The Origin of the Universe as Interpreted by Model Mechanics

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Introduction

A new physical model of our Universe, called Model Mechanics, has been formulated. The current state of our Universe as interpreted by Model Mechanics is as follows: Space is occupied by a stationary, structured and elastic light-conducting medium called the E-Matrix. A mass-bearing particle called the S-Particle is the only fundamental particle exists in our Universe. The different absolute motions of the S-Particles in the E-Matrix gives rise to all the observed particles such as the electron and the different quarks. Also, the absolute motions of the S-Particles or S-Particle Systems give rise to all the forces and processes of nature. Model Mechanics leads to a new theory of gravity called Doppler Theory of Gravity (DTG) and DTG unites with the electromagnetic and nuclear forces naturally [1, 2]. It also leads to a new theory of relativity called Improved Relativity Theory (IRT). IRT includes SRT as a subset. However, unlike SRT, the equations of IRT are valid in all environments…including gravity. In cosmology, Model Mechanics provides natural solutions to the following problematic cosmological observations: The observed accelerated expansion of the far reached regions of the universe disagrees with the predictions of current theories. The observed rotational curves of galaxies disagree with the predictions of current theories. The observed paths of travel of the spacecrafts Pioneer 10 and 11 disagree with the predictions of current theories. The observable universe appears to have a much larger horizon than it is allowed by its observed age. The GRT description of gravity gives rise to the observed flatness problem of the universe.

The above Model Mechanical description of our current Universe leads to a new interpretation for the origin of our Universe. This paper gives a detail description of this new interpretation.

The State of the Current Universe

Model Mechanics supposes that a stationary substance, called the 'E-Matrix', occupies all of pure-space (void) in our Universe. Subsequently, we perceive the E-Matrix as space. The E-Matrix, in turn, is composed of 'E-Strings', which are very thin three-dimensional elastic objects, of diameter estimated at 10^{-33} cm. The length of an E-String is not defined. Away from matter, the E-Strings are oriented randomly in all directions. This means that a slice of the E-Matrix in any direction will look the same. Near matter, the E-Strings are more organized: some emanate from the matter, and the number of these passing through a unit area followed the well-known inverse square law of physics. The E-Strings repel each other. This means that there is an unknown outside force that is compacting them together. The repulsive force and the compacting force are in equilibrium. This state of the E-Matrix allows massive matter particles to move freely within it. The motion of a matter particle or particle system in the E-Matrix is called 'absolute motion'. The absolute motion of matter in the E-Matrix will distort the local E-Strings. The E-Strings will recover to the non-distorted state after the passage of the matter particles. Light consists of wave-packets in neighboring E-Strings. On its way toward its target, a wave-packet will follow the geometry of these neighboring E-Strings. This description of light embodies 'duality', *i.e.* light possessing properties of a mass-bearing particle as well as a wave packet.

With this description of the E-Matrix (space), the next relevant question is: What is matter? All stable and visible matter is made from three basic particles: the electrons, the up quarks, and the down quarks. The protons and neutrons in the nuclei of all the atoms are made from the up quarks and the down quarks. The electrons orbit around the nuclei to complete the picture of all the atoms. The three basic particles are, in turn, made from one truly fundamental mass-bearing particle, called the 'S-Particle'. An S-Particle is a three-dimensional spherical object. It is repulsive to the E-Strings surrounding it and therefore its motion in the E-Matrix is maintained. An S-Particle orbiting around an E-String in the helical counterclockwise direction is an electron. This motion of the S-Particle is the fastest in the E-Matrix, and it gives rise to one unit of negative electric charge. A down quark is also an S-Particle orbiting around an E-String in the helical counterclockwise direction. The speed of its orbiting motion is only 1/3 that of the electron, giving the down quark a negative 1/3 electric charge. An up quark is an S-Particle orbiting around an E-String in the helical clockwise direction at 2/3 the speed of the electron, resulting a 2/3 positive electric charge.

There is one more stable basic particle: the electron neutrino. An electron neutrino has no detectable electric charge, and therefore it does not interact with the other three charged basic particles. It is composed of an S-Particle orbiting around an E-String in the counterclockwise direction like the electron. However, it is moving in a corkscrew like motion away from the charged basic particles. This means that the distortion in the E-Matrix created by the absolute motion of the S-Particle of the electron neutrino will have already

dissipated by the time the charged basic particles are ready to interact with it. This is the reason why the electron neutrino does not interact electromagnetically with the charged basic particles.

