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EXPERIMENTAL AND OBSERVATIONAL VERIFICATION OF THE UNIFIED FIELD THEORY

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Abstract: The author has developed a unified theory of fields through a series of articles. The theory developed was applied to explain the origin of planetary magnetic fields and verified by the measured and observed data. This is verification for unified theory of gravitational and electromagnetic fields. So, in this article, unified field theory developed based on the classical physics for all the fields of the nature is verified by the experimental and observational data. The complicated general theory of relativity is replaced by a much simpler classical field theory.

Key words: General theory of relativity, unification of gravitational, electromagnetic, weak and strong nuclear fields.

Introduction: In the previous paper [1], relationship between mass, the gravitational and electromagnetic fields was analyzed and explained. Then the relationship between electric charges and electric and magnetic fields were analyzed and explained. Charge and mass relationship was established and then the same principle was applied to build a model of matter particle and the gravitational field and electric fields were proved to be one and the same. Based on the theory developed, the origin of magnetic fields of all the planets of the solar system was explained and the theoretical calculations of relative magnetic field strengths of all planets were made. The calculations made agreed with the observed data of all the planets except for Mercury. Reason for the disagreement in the case of Mercury was explained. So, in this way, the unified field theory developed was verified by the experimentally measured and observed data.

Then, forces of nature namely electromagnetic, gravitational, general theory of relativity, strong and weak nuclear forces were integrated by generalizing Newton and Coulomb's laws of forces. De Broglie's matter wave equation was redefined for magnetic material particle. Sir Isaac Newton developed the corpuscular theory of light propagation. Christian Huygens developed wave theory of light propagation and disproved the Newton's theory. J.C. Maxwell developed the field theory of electromagnetic waves and the light. Then, the existence of Ether particles in the space was disproved. Albert Einstein developed photon theory of light and electromagnetic energy. Then wave particle duality theory was developed by the statistical interpretation of wave particle dual nature of energy and matter. The author through a series of articles [2] [3] [4] [5] [6] [7] [8] [9] [10] [11] [12] [13] [14] proved theoretically that all the particles are made up of electromagnetic waves and all the fields are electromagnetic fields. So, a new theory of electromagnetic radiation and propagation of waves was developed based on the electrical charges [1]. The new theory developed was applied to develop the transient and steady state theories of the universe. So, in this article, unified field theory developed for all the fields of the nature are verified by the experimental and observational data. Experimental and observational suggestions are made to verify the new theory of cosmology developed in the previous article [1].

In the section-I, a formula for magnetic field produced by rotating masses like the planets, galaxies and sun is developed and verified by the available experimental and observational data. Then in the section-II, a general theory of fields is derived from the classical electromagnetic and gravitational field theories. In the section-III, the new general theory of fields developed is verified with the two of the three experimental and observational data which verified the general theory of relativity. In the section-IV, the gravitational red shift in the Sun's radiation is calculated based on the general theory of fields and the calculated values agrees well with the calculated values of general theory of relativity and observed values. In the same section, a formula for field due to the general theory of relativity is

derived based on the classical radiation theory of fields and the Newton and Coulomb's field formulae are derived. Then formulae for weak and strong nuclear fields were derived by generalizing the formulae derived for gravitational and electromagnetic fields. The general formulae for all the forces of nature are verified by the experimental and observational data available. The general formula for the fields indicates the existence of many forces of nature which are not observed in the observable universe. Each elementary particle of nature produces a unique field as per the new general theory of fields developed. Experimental methods of particle physics may prove the existence of many such forces beyond the nuclear forces in the future. All the particles of the nature are made up of photons and originated from the photons (energy) as per the particle physics and the standard model of the cosmology. The general formula of fields indicates all the particles of the world are made by electric charges or fields. So, a photon too is made up of electric charges. So, electric charges are declared as the most fundamental particles of the universe. The energy of the smallest particles is $h/2$ where h is Planck's constant, as per the Planck's law of particle physics. So, the smallest particles are named as Planckans to honor the discoverer of the first quantum particle. All about the smallest particles of the nature and more are discussed in the section – V. In the section-V, new theory of cosmology based on the general theory of fields [1] is briefly discussed and experimental and observational suggestions are made to verify the new theory of cosmology.

