# Expansion of material bodies

(According to 'MATTER (Re-examined)')

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Abstract: Contemporary theories of volumetric changes in material bodies and the explosion of very large cosmic bodies are based on assumed properties. Knowing the development and structure of constituent 3D matter particles and the mechanical actions by external efforts on them are essential to understand these activities under different environments. Changes in external pressure on a 3D material body greatly influence the body's mass, temperature, and volume.

## Introduction:

A real entity exists in space. Space is a speculative container envisaged by rational beings whenever they think of a real entity. It is an imaginary but essential functional entity that is created by the presence of real entities and the necessity for a place for their existence. Usually, space is described by three spatial dimensions. Hence, the volume of space occupied by a real entity is defined by its spatial dimensions.

As 3D rational beings, all of our senses and instruments are devised to sense and measure 3D material objects in volumetric space. Only those material objects that are tangible by the scales used in the 3D spatial system are considered real entities. Despite their existence in volumetric spaces, material objects that exist only in 1D or 2D spatial systems are not considered real. If the measurement of a material object in any spatial dimension is less than what can be measured by the 3D spatial scale, it is currently considered non-existent. However, its existence in volumetric space is true, and it is our inability to measure the space occupied by it that makes it non-existent in our view. Hence, it is true that there are 2D material objects that exist in two-dimensional space and 1D material objects that exist in one-dimensional space. This phenomenon may be compared to the existence of a line or that of a plane in 3D space.

## An alternative concept:

An alternative concept, proposed in the book '*MATTER (Re-examined)*', is based on a single assumption: namely, the existence of matter. Matter, as the substance of physical objects, provides objective reality and positive existence to all real entities. Entities not formed by matter are functional constructs and exist only in the minds of proposers and in mathematical analyses. This

concept presents an alternative framework for understanding matter, gravitation, inertia, and fundamental particles through the existence of an all-encompassing universal medium, formed by matter. An extremely brief summary of this alternative concept is presented below; detailed and logical explanations of the topics mentioned in this article are available in the aforementioned book.

In order to exist, every point within a block of pure matter must possess affinity with its neighbouring points all around. This property enables a block of pure matter to furcate into minute particles – quanta of matter – and reduce their existence to the minimum possible dimensional space, ultimately becoming 1D objects with positive existence in all three spatial dimensions. Conversely, a 1D quantum of matter may be converted to a 2D object by inward-acting external efforts at its ends, or a 2D quantum of matter may be converted to a 3D object by inward-acting external efforts along its entire perimeter. The entire space is thus filled with quanta of matter in different spatial states without scope for voids.

Neighbouring free quanta of matter, during the process of elongation along their single spatial dimension, may come in contact and form web-like latticework structures separately in each plane. These separate latticework formations in all possible planes collectively constitute the universal medium that fills the entire space outside the most basic 3D matter particles. All actions (including the creation, sustenance, and destruction of 3D material entities) and apparent interactions by and between material objects are initiated, sustained, and terminated by the universal medium. The universal medium provides an absolute reference that extends infinitely in all directions and encompasses all 3D entities.

Due to the continuous structural changes, the universal medium remains inherently under compression. Gravitation is the compressive pressure exerted by the universal medium on material objects embedded within it. Gravitational pressure on a basic 3D material particle can be positive (push) effort on its convex surfaces, negative (pull) effort on its concave surfaces or have no effort on its flat surfaces.

Gravitation is manifested in a 3D spatial system as various ‘natural forces’ and other physical efforts. The magnitude of gravitational pressure on a 3D object is proportional to the extent of universal medium in the direction from which the pressure is applied. The extent of the universal medium between two 3D matter particles is always less than that on their outer sides. Consequently, greater gravitational pressures on their outer sides overcome lesser gravitational pressure on their inner sides and push the 3D matter particles towards each other. This apparent interaction between the 3D matter particles is gravitational attraction (gravity).

Structural distortions in the universal medium about a material object are the work associated with it, and the stress produced by these structural distortions in the universal medium is the associated energy. Structural distortions in the universal medium create 3D matter particles, and the transfer of the structural distortions carries the enclosed 3D matter particles, causing the inertial properties observed in nature. Creation and motion of 3D matter particles with higher matter content require higher distortion-density and curvature within a larger volume of the universal medium.