This simple description of all stable visible matter can answer the thorny question: What *is* the mass of a basic particle? The answer is: mass of a basic particle is the evidence of the orbiting diameter of its S-Particle. Those S-Particles that are not in a state of orbiting motion do not possess any electric charge and therefore they will not interact with the basic charged particles electrically. They will, however, interact with them gravitationally. They are the dark matters predicted by the astronomers.

The next relevant question is: what are the processes that give rise to all the forces between matter particles? The proposed answers to this question are as follows:

1) All the processes of Nature are the result of matter particles reacting to the geometries of the E-Strings (*i.e*. distortions or waves) to which they are confined because of their orbiting motions around these E-Strings.
2) Absolute motions of two objects in the same direction in the E-Matrix will cause the objects to converge to each other--an attractive force. Absolute motions of two objects in the opposite directions in the E-Matrix will cause the objects to diverge from each other--a repulsive force.

This completes the Model Mechanical description of our current universe. All the particles, all the forces and all the processes of nature can be derived from this one description. Model Mechanics replaces the math constructs of space-time and field/virtual particle with the E-Matrix and the distortions or waves in the E-Matrix. This enables us to use the math of Quantum Field Theory (QFT) in combination with the interpretations of Model Mechanics to explain all the processes of nature.

Model Mechanics gives rise to the following postulates:

1) The E-Matrix is a stationary, structured and elastic light-conducting medium. It occupies all of pure space (pure void). It is comprised of very thin and elastic E-Strings and these E-Strings are repulsive to each other. There is an unknown compacting force that compresses these E-Strings together to form the E-Matrix.
2) The S-Particle is the only truly fundamental particle exists in our universe. The different orbiting motions of the S-Particles around the E-String(s) give rise to all the visible and stable particles in our universe.
3) All the processes of nature are the results of absolute motions of S-Particles or S-Particle systems in the E-Matrix.
4) All the forces of nature are the results of the S-Particle or S-Particle systems reacting to the distortions or waves in the E-Strings to which they are confined. The distortions or waves in the E-Strings, in turn, are the results of the absolute motions of the interacting S-Particles or S-Particle systems in the E-Matrix.
5) All the stable and visible matters are the results of orbiting motions of the S-Particles around specific E-Strings.

These postulates eliminate all the infinity problems that plagued both GRT and QM. It has the same mechanism for all the forces of nature and thus it unites all the forces of nature. It gives an explanation why the force of gravity is capable of acting at a distance. It explains the provisions of the Uncertainty Principle. It explains the weird results of all quantum experiments [3]. It eliminates the need for the undetectable force messengers in QM. It eliminates the need for the hypothetical and undetected Higgs particle. It explains the mass of a particle. It explains the charge of a particle. It leads to the discovery of the CRE force, which, in turn leads to a new theory of gravity. In short, Model Mechanics gives us a unique way to achieve the elusive goal of unifying all of physics.

IRT: Improved Relativity Theory

The Model Mechanics description of the current state of our universe gives rise to a new theory of relativity called Improved Relativity Theory (IRT).

IRT Postulates:

1. Every object in our universe is in a state of individual absolute motion in the E-Matrix.
2. Relative motion between two objects in the E-Matrix is the vector difference of their absolute motions along the line joining them.
3. The measured wavelength of a standard elementary source is a universal constant in all frames of reference.
4. The speed of light in the frame of the standard elementary source is isotropic.

The Consequences of these Postulates

1. The local speed of light is the product of the local measured frequency of the standard elementary source and its measured universal wavelength
2. Light from a source moving with respect to the observer becomes a new light source in the observer's frame. The arriving speed of incoming light from a moving elementary source is the product of its measured incoming frequency and its universal wavelength.
3. There is no physical (material) length contraction. The physical (material) length of a meter stick remains the same length in all frames of reference. However, the light path length of a moving meter stick is observer dependent.

