

HIERARCHY OF MATTER-PARTICLES

According to 'MATTER (Re-examined)'

Nainan K. Varghese, matterdoc@gmail.com

<http://www.matterdoc.info>

Abstract: In material world matter provides substance to all real entities. Hence, it is logical to conceive development-hierarchy of various matter-particles, starting from unstructured matter, rather than bifurcating superior matter-particles into inferior ones on the basis of noticed properties. Diverse properties of various matter-particles are derived from immediate inferior matter-particles and depend on their physical structures. Very brief account of development of various matter-particles, from unstructured matter, as conceived in alternative concept presented in book '*MATTER (Re-examined)*', is presented in this article.

Keywords: Matter, unstructured matter, quantum of matter, disturbance, photon, biton, tetron, hexton, neutron, positron, electron, proton, deuteron, atom, molecule.

Introduction:

In the past, smallest (indivisible) part of matter was called atom. On further development of physics, atom was found a composite matter-body. Atom changed its role to a basic unit of matter that consists of a dense central nucleus surrounded by a cloud of negatively charged electrons. These parts were further confirmed to have smaller constituents. Current state of classification of all elementary particles is explained by 'Standard Model'.

All previous models attempt to divide matter (experimentally) into smaller and still smaller parts to arrive at the smallest possible matter-particle, without losing its objective reality in three-dimensional space. Reverse technique, based on single assumption that 'Substance is fundamental and matter provides substance to all real entities' is followed in this model. Matter, in its true unstructured state, has no property except tendency to maintain its integrity. Unstructured matter is used as initial platform and formations of elementary and fundamental matter-particles are logically derived from its developments. All properties of superior matter-particles are results of their structures and arrangements of constituents. There are no assumed properties or imaginary entities. Spin motions of all subatomic particles, mentioned here, are 'mechanical rotary motion' of 3D matter-bodies concerned.

Quantum of matter:

Tendency to maintain integrity of (a lump of) unstructured matter causes its fragmentation into very small bits - quanta of matter. Whole matter in nature exists in the form of infinite numbers of quanta of matter, to fill entire space without voids. A quantum of matter preserves its individuality under all conditions. It simultaneously exists in all spatial dimensions, even if its measurements in any one or more spatial dimensions are intangible. Diverse matter-particles, different properties and all other physical phenomena develop from and due to quanta of matter. Density of matter (everywhere in universe) is constant irrespective its nature of existence. Matter is neither compressible nor expandable.

Quantum of matter has definite structure and its abilities arise from inherent property of self-adhesion of unstructured matter-content. A quantum of matter, in its free state, is a 1D object. It has length as its only tangible spatial measurement. Its length may be reduced by external pressure from ends to grow matter-content in width and thus developing into 2D space until it becomes a perfect circle in a plane. Further, identical inward external pressure all around circular periphery compels it to grow into 3D space, while reducing measurements in other two spatial dimensions. As soon as a quantum of

matter grows in to third spatial dimension, it becomes (part of) a 3D matter-particle, with objective existence in 3D space. This is the stage of creation of 3D matter. Conversely, reduction in external pressure on a quantum of matter in higher spatial dimensional status gradually lowers its spatial dimensional status, until it becomes a 1D quantum of matter.

A quantum of matter further has a measure of its matter-content. Matter-content is not a spatial measurement. As we have no reference to measure quantity of matter, matter-content is not directly tangible. Matter-contents of quanta of matter have no substructures. They are homogeneous, isotropic, continuous and incompressible. Its rigidity is flexible enough to transmit efforts through it, by changes in spatial existence. Quantum of matter can express its individuality only in spatial dimension(s) of its existence. Due to differences in matter-contents, they may have different measurements, in different spatial dimensions. Quanta of matter in different spatial systems, but passing through same point in space, coexist at the point. Interactions are possible only between quanta of matter in same spatial dimension(s) and in direct contact. Quanta of matter are smallest matter-particles in existence.

Universal medium:

Tendency to elongate in single spatial dimension causes quanta of matter in same plane to meet and form junction-points. Most stable junction-point is the one that has four quanta of matter in same plane and adjacent quanta of matter perpendicular to each other. Quanta of matter in numerous junction-points in a plane, together, form latticework-structure of a 2D energy-field, which extends infinitely in all directions, in its plane. Constituent quanta of matter in a 2D energy-field are held under compression. Angular diversions, of quanta of matter at junctions, from their stable position are automatically corrected by aligning efforts between them. As long as angular differences at a junction differ in magnitudes, all participating quanta of matter remain under stress to return to their stable position.

Movement (displacement) of a participating quantum of matter (strain) at a junction is a positive accomplishment. In physical sense, it is a 'work', done by or on quanta of matter. Theoretically, displacement of quanta of matter at a junction is tangible, sensible and real. Therefore, work is real (action). Stress at the junction, between quanta of matter is always present, even in their stable state. It is their relative angular differences, which produces a resultant effort to move (deflect) any or all quanta of matter at a junction. Additional stress, produced by work (strain) is 'energy' stored at junction of quanta of matter. Quanta of matter, meeting at a junction, being part of quanta-chains of their own spatial dimension, are already compressed to their minimum length in 1D spatial system. Magnitude of compression in a quanta-chain is proportional to extent (length) of quanta-chain.

