of a stable photon, which was spinning at a constant spin speed in a homogeneous region of universal medium. Envelope of a photon's matter-core is provided by surrounding gravitational pressure. In stable photon, external pressure at any point on surface of its matter-core is always balanced by its internal pressure. Pressure difference, required to maintain balance between internal and external pressures, depends on curvature of interface between them.

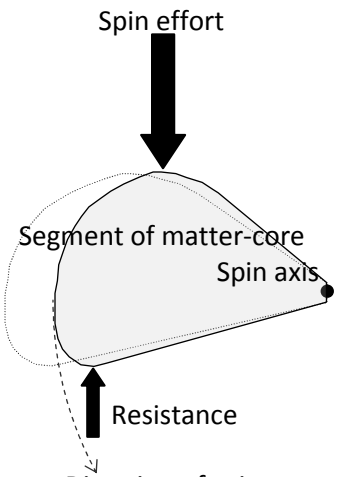


Figure 4.9

Reduction in matter-content reduces internal pressure of photon's matter-core, during the time before gravitational efforts commence their action. Gravitational pressure, all-around, asserts and reduces radial size of matter-core, as shown by one segment in figure 4.9. Compare disc-size of matter-core shown in grey with its original disc-size shown in dotted outline.

Reduction in radial size increases curvatures of disc-faces of matter-core, which in turn, increases spin effort and corresponding resistance, as shown by black arrows. Resultant spin effort increases photon's spin speed. Increased spin motion increases

centrifugal action on matter-content. Matter-content in segment, shown in figure, spreads outward (leftward as shown in figure). Actions from latticework-structures of 2D energy-fields tend to restore critical radial size of matter-core. In doing so, thickness of segment, along with its curvatures of forward and rearward disc-faces reduce. Lower curvatures of disc-faces of segment reduces, both, spin effort and resistance. Spin speed of photon reduces to value corresponding to its matter-content.

Loss of matter-content would result in reduction of segment's thickness and reduction in photon's spin speed. By the time external and internal pressures are in balance, relation between spin effort and resistance would have changed to provide correct magnitude of resultant action to spin photon at a steady spin speed, proportional to its matter-content.

Let us consider a deliberate increase in matter-content of a stable photon, which was rotating at a constant spin speed in a homogeneous region of universal medium. Envelope of a photon's matter-content is provided by surrounding gravitational pressure. In stable photon, external pressure at any point on surface of its matter-core is always in balance with internal pressure in it. Pressure difference, required to maintain balance between internal and external pressures, depend on curvature of interface between them.

Increase in matter-content enhances matter-core's radial size and thicknesses of its segments. Gravitational pressure, all-around matter-core, is off-set to increase matter-core's radial size, as shown in figure 4.10. Compare thickness of segment shown in grey with its original thickness shown in dotted outline.

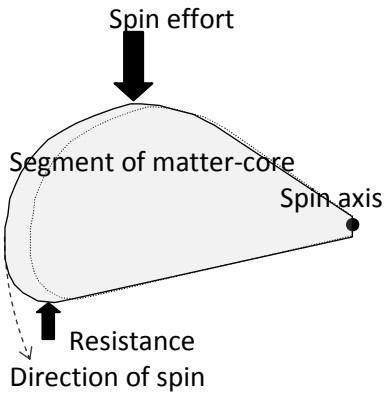


Figure 4.10

Radial size of matter-core increases. Radial enlargement reduces curvatures of both rearward and forward disc-faces of segments. As curvature of rear disc-face of segment is much greater, compared to curvature of front disc-face, it requires greater external pressure to balance internal pressure. Greater reduction in curvature of segment's rear disc-face reduces magnitude of gravitation by greater magnitude, compared to lesser reduction in magnitude of gravitation due to lesser reduction in curvature of segment's forward disc-face. Resultant of actions tends to rotate matter-core of photon at slower spin speed.

Reduction in spin speed reduces centrifugal action in matter-content of photon. Gravitational actions from front (resistance) and from rear (spin effort) also reduce. Reduction in magnitudes of these two efforts, together, lets

gravitational action at matter-core's circular periphery to compress matter-content and thereby reduce radial size of matter-core, back to its critical radial size. As radial size of matter-core is reduced to its critical size, thickness of segments of matter-core increases and universal medium re-shapes segments to increase curvatures of forward and rearward disc-faces. Increased curvatures of disc-faces increase spin speed of photon to correspond to its current matter-content.

Gain of matter-content would result in an increase of thickness of matter-core's segments and an increase in spin speed of photon. By the time external and internal pressures are in balance, relation between spin effort and resistance would have changed to provide correct magnitude of resultant action to spin photon at steady spin speed, corresponding to its (enhanced) matter-content.

If variations in spin speed of a photon are beyond capability of gravitational stabilizing actions to restore or lasts for more time, quantity of matter-content in its matter-core may be manipulated as given in section 4.7.

## 4.6. Stable photon:

After initial period of formation, unless affected by external efforts, photon reaches a stable condition. In this state, internal pressure of photon's matter-core (due to expanding nature of constituent quanta of matter and centrifugal action), at any instant, is in balance with external pressure applied by inertial-pocket in surrounding universal medium, on every point on its surface. Free photon would be moving at a constant linear speed and spinning at a spin speed, proportional to its matter-content.

Because of this balanced condition, there is no interaction between photon and surrounding universal medium. All actions about a photon become, natural, self-sustaining and in tune with inherent actions of its inertial-pocket, without affecting external universal medium. Any change in parameters of photon is immediately rectified by stabilizing actions from universal medium. Stabilization and stable states, in relation to linear and spin speeds of photon, are similar and automatic. Hence, we shall concentrate on stable state of photon in relation to its linear speed.

Figure 4.11 shows latticework-structure of a 2D energy-field in a plane, occupied by matter-core of a photon. Compared to matter-core of photon, represented in figure, sizes of quanta of matter in latticework-structure of 2D energy-field are highly exaggerated and they are not drawn to scale. Oval shaped figure in the middle shows median disc plane of photon's matter-core (side view).

2D energy-field's latticework-squares, in immediate neighborhood of photon's matter-core, are deformed. Similar deformations in latticework-structures of all 2D energy-fields (in all planes occupied by photon's matter-core), together, produce

photon's inertial-pocket. Part of inertial pocket in the plane represented in figure is shown by shaded region around photon's matter-core.

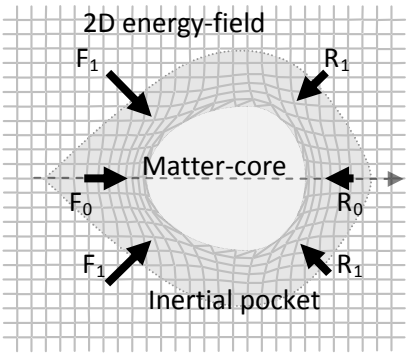



Figure 4.11

Inertial-pocket of photon is transmitted at critical constant linear speed through universal medium. Matter-core of photon is carried along with its inertial-pocket. Resultant gravitational compressions, required to produce displacements of quanta of matter to form inertial-pocket in 2D energy-field, represents external efforts on photon's matter-core. Representative resultant efforts ($F_0$, $F_1$, $R_0$ and $R_1$) applied from six directions are shown by dark arrows. Thin long arrow in dashed line shows direction of motion of inertial-pocket and that of photon's matter-core.

Efforts from either side of photon's line of motion, in any plane, are equal. Components of efforts, applied perpendicular to line of photon's motion, neutralize each other. Components of efforts, along the line of motion, produce resultant external effort on photon's matter-core. It is this resultant effort, which is driving photon's matter-core forward. As resultant effort is acting in a straight line, direction of motion of photon is along this straight line.

Ejection effort, in the direction of motion of photon (represented by $F_0$ in figure), acts against resistance (represented by $R_0$ in figure) from front of photon's matter-core. Ejection efforts on rear parts of photon's matter-core provide moving effort. Ejection efforts on front parts of photon's matter-core provide resistance. Ejection effort from rear overcomes resistance from front to move photon's matter-core, by parting latticework-structure in front. After passage of photon's matter-core, gaps created in latticework-structures of 2D energy-fields by its passage are closed and continuity of universal medium is restored.

Reactions (gravitational actions) from deformed latticework-structure maintain radial size and internal pressure of photon's matter-core. Components of reaction applied on photon's matter-core, in the direction of its motion produce necessary ejection effort and in opposite direction they produce necessary stabilizing resistance. These two, together control and limit linear speed of photon.

Components of ejection efforts, $F_1$, and resistances, $R_1$, applied perpendicular to photon's line of motion, from both sides of matter-core, maintain steady direction of photon's linear motion. When components of ejection efforts or resistances from both sides of photon's line of motion are equal, they (being in opposite directions) neutralize

each other and there is no effect on direction of photon's motion. Change in them changes direction of photon's linear motion.

**4.6.1. Stability of straight-line path:**

Infinite number of quanta-chains constitutes latticework-structure of a 2D energy-field. Half of them are positioned perpendicular to the other half. For easy reference, let us say quanta-chains in a 2D energy-field are positioned in horizontal and vertical directions in every plane. These quanta-chains help each other to maintain their straight-line (single-dimensional) character. By doing so, stability of 2D energy-field is maintained by constant interactions.

Presence of a photon, in the plane of a 2D energy-field, breaks continuity of quanta-chains, where matter-core of photon is present. Due to continuous action of gravitation, junctions in latticework-structure of 2D energy-field, around matter-core of a photon, may be considered as sticking to photon's matter-core.

Photon's matter-core is under continuous linear motion. As it moves through 2D energy-field, ends of quanta-chains (stuck to photon's matter-core) appear as if they are pulled in the direction of photon's motion. (In reality, it is the distortions in 2D energy-fields, which push and cause of photon's motion. We are assuming the opposite, to make the phenomenon easier to visualize). Ends of all quanta-chains, perpendicular to direction of photon's motion and in contact with matter-core of photon, bend in the direction of photon's motion. Bending of a quanta-chain displace of quanta of matter in latticework-structure of 2D energy-field.

By their inherent property, quanta-chains tend to maintain their 1D status. Displacements of quanta of matter in 2D energy-field invoke reactions at junctions of quanta of matter in latticework-structure. Magnitudes of reactive efforts depend on curvature of quanta-chains. Higher curvature of quanta-chain invokes higher reaction and lower curvature invokes lesser reaction.

A quanta-chain in a latticework-structure, maintains its stability by the help of all other quanta-chains in same 2D energy-field. A quanta-chain extends infinitely in space, unless its continuity is broken by presence of disturbances. Attempt to displace any part of a quanta-chain, in space, is opposed by reactions applied at all junction-points in it. We may say that a quanta-chain is anchored in latticework-structure and strength of its anchoring depends on extent of 2D energy-field.