4. The rate of a clock is dependent on the state of absolute motion of the clock. The higher is the state of absolute motion the slower is its clock rate.
5. Absolute time exists. The relationship between clock time and absolute time is as follows: A clock second will contain a different amount of absolute time in different states of absolute motion (different frames of reference). The higher is the state of absolute motion of the clock the higher is the absolute time content for a clock second. There is no absolute time dilation. The observed clock time dilation is the result of a clock second contains a different amount of absolute time in different frames.
6. Simultaneity is absolute. If two events are simultaneous in one frame, identical events will also be simultaneous in different frames. However the absolute time interval for the simultaneity of identical events to occur will be different in different frames. This is due to that different frames are in different states of absolute motion.
7. The postulates of IRT allow that the rate of a clock moving with respect to the observer can be running at a slower or faster rate compared to the observer's clock. Also the light path length of a meter stick moving with respect to the observer can be longer or shorter compared to the light path length of the observer's meter stick which is assumed to be the physical (material) length of the meter stick. These consequences lead to two equations for the time rate of an observed clock and two equations for the light-path length of a meter stick moving with respect to the IRT observer. Also they lead to two sets of transformation equations from observer A's frame to the observed B frame.

It turns out that if the observed frame is in a higher state of absolute motion than the observer all the IRT predictions will be identical to the SRT predictions. That's why SRT is a subset of IRT.

The Math of IRT

The existing SRT equations are converted to IRT equations when the observed frame is in a higher state of absolute motion than the IRT observer. New IRT equations are developed when the observed frame is in a lower state of absolute motion than the IRT observer. The conversion factors from observer A's p

$$v = \lambda_a\left(f_{aa} - f_{ab}\right) \quad \text{Relative Velocity}$$
$$c = \lambda_a f_{aa} \quad \text{Local speed of light} \qquad \text{(x)}$$
$$c' = \lambda_a f_{ab} \quad \text{Incoming speed of light}$$

$$\gamma = \frac{F_{aa}}{F_{ab}} \qquad \frac{1}{\gamma} = \frac{F_{ab}}{F_{aa}} \qquad \text{(x)}$$

λ_a =Wavelength of the standard elementary light source used as measured in observer A's frame.

f_{aa} =Instantaneous frequency measurement of A's standard elementary light source as measured by A.

f_{ab} =Instantaneous frequency measurement of B's standard elementary light source as measured by A.

$F_{aa} = f_{aa}$ = Frequency of a standard elementary light source in A's frame as measured by A.

F_{ab} =Transverse Doppler Frequency of an identical standard elementary light source in B's frame as measured by A.

1. The behavior of clocks A and B in relative motion. Observer A's Point of View:

$$\Delta T'_{ab} = \frac{F_{aa}}{F_{ab}}\Delta T_{aa} \qquad (1)$$

This equation applies when the observed clock B is in a higher state of absolute motion than observer A's clock. It shows that the passage of an interval of clock time ΔT_{ab} on the observed B clock corresponds to the passage of $\left(F_{aa}/F_{ab}\right)\Delta T_{aa}$ on observer A's clock. However, both clock time intervals shown represent the same amount of absolute time. This means that the rate of passage of absolute time is independent of the absolute motion of the clock.

$$\Delta T''_{ab} = \frac{F_{ab}}{F_{aa}}\Delta T_{aa} \qquad (2)$$

This equation applies when the observed clock B is in a lower sta

time is independent of the relative or absolute motions of the clocks.

It is noted that only one of these two equations is valid for any pair of clocks in relative motion. If the observed clock B's absolute motion is higher than the observer A's clock then Eq. (1) is used and if the observed clock B's absolute motion is lower than observer A's clock then Eq. (2) is used. In accelerator design applications Eq. (1) is used exclusively. The reason is that acceleration will increase the state of absolute motion of the accelerated particle.

2. Light path length of a moving meter stick:

The light path length of observer A's meter stick is defined to be its physical or material length. The following equations predict the light path lengths of B's meter stick.

When B is in a higher state of absolute motion than A the following equation (3) is used to predict the light path length of B's meter stick.

$$L'_{ab} = \frac{F_{ab}}{F_{aa}}L_{aa} \qquad (3)$$

When B is in a lower state of absolute motion than A the following Eq. (4) is used to predict the light path length of B's meter stick.

$$L''_{ab} = \frac{F_{aa}}{F_{ab}}L_{aa} \qquad (4)$$

It is noted that the physical or material length of a meter stick is a universal constant in all frames of reference. However the light path length of a meter stick moving with respect to the observer is observer dependent. Also it is

noted that only one of these two equations will provide the correct prediction. If the state of absolute motion of B compare to A is not known then both calculations are made and the result that agrees with observation is chosen.