Because of their physical independence, two 2D energy-fields do not interact (directly) even if they are touching (crossing) each other. Distance or separation between two adjacent and parallel 2D energy-fields corresponds to thickness of a plane or a 2D energy-field in 3D spatial system. 2D energy-fields, extending to infinity, exist in all possible planes of 3D space. They have the required rigidity, stability and flexibility to perform all actions expected from an ideal universal medium. Inherent properties of 2D energy-fields are derived from tendency of constituent quanta of matter to preserve its individuality and mechanical structure of their latticework-formations. 2D energy-fields are 2D material entities made of 1D quanta of matter. Each 2D energy-field exists and acts in its own plane. They have perpetual existence and are steady in space. They fill entire space outside basic 3D matter-particles. Since there are no voids or limits to extents of 2D energy-fields, no 3D matter-particle can exist outside them. They pervade all inter-particle spaces in macro bodies. 2D energy-fields are self-sustaining entities. They strive to sustain their integrity, stability, homogeneity, isotropy and serenity. 2D energy-fields, in all possible planes, together form all-encompassing universal medium.

In its stable state, universal medium is homogeneous, isotropic and serene. It has constant matter-density everywhere, in a region of space. It can be anisotropic, when unstable (deformed), without losing homogeneity, to facilitate relative motions. Separate 2D energy-fields, for each plane, enables it to be homogeneous and anisotropic at the same time. Latticework-structure and flaccid bonds by quanta of matter at junction-points allow 2D energy-fields to deform easily. Distortions in latticework-structures of 2D energy-fields tend to equalise and maintain homogeneity. This results in actions by field-efforts.

Absolute motions of 3D matter-particles are with respect to steady 2D energy-fields. Basic 3D matter-particles are displaced (which in turn causes motion of a macro body) in space by transfer of distortions in steady 2D energy-fields. They are moved by 2D energy-fields rather than they move through 2D energy-fields. Latticework-structure of a 2D energy-field causes sequential development of distortions in neighboring latticework-squares. Distortions, once developed, remain permanently within 2D energy-field, unless removed by external action. These phenomena give rise to the property of inertia.

A region in universal medium with deformed latticework-structures is 'distortion-field'. Depending on directions of distortions, distortion-fields are classified into gravitational, electric, magnetic, nuclear, etc. fields. All these distortion-fields are (relatively) dynamic with respect to elements, which produce them. Static distortion-fields are produced by relative displacements of interacting dynamic distortion-fields. A moving region of work/distortion-field in latticework-structures of 2D energy-fields is inertial-field. Stress, in universal medium, is the energy associated with work invested to create associated distortion. As all actions by universal medium are by identical mechanism, there is only one type of natural effort (force). Universal medium creates basic 3D matter-particles from and by itself. It also maintains stability and integrity of all basic 3D matter-particles and superior matter-bodies created from them.

Disturbance:

Any structures that disturb inherent properties of 2D energy-fields are 'disturbances' with respect to universal medium. If stress in universal medium is strong enough, it may cause local breakdown to release quanta of matter from their home position. Detached quanta of matter float around before they can regain their places in latticework-structures. However, if gap produced is comparatively large and free quanta of matter are too many, developing and restoring parts of latticework-structures takes time. In the meantime, in order to restore its continuity, 2D energy-fields from all around tend to close-in on the gap. Free quanta of matter, within gaps in each 2D energy-field, are unorganized and tend to elongate in 1D space. This group of quanta of matter is a 'disturbance'. Although a disturbance is also a collection of quanta of matter, it is very distinct and unorganized compared to latticework-structures of 2D energy-fields, which are orderly formations by them.

A collection of quanta of matter, even if it is a matter-particle in higher dimensional spatial system, is a disturbance with respect to universal medium. A disturbance of higher spatial dimensional system simultaneously exists in more than one 2D energy-field. Part of disturbance in each plane is acted upon by corresponding 2D energy-field in that plane. Since a disturbance (or part of a disturbance), in a plane, is not a part of latticework-structure, it breaks continuity of 2D energy-field in that plane. Hence, any object that creates discontinuity in latticework-structure of 2D energy-field also is a disturbance.

2D energy-field, by its inherent nature, exerts reactive effort on disturbance in the gap, to contain it. This phenomenon is gravitation. To invoke gravitation, it is necessary to have a discontinuity (a gap) in latticework-structures of 2D energy-fields. Gravitational action is against attempt of free quanta of matter in disturbance to enlarge the gap. Intrusion of 2D energy-field into the gap reduces sizes of gap and disturbance in it. This phenomenon is the basis for inherent property of universal medium to reduce disturbances in them, to minimum. Due to latticework-structures of 2D energy-fields, gravitation can act only on curved perimeters (surfaces). Gravitational attraction between 3D matter-particles is a by-product of separate gravitational actions on each of them.