Presence of a photon breaks continuity of quanta-chains, passing through space occupied by its matter-content. Quanta of matter, near the point of discontinuity in quanta-chain, are anchored only to one side of quanta-chain. Loss of anchoring on one end of broken quanta-chain makes it easier for displacement of quanta-chain, near breakage.

Figure 4.12 shows parts of matter-cores of three photons. Photon I on the left travels in a curved path, indicated by curved arrow on it. Convex side of its path is upward, as shown in figure. Photon II (in the middle) travels in a straight line. Straight arrow shows direction of photon's path. Photon III on the right travels in curved path. Concave side of its path is upwards as shown by curved arrow on it.

Representative vertical quanta-chains, shown by three curved lines, one each in contact with sides of matter-cores of photons are anchored in vast 2D energy-field, represented by horizontal lines. Only three representative quanta-chains (one for each photon) in vertical direction are shown in figure. Few representative horizontal quanta-chains are shown at the bottom of figure in grey lines. Actions of horizontal quanta-chains to maintain stability of vertical quanta-chains are not discussed.

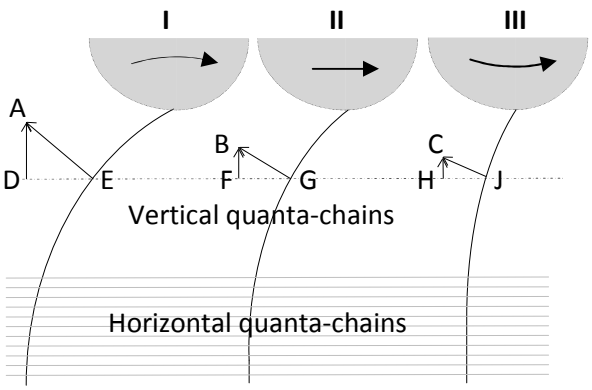



Figure 4.12

Magnitude of curvature of a vertical quanta-chain (sticking to lower side of photon's matter-core), caused by linear motion of matter-core of stable photon II, moving in straight line, is shown by curved line in the middle. Reaction, produced by curvature of vertical quanta-chain at point G in the chain, is represented in magnitude and direction by arrow GB. Reaction GB may be resolved into two mutually perpendicular components. The horizontal component GF (not shown) acts against photon's linear motion. Appropriate ejection force is produced by 2D energy-field to overcome this component of reaction and maintain linear speed of photon at a constant level. Vertical component, shown by arrow FB, acts perpendicular to direction of photon's linear motion. Matter-core of a stable photon has similar reactions, on it from opposite side also. As long as stability of linear path is maintained, similar reactions from opposite sides of photon's matter core, do not deflect photon from its straight-line path.

Each vertical quanta-chain, bearing on matter-core of a photon, is curved in appropriate direction. We can take magnitude of curvature of vertical quanta-chain (perpendicular to direction of photon's motion) in line with center of photon's matter-core, as having average curvature, as shown in figure. Hence, magnitude of reaction on photon's matter-core, by vertical quanta-chains is proportional to average curvature.

Direction of reaction is perpendicular to tangent on quanta-chain, at its point of contact with photon's matter-core. Figure 4.12 shows reactions at points, little away from point of contact, between vertical quanta-chain and matter-cores of photons, for clarity.

Magnitude of reaction along vertical quanta-chain diminishes as distance from photon's matter-core increases and magnitude becomes zero at the border of inertial-pocket. Quanta of matter in latticework-structure of 2D energy-field, beyond inertial-pocket do not subscribe towards reaction. Therefore, magnitude of reaction from 2D energy-field at any point is proportional to curvature of quanta-chain passing through that point and perpendicular to direction of photon's linear motion. Direction of reaction is perpendicular to tangent at that point towards convex side of quanta-chain. It is an attempt to straighten quanta-chain.

Should the path of a stable photon deflect from its straight line, curvature of path is added to or subtracted from curvatures of quanta-chains, perpendicular to photon's straight-line path. On inner side of curved path, curvatures of vertical quanta-chains increase and on outer side of curved path, curvatures of vertical quanta-chains decrease.

Increased curvature of vertical quanta-chain is shown in relation to photon I, on left. Reaction, EA, in quanta-chain increases in magnitude and its direction deflects more towards photon's matter-core. Component of reaction, DA, perpendicular to direction of photon's motion increases, compared to its value, when photon was moving in straight-line path. Increased reaction in this direction tends to push photon's matter-core towards its straight-line path.

Reduced curvature of vertical quanta-chain, due to deflection of photon's path in opposite direction, is shown in relation to photon III, on right. Reaction, JC, in vertical quanta-chain decreases in magnitude and its direction deflects away from photon's matter-core. Vertical component of reaction, HC, perpendicular to direction of photon's straight-line motion, decreases in comparison to its value, when photon was moving in a straight-line path. Increase of component of reaction from inner side of photon's curved path and reduction of component of reaction from outer side of curved path, together, tend to straighten photon's path.

Only those latticework-squares (of 2D energy-field) in the immediate neighborhood of photon's matter-core (constituting photon's inertial-pocket) and producing stabilizing actions are associated with actions, which sustain photon's straight-line path. We can say, in wider context, that a stable photon is completely disassociated from universal medium, outside its inertial-pocket. Thus, by forcing a 3D disturbance to become a stable photon and providing for its unhindered passage by actions of inertial-pocket, universal medium has disassociated the 3D disturbance from it and on a large scale regained its serenity.

A change in constitution of universal medium or variations in parameters of photon's matter-core are bound to destabilize photon, to repeat stabilization process again. Changes in constitution of universal medium include deformations in it or change in its extent. Such changes may be results of chaotic conditions in universal medium or presence of other 3D matter-particles in vicinity.

Presence of other 3D disturbances (3D matter-bodies, including other photons), in same planes as matter-core of a photon, changes extent of 2D energy-field from a photon. This produces gravitational attraction between them. As seen in section 3.2, gravitational attraction can act only on curved surface of a stable photon. Therefore, gravitational attraction on a photon can take place only in its disc-planes. Curvatures of disc-faces are too small, that actions of gravitational attraction on them may be neglected.

However, if a 2D energy-field is occupied by curved perimeter of matter-core of photon A and flat perimeter of matter-core of another photon B, partial gravitational attraction towards matter-core of photon B (whose flat perimeter occupies the plane) is felt by matter-core of photon A, whose curved perimeter occupies same plane. Partial gravitational attraction is not mutual. Partial gravitational attraction can produce inertial motion of only the photon, whose curved perimeter is in common plane.

Photons, even in their stable state, are influenced by gravitational attraction – subject to direction of action in relation to direction of photon's motion. Because of highest critical linear speed of photon, gravitational attraction (or its component), even if it is present, cannot act on a photon, in the direction of its linear motion.

No photon in universe is isolated or independent of other photons, which share same common planes, unless a photon can have perfectly straight perimeter in common planes. To have perfectly straight perimeter in any plane, occupied by photon's matter-core is highly improbable. Changes in one photon's parameters, at least theoretically, affect all other photons in its disc-planes. Two photons, identical in all respects and whose disc-planes coincide continuously in same planes in universal medium can produce sympathetic changes in each other, even if they are far apart in space.

In its stable state, a photon moves at a constant linear speed and at the same time spins at a speed proportional to its matter-content, with respect to universal medium. 2D energy-fields, by their stabilizing actions, facilitate photon's movements through themselves, without any other (external) efforts. In fact, it is the space or gap in universal medium, occupied by matter-core of a photon, which is moving through universal medium at a constant linear and angular speeds and matter-content of the photon is carried in inertial-pocket around the gap, along with it.

Passage of inertial-pocket in universal medium is at very high linear speed – highest possible linear speed without breaking down universal medium – and distortions introduced in latticework-structures of 2D energy-fields, due to passage of inertial-pocket at this speed, can be transmitted only within very small distance during passage of photon. Before such distortions can be transmitted beyond small range, photon moves away from the place, restoring original state of latticework-structures. This limits size of inertial-pocket around a photon's matter-core. Hence, stable photons do not establish distortion-fields, beyond their inertial-pockets.

Other than, for gravitational attraction in their disc-planes, stable photons do not interact with any other 3D matter-bodies (photons). Although interactions between matter-fields (of various macro bodies) are assigned to their matter-bodies in the course of explanations, it should be clearly understood that, no 3D matter-bodies (photons) could interact with each other directly. 3D matter-bodies cannot interact through empty space. All such interactions mentioned, take place between one 3D matter-body to universal medium and universal medium, in turn, interact with other 3D matter-body. Universal medium acts as a medium for all apparent interactions between 3D matter-bodies. All 3D matter-bodies are in the form of photons or union of photons.

## 4.7. Stability of photon's linear speed:

Inertial properties of universal medium maintain stability and critical speeds of photons. Photons' matter-cores move at constant critical speeds due to inertia of associated inertial-pockets. For easier explanations, in these paragraphs, property of inertia is often assigned to matter-core of photon, which is not factually correct. Changes in inertia of a photon may take place due to changes in its matter-content or its linear or angular speeds. Change of photon's inertia, due to changes in direction of its motion, is dealt with separately in section 4.12.

Changes, in a photon's matter-content, introduce changes in shape of its matter-core and destabilize photon. Universal medium, all-around photon's matter-core, initiate its stabilizing process. Ejection effort, spin effort and shape of matter-core are modified to suit new conditions. In other words, by stabilizing actions in universal medium, inertia of photon is modified until it re-gain its stability and moves at its critical constant (linear and spin) speeds. However, this process takes certain time. In the mean time, photon is moving at speeds different from its critical speeds and hence it is unstable. Change in matter-content of a photon and corresponding changes in its momentum due to universal medium's inertial actions changes photon's linear and spin speeds. Such instability of photon produces interaction between its matter-content and surrounding universal medium.

As soon as photon leaves 2D energy-fields of its creation, gravitation on it in various forms, stabilizes photon's parameters in universal medium. At its critical speeds, inertial-pocket in surrounding universal medium moves at its highest possible linear speed. It is this peculiar property of universal medium, which limits photon's linear speed to its critical constant value.

Matter-core of photon is a 3D object of matter and it has no ability to move on its own (other than reversion of its constituent quanta of matter into lower spatial dimensional systems). Inertial actions on it, by universal medium, compel matter-core of photon to move at highest linear speed at which latticework-structures of 2D energy-fields are able to move it. Highest linear speed of photon is limited by ability of quanta of matter in universal medium to move, without breaking down their latticework-structures. This is the reason for constancy of linear speed of light. Critical speeds of a photon are with respect to surrounding universal medium.