3. IRT Coordinate Transformation Equations.

$$\Delta x'_{ab} = \frac{F_{aa}}{F_{ab}}\left[\Delta x_{aa} - \lambda_a\left(f_{aa} - f_{ab}\right)\Delta t_{aa}\right] \qquad (5)$$

$$\Delta t'_{ab} = \frac{F_{aa}}{F_{ab}}\left[\Delta t_{aa} - \frac{f_{aa} - f_{ab}}{\lambda_a f_{ab}^2}\Delta x_{aa}\right] \qquad (6)$$

Equations (5) and (6) are used when the observed frame B is in a higher state of absolute motion than observer A.

$$\Delta x''_{ab} = \frac{F_{ab}}{F_{aa}}\left[\Delta x_{aa} + \lambda_a\left(f_{aa} - f_{ab}\right)\Delta t_{aa}\right] \qquad (7)$$

$$\Delta t''_{ab} = \frac{F_{ab}}{F_{aa}}\left[\Delta t_{aa} + \frac{f_{aa} - f_{ab}}{\lambda_a f_{ab}^2}\Delta x_{aa}\right] \qquad (8)$$

Equations (7) and (8) are used when the observed frame B is in a lower state of absolute motion than observer A.

4. Momentum of an object:

$$p = M_o\lambda_a\left(f_{aa} - f_{ab}\right) \qquad (9)$$

5. Kinetic energy of an object:

6.
$$K = M_o\lambda_a^2 f_{ab}^2\left(\frac{f_{aa}}{f_{ab}} - 1\right) \qquad (10)$$

7. Energy of a single particle:

$$E = M_o\lambda_a^2 f_{ab}^2 \qquad (11)$$

8. Gravitational red shift:

$$\Delta F_{aa} = F_{aa}\left(1 - \frac{F_{ab}}{F_{aa}}\right) \qquad (12)$$

9. Gravitational time dilation:

$$\Delta T_{aa} = T_{aa}\left(1 - \frac{F_{ab}}{F_{aa}}\right) \qquad (13)$$

10. The IRT procedure for determining the perihelion precession of Mercury without recourse to GRT is:

a. Set up a coordinate system for the Sun and Mercury.
b. Use the IRT coordinates transformation equations to predict the future positions of the Sun and Mercury.
c. The perihelion shift of Mercury will be revealed when these future positions are plotted against time. The value of the shift can be determined from the plot.

IRT includes SRT as a subset when the observed frame is in a higher state of absolute motion than the observer. IRT includes the possibility that the observer is in a higher state of absolute motion than the observed frame. This interpretation eliminated all the paradoxes encounter by SRT. The equations of IRT have an unlimited domain of applicability and therefore they are valid for use to replace GRT in cosmological applications.

Forces Based on Absolute Motions

The idea that absolute motion of interacting particles in the same direction gives rise to an attractive force, while absolute motion of interacting particles in the opposite directions gives rise to a repulsive force, is derived from the familiar electric current experiments in parallel wires. These experiments show that when electric currents are flowing in the wires in the same direction, the wires are attracted to each other, and when the currents are flowing in the opposite direction, the wires repel each other. Figs. 1 and 2 illustrate these experiments graphically. The absolute motions of the electrons in the same direction cause a distortion in the E-Matrix that pulls the wires together--an attractive force. Conversely, the directions of absolute motion of the electrons in the opposite directions will cause a distortion in the E-Matrix that pulls the wires apart--a repulsive force.

Extending the Model Mechanics interpretations of the results of the electric-current experiments to include the orbiting motions of the S-Particles around the E-Strings will enable us to explain all the nuclear forces between the interacting up quarks and down quarks [1, 2]. This interpretation becomes the most important concept of Model Mechanics and it enables Model Mechanics to unite all the forces of nature naturally.

