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Space-Time Dynamics

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Abstract
Vibrating Higgs Bosons define space-time. Higgs Bosons define universe. They are the primitive source of mass and dark energy. The visible portion of universe is the manifestation of dark energy. Without the support of dark energy, visible world cannot exist.
In this article it has been demonstrated that all events e.g. formation of galaxy, formation of subatomic particles like electron, positron, neutrino, formation of atom, different states of matter, surface tension, conductor and insulator, thermocouple, Positive energy and negative energy, Laws of thermodynamics, Super conductivity, Super fluidity and black hole are the result of space-time dynamics caused by Higgs Bosons.
No fresh mathematical model is introduced. This article explains how Nature is microscopically carrying out the events validating the existing relevant mathematical models wherever applicable.
Law of conservation of mass, law of conservation of energy, law of conservation of momentum, Newton's first law of motion, Newton's third law of motion govern the events of Nature. Volume and energy density per unit volume define the various properties of visible matter.
Keywords*: Space-time, universe, space dynamics, thermodynamics, Unified field theory, Theory of everything*

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I. Introduction

"I still believe in the possibility of a model of reality–that is, to say, of a theory which represents things themselves and not merely probabilities of their occurrence."
(Albert Einstein - 'On the method of theoretical physics', Ideas and Opinions)

Interdependency of length and time is due to a vibrating Higgs Boson which defines the length and time simultaneously. It is the vibrating Higgs Bosons: a reason for space-time continuum. Higgs bosons define the universe at absolute zero temperature, which is the source of primitive energy or dark energy. It has been demonstrated in understanding concept of space-time [5.1] that universe is of spherical shape of infinite radius with inherent curvature. The angle of curvature is zero. At this juncture, only Higgs field exists. Gravitational field, electric field and magnetic field do not exist.

This article describes the phenomena of space-time deformation and subsequent evolution of visible objects of universe and the gravitational field, electric field and magnetic field.

Some of events are covered in Magnetic field around a current carrying conductor [5.3], relation between wave energy and field strength [5.2] and concept of space-time [5.1]. This article covers some more events e.g. formation of galaxy, formation of subatomic particles like electron, positron, neutrino, formation of atom, different states of matter, surface tension, conductor and insulator, thermocouple, Positive energy and negative energy, Laws of thermodynamics, Super conductivity, Super fluidity and black hole.

The events, not covered in any of the articles, can be explained with the help of space-time dynamics.

No fresh mathematical model is introduced as already a lot of mathematical models are floating around to explain the events. This article explains how Nature is microscopically carrying out the events validating the existing relevant mathematical models wherever applicable.

II. Importance Of The Article

Vibrating Higgs Bosons influence the events in universe; hence it provides a new direction for research in various fields.
If electrolysis can be used for electrovalent compounds, similarly a magnetolysis process can be developed for covalent compounds as magnetic field is responsible for their existence.

As Higgs Bosons (energy density per unit volume) in inter-molecular space in visible matter is responsible for their properties, knowledgeable information can be used in careful selection of atoms for creating better alloys or compounds with expected properties.

III. Role Of Higgs Bosons In Shaping The Events Of Universe

Concept of temperature: Universe U represents a state of absolute zero temperature. In this state only point particles (Higgs Bosons) exist. Particle like electron or positron having volume cannot exist. This is in agreement with Gas Laws that volume will be zero at absolute zero temperature [5.1].
As per second law of thermodynamics, a body cannot raise its temperature unless heat is supplied from external source. A pertinent question arises here: How Nature is able to raise its temperature?

From Gas Laws we know that Temperature is directly proportional to Pressure [5.1]. Hence to create a high temperature zone, Nature has to create a high-pressure zone. This leads to formation of galaxies.

Formation of Galaxies: Refer to fig 1.