Magnetic field of rotating masses [15] [16] [17] [18] [19] [20] [21]: By comparing the Newton's law of gravitational field and Coulomb's law of electric field, relationship between charge and mass can be established and that is given by $Q = \sqrt{(4\pi\epsilon G)} M$ where M is the mass, Q is charge, G is gravitational constant and ϵ is permittivity of the space. A material body of certain mass is made by so many atoms. An atom is made by positively charged nucleus and negatively charged electronic cloud. The positive and negative charges are equal in magnitude and the electronic cloud is moving constantly around the nucleus. So, electrically, an atom could be modeled as a rotating electrical dipole. So, a matter body of mass could be considered as an array of electrical dipole. When a body is brought close to another body, the electrical dipoles in each body are oriented in such a way to attract each other body. This attractive force is gravitational force. The dipole density in the matter is directly proportional to the density of the matter. That is why gravitational force is directly proportional to the mass of the matter body. So, electric and gravitational forces are equivalent. Many objects of the sky like galaxies, planets, sun, stars, etc. are rotating about an axis. So, the electric dipole array in each object will be rotating about the same axis. The rotating charges produce circular electric currents on the planes perpendicular to the axis of rotation. These currents on the circular rotating discs produce magnetic field as per the Biot-savart's law. That field for rotating charge is given by $\mathbf{B} = (\mu/4\pi) \cdot \mathbf{Idl} \times \mathbf{R}/R^3$, where I is the current produced by the rotating electric charge dQ over a small length $d\mathbf{l}$ and \mathbf{B} is the magnetic field produced at a distance of R . μ is the permeability of the free space. By definition $I \cdot dl = (dQ/dt) \cdot dl = dQ \cdot v$ where v is the speed of the rotating charge dQ . So, if the entire volume of the charge of the body or the mass is reduced to a point form, the above Biot Savart's equation is directly applicable. So, the magnetic field produced by a body of equivalent charge Q or mass M is $\mathbf{B} = (\mu/4\pi) \cdot Q \cdot \mathbf{vxR}/R^3 = (\mu/4\pi) \cdot M \cdot \mathbf{vxR}/R^3$. If R is a constant, the equation is reduced to $\mathbf{B} = (\mu/4\pi) \cdot M \cdot \mathbf{vxR}/R$. So, the magnitude of the magnetic field produced is $B = (\mu/4\pi) \cdot M \cdot v$. So, the magnetic field produced is directly proportional to $M \cdot v$. This formula derived is verified by the following table and the experimental and observational data available.

S.N. PLANET	MASS (M) (M x 10 ²⁴ kg.)	SPEED(v) (km/hr)	M x v
1. Mercury	.33	10.83	3.564
2. Venus	4.87	6.52	31.655
3. Earth	5.97	1574	9444
4. Mars	.642	866	554.24
5. Jupiter	1898	45,583	8,66,07,700
6. Saturn	568	36,840	2,09,02,400
7. Uranus	86.8	14,794	12,87,078
8. Neptune	102	9,719	9,71,900

In the above table, the factor $M \cdot v$ (Mass-Speed product) indicates the relative magnetic field strength of the planets, because for greater speed of rotation and greater mass, greater magnetic field is produced by the planet. So, as per the above table, earth has got greater magnetic field as compared with the planets Mercury, Venus and Mars. The four planets Jupiter, Saturn, Uranus and Neptune produce greater magnetic field than the earth. But mercury's magnetic field is increased by the Sun's magnetic field because mercury is closer to Sun. So, mercury's magnetic field is measurable and weakest one. The magnetic fields of Venus and Mars are not measurable. So, the calculated values of the relative magnetic fields of all the planets agree with the measured values of the magnetic fields produced. In this

way, the electric, magnetic and gravitational fields are integrated and electrical charges are proved to be the source of electric, magnetic and gravitational fields.