Photon:

Universal medium compresses larger disturbances into 3D matter-cores of definite structure and shape. Gravitational actions mould them into segmented spherical (disc) shape and form 'inertial-pocket' (distorted region in universal medium) around it. Inertial-pocket maintains stability, shape and size of 3D matter-core and moves it at constant (highest) linear speed and spin speed (about one of its diameters) proportional to magnitude of matter-content. Inertial-pocket moves in universal medium and thus carry matter-core with it. Basic 3D matter-particle with associated inertial pocket is a photon. Linearly moving spinning matter-core provides its matter-part and spinning inertial pocket provides its wave-part. Each photon physically has dual nature. Photons are corpuscles of light (or other radiations of matter).

Radiation is continuous flow of photons. Photons are the most basic 3D matter-particles in nature. They are classified according to their matter-content (spin speed – frequency). All properties of light can be explained by its corpuscular nature. 3D rational beings can perceive only three-dimensional objects. Therefore, all matter-particles inferior to photons (including universal medium) remain hidden from us.

Matter is inert. Motions of photon are actions by universal medium on its matter-core. Constant linear motion in straight path and spin motion proportional to its matter-content are essential for stability and integrity of photon. 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 its matter-core. As photon moves at highest possible linear speed, no external effort in its direction of motion can affect it. Attempt to vary its linear speed changes its (frequency) matter-content, rather than its linear speed. Difference in linear speeds of segments of matter-core, due to super-positioning of linear and spin motions, causes gradual loss of matter-content from photons. This is one of the reasons for red-shift in frequency of light, travelling great distances in space. Ultimately, photons may lose all their matter-content and leave low-frequency inertial-pockets as residue in universal medium to appear as back ground radiation.

Inherently, universal medium moves photons in straight-line paths. Attempts to curve their paths, destabilise inertial-pockets and cause additional distortions that produce distortion-fields in universal medium. Interactions between distortion-fields produce apparent attraction or apparent repulsion between photons (and superior matter-particles formed by them). Photons are independent 3D matter-particles and except for gravitational attraction, in median plane of their matter-cores, no external efforts can affect their parameters.

Biton:

If spin axes of two high-frequency photons of equal matter-contents (moving in opposite linear directions towards each other in parallel paths) coincide in a straight line at the instant when they are nearest and their matter-cores spin in same (relative) phase in common disc-planes, they gravitationally attract each other. Mutual gravitational attraction modifies their inertial-pockets and changes directions of their paths to curve about each other. Disc-planes of their matter-cores remain continuously in common planes to maintain gravitational attraction. Additional distortions convert inertial-pockets into distortion-fields. Photons become unstable by inertial-pockets, but remain stable by their matter-contents. Centrifugal actions and apparent repulsion due to interaction between distortion-fields prevent matter-cores of photons from merger. Photons circle about each other in a common circular path. When all actions in the binary system of two photons are in balance, the union acquires status of an independent, self-sustaining primary 3D matter-particle - 'biton'.

Because of stringent requirements for photons to be in and in relation to each other during formation of a biton, it is extremely rare for new bitons to form. Once a biton is formed, it is equally difficult to destroy it. However, both creation and destruction of bitons do take place in universe at extremely low rate. Constituent photons of biton revolve around each other, about same center point. Both photons spin in unison about an axis passing through center of their common circular path. Disc-planes of their matter-cores remain continuously in common planes. All natural movements and speeds of individual photons with respect to universal medium are maintained at their critical level to keep their matter-contents (frequency) stable and equal. Bitons float around freely in space. They may also develop additional movements or linear motion in any direction due to external efforts. Bitons have rest mass, matter-field and inertia. They obey all inertial laws under all conditions. They are the most stable 3D matter-particles.

Matter-content levels of biton's photons depend on nature of surrounding universal medium. Critical matter-content level of biton is 'ground state of matter'. Because of stabilizing actions of bitons, it is inherent property of 3D matter-bodies to strive continuously towards ground state of matter-content level. External pressure on biton, in free space, is constant and least. Biton (and hence all composite 3D

matter-bodies) in free space have highest possible matter-content level. Rest masses of all bitons in free space are equal. A 3D matter-body in free space is at its highest matter-content (coolest state) and energy-content levels. Increase in external pressure on constituent bitons of macro body lowers their matter and energy contents (heating), which reduces frequencies of constituent photons and enlarges bitons. This causes expansion of macro bodies during heating.

Heat is a state of lower matter-content level. This state (heat) may be transferred from one part of a macro body to another part or from one macro body to another, without transfer of real or functional entities. Tendency to maintain its matter-content makes biton, a self-sustaining entity. Changes in spin speeds of photons encourage absorption of matter-content and change in linear speeds of photons encourage rejection of matter-content. These two opposing tendencies delay stabilization of biton with lower matter-content. This phenomenon slows process of cooling compared to process of heating.

Every cycle constituent unstable photon moves through a point in circular path, similar linear distortions are set up in latticework-structures of universal medium. Repetitive actions at very high rate, more or less sustain magnitudes of distortions at a constant level. Angular distortion-field formed by steady magnitude of linear distortions about periphery of biton is primary electric field. Combinations of primary electric fields in superior 3D matter-particles form their electric and magnetic fields. Electric charges and magnetic poles are relative directions of lines of force of corresponding fields. Each electric field has both, positive and negative, electric charges and each magnetic field has both, north and south, magnetic poles. Matter-field of a biton is the region in surrounding universal medium, incorporating distortion-fields of both constituent photons, distortion-field of biton and additional distortions acquired for its whole-body motion.