Consider sphere G of very large radius, a subset of universe U. Sphere G has finite radius hence angle of curvature greater than zero as compared with universe which has angle of curvature zero [5.1]. But the pressure within sphere G remains same as outside Sphere G. Sphere G rotates clockwise or anti-clock due to the cumulative and concerted actions of Higgs bosons contained in Sphere G. In the Fig 1, it has been shown as anti-clockwise but it can be clockwise also. This rotation generates gravitational field inside the sphere G. This is in line with $v^2 = gr$, where v is the circumferential velocity of sphere G. g is the gravitational field and r is the radius of Sphere G. The term "gr" represents gravitational energy within sphere G. The presence of gravitational waves is because of this gravitational energy, which has been detected recently. The direction of gravitational field is towards centre of sphere G.

The gravitational field shrinks the radius of sphere G further which results in increase in its curvature and increased pressure within the sphere G. High pressure zone represents high temperature zone amenable for creation of particles like electron, neutrino and positron [5.2].

As per Newton's third law, there will be another force in opposite direction to counter the gravitational field and to stabilize the structure. This force in opposite direction is the Anti-gravity. The sphere G is the galaxy. That is reason galaxies appear to be rotating clockwise or ant-clockwise. The anti-gravity between two galaxies is responsible for their moving away from each other. We infer the following:

- ✓ The sign of ambiguity in Einstein's gravitational formula justifies the existence of anti-gravity outside the sphere G while gravitational field is within the sphere G.
- ✓ It also confirms Einstein's assertion that gravitational field causes a further deformation of space-time.
- ✓ Galaxies repeal each other because of anti-gravity implying Big bang never took place in the distant past.
- ✓ A galaxy is not only consisting of visible mass within but supported by abundant dark energy of universe surrounding it.
- ✓ Due to gravitational field, a high-pressure zone is created within galaxy which is akin to high temperature.

Spin of stars and planets: The spin around an axis causes centripetal force within stars and planets. The direction of centripetal force within and gravitational field outside around stars and planets are in same direction: towards the centre of stars and planets. These two forces facilitate to define a stabilized volume of these objects.

Formation of electron, positron and neutrino:
Consider the figure 2. The sphere G represents a galaxy. Consider Sphere E of a small radius within Galaxy G. Radius of Sphere E is very small compared to that of Galaxy. Hence angle of curvature of Sphere E greater than

that of Galaxy. But the pressure within sphere E remains same as outside Sphere E. Sphere E rotates clockwise or anti-clock due to the cumulative and concerted actions of Higgs bosons contained in Sphere E. This rotation generates a field inside the sphere E. This field further reduces the radius of Sphere E increasing the pressure within Sphere E. Pressure within Sphere is greater than that of Galaxy. As per Newton's third law, there will be another force in opposite direction to counter the field within Sphere E to stabilize the structure. Sphere E is the electron.

The direction of field within electron is towards centre of electron. There is a corresponding field outside the electron which appears as electric field and the direction of field is away from centre as depicted in fig 2. The purpose of electric field is to stop the electron from collapsing into a point particle due to the field within. The electron represents a high potential zone. Hence a potential gradient is created around electron. That is why the electric field follows inverse square law. This confirms the directions of field around electron radiating out and not as conventionally accepted [5.3].

The energy density within the electron is uniform but the energy density around the electron is not uniform and gradually decreasing due to inverse square law.

Due to high pressure, Energy density per unit volume within electron is very high compared to the energy density per unit volume in Galaxy. Hence the strength of electric field is very high as compared to the gravitational field that exists in Galaxy.

Here we note that charge is not a fundamental attribute but a virtual attribute. The field around an electron is not due to any charge but the charge on electron is due to the field around it. This is reason that Nature is able to maintain constant charge to mass ratio on an electron.

This underlines that an electron is at the interface between wave and mass particles. Hence an electron made up of Higgs bosons can exist as wave as well as mass particle confirming the assertion by **Louis de Broglie** [5.4]. The electrons, in "p" sub-shell of an atom, pass through nucleus as wave and come out as a particle.

Consider fig 3. There is a cover of Higgs bosons around the electric field of an electron. This particle is neutrino. The two opposite forces within the structure maintain equilibrium. This makes a neutrino a stable structure, which helps formation of atom. Gravitational field around Neutrino is due to the gravitational field of galaxy.