General Theory of Fields-I [15][16][17]: As per the Newton's law of gravitational field $E_g = M.G/R^2$ where M is the mass of the body, R is the distance between the center of mass of the body and the point at which the field is E_g . As the distance R tends to infinity, E_g goes to zero. Similarly, $E_g = M.G/R^n$, where $0 < n < 2$ goes to zero if R tends to infinity. The gravitational field radiated by a source has near field component and the far field component (Like the transient and steady state responses of an electrical or control systems). The near field component dies first and then the far field component. So, the formula $E_g = M.G/R^2$ is near field gravitational component and $E_g = M.G/R^n$ is far field component of the gravitational field. So, the general formula for the gravitational field is $E_g = \sum M.G/R^n$ where $0 < n < 2$. Similarly, E_g goes to infinity as R tends to zero in the Newton's force formula. The Newton's formula for field sharply increases the field and too much of error is created and so, Newton's formula is invalid. But for $0 < n < 2$, the field is far away from infinity and therefore finite. So, at points close to $R=0$, $E_g = \sum M.G/R^n$ where $0 < n < 2$. So, in the beginning and end parts of the universe, field formula is $E_g = \sum M.G/R^n$ where $0 < n < 2$ and in the intermediate part of the Universe, Newton's formula is valid and so, $n=2$ in the general formula of fields. Newton's formula is applicable when two material bodies are interacting with each other. The radius of nucleus of an atom is close to zero. So, the strong and weak nuclear forces described by $E_g = \sum M.G/R^n$ where $0 < n < N$ and $N > 2$. The nuclear particles are small sized particles with small masses and so, the distance of their interactions are close to zero. So, the general formula for field radiated by a nuclear particles is $E_g = \sum M.G/R^n$ where $0 < n < N$ and N is for the smallest nuclear particle. The smallest nuclear particle known is photon. This basic theory is analyzed in detail in the following sections and the general theory of fields developed is proved by the experimental and observational data. As per the Charge-mass equivalence principle derived from Newton and Coulomb's laws, the theory developed for mass particle is applicable for charge particle also. .

General Theory of Fields-II [15] [16] [17]: All material bodies are made up of atoms which are basically made by positively charged nucleus and negatively charged electronic cloud moving around the nucleus. So, an atom can be modeled as a rotating magnet with nucleus fixed at the center of the rotation. So, any material body can be considered as a body made up of rotating electrical dipoles. So, if another material body is brought close enough to the first body, the dipole array in each body is oriented to attract each other body. This attractive force is gravitational attractive force and is proportional to masses of the bodies because dipole density is proportional to the mass. So, basically, gravitational force is electric force and that is why Newton and Coulomb laws are similar and charge and mass are equivalent.

But inside the massive bodies, each electrical dipole will be rotating in such a way to attract the other dipoles around if there are no other material bodies at close enough distance. So, unlike the static orientation of dipoles in the interaction between two bodies, the dipoles will have constant positive pole and a variable negative dipole. So, the moving electronic cloud will produce variable electric field and electromagnetic radiation. Since the current flow is on the spherical surfaces with random periods at any point of the spherical surfaces, on an average, the current flow could be assumed to be in a periodic form with very high frequency. So, each atom could be considered as a spherical electromagnetic and variable electric field radiator and radiates spherical waves of electric and electromagnetic fields. The average value of the radiation is static or constant radiation with uniform distribution of power over the spherical surface. Since the atomic density is directly proportional to the mass, the spherical radiation field is directly proportional to the mass of the radiating point and inversely proportional to the radius of the spherical radiation field. This radiation field is gravitational field and inside a massive body, gravitational field does not behave as per the Newton's law. This conclusion is beautifully explained by the Newton's law of force (\mathbf{F}) and the force between two bodies of masses M_1 and M_2 with the distance of separation of the centers of the masses R is

