# A MODIFIED THEORY OF THE EARLY UNIVERSE

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***Abstract:*** In the present day theory of early universe, evolution of matter particles from energy particles is not yet understood properly and the special theory of relativity which was developed in linear space is not integrated with the general theory of relativity. Due to improper understanding of the early universe, forces of nature are not united properly. Therefore, in this paper a proper theory of the early universe is developed at conceptual level which integrates the special theory of relativity, general theory of relativity, continuum electromagnetism, quantum mechanics and the classical mechanics. Then, a simple, general and deterministic theory of fields which integrates all known and unknown fields is developed. Then the same theory is extended to integrate all known and unknown field of the nucleus. Application of the theory developed to study the nuclear structure is explained. The unified theory developed is applied to study the stars and the origin and the development of the material universe in the last sections.

***Index Terms:*** **Modified theory of Early Universe, Unified Field Theory, Deterministic interpretation.**

## I. INTRODUCTION

The radiation in the early universe consisted of high energy photons. The dominant process in the early universe can be represented as [1].

Photons ⇔ Particles + Antiparticles.

As per the above equation and from the special theory of relativity we know that $E = mC^2$ [2] where m is the mass of the particle and C is the velocity of light, the material universe must have originated from high energy photons. Therefore, before the production of matter, and antimatter particles, only high energy photons must have existed in the universe. In the absence of matter and antimatter particles, space should have been linear space, since only the presence of matter particles can disturb the linear space as per general theory of relativity. Therefore, before the formation of matter and antimatter particles, the space was linear and therefore, only special theory of relativity and quantum theory of energy is applicable at the early points of the space-time structure. Special theory of relativity was formulated within Euclidian space-time structure. Therefore, the space in the beginning was absolute and no energy was present. Then suddenly within no time high energy photons appeared. Therefore, the speed of high energy photons or the light in the beginning of universe was infinity. Then, the speed of light was reduced to the present value when the matter particles originated, universe exploded, started to expand and cooled. Therefore, special theory of relativity has to be modified to study the origin and the growth of early universe. As per the quantum theory of radiation, energy is directly proportional to frequency. Therefore, the very high energy density of the early universe must have been at very high frequency.

In $E = mC^2$, the unit of C is meters per second. Therefore, mass of a particle = Energy of the particle (photons)/volume in the three dimensional space - reciprocal of $t^2$ structure where t is time = energy density of photons in three dimensional space – $1/t^2$ structure. Therefore, if we consider the Cartesian coordinated system, X and Y axis could be considered as space dimensions and $Z = 1/t^2$ Therefore, space dimensions are linear and the time dimension is non linear. Therefore, energy or photons existed in the linear space-time structure since $1/t^2$ is linear in the beginning and end of the universe. Therefore, Universe originated from EM energy and transformed back to energy at the end of the universe. Mass exists only in the middle of the time or world in non linear space – time structure. Another important fact which could be obtained from the theory is that space (X, Y) is not curved and only the time is curved. Time travels with the energy of the universe. Therefore, speed of the time is equal to the speed of energy. Energy exists in space. Electromagnetic energy exists in electromagnetic fields. Therefore, fields are curved and not the space. This is physical reality. However, if fields and space are assumed to be one and the same, space is also curved. This is what Albert Einstein did while formulating his general theory of relativity by applying Riemann's Geometry [3]. Therefore, Albert Einstein's assumption is valid only in the middle of the universe or time where is matter dominates over radiation. However, universe could be analyzed in the Euclid's geometry or linear space by applying field theoretic concepts. The observational facts tell us that universe was very close to linear or flat space, at the very early stages of universe (time = 1 to $10^{13}$ seconds) [4]. Therefore, the singularity originates in the beginning of the universe as per the general theory of relativity is due to unrealistic assumption made by Albert Einstein [5 6]. The study of early universe will also be useful to understand the structure and dynamics of elementary particles. [1].

As per De Broglie's equation, $E = mC^2 = h.f$ where f is frequency of matter wave, m is mass of the particle and h is Planck's constant, rest mass of the photon = $h.f/C^2$. If the photon is in motion, a singularity is generated in the equation for energy of the photon. Singularities are generated in physical equations due to unrealistic assumptions. Therefore, speed of photon must be different from the speed of wave.