Distortions in common 2D energy-fields, in planes passing through matter-cores and distortion-fields of different bitons in a macro body, combine to form its matter-field. As inter-biton spaces shrink, distortions in distortion-fields of different bitons influence each other. If distortion-fields of neighboring bitons are similar, actions are mutual and transfer of distortions is resisted. This produces push actions (field-effort) between bitons. Push-actions between constituent 3D matter-particles of a macro body produce its internal pressure.

If quanta of matter, discarded from matter-cores of photons of a biton, during compression, are in moderate numbers, they are absorbed into latticework-structures of 2D energy-fields. If available in sufficient quantity, they form disturbances and photons, which radiate away from place of their creation. Photons, formed during compression of macro body, are of low matter-content level. They form low frequency radiation (in the range of infra-red frequency), felt as 'heat radiation'. In case of very large macro bodies, compression by their gravitational collapse is sufficient for radiation of photons of very wide frequency range. Stars radiate matter and associated energy under gravitational collapse rather than by atomic fusion.

3D matter-particles on fringes of equatorial periphery of a galaxy have extremely high linear speeds. As and when, linear speeds of superior 3D matter-particles approach speed of light, they breakdown into constituent bitons. Free bitons, moving at very high linear speed align with their planes perpendicular to direction of linear motion. Rotating galaxies have halos, formed by independent bitons, around its equatorial region. Halos prevent translational motions of galaxies towards each other and keep them steady in space.

Tetron:

Whenever median disc-planes of matter-cores of constituent photons in different bitons coincide, they are gravitationally attracted and move towards each other. Two approaching bitons may inter-link and superposition their distortion-fields in perpendicular planes. Union of bitons re-distribute and stabilize distortions (work) in their distortion-fields and matter-contents of their photons, while maintaining individuality of bitons. Photons of union revolve about a common center point, which coincide with center points of both bitons. Planes of bitons are mutually perpendicular. This union of two bitons is a primary 3D matter-particle. It has four photons in it and hence it may be called a 'tetron'.

There is one plane passing through a tetron, in which all photons of a tetron reach simultaneously, once every spin. Median disc-planes of all photons in tetron coincide at the instant when they cross this plane. Only compatible bitons join to form a tetron. Tetrons are self-sustaining 3D matter-particles. Free tetrons float around in space until external efforts move them. It is constant endeavour of tetron's constituent bitons to keep their relative position and maintain matter-content levels of all photons equal.

Tetrons do not have a solid structure. Each tetron is made of four photons moving on the surface of a large imaginary sphere. Hence, space occupied by a tetron appears mostly empty and porous. Tetrons are independent 3D matter-particles. They are free to form unions with each other or with any other complimentary 3D matter-particles. They may approach each other and if their configurations are mutually suitable, form group in which neighbouring tetrons align so that primary electric-fields of their bitons in same planes are in apparently attractive phase. This requirement makes it necessary for tetrons, forming a group, to do so in a single layer.

Neutron:

Mutual apparent attractions bind tetrons in a layer, while mutual apparent repulsions keep them at definite distance from each other. Bonds between neighbouring tetrons are very weak and layer is not rigid. As a layer of tetrons grows in size, it becomes difficult to maintain its flatness. Gravitational attractions, between tetrons on outer periphery, bend the layer to either side, limited only by its ability to deflect. Apparent repulsion between primary electric fields of bitons on opposite sides of curvature prevent growing layer of tetrons from folding on to itself. When a layer is large enough, to balance between gravitational attraction and repulsive field-efforts from within curved layer, it closes-in to form a spherical shell. This spherical shell, made of tetrons, is fundamental 3D matter-particle - 'neutron'.

Tetrons in a completed tetron-shell are positioned so that the group, as a whole, does not exhibit resultant distortion-fields about it. Hence its matter-field exhibits no magnetic, electric or nuclear properties. Lack of resultant distortion-field about it earns it the name neutron. Each of the tetrons maintains its individuality and distortion-fields. Because of the necessity to have neighbouring tetrons in repulsive phases (main angular distortion-fields of bitons), changes in number of tetrons in tetron-shell can take place only in batches of four tetrons each. Balance between stabilizing and binding efforts within the system of a neutron sets size of its tetron-shell and number of tetrons in it.

Neutrons are independent 3D subatomic particles. In their free state, they are very fragile. They may float around in free space. They may also develop linear or angular motions under action of external efforts. They have mass, matter-field and inertia. They obey all inertial laws, under all conditions. Some of its physical parameters depend on conditions in surrounding universal medium. Since neutrons have no external resultant distortion-fields, they cannot take part in chemical, electric or magnetic activities. Neutron has no solid body. It is structured by numerous photons moving in predetermined circular paths on its surface. A neutron consists mainly of its matter-field, sparsely populated with photons. If it was possible to see a neutron, it would appear as a cloudy region in universal medium. A neutron, under linear motion, would appear as a smeared cloud.