Distortion-fields arise from structural deformations in the universal medium. Average deformation in a distortion-field may be represented by imaginary lines of force: linear lines of force

indicate magnetic fields, circular lines of force indicate electric fields, and radial lines of force indicate nuclear fields. Greater curvatures of lines of force indicate greater electric characteristics, while lower curvature indicates stronger magnetic characteristics. The starting region of linear lines of force is the magnetic north pole, and their terminal region is the magnetic south pole. Clockwise circular lines of force represent the positive electric charge, while anti-clockwise circular lines of force represent the negative electric charge. Hence, an electric field has both positive and negative electric charges. The direction of observation determines the nature of an electric charge. Inward radial lines of force represent attractive nuclear fields, and outward radial lines of force represent the repulsive nuclear fields.

Interactions between distortion-fields depend on both the relative orientations and the magnitudes of curvature of their lines of force. Two similar magnetic fields produce apparent repulsion, while two dissimilar magnetic fields produce apparent attraction. The interaction between electric fields depends on their relative angular directions and the distance between their centres of curvature. Lines of force acquire lower curvatures as the distance from the centre of curvature increases. Within critical 'zilch-effort' distance, similar electric fields apparently attract while dissimilar electric fields apparently repel. Beyond the 'zilch-effort' distance, dissimilar electric fields apparently attract while similar electric fields apparently repel. When they are at the critical 'zilch-effort' distance from each other, they do not interact. Attractive nuclear fields apparently attract all other distortion-fields, and repulsive nuclear fields apparently repel all other distortion-fields.

### 3D matter particles:

The universal medium gathers free quanta of matter in a structural gap, compresses them into 3D status to form a circular (segmented spherical) matter core that spins about one of its diameters (frequency) and moves at the highest possible linear speed. Movements of the 3D matter core are achieved by transferring structural distortions through the surrounding universal medium. These moving structural distortions have many similarities with EM waves in each plane. In their stable states, the linearly moving spinning 3D matter core and the rotating structural distortions in the surrounding universal medium together form a corpuscle of radiation – the photon. The 3D matter core constitutes the material part, and the linearly moving, rotating structural distortions in the surrounding universal medium constitute the EM wave part of the photon.

The linear speed of a photon is the highest possible linear speed (hence a critical constant) and is determined by the ability of the universal medium to transport 3D material bodies without its own structural damage. Spin speed (frequency) of a photon is proportional to its 3D matter-content. As long as the linear and rotary speeds of a photon are maintained steady by the universal medium, its 3D matter-content remains constant. Attempts to alter the linear speed result instead in changes to the photon's 3D matter content (frequency), achieved by exchanging quanta of matter with the surrounding universal medium.

Photons are the most basic 3D matter particles. Two complementary high-frequency photons, under mutual gravitational attraction, form a binary unit - a biton. Constituent photons move in circular paths about a common centre while spinning in unison and in phase with each other. A biton

is the most stable primary 3D matter particle. Bitons are the building blocks of all fundamental particles and 3D material bodies. Structural distortions in the universal medium in and about a biton sustain its self-stabilising property. Each photon completes one revolution around the centre of a biton during one turn of its 3D matter core. That is, the length of the perimeter of a biton is equal to one wavelength of its constituent photons.

In a stable biton, gravitational attraction between the 3D matter cores of constituent photons balances the centrifugal effects due to their motion in the common circular path. Structural distortions in the universal medium about the constituent photons combine to form a common distortion-field called the 'primary electric field' in and about the biton. Structural distortion-density in the primary electric field and the curvature of its lines of force decrease as the distance from the centre increases. Changes in the curvature of the lines of force institute the changes in the nature of the distortion-field. Higher curvature of lines of force (nearer to the centre) increases the electric nature and decreases the magnetic nature of the distortion-field. Similarly, lower curvature of lines of force (farther from the centre) reduces the electric nature and increases the magnetic nature of the distortion-field. At ‘zilch-effort’ distance from the centre of curvature, the lines of force are of neutral nature.