$\mathbf{F} = G.(M_1. M_2/R^2). \mathbf{a}_R$ where \mathbf{a}_R is unit vector in the direction of R with centers as origins of spherical coordinate systems. This force could be considered as force acting on either one of the bodies from the other body. So, \mathbf{F} could be written as $\mathbf{F} = (\sqrt{G}.M_1/R). \mathbf{a}_\theta \times (\sqrt{G}.M_2/R). \mathbf{a}_\phi = (\sqrt{G}.M_2/R). \mathbf{a}_\theta \times (\sqrt{G}.M_1/R). \mathbf{a}_\phi$ So, the radial field radiated by a body of mass M is made by two spherical field components and the force acting between two bodies is cross product of component fields taken from each body's spherical field radiated which are mutually perpendicular to each other. But this spherical field radiation is not valid inside the material body. Inside the material body, the gravitational field radiated is $G.M/R$ as explained in the previous sections. The above analysis clearly indicates that Newton's gravitational force includes three components. One is radial component and other two are angular components in the spherical coordinate system. As is well known, the radial component of the force produces closed loop motion of planets around the Sun located at the center of the solar system. The other two components produces rotational (cross product of the angular components) motion of the planets and the Sun about their own axis perpendicular to the plane of rotation. The two angular components produces spherical field and so, the curvature of the spherical field is responsible for the tilt in the rotation of the planets and the Sun. Since R varies with the elliptical motion of the planets, the tilt angle of the planets also varies.

Now, let us analyze the interaction of the field $E_1 = G.M_1/R$ radiated out of the body of mass M_1 interacts with the field radiated out by another body of mass M_2 whose center is located at a distance R from the center of M_1 . The radiated power flows in the radial direction of the spherical field. As per the Poynting theorem of electromagnetism, this power is $\mathbf{P} = \mathbf{E} \times \mathbf{H} = (E^2/\eta)$. $\mathbf{a}_R = \mathbf{a}_R(G.M/R)^2/\eta$ where \mathbf{E} and \mathbf{H} are electric and magnetic fields respectively of the spherical radiation and η is the intrinsic impedance of the medium. So, the field on the sphere of constant field is $E = G.M/R$ and $E_\theta = E_\phi = E/\sqrt{2}$ because $\mathbf{a}_R = \mathbf{a}_\theta \times \mathbf{a}_\phi$. So, the force between two bodies is $\mathbf{F} = (E_1/\sqrt{2}) \mathbf{a}_\theta \times (E_2/\sqrt{2}) \mathbf{a}_\phi = (G./(\sqrt{2}R))^2 M_1 M_2 \mathbf{a}_R = (E_2/\sqrt{2}) \mathbf{a}_\theta \times (E_1/\sqrt{2}) \mathbf{a}_\phi$. So, the force between two bodies derived from the inner gravitational field radiated is very much similar to that of Newton's force law.

Albert Einstein assumed that field and the space are one and the same and mass produces curved and closed fields to develop the general theory of relativity. So, inside any massive body general theory of relativity is valid. So, to calculate the gravitational red shift in the radiation of atoms at the surface of the Sun, general theory of relativity is very well valid. Newton's gravitational law is not valid. This conclusion is verified in the following calculation. But outside interactions take place as per the linear and static alignment of dipole arrays of the interacting bodies and so, the general theory of relativity is valid only very approximately. This conclusion is verified by the theoretical calculations made by using general theory of relativity and Newton's law and the observational data made for the perihelion motion of all the planets of solar system [22].

If the light is travelling close to the surface of the Sun or other massive body, the photons of the light will interact with the gravitational field of the Sun or other body as per the Newton's gravitational force [23]. A photon is made up of f number of electric dipoles as per the Planck's law of quantum mechanics where f is the frequency of the light. These electric dipoles are aligned in a direction and are moving with the speed of light in the same direction of alignment. These dipoles of a straight line will interact with the dipoles of the surface of the Sun and attract the dipoles of the light because field due to a dipole of the matter particle (mass of an electron) is much greater than the field due to the mass of a photon. So, the light is deflected. The gravitational deflection angle of light calculated based on this theory (Newton's law and classical mechanics) agrees well with the observed values [23]. Since light is electromagnetic field and the Sun radiates spherical gravitational field, general theory of relativity with the ray theory of light too could be used to calculate the gravitational deflection of light with great accuracy.

General Theory of Fields-III [15][16][17]: Albert Einstein suggested three tests to verify the general theory of relativity. Out of the three tests, two tests in which interactions are outside the interacting bodies. So, Newton's gravitational field theory and classical mechanics are well suited to solve the problems and theoretical calculations made agrees better with the observational data as compared with the calculated values of general theory of relativity [22][23]. In the gravitational red shift of Sun's radiation interaction takes place just inside the Sun's surface. So, Newton's theory is not valid and general theory of relativity and the general theory of fields are valid. So, based on the general theory of fields developed in the previous sections, gravitational red shift of Sun's radiation is calculated in the following lines and calculations agrees well with the calculations made by the general theory of relativity and observed data.