Linear speed of photon depends solely on properties of universal medium around photon's matter-core. Matter-core of photon, being a 3D matter-particle that causes inertial actions and on which universal medium acts is carried in its inertial-pocket along with moving distortions. Both, inertial-pocket in universal medium and photon's matter-core, move in synchronism. In synchronized and stable conditions there is no interaction between them. This is the state of a photon, moving at critical linear speed (of light or radiations of 3D matter-particles) in straight-line path.

Inertial-pocket, carrying photon's matter-core, is a product of universal medium. Its linear speed depends on nature of universal medium in any region of space. Hence, critical linear speed of a photon (light) is limited to highest linear speed of inertial-pocket in universal medium of corresponding region in space (or inertial frame). It may be noted that measurement of distance in space is related to speed of light. A change in speed of light in any region of space makes corresponding change in scale of distance measurement also. Corresponding changes in speed and distance keeps the factor time, a constant. Thus, we may consider speed of light is maintained at critical constant value in all regions of space.

Critical constant linear speed of light in any region space, when related to an absolute reference from an external point in space, is liable to vary depending on the nature of universal medium in that region, where a photon is currently present. If variations of photon's linear speed in different inertial frames (when related to an absolute reference) are accepted, phenomenon of 'time dilation' and inconsistency in 'twin paradox' will disappear

State of universal medium, in a region of space, has great influence on various apparent interactions between 3D matter-particles. All physical constants, derived by us, depend on state of universal medium around and about us. Therefore, magnitudes of

physical constants, including speed of light, depends on state of universal medium in any region of space. Since state of universal medium is variable in different parts of space, all physical constants derived by us are also variable, when considered in conjunction with different regions of universal medium (space).

There are infinite numbers of independent moving photons throughout space. It is possible for a photon, during its motion through universal medium, to encounter a part of universal medium, constituted by quanta of matter in latticework-formation of equilateral triangles instead of squares. Since this part of universal medium is rigid, it offers high resistance to motion of photons. In these regions, linear speed of photon is reduced drastically. Reduction in linear speed of a photon causes it to discard its constituent quanta of matter at a very high rate.

Deluge of free quanta of matter into rigid part of latticework-structure works like an explosion to disintegrate latticework-structures in that part of universal medium. Free quanta of matter in this region gradually re-form latticework-structures made up of squares. Simultaneously, quanta of matter forming rigid parts of universal medium in the direction of motion of a photon tend to pierce into its matter-core. Thus, some of the quanta of matter in its latticework-structures are assimilated into photon's matter-core to increase its matter-content.

### 4.7.1. Higher than critical speed:

Matter-core of a photon is an inert 3D object. It has no ability to move on its own. It is the transfer of distortions in latticework-structures of 2D energy-fields, which move photon's matter-core. As it is the distortions that carry matter-core, it is imperative that both matter-core and inertial-pocket move in synchronism with each other. Misalignment between them affects stability of photon. Since speed of transfer of distortions, in latticework-structures of 2D energy-fields, is limited to a highest critical linear speed, normally, matter-core of a photon cannot move faster than highest critical linear speed in the direction of motion of distortions in universal medium. However, there are occasions when matter-core of a photon may be moving at higher speed than its highest critical linear speed. Few of these occasions are given below:

(a) Figure 4.13 shows displacements of matter-core of a photon, situated at O, in unit time. Transfer of distortions in universal medium in direction OA moves photon's matter-core from O to A in unit time. OA represents critical linear speed of photon. Let another set of distortions in universal medium act on photon in direction, OC. These distortions attempt to move photon's matter-core from O to C in same time. Resolve this attempted displacement into two components OB and BC. Displacements OA and OB are in same direction; they tend to add to each other. Since photon is already moving at its highest linear speed, actions by these distortions are unable to move photon's matter-core at

higher linear speed than linear speed represented by OA. Hence, addition of OA and OB does not take place. Photon continues to move at its critical linear speed in the direction of OA.

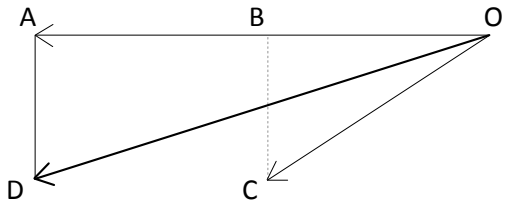


Figure 4.13

Component, represented by BC, of intended displacement OC, is perpendicular to linear motion of photon's matter-core, OA. As it is not in the direction of linear motion of photon's matter-core, it is applicable to photon's matter-core. Actions by distortions along OA and BC are applicable to photon. AD = BC. As a result, photon's matter-core tends to be displaced in resultant direction, along OD, in unit time. Linear speed of photon tends to equal to OD in unit time. Clearly linear speed, represented by OD is greater than photon's critical linear speed, represented by OA. Photon's matter-core tends to move at a linear speed higher than its critical linear speed in direction OD.

Although, photon's matter-core is moving at critical linear speed with respect to ejection effort from rear and at a lower linear speed with respect to lateral external effort, their resultant tends to move photon's matter-core at higher linear speed than critical linear speed in a plane containing line OD. With respect to latticework-structures of 2D energy-fields, in front of photon's matter-core, photon's linear speed tends to become greater than its critical linear speed.

(b) Let a photon move from region of higher distortion-density in universal medium to region of lower distortion-density. Since there is a gradient of distortion-density, in universal medium (through which photon is moving), rear part of photon's matter-core exists in region of higher distortion-density compared to its forward part. Ejection effort from rear of photon's matter-core corresponds to higher distortion-density and resistance from front corresponds to lower distortion-density in universal medium. Ejection effort produced by universal medium at rear is more than that is required to move photon's matter-core through region of lower distortion-density in universal medium at its critical linear speed. Additional ejection effort tends to increase photon's linear speed beyond its critical value.

(c) Similar action takes place, when a matter-field (about a macro body) that contains photon is itself moving in same direction as that of photon's motion. As long as matter-field moves in same direction, ejection effort at the rear of photon's matter-core remains higher than what is required to move it at critical linear speed with respect to the moving matter-field. Hence, matter-core of a photon, moving in same direction as a moving

matter-field that contains the photon, tends to move at higher than its critical linear speed.

(d) Matter-core of a photon, moving at a steady linear speed, is under action of constant ejection effort from its rear. Magnitude of ejection effort is appropriate for magnitude of matter-content of photon. Magnitude of resistance, from front, corresponds to curvature of matter-core's forward end. Reduction in matter-content of a photon reduces volume of matter-core, with corresponding reduction in curvatures of front and rear ends and increase in curvature of its circular periphery. Radial size of matter-core temporarily reduces.

Gap required to be opened for passage of photon's matter-core is reduced correspondingly. Magnitudes of ejection effort from rear and resistance from front are also reduced. Due to inertial property of universal medium, ejection effort takes certain time to adjust its magnitude to correspond to reduction in matter-content of photon. During inertial delay, excess ejection effort tends to increase linear speed of photon's matter-core beyond critical value.

(e) Linear speed of a photon may increase when its path enters into matter-field of a macro body, with lower distortion-density (like optically rarer medium) from matter-field of a macro body, with higher distortion-density (like optically denser medium). However, this should not cause bending of its path, as is believed presently, while explaining 'refraction' of light.

During stable linear motion of a photon, at every instant, its matter-core and inertial-pocket maintain their synchronous motion. Should there be a tendency to increase linear speed of matter-core for any reason, in order to maintain stability of its linear speed; inertial-pocket also should increase its linear speed, correspondingly. Since inertial-pocket is already moving at its highest linear speed, this cannot be done without at least a partial breakdown of inertial-pocket. Photon's matter-core and its inertial-pocket are not synchronized any more. Lack of synchronization produces interaction between the two, due to their relative displacement. Forward surfaces of photon's matter-core can be imagined to rub into and against inertial-pocket and its rear surfaces can be considered to move away from rear part of inertial-pocket.

Photon's inertial-pocket, being combinations of distortions in latticework-structures of 2D energy-fields, it has only one steady linear speed in space. This is the linear speed of electromagnetic waves or of light. Depending on structural parameters of universal medium in a region, linear speed of transmission of free distortions (which are not linked to superior 3D matter-bodies) is limited to highest linear speed, possible without damaging universal medium. Therefore, linear speed of photon's inertial-pocket is also limited to this speed.

It is the universal medium that is pushing matter-core of a photon through itself. Therefore, ability of universal medium is the criterion for photon's linear speed through it. As long as photon's matter-core moves in synchronism with surrounding distortions (inertial-pocket), universal medium causes no resistance to motion of matter-core or its stability. Tendency of relative displacement between a photon's inertial-pocket and matter-core causes universal medium to create instability in motion of photon.

As matter-core of photon is moving at higher linear speed than critical speed of light and ejection effort from its rear, being in the direction of its linear motion, ejection effort is unable to act on photon's matter-core. As linear speed of photon's matter core is higher than that of light, its 'relativistic mass' is infinity and no effort in the direction of its motion can affect photon's matter-core.

At the same time, forward motion of matter-core prevents any loss of its matter-density or its internal pressure. Matter-core of photon maintains its structural stability. Inability of quanta of matter in latticework-structures of universal medium, in front, to move away from path of matter-core (that is approaching at faster linear speed), to create free passage, acts on photon's matter-core to reduce its linear speed. Parts of latticework-structures in front of photon's matter-core breakdown and few quanta of matter from these parts tend to pierce and enter into matter-content of photon.

As forward surface of photon's matter-core rubs latticework-structure of its inertial-pocket, in front, and presses into it, many of quanta of matter from universal medium are assimilated into photon's matter-core. Assimilation of quanta of matter, into photon's matter-core, raises its matter-content – its rest mass. Quanta of matter in latticework-structures in front, being intercepted by 3D matter, tend to withdraw themselves, away from approaching 3D matter. However, as speed of approaching matter-core is faster, it engulfs some of the quanta of matter from universal medium and makes them part of its own matter-content.

Forward displacement of photon's matter-core with respect to its inertial-pocket (by which action, matter-core tends to rub against forward inner-side of inertial-pocket) may be considered as an increase in photon's linear speed. Rearward displacement of photon's matter-core with respect to its inertial-pocket (by which action, contact pressure between matter-core and forward inner-side of inertial-pocket reduces) may be considered as a reduction in photon's linear speed. Contact pressure between matter-core and rearward inner-side of inertial-pocket is necessary for matter-core's linear motion.

Increase in ejection effort from rear of matter-core, without corresponding increase in resistance from front, tends to increase photon's linear speed. Photon's matter-core is pushed forward by distortions at rear of its inertial-pocket on to latticework-structure of inertial-pocket in front. This can happen, when a photon is (apparently) attracted towards

another 3D matter-body from front due to gravitational or other types of apparent attractions. Mechanisms of these (apparent) attractions have their own set of distortions induced in universal medium at rear of photon's matter-core to enhance resultant ejection effort. Since photon's inertial-pockets are not 3D matter-particles, they cannot be (apparently) attracted towards any other 3D matter-body.