On breaking up, neutron's (protons' and deuterons') tetron-shell may split into a number of fragments, each containing varying numbers of tetrons. There are no definite criteria for fragmentation, other than (in normal cases) tetrons are not split into constituent bitons. Each fragment has different numbers of tetrons in it. Rest masses and resultant distortion-fields of fragments may differ from each other. Depending on number of tetrons and relative orientations within the group, each fragment may have different properties. Splitting neutron (proton/deuteron) into many fragments appear (during experiments) as many types of constituent fundamental particles, each having different characteristic properties. Each apparent fundamental particle is nothing but similar groups of tetrons, with different properties due to varying numbers of tetrons in it. This is (incorrectly) interpreted as hundreds of different types of elementary matter-particles constituting a subatomic particle.

Neutrons are used mainly as spacers or balancing weights in formation of nuclei of atoms. An additional neutron, which is not required for these purposes and is trapped within nucleus of an atom, changes atom's physical properties and may make it unstable. Since a neutron has no resultant (external)

distortion-fields, it can interact with only with those 3D matter-particles, which are within range of individual tetrons. Consequently, presence of neutrons cannot make changes in chemical properties of materials, excepting catalytic effects.

Hexton:

It is also possible for three bitons to combine. If approaching bitons are of compatible classes, they can join to form a union, where each biton is situated in one of mutually perpendicular co-ordinate planes in 3D spatial system. Two bitons are of same type and class. Third biton is of different class. If two bitons have relatively clockwise spinning photons, third biton has to have photons of anti-clockwise spinning photons or vice versa. Relative positions of constituent bitons are maintained by balance between mutual gravitational attraction between photons and repulsive field-efforts between angular distortion-fields due to spin motion of photons. Union has six photons and hence the combined 3D matter-particle may be called a 'hexton'. Constituent photons of hexton move on the surface of an imaginary sphere, whose center is common to all three bitons. Plane of primary electric field of each biton is perpendicular to planes of primary electric fields of other two bitons. In stable state, bitons of a hexton are maintained mutually perpendicular and all constituent photons with equal matter-contents.

Distortion-fields of unstable photons in hexton advance around imaginary sphere to form angular distortions. Although, hexton has no bodily rotary motion, its distortion-field has all properties of a rotating matter-field. Hexton's matter-field guards it from intruding 3D matter-particles, which might collide with its photons. Hextons are self-sustaining, extremely stable 3D matter-particles and have almost infinite life span. It may float around in free space. It may also develop linear or angular motion under external efforts. Hexton has rest mass, matter-field and inertial properties. It obeys all inertial laws under all conditions. Hexton has no solid physical structure. It mainly consists of matter-field with six photons moving on its spherical periphery, at the speed of light. This gives hexton a hazy or cloudy appearance. If we could see a hexton, only spinning photons on the surface of an imaginary sphere would be visible. If hexton happens to be moving linearly, it will have a smeared cloudy appearance.

Each biton of a hexton has its own primary electric field around hexton, extending into space. They combine to form resultant distortion-fields of hexton in 3D spatial system. Planes of primary electric fields of hexton make 45° angles with hexton's equator in same direction. Other than for directions of rotation and spin motions of photons, movements of photons on each hemisphere of a hexton on either side of equator are identical. In order to understand nature of hexton's distortion-field, it is necessary to resolve distortions in its matter-field into all possible components. Distortion-fields about a hexton (in planes containing its axis) has two parts about its equator, one part each for a hemisphere.

Due to reactive efforts, independent hexton may develop spin motion about its axis at slow speed, due to which hexton's primary electric fields lose fixed orientations in space. Distortion-field of a hexton is resultant of primary electric fields of its constituent bitons. It may not have same direction or magnitude of constituent primary electric fields. Nature of hexton's resultant distortion-field can be understood by its resolved components – magnetic, electrical and nuclear fields – in 3D space.

There are only eight combinations of different classes of bitons, which form stable hextons. Four combinations each form identical stable hextons having same properties. One type of hexton is 'positron' and other type of hexton is 'electron'. Although, physical structure of both positron and electron are similar, their characteristic properties caused by relative arrangements of primary electric fields of their bitons are different. Physically, electron and positron are similar in all respects, other than relative directions of linear and spin motions of their photons. Their physical parameters like sizes, matter and energy contents, mass, electric charges, etc. are identical under similar external conditions. Radial sizes of bitons, tetrons and hextons are same, under similar external pressure on them.

Positron:

Lines of force of primary electric fields of positron appear on each hemisphere as if starting from the region of its equator, proceed to cross equator and terminate at null points, in the region of its poles. At the same time, these lines of force are directed along positron's equator around the imaginary sphere in

same angular direction. Because of motion of unstable photons on the surface of imaginary sphere, their distances from axis of positron reduce as lines of force progress from equator towards poles. Hence, distortion-field also has radial components towards positron's axis from its surface.

Components of primary electric fields of positron, parallel to equator, are in phase and are in the direction of hexton's spin motion. Hence, they form a resultant electric field around positron's equator. Positron has an electric field and thus has both positive and negative electric charges, similar to electron.

Components of primary electric fields of positron, perpendicular to equator (parallel to positron's axis), are placed alternately, on either side and are directed outwards - towards poles of positron. Since, they are parallel to axis; they are linear in nature. They constitute positron's magnetic field. Both of positron's poles have north magnetic polarity. It has no well-defined magnetic south polarity.