Let us consider the photons radiated by the electrons of the atoms at the surface of the sun. In the absence of Sun's gravitational field, electrons of the atom will radiate photons freely. But the gravitational interaction between the surface electrons and the Sun's gravitational field will shift the frequency of the photon. The Sun's gravitational field at its surface is $M_s G/R_s$ where M_s is mass of the Sun and R_s is the radius of the Sun. Let ΔT is the change in the period of the electromagnetic energy radiated due to the gravitational pull. So, $C/\Delta T + (1/3)C/\Delta T = M_s G/R_s$. The high frequency electromagnetic waves radiated by the atoms of the Sun's mass due to the energy generated in the nuclear reactions increases the field acting on the surface electrons by $(1/3)C/\Delta T$. Since energy of the Sun's mass $M_s = M_s C^2$ is to be conserved, M_s has to be conserved. So, $1.33 C/\Delta T = M_s G/R_s$. So, $\Delta T = 1.33 C R_s / M_s G = 2 \times 10^{-6}$. Since $f = 1/T =$ the frequency of the light radiated by the Sun's surface in the absence of gravitational field where T is the period of the EM wave radiated, $f + \Delta f = 1/(T + \Delta T)$ where Δf is the gravitational red shift of the light frequency. Since $1/(T + \Delta T) \approx (1/T)(1 - \Delta T) = f(1 - \Delta T) = f + \Delta f$, $\Delta f = -f \Delta T$. So, ΔT is the part of f is red shifted. That is $\Delta T = 2$ ppm (parts per million). This calculated value based on the unified theory developed agrees with the calculated value of Albert Einstein based on his general theory of relativity and the observed values.[24].

So, the gravitational field inside an object of the mass M is $M.G/R$ where R is the distance from the center of the mass M . Outside the volume of the objects the force between two objects of finite mass is given by the Newton's law of force as explained in the previous sections. This fact is proved mathematically from the formula for field inside the mass. Let us assume that light from a distant star passes very close to the Sun's surface. So, the photons with finite mass $M_p = h.f/C^2$ of the light will interact with the Sun's gravitational field $M_s G/R_s$. Similarly, electrons of the Sun's surface will interact with the same Sun's gravitational field. Electron is part of the Sun and photon is an outside the volume of the Sun's mass even though the photon is very close to Sun's surface. Sun's surface is the boundary which separates inner and outer space of the Sun. So, at the surface of the Sun, both the Newton's gravitational and general field theory fields are valid and equal. So, the Newton's force law is derived from the field law $M_s G/R_s$ valid inside the Sun's volume in the following lines.

Let the mass of the electron be M_e . So, as per the gravitational field law derived in the previous section, the force acting on an electron at the surface of the Sun is $F_e = G.M_s M_e / R_s$. Similarly, force acting on the photon close to the Sun's surface is $F_p = G.M_s M_p / R_s$. So, $F_e / F_p = M_e / M_p \approx 1.8 \times 10^5$. So, $F_p = G.M_s M_p / R_s = F_e / (1.8 \times 10^5) = G.M_s M_e / R_s (1.8 \times 10^5)$. So, the Sun's gravitational force acting on the photon close to Sun's surface is equal to Sun's force acting on the electron at a distance of $1.8 \times 10^5 R_s$ from the center of the Sun. Let $R^2 = 1.8 \times 10^5 R_s$ and so, $R_s < R^2 < R_s^2$ So, $F_p = G.M_s M_p / R^2$ This is Newton's force law for two bodies interacting with each other. Another important conclusion is for sub atomic and sub nuclear particles like electrons and photons interacting at very close distances, $1 < n < 2$, if force $F = G.M_s M / R^n$ where M is the mass of sub atomic and sub nuclear particle's mass. So, this force formula is applicable to strong and weak nuclear forces. The value of n for photon and Sun interaction is approximately 1.5. For the gravitational field inside the large scale mass like Sun, $n=1$ and well outside the large scale mass $n=2$ and for the points very close to the Sun's surface $n \approx 1.5$ for photon and $1 < n < 2$ in general for weak and strong nuclear forces because photon is the smallest elementary particle known to us. This calculation based on the general theory of fields agrees well with the strong and weak nuclear force ranges as explained in the following paragraph.