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

Increase in volume restores curvatures of all sides of photon's matter-core with corresponding changes in all external effects on it. Photon's linear speed is stabilized to its critical value. During this process, photon has increased its rest mass by assimilating few quanta of matter from universal medium. Thus, an attempt to increase linear speed of photon's matter-core, above critical speed of light, produces an increase in photon's matter-content and subsequently increases its spin speed. It can also be viewed that a photon trying to increase its momentum by increasing its linear speed, is compelled to increase its rest mass instead of its linear speed and thereby increasing its momentum, without increasing its linear speed above critical level.

At its critical linear speed a photon moves in linear path at the speed of light, no external effort can affect it in the direction of its linear motion and thereby increase its linear speed. Sudden reduction in resistance on forward surfaces of matter-core can induce it to move (impulsively) faster for a short time, until ejection effort on it stabilizes.

Increase in photon's linear speed can take place by a loss of its matter-content without corresponding reduction in its momentum. At the instant of loss of matter-content, ejection effort being higher than what is required for its present matter-content, throws photon's matter-core, forward. Once the photon exceeds critical linear speed, ejection effort is not effective any more; until photon's linear speed comes down to critical level.

Quanta of matter, assimilated into photon's matter-core, increase photon's matter-content. Increase in its matter-content (rest mass) requires higher ejection effort from rear, to move photon at same linear speed, as it was moving earlier. Since ejection effort

from rear has not increased correspondingly and photon's matter-core is bulkier, its linear speed gradually slows down to restore its linear speed to critical constant value.

As linear speed of photon reduces to its critical value, excessive contact pressure between its matter-core and inertial-pocket (in front) is relieved. Thus, an attempt to increase linear speed of a photon results in photon gaining additional matter-content (with corresponding increase in its energy-content) from surrounding universal medium instead of an increase in its linear speed. Increase in matter-content is indicated by an increase in photon's spin speed − frequency or colour. Any attempt to increase linear speed of photon (light) results in increasing its frequency (colour of light) rather than its linear speed.

There are special occasions, where linear speeds of photons may be increased momentarily due to motion of macro bodies, whose constituent these photons are. (See section 5.15.7).

**4.7.2. Lesser than critical speed:**

Few occasions, when linear speed of a photon can be reduced are given below;

(a). Reduction in ejection effort on matter-core of photon. This can be produced by reducing ability of quanta of matter in latticework-structures of 2D energy-fields to move at their highest speed, by external means. Gravitational (apparent) attraction on matter-core of a photon, acting from its rear, can produce this effect. It reduces external pressure on photon's matter-core and lowers its matter-density. As a result, photon is liable to lose part of its matter-content.

(b). Increase in resistance to photon's linear motion, from front. Increase in resistance to a photon's motion takes place, when a photon is entering region of higher distortion-density of universal medium. In this case, since both ejection effort and resistance are effective on photon's matter-core, its internal pressure or matter-density do not diminish. Hence there is no loss of matter-content from photon's matter-core. Even if a photon (hypothetically) comes to a halt in this way, its matter-content is preserved. Under suitable conditions, photons are able to move very slowly or remain (theoretically) halted in position, provided internal pressure of their matter-cores can be maintained at required level.

Linear speed of a photon may reduce when its path enters into matter-field of a macro body with higher distortion-density (like, optically denser medium) from matter-field of a macro body with lower distortion-density (like, optically rarer medium). However, this should not cause bending of its path, as is believed currently and used in explanation of 'refraction' of light. Bending of light's path during refraction is explained in section 6.10.

(c). Increase in photon's matter-content, without corresponding increase in ejection effort (linear momentum). It slows down a photon and reduces internal pressure of its matter-core. This phenomenon takes place whenever a photon acquires matter-content by absorbing matter-content of another photon (or other 3D disturbances) into its matter-core.

(d). By reductions of any of photon's natural motions, by bodily interference or restriction. (Bodily restrictions to motions of a photon are explained in section 5.10)

Should linear speed of a photon reduces below its critical value, gravitational efforts on matter-core of photon on its front and rear surfaces are lowered to less than that is required for photon to maintain its linear speed at critical level. If ejection effort is reduced for any reason and photon's linear speed reduces, resistance on its forward face is also lowered. These two, together reduce compression on disc-faces of photon's matter-core. Reduction in compression lowers its matter-density and internal pressure.

Photon's matter-core is constituted by quanta of matter in their 3D states. Matter-density of a quantum of matter is constant under all conditions. As internal pressure of photon's matter-core reduces, gravitational pressure on its curved periphery tends to reduce radial size of photon's matter-core, from its critical radial-size. This is an attempt to increase internal pressure of matter-core and this in turn causes bulging of its matter-content to front and rear. Additional bulges increase curvature of disc-faces with corresponding increase in gravitational efforts on them.

Due to forward motion of photon's matter-core, additional bulging of its matter-core is more towards its rear end. That is, increase in ejection effort on photon's matter-core from rear becomes greater than increase in resistance from front. Because of these increased efforts, resultant being in the direction of ejection effort, photon tends to increase its linear speed until increase in resistance from front matches additional ejection effort from rear. At this point, radial size of photon's matter-core and its internal pressure are restored to their original states.

This process takes some time and in the mean time, photon's matter-core happens to have low internal pressure. Large scale reduction in internal pressure lowers matter-density of photon's matter-core by development of gaps between 3D quanta of matter within its matter-core. At lower internal pressure, gravitation from all around its circular periphery tends to compress and reduce its radial size. However, jamming effect from latticework-structures of 2D energy-fields reduces effects of gravitation on photon's matter-core. Gravitational pressure will not be able to balance internal pressure of photon's matter-core.

As internal pressure of photon's matter-core reduces, difference between internal and external pressure diminishes. Lower pressure difference across perimeter of a 3D

disturbance encourages few of its constituent quanta of matter to revert to lower spatial dimension and join universal medium, outside photon's matter-core. (Refer section 4.1.2). Constituent quanta of matter of photon's matter-core tend to expand into surrounding universal medium and escape from matter-core.

As linear speed of photon reduces below its critical linear speed, its matter-core tends to lose constituent quanta of matter from it. Low internal pressure of photon's matter-core encourages loss of constituent quanta of matter from it. Consequently, any photon that tends to move slower than its critical linear speed loses quanta of matter from its matter-core into universal medium and thus reduces its rest mass. We may say that a photon losing its linear speed, without a corresponding reduction in its momentum, loses its rest mass.

Since photon's linear speed, during stabilization of its linear speed, is less than speed of light, external efforts on it, in directions other than in its direction of motion do not have any significance. Only those efforts, which are in the line of its motion, can have any effect on internal pressure of its matter-core. An effort, assisting linear motion of photon from rear of its matter-core, can increase its internal pressure. This effort is against resistance on photon's matter-core, from front. These two, together tend to compress photon's matter-core, to increase its internal pressure.

An effort, from rear, in opposition to photon's linear motion reduces internal pressure of its matter-core, further. [A push effort from rear of a moving matter-body, to oppose its linear motion may seem to be an impossible proposition. However, it may be noted that actions of external efforts only modify distortions in universal medium about a matter-body. Hence, an effort that reduces distortions at rear part of photon's matter-core tends to reduce push action from its rear]. Push actions on photon's matter core, from front overcomes lesser push effort from rear to reduce its linear speed.

Retarding effort from rear is acting against ejection effort on photon's matter-core. Reduction in ejection effort, without corresponding increase in resistance tends to increase volume of photon's matter-core with corresponding reduction in matter-density. Increasing volume, without addition of matter-content, lowers its internal pressure. Matter-density of photon's matter-core is lowered. This encourages reversion of constituent quanta of matter to their lower spatial dimensional states. External efforts in any other directions do not affect internal pressure of photon's matter-core.

Similar action takes place, when matter-field of a macro body that contains photon, is itself moving in opposite direction to direction of photon's motion. As long as matter-field moves in opposite direction, ejection effort at rear of photon's matter-core remains lower than what is required to move photon at critical linear speed with respect to moving matter-field. Hence, a photon, moving in direction opposite to a moving matter-field tends to move at lower than its critical linear speed.

Reduction in ejection from rear, without corresponding reduction in resistance from front, tends to reduce photon's linear speed. Compression on photon's matter-core tends to reduce. Photon's matter-core is (apparently) pulled rearward by reduction in distortion-density behind its rear part. This can happen, when a photon is (apparently) attracted towards another matter-body from rear by gravitational or other types of apparent attractions. Mechanisms of apparent attractions have their own set of distortions induced (in opposite direction) at rear of photon's inertial-pocket to reduce ejection effort and in front of photon's inertial-pocket to increase resistance.

Since magnitudes of changes are related to curvatures of forward and rear surfaces of photon's matter-core, magnitude of change in ejection effort at rear end of matter-core is much greater than magnitude of change in resistance at forward end of matter-core. As photon's inertial-pocket is not a 3D matter-particle, it cannot be (apparently) attracted towards any other 3D matter-body.

Due to greater reduction in ejection effort, compared to reduction in resistance, photon's matter-core tends to shift rearward relative to its inertial-pocket. Photon tends to slow down. Reduction in photon's linear speed moves photon's matter-core rearward with respect to its inertial-pocket to relieve internal pressure of matter-core. Photon's matter-core expands in volume to fill inertial-pocket. All constituent quanta of matter in matter-core take part in this expansion. During this process, few (randomly oriented but rightly placed) quanta of matter expand rapidly (into their lower spatial dimensions) and escape from matter-core of photon to join latticework-structures of universal medium, outside. Matter-content of photon reduces, while matter-core's volume increases. Radial size and thickness of matter-core increase. Having larger radial size initiates stabilising process of photon's parameters and its linear speed, in relation to curvatures of photon's disc-faces as described in earlier paragraph.

If photon is slowed down by external actions, it will keep losing its matter-content until either such action is terminated or until photon's matter-core vanishes completely, reverting whole of its matter-content into universal medium. This phenomenon may be understood as the imaginary process of reversion of (3D) matter into undefined 'energy**'**. In reality, 3D matter is reverted into its lower spatial dimensions rather than into energy.

By this action, only 3D matter-content of photon is reverted into universal medium. Energy, associated with photon in the form of stress in its inertial-pocket (associated distortions in universal medium), if not neutralized by actions of an opposing effort, remains unaffected. If sufficient time is available, associated energy about a photon may be reduced gradually, by inertial actions, to correspond to photon's present matter-content. On faster disintegration of photon's matter-content, remnants of associated distortions (inertial-pocket) are left out in universal medium to function as simple 'distortion-field' (moving in same direction as that of lost matter-core of photon) to

continue to be present in universal medium and moving through it as electromagnetic waves. Normally, this process of reversion of 3D matter into universal medium takes place in the neighborhood of extremely large macro bodies (See section 16.1.6).