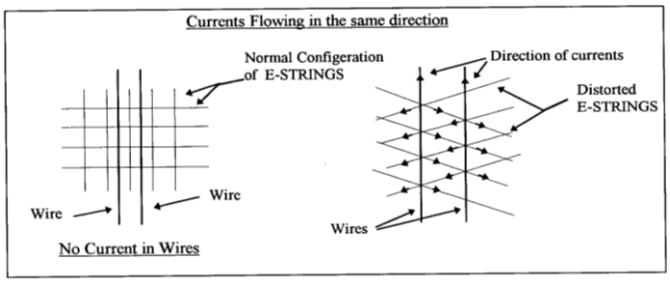

Fig. 1. Currents (electrons) in the wires are flowing in the same direction, and therefore the force between the electrons is attractive. The right diagram that shows that the tension created in the E-Strings by the absolute motions of the electrons is pulling the wires together.

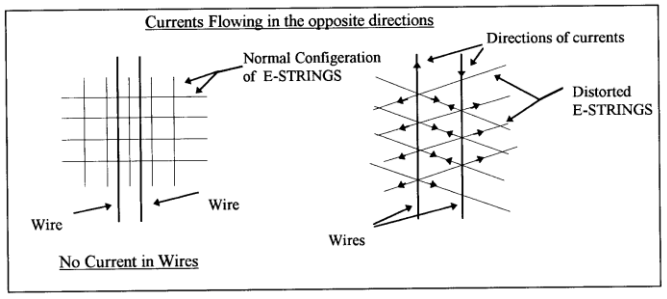

Fig. 2. Currents (electrons) in the wires are flowing in the opposite direction, and therefore the force between the electrons is repulsive. The right diagram shows that the tension created in the E-Strings by the absolute motions of the electrons is pulling the wires apart.

1. Cosmological Repulsive Effect Force

Current physics posits that there are four forces of Nature: the electromagnetic force, the nuclear weak and strong forces, and gravity. Model Mechanics posits that there is a fifth force of Nature; the new force being the CRE force. As the name implies, the CRE force between any two objects is repulsive. While the CRE force is new to physical theory, it is not new to experience; it is what we commonly refer to as 'inertia'. In other words, the resistance between two objects to change their state of absolute motion is the CRE force between them. The CRE force between any two objects is always repulsive, and it is derived from the confinement of the interacting objects to the diverging structure of the E-Matrix.

To understand the CRE force, recall the inverse square law of physics. This law states that the intensity of light, gravity and electromagnetic force decreases with increasing distance from the source is inversely proportional to r^2. The geometry of neighboring E-Strings emanating from any two objects also obeys the inverse square law. This means that each object will follow the diverging geometry of these neighboring E-Strings. Therefore, their path of motions in the E-Matrix will have a tendency to diverge from each other. This repulsive effect is identified as the CRE force. The CRE force between any two objects is not constant; it increases with the square of the distance between the objects. The CRE force is not the cosmological constant that Einstein inserted into his original GRT field equations. Although the cosmological constant is repulsive, it is not the CRE force predicted by Model Mechanics for the simple reason that it is constant.

The CRE force played an important role in the formation of our Universe, and is continuing to do so today. The repulsive CRE force, along with the attractive electromagnetic force between gravitating objects shaped the primeval Universe into the Universe that we see today. The CRE force also played an important role in the manifestation of the nuclear weak force. Without the CRE force, there would be no nuclear weak force. It is the CRE force that initiates the radioactive decay of atoms. Perhaps, the most important function of the CRE force will be a role, in combination with the electromagnetic force, in the processes of life.

Model Mechanics predicted the repulsive CRE force in 1993. However, it was not discovered until 1998 when two independent groups of astronomers discovered that the Universe at the far reached regions are in a state of accelerated expansion. This observation is in direct conflict with the prediction of GRT. In order to explain this observation astronomers are now re-introducing the discarded repulsive Cosmological Constant to the GRT equation. The CRE force eliminates the need for this ad hoc approach.

2. Doppler Theory of Gravity (DTG)

Newton posited that gravity is a force, but he did not provide a mechanism for it. Newton's gravity model involved the unexplained phenomenon of action at a distance, which was troublesome for the physicists of his time. Also, Newton's equation for gravity was eventually found to be slightly inconsistent with observations. Recognizing the deficiencies in Newton's theory, Einstein formulated GRT, which is not a theory of force, but rather a theory of space-time, amounting to an extension of SRT to include gravity. However, GRT also encounters problems with some current observations as outlined in the next section of this paper.