As per the Coulomb's law of electrical force, electrical field generated by a charge Q at a distance R is $E_e = Q / (4\pi\epsilon R^2)$ where ϵ is the permittivity of the space. The strength of the weak nuclear field is 10^{-5} times the strength of the electromagnetic field [25]. So, the strength of the weak nuclear force is $E_w = 10^{-5} E_e = 10^{-5} Q / (4\pi\epsilon R^2)$. Range of weak nuclear force is $R = 10^{-17} m$. So, $E_w = Q / (10^5 \cdot 4\pi\epsilon (10^{-17})^2) = Q / (4\pi\epsilon 10^{-29}) = Q / (4\pi\epsilon R^{1.7})$. So, $E_w = G.M / R^{1.7}$ because $Q = 4\pi\epsilon GM$. So, $E_w = G.M / R^n$ where $n = 1.7$ and $1 < n < 2$. So, the formula derived based on the general theory of fields agrees with the experimental data based derivation. [25] Similarly, Strong nuclear field is 137 times stronger than the electromagnetic field and the range of the strong field is $10^{-15} m$. So, the strong nuclear field is $E_s = 137 E_e = 137 Q / (4\pi\epsilon (10^{-15})^2) \approx G.M / R^n$ where $n \approx 2.1$. So, in the case of strong nuclear force also the formula derived for photon field at very close distance to Sun's surface is valid approximately because the nuclear particles have much greater mass as compared with the photons even though the range of the field are almost the same. So, for strong nuclear fields, the force formula of an electron interacting with the Sun at a very close distance to Sun's surface is very well valid. So, Newton's force formula is valid for an electron interacting with the Sun at very close distance to the Sun's surface. But at very close distances Newton's force formula is valid only approximately because the force decreases very slowly at large distances and sharply increases at close distances and fails if the distance approaches zero. However, Newton's formula indicates that at close distances, the force value is very large. That is why $n \approx 2.1$ in the force formula for strong nuclear forces.

Similarly, for photon at close distance to Sun's surface, the force between the Sun and the photon is $F_p = G.M_s M_p / R_s^2$. As we have seen in the previous paragraph, the force between the electron and the Sun is $E_e = G.M_s M_e / R_s^{2.1}$ The electron mass $M_e \gg M_p$, the mass of the photon. So, as the particle's mass or charge becomes smaller and smaller, the range (R) of the interaction or field radiated also becomes smaller and smaller. This means the Newton or Coulomb's laws approaches the singularity and error in the formula too sharply goes up and formula becomes invalid. In other words, the value of n in the general formula for fields $E = G.M / R^n$ also goes up as the mass or charge of the particle or range of interaction goes to zero. So, the general field formula for the particles is $E = G.M / R^n$, where $2 < n < N$ if $R > R_p$ where R_p is the radius of the particle. The value of $n = N$, if R_p or M becomes smallest. As explained earlier, $1 < n < 2$ in the general formula of the fields $E = G.M / R^n$, if $R < R_p$. As explained earlier, $E = G.M / R^2$ goes to zero if R tends to infinity. But $E = G.M / R^n$, where $0 < n < 2$ is finite at those points from where $E \approx 0$ for $n = 2$. So, the general formula for the fields is $E = G.M / R^n$ where $0 < n < N$ for $R > R_p$. Similarly, $E = G.M / R$ for $R < R_p$ becomes invalid at the points very close to the center of the mass or charge. So, for $R < R_p$, $E = G.M / R^n$, where $0 < n < 2$. So, for points close to $R = 0$, $0 < n < 2$ for $R < R_p$ and at points close to $R = \infty$, $0 < n < 2$ for $R > R_p$. In other words, in the beginning point of R , for $R < R_p$ and at the end points of R , for $R > R_p$, force formula is one and the same. This is one way of building a general field formula for all fields of nature and the other way is explained in the section unified field theory-I.