Direction of distortions in positron's matter-field is partially along radial lines and they are perpendicular towards to axis of imaginary sphere. They produce inward or 'attractive nuclear field'. Because of attractive nuclear field, all other 3D matter-particles are apparently attracted towards positrons and it is difficult to find free positrons in nature.

Electron:

Lines of force of primary electric fields of electron appear on each hemisphere, as if starting from the region of its poles, proceed to cross equator and terminate at null points, in the region of equator. At the same time, these lines of force are directed along electron's equator around imaginary sphere in same angular direction. Because of motion of unstable photons, on the surface of an imaginary sphere, their distance from axis of electron increases as they progress from poles towards equator. Hence, distortion-field also has radial components away from electron's axis towards its surface.

Components of primary electric fields of electron, parallel to equator, are in phase and are in the direction of hexton's spin motion. Hence, they form a resultant electric field around electron's equator. Electron has an electric field and thus has both positive and negative electric charges, similar to positron.

Components of primary electric fields of electron, perpendicular to equator (parallel to electron's axis), are placed alternately, on either side and are directed inwards - towards its equator. Since, they are parallel to axis; they are linear in nature. They constitute electron's magnetic field. Both of its poles have south magnetic polarity. It has no well-defined magnetic north polarity.

Direction of distortions in electron's matter-field is partially along radial lines and they are perpendicular and away from axis of imaginary sphere. They produce outward or 'repulsive nuclear field'. Because of repulsive nuclear field, no other 3D matter-particle is allowed near electron and all electrons, in nature, remain as single entities throughout their lives.

Proton:

Tetrons and positrons apparently attract each other. They are of same (spherical) size. As more and more tetrons join around a positron, the group grows into a layer and form tetron-shell, similar to neutron. Tetron-shell, formed around a positron, is a proton. Gravitational attraction between two positrons (in close proximity) is too high to support more than one positron in a stable tetron-shell. Hence, a proton can have only one positron in it. Protons are independent fundamental 3D matter-particles. Proton may float around in free space or develop linear or angular motions under external efforts. It has rest mass, matter-field and inertial properties. It obeys all inertial laws under all conditions. Its total matter-content is sum of matter-contents of all its constituent photons. Its energy-content includes energies of all constituent photons, bitons, tetrons and positron. Proton may also have additional energy stored in its matter-field, associated with whole-body motion (or due to external pressure). In stable conditions, protons continuously strive to maintain their stability and can be considered as self-sustaining 3D matter-particles. Proton has no solid structure. It appears as a hazy or cloudy looking sphere made of numerous photons, moving at its surface in orderly fashion. But for its matter-field, a proton is extremely porous for universal medium.

Tetron-shell of proton is situated either on the side its positive electric charge or on the side its negative electric charge. Positron is the only 3D matter-particle in a proton that exhibits one of its

primary electric fields. Resultant distortion-fields of a proton may be different from those of its positron, only in cases of incomplete tetron-shells. Since positron, in a stable proton, exhibits only one of its primary electric field, both types of protons are identical in all their properties. Only difference, they can make in structure of an atom, is in distribution of matter-content, in relation to its electric charges.

Proton exhibits properties, attributed to one primary electric field of its positron. Two bitons of its positron take part in combination with tetron-shell and hence act like a complete tetron. Resultant distortion-field of a proton is concentrated in tangential plane(s) at a point on the surface of tetron-shell. A constituent tetron, in tetron-shell of a neutron, can be converted to a positron by addition of another suitable biton and rearranging bitons in it (during pair production). This newly created positron, being already a part of a single tetron-shell, converts the whole group into a proton or part of it.

Deuteron:

A positron is capable to form tetron-shells on both hemispheres. Hence, in most cases, it is possible for tetrans to develop into two separate layers, starting from equatorial region of positron. Resulting layers use two bitons of positron for common anchoring with its third biton free to exhibit its distortion-field, externally. Corresponding tetrans on layers, facing each other, are in repulsive phase and deflect layers away from each other to enclose both hemispheres of positron. Two tetron-shells about a common positron make fundamental 3D matter-particle, deuteron. At present, each deuteron in atomic nuclei is counted as one proton plus one neutron. In most atoms, only deuterons are used to form their nuclei, with additional neutrons for mechanical stability. Deuterons float around in free space. They may develop linear or angular motions due to external efforts. They are self-sustaining 3D matter-particles with rest mass, matter-field and inertial properties. They obey all inertial laws under all conditions.

Rest mass of a deuteron is sum of rest masses of all tetrans in its shells and rest mass of its positron. Energy-content of deuteron is sum of energy-contents of all its tetrans, energy-content of positron, energy invested for formation of tetron-shells and additional energy it has as a whole unit. Deuteron has no solid structure. It appears as a union of two hazy or cloudy looking spheres made of numerous photons moving at their surfaces, in orderly fashion. But for its matter-field, deuteron's structure is extremely porous for universal medium.