Universal medium maintains critical linear speed of free photons (light or similar radiations) automatically by changing their matter-contents (frequency − rest mass), during attempts to vary their linear speed. Attempt to vary linear speed of photon changes its frequency rather than its linear speed.

## 4.8. Stability of photon's spin speed:

Stabilization of a photon's spin speed of is also similar to stabilization of its linear speed. Stabilization of spin speed is more prominent during variation in matter-content of a photon. (See section 4.14.4). Since photon's spin speed is proportional to its equatorial thickness (which itself is proportional to its matter-content – rest mass), every photon spins through plane of any one 2D energy-field in same time, irrespective of its matter-content. If spin speed of photon varies from being proportional to its matter-content, it invokes actions similar to those caused by variations in its critical linear speed. Universal medium acts on each segment of its matter-core as separate 3D matter-body. As far as spin motion of photon is concerned, its critical spin speed corresponds to its matter-content.

Universal medium continuously strives to maintain parameters of photon at stable level. During variations in photon's spin speed, not corresponding to its matter-content, its matter-core loses or gains matter-content as required, in an attempt to maintain its spin speed at a level proportional to its rest mass. Should photon's spin speed reduces without reduction in matter-content, its matter-core would reduce in matter-content by letting few of its constituent quanta of matter to escape into universal medium. Should spin speed of a photon increase without corresponding increase in its matter-content; its matter-core would assimilate quanta of matter from surrounding universal medium, to increase its matter-content.

There are no natural mechanisms, which can vary spin speed of photon, by direct action. Changes in spin speed (frequency) of photons are automatically affected when their matter-contents are varied during attempts to vary their critical linear speed.

### 4.8.1. Frequency shift of light:

Photon is a corpuscle of light or any other similar radiation (of matter). A ray of light is continuous flow of numerous photons in same direction. Frequency of a ray of light is average spin speed of all its constituent photons. Spin speed (frequency) of a photon is proportional to 3D matter, contained in is matter-core. A ray of light may contain photons with (approximately) same quantity of 3D matter-content or photons with large variations in their 3D matter-contents. Ray of light with photons having similar quantities of 3D

matter-content is sensed as of single colour. Ray of light with photons having different quantities of 3D matter-content is sensed as of hue or combination of different colors.

Frequency of light ray can be varied only by changes in matter-contents of its constituent photons. One way to vary frequency of light is by an attempt to vary its critical linear speed. Corpuscles of light are related to only with surrounding universal medium (inertial pockets). Matter-cores of photons are created from and by universal medium. No physical macro body can create photon. Photons have no other source-bodies, except unobservable universal medium. From the moment of their creation, photons are independent basic 3D matter-particles, existing in universal medium.

Photons may be created near or in a region of universal medium, occupied by a macro body. This does not make that macro body as photons' source-body. Macro body may act as a catalyst and provide environment, in universal medium, suitable for creation of photons. Hence, the assumption that parameters of light (like its linear speed or frequencies) are affected by presumed source-bodies (macro bodies in the region of creation of photons) or receptors (which receive light radiation) is not very correct. Hence, phenomena similar to 'Doppler effects', in which source-body (that creates the phenomenon) affects wave motions like sound, electromagnetic waves, etc. do not apply to radiations of light.

Average linear speed of a stable photon with respect to universal medium (outside inertial-pocket of photon) is considered as critical constant speed of light (or similar radiations). As photon is a linearly moving spinning 3D matter-particle, resultant linear speeds of different points on its matter-core are different and depend on their instantaneous locations in matter-core. Matter-core of a photon has two segments. Due to centrifugal action, forward-turning segment has larger radius than rearward-turning segment. Because of this, location of photon's spin axis is not at geometrical centre of photon's matter-core.

Resultant linear speed of forward-turning segment is greater than and resultant linear speed of rearward-turning segment is lesser than critical linear speed of photon. Resultant linear speed of a point on extremity of a segment of matter-core varies cyclically from less than critical linear speed - to critical linear speed - to higher than critical linear speed - to critical linear speed of light - to less than critical linear speed. When photon's median disc-plane coincides with linear path of photon, rear segment of its matter-core is thicker than forward segment, so that it can produce sufficient ejection effort. Shapes and matter-contents of segments of matter-core are controlled dynamically by universal medium to sustain stability of photon.

Figure 4.14 shows representation of matter-core of a stable photon, looking at one of its poles. Point K is end of its spin axis at the pole. A and B are segments of matter-core, when photon's disc-plane is perpendicular to line of its linear motion. C and D are same

segments of matter-core, when photon's disc-plane coincides with line of its linear motion. Gray arrow KJ shows direction of photon's linear motion. Oval shape in dashed line shows path of extremities of segments of matter-core (photon's equator). Grey arrows on equator show direction of matter-core's spin and magnitude of spin speed, ω. Point H is geometrical centre of matter-core. Arrow HG represents average linear speed of matter-core. Its magnitude is critical linear speed of light, c.

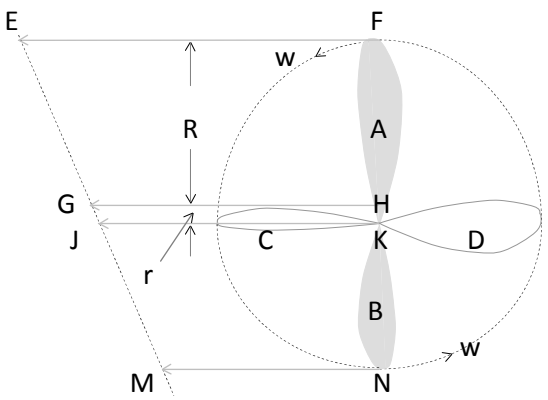


Figure 4.14

As photon's matter-core spins, point H moves towards point K and coincides with it after 90° rotation. For the next 90° rotation, point H moves away from spin axis to its current position. This cycle keep repeating. Arrow FE, represents resultant linear speed of point F on extremity of forward spinning segment of matter-core, when it is at position shown in figure. Arrow KJ represents linear speed of matter-core's spin axis, with respect to universal medium, outside its inertial-pocket. Arrow NM represents resultant linear speed of rearward spinning segment, B, of photon's matter-core, when it is at position shown in figure. Average linear speed of photon is median of these two linear speeds, FE and NM, shown by arrow HG. R is distance between geometrical centre of matter-core and extremity of forward turning segment A of matter-core and r is distance between spin axis K and geometrical centre H of matter-core.

Dimensional units are not mentioned in following equations. Equations are written for position of matter-core, as shown in figure.

Critical linear speed of light = Average linear speed of matter-core = c

Distance between geometrical centre F and spin axis H = r

Radial distance from geometrical centre to extremity of matter-core = R

Angular speed of segments of matter-core with respect to spin axis = ω

Distance between spin axis and geometrical centre of matter-core $= (R - r)$

Linear speed of spin axis $= (c - r\omega)$ **(4/1)**

Linear speed of top extremity, D, with respect to spin axis, $H = R\omega$

Resultant linear speed of top extremity, $D = c - r\omega + R\omega$ **(4/2)**

Difference between critical speed of photon and resultant speed of point,

$$D = c - (c - r\omega + R\omega) = R\omega - r\omega \qquad \textbf{(4/3)}$$

Linear speed of bottom extremity, M, with respect to spin axis, $H = (R - r)\omega$

Resultant linear speed of bottom extremity, M

$$= c - r\omega - \{(R - r)\omega\} = c - r\omega - R\omega + r\omega = c - R\omega \qquad \textbf{(4/4)}$$

Difference between critical linear speed of photon and resultant linear speed of M

$$= c - (c - R\omega) = R\omega \qquad \textbf{(4/5)}$$

Difference of resultant linear speed of lower extremity, M, from critical linear speed of light, c, is greater than difference of resultant linear speed of upper extremity, D, from c. Resultant linear speed of point D is more than c and resultant linear speed of point M is less than c. Resultant linear speeds of extremities are as for given relative positions of segments of photon's matter-core.

As photon's matter-core spins about its spin axis, sizes of segments and resultant speeds of their extremities vary, corresponding to their relative positions with respect to direction of photon's linear motion. Segment that has greater linear speed than c is likely to assimilate quanta of matter into it from universal medium to increase its matter-content. Similarly, segment that has lesser linear speed than c is likely to discard quanta of matter from it into universal medium to reduce its matter-content. Every half-spin, roles of segments of matter-core reverse. Change in quantity of 3D matter in photon's matter-core is sum total of quanta of matter assimilated into and discarded from matter-core of photon.

Resultant linear speed of rearward turning segment, B, of photon's matter-core differs by greater margin from critical linear speed, c.

Hence, rate of loss of quanta of matter from a photon's matter-core, due to their resultant linear speed difference (between its two segments) is greater than rate of gain of quanta of matter. Rate of this exchange of photon's matter-content is too small and facilitates only a gradual loss of its matter-content during photon's travel through very large distances in space. Thus, photons in a radiation, traveling very large distance in space, gradually lose their matter-content and thereby lower their frequency.

This (is one of the reasons that) gives rise to phenomenon of 'red shift' noticed in frequency of light, radiated from regions near macro bodies at great distances. (See section 16.1.6). Red shift is a phenomenon by which original frequency of light or other types of radiations are lowered during course of their travel through large distances in space. Greater the distance of a macro body from an observer, larger is shift in frequency of radiation, received from region near that macro body. At present, this phenomenon is assigned to 'Doppler Effect', due to mistaken assumption that radiation of basic 3D

matter-particles is also wave-like, through imaginary physical medium, equated to vacuum.

Higher-frequency photons have greater speed difference between their forward-moving and rearward-moving segments. Hence, higher-frequency radiations are red-shifted by greater magnitude compared to lower-frequency radiations. If distance traveled is very large, many photons lose their entire matter-content and disappear in this way. Hence, depending on their frequency, there is a limit on rage of transmission of photons. Phenomenon of red-shift causes reduction in magnitude of light, received by us on earth (presumably) from distant macro bodies in universe, making night sky dark (Refer 'Olbers' Paradox'). Light rays, originated beyond certain distance from earth, never reach us.

Light radiations from macro bodies beyond certain distance do not reach us on earth. They would lose all their matter-contents (so that constituent photons will not exist anymore) during their travel (presumably) from distant macro body towards earth. Case is similar with respect to all other radiations (of matter). Consequently, there is a limit on distance in space to any macro body, from which observer may receive information. This sets a limit on extent of universe for an observer.