The Max Planck's fundamental law of quantum mechanics is derived using Poynting's theorem of electromagnetism [7]. Quantum theory of radiation is also derived from the continuum theory of radiation. Therefore, quantum mechanics is integrated with the continuum electromagnetism [7]. Electromagnetic energy behaves like particles at higher frequencies, even though the fields behave as waves and the energy becomes a discrete wave. Special theory of relativity [1] is modified by considering $C^2$ (speed of energy of

group velocity or photon) as maximum velocity in the material Universe for all relative velocities greater than or equal to C [8]. Then De Broglie's matter wave equation is modified [8]. By combining the theories of these two articles[7 8], the well known quantum energy states of the electrons are derived from the classical continuum mechanics and the Schrodinger's matter wave equation is derived from the electromagnetic wave equation [8 9].

Thus, in the present day theory of early universe, evolution of matter particles from energy particles is not yet well understood and the special theory of relativity which was developed in linear space is not integrated with the general theory of relativity. Due to improper understanding of the early universe, forces of nature are not united. Therefore, modified special theory of relativity and quantum mechanics [7 8 9] must be used to study the early universe (radiation and matter dominated universe) and the nuclear forces which formed in the early universe.

After developing special and the general theories of relativity Albert Einstein attempted to integrate the gravitational field with the electromagnetic field [2]. Since general theory was developed in Riemann's space and the electromagnetic theory was formulated in Euclid's space, the unified field theory developed by Albert Einstein was complicated and also not popular. Later on weak and strong nuclear forces were found and quantum field theory of elementary particles was developed [10]. By applying the quantum field theory, electromagnetic fields were integrated with weak nuclear forces. The same theory was applied to integrate the strong nuclear forces also. But so far no complete unified theory of fields is developed. Therefore, in this article, a simple, general and deterministic theory of fields which integrates all known and unknown fields is developed.

## II. A QUALITATIVE THEORY OF THE EARLY UNIVERSE

In electromagnetic field theory, Euclid or linear space is used to formulate all problems. Only in gravitational field theory space is assumed to be curved. But Newton's law of gravitational field is comparable to Coulomb's electric field laws. Therefore, if the space is really curved, the space of electromagnetic fields should be proved to be curved. But no such evidences are available in the literature. Mass and Charges are proved to be equivalent sources of fields, if we compare the Newton's Law of gravitation [11] with the Coulomb's Law of electricity [1]. Electric Charge is equal to $\sqrt{G4\pi\varepsilon}$ X Mass. This relationship establishes the link between fundamental units of electric and gravitational fields. This is another evidence to prove that space is not curved.

Pure impulse charge distribution of very high density over a very small volume can generate radiation of very high frequency like radiations from atoms. Therefore, a very high voltage generator must have generated highly energetic radiation in the beginning of the universe. Static impulse electric field and potential is generated as per the Coulumb's law. Charge density of very high impulse potential energy = Lt. $(\Delta v \rightarrow 0)$ $Q/\Delta v$ where Q is charge and v is volume in which Q is distributed. In other world, universe originated from electromagnetic spark or universe originated from a high voltage impulse Hertzian dipole radiator [12].

Therefore, if the space in the atoms is compressed like in the gravitational pull of stars, very high level of energy is emitted. Stars are formed from a massive cloud of hydrogen atoms and the gravitational pull compresses the atoms and very high level of energy is generated. Therefore, if the hydrogen atoms are compressed by a very high voltage spherical capacitor/electromagnet like in stars, energy could be produced like in the stars or in the beginning of the universe. Therefore, magnetic/electric fields could heat the atoms and generate radiation.

Force between protons and neutrons or between neutrons [3 13] could be treated as equivalent to positive and negative charges at very close distances like charge mass equivalence was established. This equivalent charge distribution creates discrete energy levels as per quantum mechanical theory. Particles spin and revolve around each other. Photons may be generated by the nuclear forces. Therefore, a neutron could be considered as a electric dipole with very small distance of separation. Similarly, all sub nuclear particles could be equivalently considered either as dipoles (Chargeless particles) or as charged particles. They create field quanta. Nuclear forces very strong forces and therefore, photons of nuclear fields have considerable rest mass. [14 15].

Energy behaves like a particle and field behaves like a wave as per the modified quantum mechanical theory [7 8 9]. Speed was infinite in the beginning and then reduced to C when the matter originated from the energy. Therefore, modified special theory of relativity [7 8 9] must be used in the radiation dominated universe. Energy originated from a point of infinite energy and spread as spherical wave of very infinite frequency. Frequency reduced to matter particle frequency range at speed C when velocity reduced to C from infinity. Band width of radiation was constant. Since EM waves are not divisible at normal temperatures, they must have been split when they were moving at very high speed in the beginning. Charges and matter particles must have originated from field when the field broke into pieces.