Deuterons apparently attract each other due to gravitation. Depending on their mutual orientation and distance between them, deuterons may apparently attract or repel each other due to interaction between their electric fields. Deuterons in free space, bind to each other due to gravitational attraction and apparent attraction due to interactions between their electric fields. Deuterons also form bonds in other styles. In such cases, bindings are weaker but they are applied in similar manner.

Tetron-shells of a deuteron are much bigger than its constituent positron, which is in the middle of tetron-shells. During formation of union between deuterons, matter-fields of tetron-shells of deuterons press into each other. Intervention of tetron-shells of deuterons keeps their positrons away from each other, irrespective of very strong apparent attraction between positrons. Two deuterons binding with their axes parallel is the most stable and strongest union of deuterons. In their static and free state, these unions are alpha particles. In their spinning state, they form nuclei of helium atoms.

Atom:

An 'atom' is the smallest part of an element, which exhibits element's characteristic properties. An atom consists of a central core called nucleus and one or more electrons orbiting the nucleus. General scheme on structure of atoms (except for Hydrogen) is as follows. Atoms are formed in two stages. Their nuclei are formed first and then orbital electrons are collected to spin and complete structure of atom. Atom becomes stable only when it has gained all orbital electrons and nucleus and electronic envelope are spinning (mechanical rotation) in unison. Number of electrons, orbiting a nucleus, is strictly equal to number of positrons in nucleus. In most cases, atoms are very sturdy and stable. Atoms are self-sustaining, independent 3D matter-bodies and they continuously balance themselves to remain stable and independent under normal conditions. They may interact with external 3D matter-bodies only through and by actions of their distortion-fields. Although direct contact between their distortion-fields is

essential for interaction, constituent photons never come close to each other.

Atoms have definite and logical physical structure. Same physical laws, applicable to all other 3D matter-bodies, govern their actions under all conditions. No 3D matter-particle may be added to an atom or removed from it, without causing at least partial disintegration. Atoms do not share orbital electrons. Nuclei of most atoms are built in circular sections (of different girths) and linked together axially. This makes an atom appear like a 3D matter-body, formed by number of discs (each disc made of two concentric rings – one ring of deuterons in nuclear section and other ring by orbital electrons) of varying sizes, kept together side by side. Atomic sections of different sizes, makes an atom, somewhat oblong spherical, cylindrical or oval, in shape. Atom, as a 3D object, is mostly empty but for presence of its matter-field, in and about it. Constituent photons move in circular paths within bitons of atom in an orderly and repetitive manner. This gives the structure of an atom, a cloudy appearance. It is porous to most high-frequency radiations.

Matter-density of subatomic matter-particles in a macro body depends on conditions of surrounding matter-field. Changes in distortion-density of macro body's matter-field can vary matter-density of atom. Inter-atomic distances and matter-content level of subatomic 3D matter-particles, together establish matter-density of a macro body. Matter-density of a macro body also depends on the type of its atoms and their relative arrangements (molecular formations). Neighbouring atoms, in a macro body, stay as far apart from each other as possible. They do not intrude into each other's space.

Since electrons cannot form group with other 3D matter-particles, atomic nuclei do not contain electrons. Nuclei may contain deuterons, protons and neutrons (nucleons). Since availability of protons and neutrons is small, majority of nuclei are formed by deuterons. Formation of a nucleus is not gradual; it is accomplished in shortest possible time. Types of nuclei formed vary and depend only on chances of number and type of available nucleons, arranged into most stable combination. Once stability of nucleus is established by spin motion (due to first orbital electron), it remains stable and sturdy under all normal conditions. Mechanical stability of bond of (spinning) nucleus is the only concern governing arrangement for a given number of nucleons. Stable arrangement for a given number of nucleons is unique. Uniqueness of this arrangement is the sole factor determining atom's characteristic properties.

Matter-content of nucleus is sum total of matter-contents of all its constituent photons. Due to interactions and inter-dependence, photons of a nucleus share total matter-content of nucleus, equally among themselves. Energy (work) associated with a nucleus is sum total of energy associated with all its constituent 3D matter-particles and additional energy of nucleus as a whole body. Nucleus (of an atom) is an independent and self-sustaining 3D matter-body. It has rest-mass, matter-field and inertial properties. It obeys all inertial laws under all conditions. It exhibits gravitational, magnetic and electric fields. Atomic nuclei may float around in free space or acquire linear or angular motions under external efforts. Its matter-content level is a function of external pressure on it. All photons, constituting a stable nucleus, are at equal matter-content level. Development of a nucleus is completed only when its sturdiness is established during state of spin.

Energy (work) content of atom includes total energy of its constituent photons, energy invested for formation of bitons, energy invested for formation of hextons, energy invested for formation of other subatomic 3D matter-particles and energy invested for formation and spin of atom. Total energy invested towards formation and sustenance of its constituents is stored in associated matter-field as its 'intrinsic energy'. Atom also has additional energy invested in its matter-field due to any additional motion or displacement it has against restraining influences, under action of external efforts. Only this part of additional energy, associated with its whole-body motion, may be released to do external work by atom. Energy invested for its formation and sustenance may be released only on atom's disintegration.