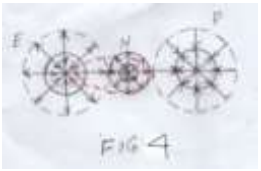
The energy density within the inner sphere and the space within inner sphere and outer sphere is same. Only the direction of force in the inner sphere is opposite of the direction of field in the space between inner sphere and outer sphere. These two forces in opposite directions within Neutrino are in equilibrium.
The electric field around electron follows inverse square law due to formation of potential gradient. Hence it occupies more volume. In case neutrino, the field in the space between inner sphere and outer sphere does not follow inverse square law. Hence neutrino occupies less space. This is the reason the size of Neutrino is small as compared to that of electron. Due to its size, its mass appears to be less than an electron.

The Higgs Bosons which create the electric field around electron are integral to electron. But the gravitational field around a Neutrino is not integral to Neutrino. Neutrino represents a high potential zone with respect to its

surroundings; hence the gravitational field around Neutrino also follows inverse square law. This also exemplifies that electric field around electron is over a small distance, whereas the spread of gravitational field is across galaxy.

The interaction of electron with neutrino produces positron and is a result of Space-time dynamics.

When an electron is adjacent to a Neutrino, the fields in the space between electron and Neutrino are in equilibrium. There is net force on other side of inner core of Neutrino. Due to this, the inner core is ejected and the remaining portion of neutrino is as shown in fig 4. The positron is a particle with direction of field inside and outside just opposite of an electron as depicted in fig 4.



The difference between an electron and a positron are given below:

- ✓ Electron is created due to spin of space-time. The spin causes electron to have a stabilized volume, hence it can exist independently. Its spin, clockwise or anti-clockwise defines the fourth quantum number in orbital.
- ✓ Positron is a result of the reaction between electron and neutrino. It does not have any spin, hence Nature cannot determine its fourth quantum number. Though forces within and outside of positron are in equilibrium, it is made up of vibrating particles making its structure vulnerable to decay. Hence it cannot exist independently. It acquires a stabilized volume as a proton only. Because of its volatility and absence of fourth quantum number, it cannot remain in orbits as electron can do. Hence, anti-matter cannot exist.

Similarly when a positron is adjacent to a neutrino, because of direction of fields in the space between positron and Neutrino, the outer sphere of neutrino is removed. The inner sphere of neutrino remains, which is an electron. A neutrino contains both the structures of an electron and positron, hence whenever an electron and positron are adjacent to each other, they form neutrino.

Presence of electrons and positrons as separate particles represents plasma state. At this juncture temperature becomes relevant and represents a high temperature zone. Temperature is a measure of energy density [5.2]. Higher the energy density, higher is temperature and vice versa. As it cools, the density of Higgs bosons around the positron reduces. To protect the structure of positron, neutrinos provide support under the influence of gravitational field. This agglomeration of positron surrounded by neutrinos is Proton. That is the reason; a positron and a proton have same charge but different mass.

As neutrino does not have a field of its own, a bunch of neutrinos form Neutron under the influence of gravitational field.

Formation of atom:
Since the direction of field around positron and Neutrons is same, they are held together under the influence of gravitation field and form nucleus of an atom. The Higgs Bosons around the nucleus form a stable energy level. This is in line with Bohr's postulation [5.7] that stable energy levels are formed around nucleus. Electrons move around the nucleus and the centripetal force keeps it in orbital. This structure is the atom. This is Hydrogen atom.

A bunch of Hydrogen atom under the influence of gravitational field turn into a star or a planet depending on the mass of the agglomeration. In this agglomeration, the fusion of hydrogen atoms leads to formation of atoms of higher atomic numbers.

It has already been explained that electric field is responsible for electrovalent compounds and magnetic field is responsible for covalent compounds [5.3].

Different States of matter: Temperature is a measure of energy density per unit volume [5.2]. This energy density is due to the Higgs bosons present in the inter-molecular space. Energy density per unit volume results

in force per unit area (internal stress). Gravitational field and internal stress are in opposite directions. The strength of gravitational field and internal stress define the state of matter.