Changes in external pressure on a biton vary the structural distortion-density in the surrounding universal medium. An increase in external pressure assists the constituent photons to lose parts of their 3D matter contents and increase their wavelengths and thereby enlarge the radial size of the biton. Reduction in the gravitational attraction between the photons decreases distortion-density and curvatures of the lines of force in the distortion-field in and about the biton. This corresponds to an increase in the temperature. Similarly, a reduction in external pressure assists the constituent photons to gain 3D matter contents from the surrounding universal medium and reduce their wavelengths and thereby shrink the radial size of the biton. An increase in the gravitational attraction between the photons increases the distortion-density and curvatures of lines of force in the distortion-field in and about the biton. This corresponds to a reduction in the temperature.

The equivalent of 3D matter-content in a material body is represented by its mass. Therefore, the mass of a biton and that of a 3D material body under higher external pressure (in warmer states) reduce with enlargements in their volumetric sizes. Similarly, the mass of a biton and that of a 3D material body under lower external pressure (in cooler states) increase with reductions in their volumetric sizes. Bitons in various combinations (under mutual gravitational attraction) form all other fundamental particles and superior 3D material bodies. When they form a superior 3D material body, their primary electric fields combine to form the integrated body’s distortion-field.

Under gravitational attraction, two bitons in mutually perpendicular planes about a common centre form a tetron. A large number of tetrons group together to form a single-layered spherical shell to constitute a neutron. Under gravitational attraction, three bitons in mutually perpendicular planes about a common centre form a hexton. There are two types of hextons – positrons and electrons. A positron has a magnetic field with two north magnetic poles, an electric field with both positive and negative electric charges and an attractive nuclear field. An electron has a magnetic field with two south magnetic poles, an electric field with both positive and negative electric charges and a repulsive nuclear field. A neutron-like spherical shell formed by the tetrons about a positron

constitutes a proton. Two neutron-like spherical shells formed about a positron constitute a deuteron. Except for neutrons, all fundamental particles have resultant electromagnetic fields about them.

Atomic nuclei are formed by tubular combinations of fundamental 3D matter particles, while electrons occupy surrounding planetary orbits, also in a tubular shape. Deuterons are major components of atomic nuclei. Each deuteron is currently counted as one proton plus one neutron. Since protons readily form hydrogen atoms with electrons, free protons available for nucleus formation are rare. Neutrons are occasionally added to nuclei as balance weights or to fill vacant places in their structures.

Depending on the availability of nucleons, deuterons form groups of ring-shaped nuclear sections of varying diameters. Each nuclear section has a resultant magnetic field across and a resultant electric field around it. Magnetic fields help them attach to each other side by side to form the tubular structure of the nucleus. Nuclei of most atoms (except those that have very few nucleons) are tubular in shape. During the formation of an atom, available electrons in the neighbourhood are attracted to orbit around the nucleus. This process compels the nucleus to develop spin motion and helps each positron in the nucleus remain continuously in phase with its paired electron in the orbit around the nucleus. The first electron that approaches a nucleus initiates its spin motion, halting further development of the nucleus. Development of the atom continues until all positrons in the nucleus are paired with the orbiting electrons and movements of all constituents are stabilised.

The shape of a stable atom (except those with very few nucleons) is corrugated tubular with sections of different girths. The nuclear sections, together in parallel attachments, form the inner tube, and the electronic envelope formed by electrons orbiting separately around each nuclear section form the outer tube. Both the nucleus and the electronic-envelope spin in unison about the atomic axis (to which the nuclear axis coincides in a stable state). Stable atoms (except those of noble gases) have resultant magnetic and/or electric fields about them. These resultant distortion-fields (electromagnetic fields) help them form molecules.

The real shape of an atom depends on the distribution and relative locations of nucleons in the nucleus and the orbiting electrons around the nucleus. Size, shape and distortion-density in the distortion-field about an atom may not be symmetrical. However, for the following explanation, atoms with symmetrically arranged 3D matter particles and a uniform distortion-field are considered.