Since radiation pressure of the early universe creates force expansion of the universe is possible only till the time this force is finite. Due to deceleration of the universe expansion stops at the end of the universe and matter particles are converted into energy particles and come back to the center of the world. Therefore, due to the deceleration and acceleration of particles in the opposite radial directions in the universe and the origin of the universe at the zero time, universe has transient and steady states. Since universe originated from electromagnetic energy and field and electromagnetic wave equation is a second order equation, the dynamic of the universe could be described by a second order feedback control system [16]..

Time is just the fourth direction of the spatial direction as per the special theory of relativity. Therefore, time dimension could be represented as imaginary dimension in the complex plane. Spherical coordinate system has one radial coordinate and two angular coordinates. Therefore, a point in the spherical coordinate system is represented by one distance and two angles. Therefore, imaginary

time axis could very well be combined with real radial axis of spherical coordinate system. Since general theory of relativity is developed in spherical coordinate system, by combining the imaginary time axis with the radial axis, special theory of relativity is combined with the general theory of relativity. Lorenz's transformation could be developed in spherical coordinate system. This hybrid theory will be useful in the analysis of radiation and matter dominated universe which exists in between radiation dominated and matter dominated worlds. This hybrid theory may tell how electromagnetic energy was converted into matter particles in the early universe. Modified general theory of relativity and cosmology [17] could be integrated with the special theory of relativity since both are in Euclid's space.

## III. UNIFIED SPECIAL AND GENERAL THEORIES OF RELATIVITY

As per the postulates of special theory of relativity, maximum speed of light is the maximum speed in the universe. Therefore, if this maximum speed is taken as reference speed, then we have assumed the presence of an electromagnetic radiator at the origin of the coordinate system chosen. In this way, the time becomes just the $4^{th}$ dimension of space since the space coordinates itself originates simultaneously with the time coordinate and moves at the maximum speed of electromagnetic field. Since the 4-dimensional coordinate system and the field both are originating at the origin at the same time and moves with the same speed, the field and the space of the coordinate axis could be assumed to be one and the same. While formulating the special theory of relativity Albert Einstein assumed that the space and time are one and the same. Similarly, for formulating the general theory of relativity he had assumed that the space and field are one and the same. Such independent assumptions are not required since the assumption made for formulating general theory of relativity is derived from the special theory of relativity in the previous lines. The special theory of relativity was formulated in Euclid's coordinate system. But the general theory of relativity was formulated and developed in Riemann's coordinate system. Since the assumption of general theory of relativity was derived here from the special theory of relativity, general theory of relativity could be developed in the Euclid's space itself.

## IV. UNIFIED THEORY OF FIELDS

The electromagnetic field radiated by an isotropic point source at the origin of a coordinate system [12] consists of three terms which are directly proportional to $1/r$, $1/r^2$ and $1/r^3$ where r is the radial distance in the spherical coordinate system. The $1/r^2$ term is Newton or Coulomb field component. The $1/r^3$ component is dipole field component and very much near field component. The term $1/r$ is far field component. As per the assumption of general theory of relativity, the space and the field are one and the same. Therefore, r = field radiated. In other words, r and the radiated field are interchangeable. Therefore, the term $1/r$ is field component of the general theory of relativity. Therefore, general expression for field radiated = $\sum K_n/r^n$ where $K_n$ are proportionality constants and n = 1, 2, 3. The Newton's and Coulomb's laws are comparable and charge and mass equivalence could be established. Since all matter particles are made up of atoms, the simplest model of a matter particle is a dipole field radiator. Therefore, gravitational field of Newton and the general theory of relativity are proved to be equivalent to electromagnetic fields.

All matter particles are made up of atomic particles and atoms are made up of electrons and nucleus. This nucleus contains so many elementary particles [1]. Since the nucleus is made up of so many elementary particles with charges or masses or both and all particles are bind together either strongly or weakly, a nucleus could be modelled as an array of dipoles of different sizes and charges located within the volume of the nucleus. Therefore, an atomic particle in general could be modelled as an array of electromagnetic dipoles of different sizes and charges located within the volume of an atom. Therefore, radiation of a matter particle of any mass could be expressed by the radiations of an array of electromagnetic dipoles. Therefore, general field radiated by a particle could be expressed by $\sum K_n/r^n$, where n is an integer varies from one to infinity [18]. For $n > 2$, the field components are atomic and nuclear field components. From this simple theory the structure of the nucleus could be understood in combination with the Schrodinger's wave mechanical equation.