If the stress is more than gravitation filed: The internal stress causes the atoms or molecules drift from each other, which appears as diffusion as defined by Graham's law. Due to diffusion, gases do not have a fixed volume.

If the internal stress is equal to gravitational field: The atoms or molecules are held closely to define a volume but the relative movement of atoms or molecules is not restricted. This defines the liquid state of matter.

If the internal stress is less than the gravitational field: The atoms or molecules are held closely to define a volume and the relative movement of atoms or molecules is restricted. This defines the solid state of matter.

Plasma state: If the internal stress in the intra-atomic space (space between nucleus and orbital) is more than the gravitational field, then electrons will move out of orbital. The electron and nucleus will exist as charged particles. This is the state of plasma.

Viscosity: States of matter is defined by energy density per unit volume in the inter-molecular space. The relative movement of molecules in a liquid is regulated by the energy density in the intermolecular space. The resistance to relative movement of molecules is defined as viscosity. With the reduction of energy density, the viscosity reduces.
The density of matter is the density of atoms per unit volume. Viscosity is due to energy density per unit volume in the inter-atomic or inter-molecular space. It is independent of atomic density per unit volume.
Mercury is classic example of viscosity. Mercury does not flow like water because of high viscosity as compared with that of water. Because of cohesive force among the Higgs Bosons, it acquires a spherical shape (globule). Two globules of mercury merge and form one globule due to cohesive force between Higgs bosons. Individually two globules will have more surface area indicating high energy level. The surface area of merged globules will be less than the sum of surface area of two separate globules. The merged globule requires less energy. Nature always maintains lower level of energy at a given condition.

Surface tension: Surface tension observed in liquids is due to the affinity among Higgs Bosons in the inter-molecular space. When a liquid is held in a container, the surface of liquid is either convex or concave. This is due to the viscosity of liquid.

Conductor and insulator: Conductors allow current to pass through body of material whereas insulators do not allow the current to pass. Conductors have crystalline structure whereas insulator is amorphous. Carbon as charcoal is amorphous and is insulator. Carbon as graphite is crystalline and allows current to pass. In crystalline structure the same energy density is maintained in the intermolecular space in the entire length of body. Insulators being amorphous do not follow any pattern like crystalline structure follows. Hence energy density per unit volume is not uniform. Energy in the intermolecular space is entrapped in pockets and do not allow a free flow of energy.

When a conductor is connected to a battery, Higgs bosons flow from high density zone to low density zone. While doing so they apply force on electrons and carry them from one end to another end, which appears as current. Flow of Higgs Bosons from High density zone increases the energy density per unit volume along the conductor. Increase in energy density represents increase in temperature. That is why when current flows in a conductor, it becomes hot. Specific resistivity of a conductor is directly proportional to energy density per unit volume in the inter-molecular space. In other words, Specific resistivity is a measure of energy density per unit volume. It depends on the composition and structure of conductor.

When an insulator is connected to a battery, Higgs bosons do no flow as there is no free passage. If high voltage is applied, it increases the energy density in a pocket of insulator resulting in high stress. Energy density per unit volume is equal to stress (force per unit area) [5.2]. It causes a puncture in the insulator to release the excess energy.

Strength of materials: The stress developed due to the energy density per unit volume in the inter-molecular space defines the strength of materials.

Thermocouple: When one end of a metal wire is at high temperature and the other end is at low temperature, a temperature gradient is created along the length of metal wire and heat (Higgs bosons in the intermolecular space) moves from high temperature to low temperature. In a thermo-couple, two wires of dissimilar metals A and B are joined and the ends are subjected to temperature difference. The potential (energy density per unit volume in inter-molecular space) in one metal A is high as compared to the other metal B. When one end of a thermo-couple is subjected to high temperature, energy from wire A flows to wire B because of potential difference. This flow of energy carries electrons wire A to wire B and current flows. This confirms the findings of **Thomas Johann Seebeck** (Seebeck Effect) [5.5].

Positive energy and Negative energy: It is evident from Einstein's energy-mass equivalence or Max Planck's energy-frequency equivalence that energy is always positive. It is the energy density per unit volume that makes difference. If energy density per unit volume is increasing, it is positive energy. If energy density per unit volume is decreasing, it is negative energy.