## Molecular formation:

Atoms of the same or different elements group together to form a molecule until all resultant distortion-fields about the atoms are neutralised and the union of atoms does not exhibit a resultant distortion-field about it. The distortion-density of the distortion-field in and about a molecule and the curvatures of its lines of force are proportional to the total 3D matter-content of the molecule. The mutual gravitational attraction between the atoms is proportional to the 3D matter content of their constituent photons. Mutual apparent attraction / repulsion between the resultant distortion-fields of neighbouring atoms is determined by the curvatures of their lines of force and the distance

between their centres of curvature. Equilibrium of these efforts in a molecule is achieved when the gravitational attraction is balanced by the repulsion due to the interaction between their distortion-fields.

When the neighbouring atoms are far from each other, they are mutually attracted by gravitational attraction between the 3D matter-cores of their constituent photons. As the atoms approach each other, their resultant distortion-fields interact to produce field-efforts. To form a stable union of a molecule, distortion-fields of the neighbouring atoms have to be of opposite natures so that, in combination, they neutralise and the molecule does not exhibit a resultant distortion-field about it.

Part A of figure 1 represents the lines of force of distortion-fields of two atoms situated far from each other. Lines of force about atom 1 have clockwise curvatures, and the lines of force about atom 2 have anti-clockwise curvatures. As the distortion-fields are situated beyond zilch-effort distance, interactive field-effort 'F' between them is of apparent attraction. Field-effort 'F' and the gravitational attraction 'G' between the atoms bring them towards each other to form a union. As the distance between the atoms reduces towards zilch-effort distance, interactive field-efforts 'F' between their distortion-fields reduce, and the magnitude becomes nil at zilch-effort distance between the centres of curvature of the distortion-fields. At this instance, gravitational attraction 'G' is the only effort between the atoms.

As the distance between atoms reduces to less than 'zilch-effort distance', the interactive field-effort 'F' between the distortion-fields of the atoms reverses to become repulsive. Atoms continue to approach each other until the repulsive interactive field-effort 'F' between their distortion-fields equalises the gravitational attraction between the atoms, as represented in part B in figure 1. Variations in the 3D matter-contents of the atoms (indicated by their temperature) are reflected in the magnitude of distance between the atoms in the molecule.

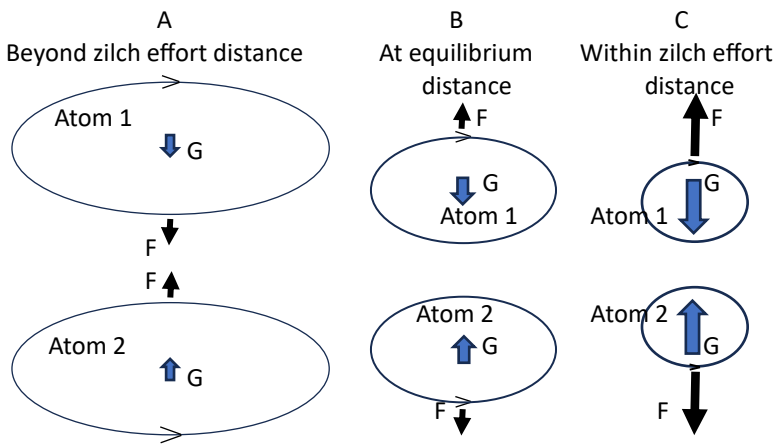


Figure 1

However, increments in structural distortion-density and curvature of lines of force of distortion-fields about the atoms enhance their electric nature to produce a resultant electric field about the combination of the atoms. This creates an imbalance of the electric field in the surrounding universal medium. Points of action of field-efforts on the atomic axes of the constituent

atoms determine the stability of the union. Departure of the points of action of field-efforts from their centres of gravity compels the spinning atoms to precess about a common axis. Since the natures of the distortion-fields and the directions of their actions are in opposite directions, the constituent atoms of the molecule precess in the same direction. As the molecule develops spin motion, the resultant electric nature developed in its distortion-field becomes ineffective, and the molecule as a whole becomes electrically neutral. (This action is similar to the formation of a hydrogen molecule, as explained in the aforementioned book).

To achieve the neutral state of a molecule of a compound, the numerical ratio of constituent atoms of elements and their relative positions to each other need to be constant. A compound molecule attains a stable state only when it has reached the required spin speed that causes the resultant distortion-field about the molecule to be ineffective.