Consider a region of space where there is a gradient in distortion-density of universal medium, without presence of very large macro bodies or that is far away from very large macro bodies, where gravitational effects due to their presence are very little. Photons, passing through this region, are under influence of gradient in distortion-density of universal medium. If a photon is moving in a direction towards region of lower distortion-density, its matter-core is continuously under excessive ejection effort. At any instant, ejection effort on photon's matter-core is slightly higher than what is required for next instant. Excessive ejection effort on photon's matter-core tends to increase its linear speed above critical level. Photon's matter-core accumulates quanta of matter from universal medium to increase its matter-content and thereby increase its frequency. Photons, passing through region of space with gradient in distortion-density, in direction towards region of lower distortion-density, for appreciable time, are likely to increase their frequency. This phenomenon is called 'blue shift' of radiation.

By the same reason, a photon, moving in direction towards region of higher distortion-density in universal medium, continuously loses matter-content and lowers its frequency at a higher rate than that could happen during its travel through homogeneous region of universal medium. This causes additional red-shift in its frequency. If gradient in distortion-density of universal medium is produced by presence of a very large macro body, above effects on linear speed of photons, moving in appropriate direction may be neutralized by gravitational attraction on them.

## 4.9. Resultant speed of photon:

One of inherent properties of universal medium is to maintain photon's linear speed at a constant critical level and photon's angular spin speed proportional to its matter-content – rest mass (unless photon's matter-content is extremely large) with respect to surrounding universal medium. Here, it should be noted that motion is assigned directly to photon for ease of explanation only. In fact, universal medium is pushing photon at constant linear speed and turning photon at spin speed proportional to its matter-content.

Any prolonged external influence on a photon's speeds makes variations in its rest mass instead of on its speeds. Attempt to increase photon's speeds results in photon gaining matter-content and attempt to reduce photon's speeds results in photon losing part of its matter-content, instead of variations in its speeds. Changes in photon's rest mass vary its frequency. Therefore, attempt to change linear speed or spin speed of photon invokes changes in its frequency (spin speed) instead of changing its linear speed. This phenomenon helps to keep linear speed of photon at critical constant value, in any region of space.

Angular movement due to photon's spin motion is superimposed on its linear motion. By its inherent nature, a photon tends to move at constant critical linear speed in any region of universal medium. However, due to superimposition of its linear and spin movements, at any instant, forward turning segment of photon has its linear speed augmented and rearward turning segment has its linear speed reduced by magnitudes of linear components of photon's spin speed. Linear speeds of other points in photon vary correspondingly and variation depends on location of point within photon's matter-core. Therefore, alternately each segment of photon's matter-core moves faster than the other, in linear direction.

Spin axis of a photon is always perpendicular to direction of its linear motion. Difference in their speeds modifies momentum of segments of matter-core. Forward turning segment experiences higher centrifugal action and becomes comparatively larger than other segment. Due to higher centrifugal action on it, larger segment has a tendency to move farther outward compared to other segment. Larger segment has greater control over the motion of photon's matter-core. This introduces a lateral shift in the direction of linear motion of a photon. Such shifting motion is neither continuous nor gradual.

Axis of photon is carried forward with a resultant lateral shift and path of this movement is along a cyclical curve about a straight line. Such movement prevents any part of photon's matter-core being in latticework-structure of same 2D energy-field for more than an instant and no plane contains photon's matter-core continuously. Since there are millions of photons in a ray of light – radiation – (each one with different matter-content level, direction of axis, relative phase, direction of spin, etc.), lateral shift

in the direction of linear motion of its photons, gives a ray of radiation an appearance of spreading outward as it proceeds from region of production.

Therefore, a ray of normal radiation of matter, increases in its cross sectional area as it travels away from region of its production. This phenomenon is the reason for assumption that gives rise to wave front-type of advancement of a radiation (light) in space. If all photons in a ray are identical, as is found in some artificially controlled light beams (laser), lateral shift of photons will not be noticed because all photons (being polarized) in the beam are shifted identically and in same direction. Such rays of radiation have uniform cross sectional area throughout their length.

## 4.10. Extent of Universe:

Our vision (information about outside world) is limited to certain frequency range of matter radiation. This range may be enlarged to include slightly wider range, by help of some instruments. Even then, it is limited within this enlarged but a small range. This imposes a limit on our information, in terms of distance also. High-frequency photons (above and about $10^{20}$ Hz) tend to form superior 3D matter-particles. There are very few of them, freely moving about in space. For the purpose of this discussion, we may consider that only photons of frequency lower than this value are radiated from the region of any large macro body.

Consider that photons, radiated from region of a very large macro body, have highest possible matter-content level – frequency, when they leave region of gravitational attraction of very large macro body (near which, these photons are created). As photons travel towards us, on earth, they gradually lose their matter-content and lower their frequency. By the time these photons reach us, if their frequency is not below our visual range, we are able to see them. If very large macro body, near which radiation originated, is farther than this distance, we will never be able to see it or gather information from or about it.

In other words, our 'universe' is limited in its extent (by vision) up to this distance from us. This is true in case of observers, anywhere in space. Limit of universe is same (unless frequency range of vision differs) from any point in space in any direction. Beyond this limit, universe extends infinitely but we will be unaware of it forever. Universe, for any observer, is spherical in shape with constant radial size in all directions, from him. Observer is always at the centre of observed universe.

## 4.11. Background radiation:

Most photons, coming from very far (even from outside our limited universe) towards earth, lose most of their matter-content by the time they reach earth. Therefore, their frequencies are much below infra-red region, when they are within the region of earth.

On collision with distortion-field of any material bodies near earth or matter-field of earth itself, they lose all their remaining matter-content. These photons do not have enough momentum, to be transmitted through or reflected from any material body on or near earth.

On losing whole of their matter-contents, work (and related kinetic and pressure energies) associated with matter-cores and inertial-pockets of these photons, are accepted and assimilated by universal medium (matter-field of earth). Quanta of matter in matter-cores of these photons are reverted into universal medium. Distortions in inertial-pockets, without matter-content, when assimilated into universal medium create local turbulences. These turbulences appear as electromagnetic waves of frequencies corresponding to spin speeds of matter-cores of photons, at the instant of complete reversion of their matter-contents.

Since space extends infinitely and equally in all directions from an observer, magnitude of these (apparent) electromagnetic radiations, received on earth, are also equal from all directions. Therefore, it may be correctly inferred that microwave background (electromagnetic) radiations received on earth from outer space is work (energy) associated with remnants of higher-frequency radiations of matter from regions of very distant macro bodies (even from outside our universe) and lower-frequency radiations from regions of nearer macro bodies.

## 4.12. Matter and energy-content of photon:

Matter-cores of photons are made of quanta of matter in 3D states. Photons are basic building blocks of all 3D matter-particles and macro bodies. All 3D matter-bodies are made of photons and there are no other basic 3D matter-particles, in nature. Hence, we can say that 3D matter is made up of quanta of matter, in their 3D status. At present, matter is believed to be a creation from energy, despite energy has no definite definition.

Matter-content of a photon is the quantity of 3D matter, in the form of quanta of matter, required to create it. Photons, in turn, form 3D matter of macro bodies. Quanta of matter, required for creation of photons, are taken from latticework-structures of 2D energy fields. 1D quanta of matter, detached from latticework-structures of 2D energy fields, are collected and compressed to convert them into 3D objects (collectively) to form matter-cores of photons. While forming matter-cores of photons, gaps are created in latticework-structures of 2D energy fields. Gaps, in latticework-structures are immediately filled, but for 3D matter-particle existing in the gap. No reduction in immensely vast 2D energy fields is felt due to their tendency to assume homogeneous and isotropic state.

Matter-content, in association with work invested by and in universal medium provides existence to 3D matter-bodies. A platform of 3D matter is essential for creation and application of work (and associated energy). Investment of work is essential for the

existence and sustenance of 3D matter, in the form of basic 3D matter-particles in various states (of motion). Energy cannot be converted into matter and matter cannot be reverted to energy. They are entirely separate and distinct. They are complimentary and exist by mutual assistance. 3D matter, made of quanta of matter, is (the only) real entity but energy, which is the stress in universal medium, produced by work-done, is a functional entity. Energy is property of quanta of matter in latticework-structures of 2D energy-fields, in their strained state.

Matter-content of a macro body is the sum total of 3D matter-contents of all its constituent photons. Latent energy in matter-field of a macro body sustains its 3D matter-content in stable state. Otherwise, it has no contribution towards matter-content (or mass) of macro body. Matter-content of a macro body is, at present, erroneously identified as concentrated form of energy. Every material is assumed to inherently possess concentrated form of energy and it is called 'intrinsic energy'.

Matter cannot do work. It only provides 3D matter-body (a platform) on which or about which work can be done. Work-done indicates changes made. Only work that can be done on quanta of matter, within matter-core of a photon, is compressing them and changing their spatial dimension(s) of existence. Once this is done and matter-core of photon is born, no further work can be done on quanta of matter in it, as long as they remain in 3D spatial dimension. Therefore, we can take that nature of all 3D matter-bodies are same and constant. Since nature of 3D matter (in the form of basic matter-particles) cannot be changed further, no work can be done on it. All additional work is done about basic 3D matter-particles. Matter-density of matter-core of a photon is the highest that can be tolerated in 3D spatial system. 3D matter provides substance of positive existence to all real objects and energy is a quality of universal medium.

Substance of 3D matter-body is measured by effect of work/energy on it. Mass is the relation between external effort on a macro body and macro body's response to the effort (its acceleration). Hence, mass is a measure related to macro body's (its matter field's) inertia. Inertia of a macro body depends on its substance and (absolute) linear speed. For this reason, mass is liable to vary depending on linear speed of macro body. Apparent increment in mass due to linear speed is 'relativistic mass'. Mass of macro body at absolute rest (with respect to universal medium) is its 'rest mass'. Therefore, rest mass can represent matter-content of a macro body. Rest mass is the relation between matter-content of macro body and effect of external effort on it at low linear speed or at rest.

In normal circumstances, when linear speed of a macro body is small compared to linear speed of light, differences between rest mass and relativistic mass is extremely small. Therefore, we do not take it into consideration. Rest mass is considered to represent macro body's mass. Mass represents matter-content of a macro body. It also is the constant of proportion between external effort on a macro body and macro body's

linear acceleration. Therefore, it is a mathematical relation that is assumed to represent matter-content of the macro body.

Since linear speed of a photon is the speed of light (because photon is corpuscle of light), its relativistic mass is infinity in the direction of its motion. Hence, no external effort in the direction of photon's motion can affect it. External efforts in directions other than direction of photon's linear motion, including direction opposite to its motion, can act on a photon. In all these cases, only photon's rest mass needs to be considered. Relativistic mass**,** produced due to macro body's linear speed, has only ghost appearance and it carries no matter-content. Hence, no external effort can be applied on or act on relativistic mass of a macro body.