Laws of thermodynamics:
Zeroeth Law of Thermodynamics: Temperature is a measure of energy density per unit volume in the intermolecular space.

First Law of Thermodynamics: Higher temperature implies higher energy density per unit volume. This, in turn results, in higher potential. Similarly, Lower temperature implies lower potential. Hence the energy flows from high temperature zone to low temperature zone till both zones reach the same energy density per unit volume.

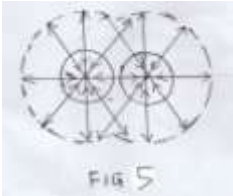
Second Law of Thermodynamics: A cold body cannot raise its own temperature unless heat is supplied from an external source or a mechanical work is done. Supply of heat from a high temperature zone increases the energy density per unit in cold body. This increases the temperature of cold body.
If a metal is twisted many times, it deforms the grain structure of the metal reducing the volume of intermolecular space. This results in high energy density per unit volume in the intermolecular space. It appears as rise in temperature.

Third Law of Thermodynamics: This introduces a concept of entropy. Mathematically it is represented as (dQ/T). From Zeroeth law, we know that two systems are in thermal equilibrium if both of them maintain same temperature.
The question is whether heat exchange takes place between them or not? Energy is not a static state but a dynamic state as the source of primitive energy is a vibrating Higgs Bosons. Even if two systems are in thermal equilibrium, Heat exchange takes place between them. dQ represents the quantity of energy exchanged at a given temperature. Higher the temperature, higher is the quantity exchange and vice versa. At absolute zero temperature, there exist a single system the Universe filled with primitive source of energy. As there is no exchange of energy, dQ is zero.

Two systems, with difference in temperature, exchange heat till quantum of energy transfer from each side becomes equal. Then both attain the same temperature. The quantum of dQ is the information which helps Nature to determine at what temperature a system exists.

In nutshell, the laws of thermodynamics are laws of space-time dynamics.

Colour of objects: When light falls on an object, it absorbs energy. To maintain the same temperature, excess energy is released, which appears as reflection of light. The frequency of reflected light is determined by the energy density per unit volume in the inter-molecular space of object. Depending on the frequency of reflected light, the object appears of a particular colour.
Super conductivity: When the energy density in the intermolecular space reduces below the energy density in the intra-atomic space (space between nucleus and electrons), atoms cannot retain a stable structure. Structure of an electron is stable as long as it has support of Higgs Bosons, which appears as electric field around it. The reduction in energy density in inter-molecular space, reduce the cover of Higgs bosons around electron. At this juncture, the Higgs bosons in the intra-atomic space come to the rescue of electrons. They provide a cover to pair of electrons. As the electrons do not have individual covers of Higgs Bosons, they do not repeal each other. Now there is a common cover for a pair of electrons. This is shown in fig 5. This reduction in energy density offers little or no resistance. Hence it becomes super-conductor. **Bardeen-Cooper-Schrieffer** (BCS)[5.6] Theory of Superconductivity explains this phenomenon only.



When super conductor is subjected to High Intensity magnetic field, Higgs bosons are supplied to intra-molecular space. If the energy density increases a critical level, each electron gets individual cover, super conductivity is lost otherwise super-conductivity is maintained. This explains type-1 and type-2 superconductivity.

Super fluidity: At lower temperature, the energy density per unit volume in the inter-molecular space drastically reduces, reducing its viscosity. This reduces the resistance to flow. Liquid flows from high potential zone to low potential zone. When energy density in the inter-molecular space is more than the potential surrounding the liquid, it starts flowing. This defines the super-fluidity.

Black hole: The concept of Black hole emanated from a hypothesis that escape velocity of a celestial body is equal to velocity of light.

As per the hypothesis, a massive star, which has exhausted its nuclear fuel, will condense under the impact of gravitational field to form an extremely dense body of mass. Such a body of mass will have an escape velocity equal to velocity of light. Such a body of mass is called black hole.