At lower temperatures (higher 3D matter-content – higher mass), atoms are nearer, and the molecule has a smaller volume. Hence, as a general rule, the volumetric sizes of molecules of elements and, hence, that of most 3D material bodies contract upon cooling and expand upon heating. In free space, a 3D material body has the least volumetric size and highest 3D matter-density.

External pressure on a stable molecule assists gravitational attraction between its constituent atoms to bring them nearer. As the atoms are brought nearer, interactive repulsion between their distortion-fields reduces. When the distance between the centres of curvature of atoms' distortion-fields is reduced to 'zilch-effort distance', the precessional actions on the atoms cease, and the molecule stops spinning and displays a resultant distortion-field about it. Bringing the atoms nearer than 'zilch-effort distance' by higher external pressure may introduce precessional actions in the opposite directions, and the molecule tends to spin in the opposite direction. At this non-spinning stage, the atoms are free to exhibit their individual distortion-fields, which may interact with available external distortion-fields and break the bonds of atoms in the molecule. Constituent atoms of the molecule may disperse to become independent or to form a molecule with other atoms available in the region.

## Anomaly:

However, certain elements in fluid states exhibit anomalous behaviour compared to what is explained above. Part C in Figure 1 represents lines of force of distortion-fields about two atoms of a molecule. Due to the very low temperature and peculiar structure of these atoms, they are much smaller and have dense distortion-fields with highly curved lines of force. As the fluid is cooled, 3D matter-contents of the constituent atoms and mutual gravitational attraction between them increase. Cooling also increases the distortion-density and the curvatures of lines of force in the distortion-fields in and about the atoms of the fluid. Greater curvature of the lines of force increases the electric nature of their distortion-fields. Being within 'zilch-effort distance', increased curvatures of lines of force in the distortion-fields greatly enhance the apparent repulsion between the atoms.

At a critical 3D matter content level (temperature), an increase in gravitational attraction and apparent repulsion due to interaction between their distortion-fields compensate each other.

However, as the 3D matter-content level of the atoms increases (in cooler states), the magnitude of apparent repulsion between their distortion-fields overwhelms the magnitude of gravitational attraction, and the atoms tend to move away from each other so that the equilibrium between the gravitational attraction and the field-effort is maintained. This increases the volume of the molecule. Expansion of the molecule and, hence, that of the fluid body will continue until it transforms into a solid state by the molecules arranging themselves into a crystalline structure. Thereafter, the 3D material body behaves like other solid bodies. This process causes the anomalous expansion of certain fluid elements during cooling through certain ranges of temperature. During heating through the same range of temperature, the opposite action takes place. E.g., the volume of water reduces as it is cooled until its temperature reaches 4°C, and then its volume increases till it reaches the solid state at 0°C. Thereafter, the water in the solid state (ice) will behave like any other solid body. I.e., its volume will shrink as it is cooled further. External pressure (temperature) also influences the states of water molecules.

## Explosion by a large material body:

Explosion of a material body takes place when its internal pressure cannot be contained by its outer region (cover). In order to explode, the binding strength of the outer region of the material body should fail to contain its internal pressure. The body will explode as soon as the outward pressure overcomes the binding strength of the cover. For an explosion to occur, the outer region of the body has to be of a different type with stronger bonding strength than the body's inner material.

Constituents of very large (cosmic) bodies are more or less uniform. Internal pressure in a very large material body by external compression or by gravitational collapse increases gradually towards its centre. The variation is more or less uniform outwards from the centre. No separate outer cover with stronger binding strength forms to contain the internal part. As this does not fulfil the requirement for an explosion, it cannot cause a material body to explode as is believed in the cases of cosmic bodies.

Very large 3D material bodies (like the stars, etc.) are believed to explode at certain stages of their lives to create novae. This requires an additional mechanism by which the outer and inner parts of the body are thrown outwards. Such a mechanism, described in the book 'MATTER (Re-examined)', is provided by the rapid changes in the structures of atoms in the central region and structural distortions in the universal medium near the centre of the body. A brief essay, 'Novae', is also available at my website.

**Reference:** *'MATTER (Re-examined)'* https://www.amazon.com/dp/1492241865, https://www.amazon.com/dp/1492241881

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