Relativistic mass can be expressed in terms of energy. This has led to speculation that rest mass of a macro body is also identical to relativistic mass and rest mass of a macro body is a converted form of energy. Thus, a macro body's rest mass – its matter content − came to be equated with energy. Changes in matter-content – rest mass – of a macro body takes place by addition or removal of quanta of matter to or from its constituent photons. Matter-content from a photon may be transferred to another photon, radiated away as low-frequency photons or reverted to universal medium. Rest mass of a macro body is sum total of rest masses of all its constituent photons. Rest mass of a macro body depends only on its matter content. If there is no change in its matter content, rest mass of a body remains constant under all conditions.

Law of conservation of energy is applicable to both matter and energy, separately. In case of matter, it is more like 'law of conservation of rest mass or matter-content'. Any conversion from or to universal medium also should be taken into consideration. At present, this is compensated by taking heat as a form of energy.

A photon, basic 3D matter-particle, is created and sustained by continuous actions of universal medium. Each of the 2D energy fields, in planes passing through basic 3D matter-particle (photon's matter-core), invests work (that produces strain and associated energy) in part of its latticework-structure. Invested work creates necessary surroundings (inertial-pocket or distortion-field), by distorting latticework squares) for creation and sustenance of matter-core of photon. All investments of work (energy) are produced ultimately by gravitational actions of universal medium.

Whole of energy associated with a photon is the product of gravitational action of universal medium on its matter-core. All forms of energy originate and manifest in different forms from gravitational actions. Gravitational attraction is also one of the by-products of gravitational action. Work invested by universal medium remains within universal medium but in association and in relation with matter-core of photon, in the form of displacement of quanta of matter with respect to each other, in latticework-structures of 2D energy-fields.

### 4.12.1. Work and energy about photon:

Displacement constitutes work. Hence, an effort invested to displace quanta of matter in universal medium produces work. Work, done in association with 3D matter-bodies, is the cause of energy. At present, the term 'energy' is used in an abstract form to represent both matter and work-done about it. This concept brings out distinction between matter and energy. Investment of work by universal medium is required at every stage of development of 3D matter-bodies. Certain work is invested for creation and sustenance of photons, certain work is invested for development and sustenance of primary 3D matter-particles by photons, certain work is invested for development and sustenance of subatomic particles by primary 3D matter-particles, etc.

Work invested in association with any step, towards development of a macro body, can be undone and associated stress (energy) in universal medium can be released only on disintegration of that development (3D matter-body). Only the additional work, invested in association with whole macro body – in matter field of macro body, is normally available to do external work. All other parts of work, invested for requirement of macro body's components, remain latent with 3D matter-particles of macro body and cannot be normally used to do external work. Each part of invested work is considered separately in this text, with each type of 3D matter-particle, when they are dealt with, as separate 3D matter-body. Since, work and energy are almost synonymous in present-day context; they are used interchangeably in following sections.

Energy is stress in universal medium related with a 3D matter-body. Hence, it may be considered as a quality of universal medium, produced in association with matter-content (rest mass) of a macro body. It is associated with state of macro body and its ability to do work by virtue of its state. Energy can be used to indicate state of distortions in universal medium about a 3D matter-body or relative displacements of quanta of matter in latticework-structure of a 2D energy field. Energy or stress, produced in universal medium is proportional to work-done. By transfer of work from one part of universal medium to another, energy is transferred from one place in universal medium to a new location, along with work.

Energy is intangible and it is produced by universal medium while doing a tangible work. Energy is intangible because it is the product of displacement of quanta of matter (from their natural stable position) in latticework-structures of 2D energy fields and we have no means to measure stress due to displacements of quanta in their functional state. Energy is the ability or desire of displaced quanta of matter to return to their stable and serene states. Since it is only an ability or desire, it has no real existence. Quanta of matter at a distorted junction point in latticework-structure of 2D energy-field tend to return to their neutral state. This tendency creates stress at junction points. This is the

energy. Work-done on a macro body is tangible due to our ability to measure its movements in 3D spatial system.

Work on a macro body is produced by inertial (gravitational) actions of universal medium about its matter-content. Work is changes in distortions in universal medium about a 3D matter-body. To do this, accessible additional work about a 'force-applying mechanism' by universal medium is transferred to a 'force-receiving body'. Additional distortions in universal medium about 'force-receiving body' are increased by reduction in additional distortions in universal medium about 'force-applying mechanism'. Total additional distortion and associated stress in the system do not change by this action. Only a re-location of additional distortions and associated stress takes place. Thus total momentum (or energy) of system is preserved, irrespective of transfer from one 3D matter-body to another. Hence, the 'law of conservation of momentum' is maintained.

Conservation law, in our sense, is applicable to energy of whole-body systems, during their (apparent) interactions. In case of very small 3D matter-particles like photons or primary or subatomic matter-particles, transfer of energy to or from universal medium also should be taken into consideration. Smaller 3D matter-particles may gain or lose matter-content in the course of their stabilization. Their energy at any instant is related to their matter-content. As their matter contents vary, energies invested in association, also vary correspondingly. If such a change is gradual, universal medium will absorb energy (along with work) returned to it. If such reversion is sudden, it may produce fluctuations/waves in structures of universal medium to be transmitted away as moving distortions. In lager macro bodies, losses of matter-content and associated energy by constituent photons are not noticeable due to enormous difference between matter-contents of photons and total matter-content of macro body.

Changes in energy of a macro body (unless it affects linear speed of its photons) do not change macro body's matter-content. Since energy of a macro body exists in universal medium about macro body, it cannot be measured in terms of 3D spatial system. However, its cause, the work, on macro bodies is tangible in 3D spatial system. Accordingly, we measure work and energy, in these terms.

Energy assumes many different forms in different contexts – gravitational, electric, magnetic, nuclear, inertial, chemical, mechanical, frictional, kinetic, potential, etc. energy. They are all results of work and are measured as changes in state of (motion of) 3D matter-bodies. At least in some cases, they have only phantom existence.

Potential energy due to elevation of a macro body from surface of earth is an example. Work (energy) is required to raise macro body from surface of earth. Nevertheless, raising a macro body to certain elevation does not make any change in or about the macro body or in its matter-content. Energy is expended in overcoming gravitational attraction between macro body and earth. However, no work is done on or

about macro body. If macro body is taken out of gravitational influence of earth, what happens to all the potential energy stored in it? Hence, it is not correct to say that energy is stored in macro body in the form of potential energy.

When elevated macro body is brought back to surface of earth, it is the gravitational attraction that is moving it towards earth and not the potential energy stored in it. Effort used to elevate macro body is spent in doing work against gravitational attraction. This does not constitute work done on or about the macro body. Gravitational attraction, between macro body and earth, readily removes whatever temporary work is done about macro body during its motion, when it comes to rest in its new location.

Work (energy) may cause changes in matter-content level of a macro body, always by attempting to vary linear speeds of its photons, but it cannot convert itself into 3D matter. It may also cause creation of 3D matter from quanta of matter and may cause reversion of 3D matter into universal medium. Heat or radiation are matter emissions. They constitute transfer of 3D matter. Heating a macro body lowers its matter content. During heating, work invested in macro body and corresponding energy are reduced due to reduction of macro body's matter content. Otherwise, there is no investment of work (or energy) into a macro body during heating. (See section 9.12).

Energy, in association with a photon, may be considered as a combination of three parts. First part is stored within its matter-core and other two are stored in its inertial pocket.

First part of energy is produced by work needed to compress disturbance, convert quanta of matter in it into 3D status and to maintain matter-density of matter-core. This part of energy originates from work done by gravitation against tendency of quanta of matter in matter-core of photon to separate, expand and revert into their 1D status. This is the pressure energy associated with photon's matter-core.

Second part of energy originates from work done by universal medium, to provide photon with its linear motion at critical constant speed. Presence of 3D disturbance creates inertial-pocket in universal medium, surrounding the 3D disturbance. Inertial-pocket converts the disturbance into matter-core of photon, maintains its stability and provides all natural motions of photon. In order to maintain linear motion of photon at a constant rate, inertial pocket moves through universal medium at its maximum possible speed. Matter-core of photon is carried with inertial pocket. Distortions of latticework-structures in inertial-pocket, producing linear motion of photon, produce stress in universal medium. This stress is kinetic energy associated with photon due to its linear motion.

Third part of energy originates from work done to provide photon's matter-core with spin motion and maintain spin speed in proportion to its rest mass. Distortions in inertial-

pocket, producing spin motion of photon, produce stress in universal medium. This stress is kinetic energy associated with a photon due to its spin motion.

Photons require certain energy associated with work invested about them for their creation and sustenance. Once this is accomplished, photons become (for all practical purposes) independent of universal medium. No more work or energy can be stored in association with stable photons. Investment of work (with associated energy) is action of universal medium. In stable state of photons, universal medium cannot interact with them. In case of macro bodies, energy is invested into universal medium that surrounds its constituent photons.

There is another type of energy associated with photon, which appears only when disc-planes of more than one photon are present in any one plane. This energy is originated from work owing to gravitational attraction between photons. Work is produced due to difference in extents of universal medium around a photon. When disc-planes of matter-cores of two photons are in same plane, extent of universal medium between them is always less than extent of universal medium on their outer side. Difference in magnitudes of gravitation is felt by both photons separately. Distortions in the region of universal medium near outer sides of both photons have more distortions compared to distortions on their inner sides. Difference in magnitudes of distortions produces difference in associated stress. This difference in stress is apparent 'potential energy' and in this case, it represents gravitational attraction.

Potential energy due to gravity has only phantom existence. Therefore, it is not included with energies associated with photon. In fact, it represents apparent action by gravitation and it develops into other forms of energy only when work is done on photons to move them towards each other. At that time, it can be said that potential energy is transformed into kinetic energy. Actually, it is the gravitational effort, which is doing the work and hence producing kinetic energy. This is interpreted as a conversion of non-existent potential energy into kinetic energy. Since gravitational effort is doing the work, energy associated with it is inherent in universal medium. Inertial-pocket acts only as a conduit for transfer of work.

Photons or macro bodies cannot store potential energy in association with them. To store energy means to have permanent work done about them in universal medium. Variation in the extent of universal medium is the cause for development of potential energy due to gravitation. It has nothing to do with photon's or macro body's matter content. There are no changes in intrinsic distortions in universal medium about photon's matter-core or macro body. Tendency by photons to store apparent potential energy (say, from gravitational attraction) tends to vary its linear speed. This can only produce a variation in its matter-content and frequency, instead of affecting its linear speed. Photon's linear speed can be varied only by changes in consistency of universal medium.