Smallest Particles of the World [15] [16] [17] [26] [27]: So far photons are believed to be the particles with smallest mass. The mass of a photon is given by $M_p = h \cdot f / C^2$. From the formula, one could easily conclude that a photon is made up of f cycles of electromagnetic wave. Photon is an energy particle and electromagnetic wave behavior of fields at lower frequencies becomes electromagnetic energy particle behavior at higher frequencies. So, a photon is made up of $2f$ number of energy particles and each particle's energy is given by $h/2$ as per the Planck's law. This energy is half of the Planck's constant. So, Mass of the particle is $h / (2 \cdot C^2)$. So, this particle is the smallest particle of the world and all the other particles are made by this smallest unit. We may call this smallest particle as Planckan particle to honor the discoverer of the first quantum particle. As per the electromagnetic wave theory, radius of Planckan is $\lambda/4$ where λ is the wavelength of the electromagnetic wave. Each half cycle of an electromagnetic wave is made by either positive or negative fields. As per the laws of Coulomb and Newton, field and charge or mass are one and the same. So, Planckans are simply the electrical charges. So, all the matter or energy particles are made up of highly concentrated electrical charges. Since all the matter and energy particles of the world are made up of Planckans, the Universe must have originated from the Plankans. As per the standard model of Cosmology, the Universe is originated from the Photons. Since Planckans are much smaller than the photons, analysis data in the field of particle physics in terms of Planckans may reveal many laws of physics like atomic and particle physics revealed many laws of physics. Planckan

particle physics is the smallest scale physics since Planckans are the smallest particles of the world. This branch of physics will be the final branch of physics.

As per the new theory of cosmology proposed [1], matter particles originated from the Planckans, when the radiated planckans cooled down from very high temperature to the steady state universe's temperature. The first atom produced must have been hydrogen atoms because hydrogen is the simplest of the atoms of all the elements of the world. That is why hydrogen clouds are abundant in the Universe and all the stars and other objects of the sky originate from the hydrogen clouds. The radiation dominated universe is transient universe and Planckans dominate this part of the Universe and the center of the universe is the center of the transient or radiation dominated world. Matter dominated steady state world expands and all the particles are split back into energy form and goes back to the transient world to satisfy the first law of thermodynamics. These photons which travel back to the transient world will be energized and split into Planckans and fused to form matter particles when they travel back to the steady state universe where the temperature is lower. So, the density of hydrogen cloud will be maximum at the boundary between cooled steady state or matter dominated world and the radiation dominated transient world. This density will be reduced as and when they expand moves in the forward direction. Radiation from the hydrogen is at 1420MHz (21cm) and so, in the direction of the transient universe and center of the world, the radiation at 21cm will be maximum. The dark matter or hidden matter or energy is there in the radiation dominated world. Since the hydrogen clouds of matter dominated world originates from the edge of radiation dominated world there will be a gravitational red shift due the energy of the transient universe or charges (Planckans) of the transient world. So, just like the gravitational red shift of the Sun's surface radiation, there will be a gravitational red shift in the hydrogen clouds radiated from the surface of the hot radiation dominated world. But this red shift is reduced as and when the cloud moves away from the gravitational field's influence. So, by finding the maximum red shift, the radius of the transient world and the mass of the radiation dominated world could be found.

Conclusion: Origin of magnetic fields of planetary and other rotating masses are explained and a formula for the magnetic field produced by the rotating masses is derived. Based on this formula, magnetic fields produced by the planets were calculated and the calculated values agree well with the experimental and observational data available. A general formula for all the fields of the nature is developed by generalizing Newton and Coulomb laws of fields and this formula is verified by the three tests suggested by Albert Einstein to verify the general theory of relativity and the experimental data of nuclear fields. Space is proved to be linear and not curved as assumed in building the general theory of relativity. So, the Universe is proved to have a center. Finally, Planckan particles are declared as the smallest particles of the Universe and a new theory of cosmology developed based on the unified theory of fields was briefly discussed and experimental and observational suggestions are made to verify the new theory of cosmology developed.

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