Atoms are independent and self-sustaining spinning 3D matter-bodies. In normal circumstances it is difficult to destroy them or to pull out constituent parts, without destabilizing them. They are structured in sections of different girths, which are arranged parallel to each other with their centers of rotation on a common axis. Each atomic section has two concentric layers. Inner layer, constituted by nucleons, rotate around nuclear axis. Outer layer, formed by orbital electrons, form an electronic envelope around atom.

Common axis, around which electrons orbit the nucleus, is atomic axis. In stable state, atomic axis and nuclear axis coincide. Deflection between them produces electric potential. In an atom, balance between interactive field-efforts determines orbiting speed and size of electron's orbital paths. It is also essential to have angular speed of all orbital electrons around nucleus equal. Mutual transfer of momentum between nucleus and orbital electron is permitted for development and stabilization of spin speed of nucleus. Interactive field-efforts between nucleus and orbital electrons rectify misalignments.

Space occupied by an atom is (comparatively) a large region of universal medium, constituting its matter-field. 3D matter-particles in atom – matter-cores of photons – are very small and few. They move in circular paths in orderly manner, while maintaining natural motions in atom. Hence, places between matter-cores of photons are vast and vacant, but for presence of universal medium. This makes an atom reasonably transparent for (high-frequency) radiations and electromagnetic waves. Depending on nature of distortions in matter-field, radiations or electromagnetic waves may be transmitted through or reflected from the region of an atom. However, most photons, in normal radiations, are prevented from approaching atom are reflected (or scattered) by its matter-field.

Atoms of each material, in a macro body, have a stable matter-content level. This matter-content level is determined by external pressure on its bitons, which in turn is set by distortion-density in inter-atomic space, extent of which is a function of apparent attractions between atoms and total gravitational attraction within macro body. In free space, matter-content levels of all bitons are same. Matter-field of an atom and its surrounding space-conditions determine stable matter-content level of atoms in a macro body. It is the constant endeavor of all atoms of a macro body to maintain their matter-content level, stable at all times and under all conditions.

Larger macro body (with more number of bitons) has denser matter-field. Denser matter-field exerts higher external pressure on constituent bitons of macro body and reduces their matter-content levels. Higher the number of 3D matter-particles in a macro body, greater is the loss of matter-contents by all bitons in it. An atom (its matter-field) is suspended in space between matter fields of neighbouring atoms. Matter-content levels of atoms determine external pressure on bitons in a macro body. There can be differences in rest-masses, not only between atoms of different elements, but also between atoms of same element in different space conditions. An atom at the surface of a macro body and another atom in its interior exist in different space conditions.

Matter-content is lost from constituents when subatomic 3D matter-particles constitute superior 3D matter-particles to form atom. This difference is 'mass defect'. Similar mass defect occurs whenever more than one subatomic 3D matter-particle, atoms or even larger macro bodies combine to make single units or macro bodies. In large macro bodies, due to external pressure on atoms, photons of bitons towards their central regions are at lower matter-content level. This difference may correspond to different physical states of matter. This causes very large macro bodies to have liquid or gaseous interior with or without solid exterior.

Because of their orbital electronic envelope, each atom repels all others and matter-cores of their photons never come within touching distance of each other, even when they form parts of same group. Independence of individual atoms prevents collision between their orbital electrons, which are moving at very high speed. Mainly, it is the gravitational attraction between atoms that is keeping atoms of a macro body together. Other factors like external pressure and space conditions also help to modify distances between neighbouring atoms in a macro body.

Molecule:

Atoms of many elements have single deuterons as atomic sections. These sections are electrically active and provide required electric fields for molecular formation. Formation of molecules by atoms makes material macro body electrically neutral. Similarly, depending on their mechanical structures, most atoms (except noble gases) have surviving (resultant) magnetic fields, which necessitates that these atoms form small groups to neutralize their magnetic fields. These two qualities together facilitate characteristic formations of atoms (into molecules or crystals) in macro bodies. Changes to these natural formations by atoms produce strain in matter-field of macro body.

Molecules are unions of more than one atom. Constituent atoms of a molecule may be of same type or of different types. Molecules are independent spinning macro bodies. While keeping their independence, molecules may enter into structural formations with other molecules or atoms. Various combinations and formations by atoms and molecules (chemical actions) are results of interactions between their external distortion-fields. In neutral macro bodies, spin motions of molecules (or corresponding groups of atoms/molecules) prevent resultant distortion-fields. Resultant magnetic fields of atoms help to form groups of few atoms each, in a macro body. These groups have definite structures, which are identical. Atoms of different elements may form groups in definite proportions. Proportions of different atoms in a group are determined by resultant distortion-fields of atoms. Group formations by atoms into crystalline shapes are more prominent in solid macro bodies. Generally, resultant electric fields of atoms accomplish chemical actions and molecular formations. And resultant magnetic fields of atoms or molecules carry out crystalline structures.

A molecule is an independent 3D matter-body. Its constituent atoms maintain their individuality and independent motions of constituent 3D matter-particles. Distorted universal medium in and around a molecule is its matter-field. Interaction between neighbouring molecules is between their matter-fields.

Conclusion:

Alternative concept presented in the book 'MATTER (Re-examined)', derives various matter-particles step by step, logically and progressively from unstructured pure matter. Whole process is based on single property of unstructured matter that it tends to maintain its integrity.

Reference:

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

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