## V. UNIFIED FIELD THEORY AND ASTROPHYSICS

As per the theory developed in this article, any star which is compressed by it's own gravitational pull, after the nuclear fuel of the star is burned out will become a nuclear star if the mass of the star is greater than Chandraseker's limit. If the mass of the star is greater than Chandrasekher's limit, the star will explode due to nuclear fission reaction [3]. The theory developed by applying the modern physics in the literature also leads to the same conclusion like the theory developed in this section. But for greater mass of the stars, the star is believed to become a black hole as per the theory developed in the present day literature. As per the theory developed in this article, if the mass of the star is very high, the outer layers of the star will be compressed to neutron layers due to less gravitational pressure and the inner layers will be compressed with greater gravitational pressure. Therefore, inner layers will explode and therefore, the star will expand and the expansion stops when the explosive force acting is reduced to zero and from that time the star once again pulled back towards the centre of the star. Therefore, expansion and compression of the star alternates and this type of oscillation of the star is eternal. Therefore, as per the theory presented in this article a black hole can't be stable beyond certain period of time, if there is a formation of black hole.

## VI. UNIFIED THEORY OF FIELDS AND THE ORIGIN OF THE UNIVERSE

As per the standard model of cosmology [1], matter and charges of the material world originated from the energy. Therefore, the space and the time of the material universe originated from the point of origin of the material world. Therefore, the coordinates of the space and time of the universe originated simultaneously and expanded at the maximum speed of light in the absolute space and time coordinate system. Therefore, the origin of this relative space, time and the field are one and the same. In this way, the four

dimensional space and time of the special theory of relativity [11] is integrated with the space and field of the general theory of relativity [2] in the standard model of cosmology.

By comparing the Newton's law of gravitational force with the Coulomb's law electric force, equivalence of charge and mass relationship could be established. Energy of a matter particle $E = m.C^2 = Q.C^2$, where m is the mass of the particle, Q is the charge of the particle and C is the maximum speed of light. Therefore, charges and mass both originated from electromagnetic energy. As per the Newton's gravitational force law and Coulomb's electric field laws, a point charge or mass could be defined as highly concentrated fields. Therefore, the energy of the particle as per the Special theory of relativity is stored in the concentrated field of the particle.

As per the standard model of cosmology, in the beginning, electromagnetic energy of very high frequency, density and very high temperature originated from a point. Since this energy originated at zero time (almost) from the absolute space as per the theory presented in this article, the speed of the electromagnetic energy and field must have been very high. As per the electromagnetic field theory [3], the power density on the spherical surface of the radiation from the isotropic point source is $P = P_0/4\pi r^2$ where $P_0$ is power radiated by the source and r is the radial distance from the source. But by definition P = dE/dt where E is the energy and t is the time. Therefore, P = dE/dt is energy flow per unit time which is the speed of electromagnetic energy.

Therefore, energy radiated from the point of origin of the universe and it's speed declined and reduced to zero at very large distance. As per the first law of the thermodynamics, energy should be conserved. Therefore, in the beginning, radiated energy expanded and compressed back towards the point of origin at very high speed. This frequency of oscillation in the space must have been very high since speed of energy was very high in the beginning. After multiple oscillations in the space at very high speed, the energy must have cooled down to the point to produce matter and charge particles and the oscillation of the universe must have reached steady state from the high frequency and high energy density transient state of oscillation. Therefore, production of matter and charged particles, preservation of the material universe produced and conversion of material universe back to energy state are continuous and cyclical phenomena.

Therefore, all in the material universe are equivalent to energy. As per the first law of thermodynamics, this energy dynamical system is a feedback control system. Since Maxwell's and Schrodinger's equations are second order equations, this universal feedback control system is a second order feedback control system [16]. Since all in the world originated from energy, from the energy dynamical point of view, the world could be described as system of histories within histories. Therefore, any system of the world could be described by the second order feedback control system theory. Human history, economics, environment, Individual's body and mind, financial system, social system, etc. could be described by second order feedback system's theory.

## VII. CONCLUSION

The need for modifying the theory of early universe was stressed first by analyzing the special theory of relativity and quantum mechanics, based on the recently modified theories of special theory of relativity and quantum mechanics. Then the theory of early universe was modified at conceptual level by establishing charge and mass relationship and applying the recently modified theories of special theory of relativity and quantum mechanics. A simple, general and deterministic theory of fields which integrates all known and unknown fields is developed. Application of the theory developed to study the nuclear structure is explained. The unified theory developed is applied to study the stars and the origin and the development of the material universe in the last sections.

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