Of these different types of energies about a photon, only kinetic energy, converted from apparent potential energy due to gravitational attraction can be released by a photon to do work and yet maintain its stability. Kinetic energy converted from apparent potential energy develops only in the presence of another photon (with their disc-planes of their matter-cores in same planes) and the photon developing linear motion due to gravitational attraction between them. On disintegration of photon, all associated energies disappear, when work-done on or about photon are released back into universal medium.

Energy associated with (developed during) compression and shaping of matter-core of photon is pressure energy, Ep, by gravitational effort, in each plane, on photon's matter-core:

$$\text{Energy}, E_p = P \div \sigma$$

Where 'P' is pressure and 'σ' is matter-density of photon's matter-core.

Substituting pressure, P, with gravitational pressure, G1, on 3D disturbance;

$$\text{Energy}, E_p = G_1 \div \sigma$$

Here, $G_1$, being gravitational pressure exerted by universal medium, is a constant and matter-density of photon, □ □is also a constant (being matter-density for 3D matter). Pressure energy of photon's matter-core in each of its 2D plane is a constant. So, total pressure energy of a photon is proportional to number of planes of existence of photon's matter-core, which is proportional to its rest mass, m, (constant of proportion is $K_3$) or frequency, f, (constant of proportion is $K_4$).

$$\text{Total pressure energy in a photon, } \sum E_p = \frac{K_3 m G_1}{\sigma} \qquad \textbf{(4/6)}$$

$$\text{Or,} \qquad \sum E_p = \frac{K_4 f G_1}{\sigma} \qquad \textbf{(4/7)}$$

Let external effort, F, act on static matter-core of photon of rest mass, m, to move it in a linear direction, A is its acceleration, V is its velocity, S is its displacement and T is time. Then:

$$F = mA \qquad \text{and} \qquad A = dV/dT$$

$$F = m\left(dV/dT\right) \qquad \textbf{(4/8)}$$

Energy is measured in terms of work. Therefore, work done by universal medium on itself, to move a photon at its critical linear speed is kinetic energy stored in universal medium, in association with photon. Let kinetic energy due to linear motion of photon is $E_k$. Now linear speed of a photon is the speed of light and so its relativistic mass is infinity. Hence, during its stable state, there is no external effort applied on it in the direction of its linear motion. (Refer section 4.7). There is no change in its matter content – rest mass.

So energy stored (produced during work-done) or work done in universal medium in association with matter-core of photon, to move it at any speed depends only on photon's rest mass.

Work-done = Force × displacement

Work done in universal medium, $E_k = F\int ds$ Where ds is displacement in small time.

$$E_k = m\left(dV \big/ dT\right) \times \int ds$$

Putting value of F from equation (4/8) and dS/dT = V

$$E_k = m\int \frac{dVds}{dT} = m\int VdV = \frac{mV^2}{2} \qquad \textbf{(4/9)}$$

In free space, velocity of a photon 'V' is of critical constant value of speed of light 'c'. Mass of photon is equal to its rest mass 'm'. Putting these values in the equation (4/9), we get:

$$E_k = mc^2 \div 2 \qquad \textbf{(4/10)}$$

Angular velocity of a photon, $\omega = 2\pi f$ where f is its frequency of spin.

Considering matter-core of photon as a disc, spinning about one of its diameters through center of gravity, its moment of inertia about spin axis,

$MI = mr^2 \div 4$ Where 'r' is radius of photon's matter-core.

Kinetic energy due to photon's spin,

$$E_s = MI \times \frac{\omega^2}{2} = \frac{mr^2}{4} \times \frac{\left(2\pi \times f\right)^2}{2} = \frac{mr^2\pi^2f^2}{2} \qquad \textbf{(4/11)}$$

Total energy of a stable photon,

$$E = E_p + E_k + E_s = \frac{K_3 m G_1}{\sigma} + \frac{mc^2}{2} + \frac{mr^2\pi^2f^2}{2} \qquad \textbf{(4/12)}$$

However, in normal circumstances, none of these energies is available to do external work. They are latent in photon's matter-core and in universal medium, in association with photon (photon's inertial pocket), for its creation and sustenance. As long as photon continues to be a 3D matter-particle, these energies remain with it.

If inertial-pocket of photon is invested with additional work (along with corresponding energy) to move it in any direction in addition to its natural motions, only that part of energy will be available to do external work. When a photon is part of free radiation, this is not practical. But when a photon is part of a larger 3D matter-body and its inherent movements are limited within the 3D matter-body, inertial-pockets of photons of larger 3D matter-body, as a whole, may be invested with additional work (along with

corresponding energy), which may then be released to do additional work, elsewhere. This is what happens when a composite 3D matter-body is moved.

By Planck's equation, energy carried by a radiation, E = hf

Where 'h' is Planck's constant and 'f' is frequency of radiation. Though this equation was originally made for transfer of matter – heat and light, presently it has come to be used with all operations regarding electromagnetic waves, which do not carry any matter-content. However, photons carry matter as well as associated energy (similar to electromagnetic wave). Hence, it is taken in this concept that, this equation is valid only for the energy part of photon.

$$hf = \frac{K_3 m G_1}{\sigma} + \frac{mc^2}{2} + \frac{mr^2\pi^2 f^2}{2} \qquad \textbf{(4/13)}$$

Of these energies, pressure energy, Ep and kinetic energy due to spin, $E_s$ are too small, compared to kinetic energy due to photon's linear motion, $E_k$. Neglecting both $E_p$ and $E_s$ being too small we get;

$$E_k = \frac{mc^2}{2} = hf$$

From this, energy equivalent (not equal) of mass of a photon may be found as;

$$m = \frac{2hf}{c^2} \qquad \textbf{(4/14)}$$

### 4.12.2. Kinetic energy and rest mass:

To stabilize a photon, universal medium need to do work on itself (develop energy) in association with photon. During this action, quanta of matter in universal medium about matter-core of photon are moved (latticework structures of 2D energy-fields are distorted) and hence certain work is done. Magnitude of work, required (and energy developed) to stabilize a photon, depends on photon's rest mass. Energy due to compression pressure and kinetic energy due to linear movement of photon bear direct relation to photon's rest mass. Assuming matter-cores of two photons in same directions of motions in all respects, combining to form a single photon (moving along common spin axis), their rest masses add together and so will their pressure energies and their kinetic energies due to their linear motions. Since these energies are related to work required to stabilize photon and they are directly proportional to the photon's rest mass, such combination do not require variation of energy (of pressure energy and the kinetic energy due to linear motion) to sustain the stability of newly made photon with respect to its size and its linear speed.

Relation of kinetic energy, due to spin motion of a photon, to its rest mass is not direct. Therefore, kinetic energy due to spin, developed in association with same matter content (rest mass) being a single photon or being more than one photon, are different. For a change in rest mass of a photon, change in its kinetic energy due to spin motion is not proportional. Additional kinetic energy required, has to be supplied by universal medium and any excess energy has to be absorbed by universal medium. As this process is an inertial action, it takes some time to complete. During this time interval, photon is unstable (by its matter content and inertial-pocket). Rest mass of photon tends to change, in an effort to restore its stability.

If there is a reduction in rest mass of photon or a photon splits into more than one, excess kinetic energy due to spin motion is available in the photon's inertial-pocket. Excess kinetic energy due to spin, tends to accelerate daughter-photons and compel them to spin faster. This in turn, compels them to absorb quanta of matter from universal medium to increase their rest mass. Similarly, during sudden increase in rest mass of a photon or during combination of matter-cores of two photons, there is a shortage of kinetic energy due to spin motion. This lowers (combined) photon's spin speed and thereby compels it to discard some of its rest mass during stabilization period.

Discarded quanta of matter from these photons (if only few) are absorbed into universal medium. If there are great many discarded quanta of matter, they form disturbances in universal medium and develop into photons to radiate away. Therefore, whenever two photons combine, there is a loss of matter-content from the combination. Rest mass, thus lost, may be radiated away in the form of new photons or may be reverted into universal medium. In this case, directions of photons' motions are assumed similar so that their kinetic energies due to spin add together. Should there be a difference in directions of motions of photons, interactions are similar but changes caused due to relative directions of kinetic energies due to spin also need to be considered as per basic physical laws.

Following example illustrates changes in kinetic energy due to spin, when rest mass – frequency – of a photon changes. Let us take two photons of frequency of $10^{10}$ Hz each and identical in all their motions. Let radius of matter-core of photon (which is common to all photons) is 'r' meters, Planck's constant 'h' = 6·625 x $10^{-34}$ erg sec and velocity of photon c = 3 x $10^{8}$ m/s and $m_0$ is rest mass of each photon.

$$\text{Kinetic energy due to spin of one photon, } E_s = \frac{m_0 \pi^2 f^2 r^2}{2} \quad \text{by equation (4/11)}$$

$$\text{Putting energy equivalent of rest mass, } m_0 = \frac{2hf}{c^2} \quad \text{by equation (4/14)}$$

Kinetic energy due to spin motion of each photon, $E_s = \frac{\pi^2 h f^3 r^2}{c^2}$ **(4/15)**

Putting values of constants, $E_s = 7.265 \times 10^{-20} r^2$ joules.

Sum of Es for two photons, $\sum E_s = 2 \times 7.265 \times 10^{-20} r^2 = 14.53 \times 10^{-20} r^2$ joules.

Assuming directions of motions of photons are similar; let the photons combine by their matter-cores moving towards each other in the direction of their spin axes, to form a single photon of double the rest mass. Since frequency is directly proportional to rest mass, new photon will have frequency; double that of a single photon, i.e. 2 x $10^{10}$ Hz.

Es for the new photon by equation (4/15), $\sum E_s = 58.1208 \times 10^{-20} r^2$ joules.

Additional Es required for new photon to achieve stability, without loss of rest mass;

$E_s = 43.59 \times 10^{-20} r^2$ joules.

(Since photons are real 3D matter-particles, they exist in space and radius of matter-core of photon is a positive number).

Because of this shortage, spin motion of newly formed photon is slower until universal medium is able to invest additional work to develop required energy and shortage is overcome. However, in the mean time, new photon will discard some of its matter-content due to its reduced spin speed. Discarded matter-content, depending on rate of availability of free quanta of matter, is either reverted to universal medium or they may form new photons and radiate away.

In order that law of conservation of energy or mass to be maintained, rest mass, lost from photon, and additional kinetic energy due to spin, developed in universal medium during photon's stabilization also need to be taken into consideration. This means that whenever matter-cores of two photons combine, resulting photon is of lower matter-content – rest mass – than sum total of matter-content of constituent photons. And there will be additional photons of much lower frequency to be radiated away from the surroundings of union, whose matter-content – rest mass – is equal to 3D matter lost from the combination (disregarding matter, reverted to universal medium).

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