A star must exhaust all its nuclear fuel. It implies it does not have any heat energy left in it. When a star exhausts its nuclear fuel, it is converted into a celestial body like planet. Such planets display stability near a star as these planets receive heat energy from star e.g. Earth getting heat from Sun. This means such planets must move to a cold zone of absolute zero temperature. Absolute zero temperature signifies lack of heat energy.

Mass particles like electrons, protons, neutrons and atoms are stable in high temperatures only. At absolute zero temperature (lack of any heat energy), these particles are unstable and get converted into energy as demonstrated by Oruganti [5.2]. Due to cohesive force among Higgs bosons, the celestial body converts into a massive dense body of energy.

As the density of energy is very high, it emits very high frequency rays since frequency depends on energy density per unit volume [5.2]. Along with energy it loses the mass also. This implies a black hole is an unstable structure and cannot maintain a constant escape velocity.
In fact, all types of black-holes (stellar or otherwise) are dense form of energy having energy density per unit volume extremely high. Hence all types of black hole release very high frequency rays.

The high activity around the rim of a black hole is due to the high frequency rays emitted by black hole.

Once the entire energy is radiated out, the black hole shall vanish.

Recycle is one important process of Nature. It never creates anything new. It recycles the old into new. If the galaxy helps energy to convert into mass particles like electron and positron, black hole converts mass particles into energy. This is the rule of eternity.

If a black hole with escape velocity equal to velocity of light can really be formed, it will be a permanent knot in space. Nature will have no mechanism to break this structure. Such structures will be beyond the control of Nature. Nature's control mechanism will not allow such formation.

What information is retained or lost in black hole? Once converted into energy Higgs bosons do not retain the history: which set of Higgs bosons were part of electron or positron. But Higgs bosons retain its own identity e.g. the mass, vibration and frequency with which it started before galaxy formation. This is in agreement with law of conservation of mass and law of conservation of energy.

IV. Observations

Higgs bosons are the operating system of Universe. There is only one fundamental particle Higgs boson and fundamental field the Higgs field around Higgs Boson, which drive the entire universe.

Existence of second fundamental particle is ruled out. If it exists, what are its attributes different from mass and field? Charge is not a fundamental attribute but a virtual attribute acquired due to electric field around electron or positron. All other particles, observed so far, are manifestation of Higgs Bosons at a given condition. Such particles derive their attributes from the attributes of Higgs Bosons.

Higgs field is the only fundamental field. Other fields like gravitational field, electric field and magnetic field come into existence due space-time dynamics. Barring these force no other forces exist in nature.

The direction of field around electron and positron is just opposite of the conventionally accepted. The direction of field around electron is radiating out. The direction of field around positron is towards centre of positron.

A body of mass does not have any field associated with it. Newton rightly conceived existence of gravitational field but it is not due to the mass. It is due to space-time deformation to form a galaxy. It is gravitational field of Galaxy brings them together giving a false impression that bodies of masses attract each other. That is the reason Newton had to emphatically declare "action at a distance is impossible".

Nature follows law of conservation of mass, law of conservation of energy, law of conservation of momentum, Newton's first law of motion, Newton's third law of motion. Natural Laws are consistent with each other because all laws are governed by the same particle Higgs Boson. All universal constants are inter-related as they are related to the same particle – Higgs boson.

Volume and energy density per unit volume play a major role in shaping the visible universe and its events.

Big Bang Theory is mere a conjecture than a fact, as two galaxies are repealed due to anti-gravity field around galaxy.

Time cannot be negative as it is positive and always increasing. It is a diktat of Nature. Time machine is more hypothetical than a reality.

Standard model conceives substructures for electron, which appears to be more hypothetical than fact. The reaction between electron and neutrino, positron and neutrino, electron and positron cannot be explained. The dual nature of electron as wave and particle cannot be explained. This article provides the true picture of these particles and explains these reactions.

Space-time is a creation of Vibrating Higgs Bosons. Hence space-time dynamics is in principle Quantum Mechanics and vice-versa.

Einstein was unnecessarily struggling for Unified Field Theory, while he was sitting on the theory, had he cared to define time.

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