As a mean to resolve the problematic observations encounter by GRT a new theory of gravity called Doppler Theory of Gravity (DTG) is formulated. Like Newton's theory of gravity, DTG also treats gravity as a force but with an identified mechanism. Based on the provisions of Model Mechanics, the mechanism of gravity between two objects A and B moving in the stationary E-Matrix is as follows:

1. If both A and B are moving absolutely in the same direction, this gives rise to an attractive force because A's absolute motion distorts the surrounding stationary E-Matrix and B's absolute motion is confined to follow the distortion created by A; conversely, B's absolute motion distorts the surrounding stationary E-Matrix and A's absolute motion is confined to follow the distortion in the E-Matrix created by B.
2. The global structure of the stationary E-Matrix is divergent. Both A and B are confined to this global divergent structure as they travel in the stationary E-Matrix. This gives rise to the repulsive CRE force between A and B globally.

The force of gravity between A and B is the combined result of items 1 and 2 above. It is noteworthy that gravity is the sum of an attractive and a repulsive force acting on both A and B. This explains why the force of gravity is so weak compared to the electromagnetic and nuclear forces.

The above description for gravity suggests that the Newtonian equation for gravity can be modified to make it consistent with observations as follows:

$$F_g = \frac{F_{ab}}{F_{aa}}\left(G\frac{M_a M_b}{r^2}\right)\mathbf{j}_a \bullet \left(\pm \mathbf{j}_b\right) \qquad (14)$$

The dot product $\mathbf{j}_a \bullet \left(\pm \mathbf{j}_b\right)$ in Eq. (14) expresses the concept that not all objects in the Universe attract each other gravitationally. A positive dot product represents an attractive force, but a negative dot product represents a repulsive force. Those objects that have the same direction of absolute motion are attracted to each other, but those objects that have absolute motions in the opposite direction exert a repulsive force on each other. Assuming the Big Bang model is correct then the dot product of the vectors for all local regions of the Universe is +1. This means that gravity in the local region is attractive. The dot product for a distant region, say beyond the radius of the observable Universe, is -1. Therefore, gravity for all those distant regions is repulsive. This is the reason why the far reached regions of the Universe are in a state of accelerated expansion.

The DTG description of the force of gravity uses the same mechanism as that for the electromagnetic and nuclear forces [1]. This enables Model Mechanics to achieve the elusive goal of uniting gravity with the electromagnetic and nuclear forces naturally.

Cosmological Observations Explained by Model Mechanics

One of the most pressing problems of the Standard Big Bang Model is the observed horizon problem. The age of our universe is determined to be 14 billion years old in all directions and yet we observe the horizon for the opposite regions of our universe to be 28 billion years apart. In fact if all the regions are included the observed horizon of the universe is estimated to be 46 billion years. This means that these opposite regions of our universe cannot be in contact with each other at the Big Bang and this is known as the horizon problem. Cosmologists invented the ad hoc Inflation hypothesis to explain the horizon problem. Model Mechanics explains the horizon problem naturally without resorting to the ad hoc Inflation hypothesis. The earth is in a state of absolute motion in the E-Matrix. This motion curves the E-Strings surrounding the earth. What we perceive as normal and straight E-Strings are actually severely curved E-Strings. In other words, when we look up in the sky we are actually receiving light from these curved E-Strings. This means that no matter what direction we look we are looking into the same curved E-Strings from the same region of the universe. This means that the perceived opposite regions of the universe are really the same region and therefore the perceived horizon problem was never existed. As it turns out, there is a perfect physical example of this phenomenon. The medical device gastro-scope made of fiber optics, allows a physician to examine the interior of a patient's stomach is such an example. No matter how the physician curves the eyepiece, he will still be seeing the same picture of the stomach.

In 1998 two independent groups of astronomers discovered that the far reached regions of the universe are in a state of accelerated expansion motion. This discovery is contrary to the predictions of GRT that predicts that the expansion of the universe should be slowing down. Astronomers revived the once discarded repulsive Cosmological Constant to explain the observed accelerated expansion. They posited that the universe is filled with a form of dark energy called Quintessence and this dark energy has the anti-gravity effect that gives rise to the Cosmological Constant. Model Mechanics predicted the accelerated expansion for those far reached regions of the universe in 1993. The basis for this Model Mechanical prediction is that gravity at those regions is repulsive with respect to us as described in the DTG equation. The repulsive CRE force of DTG can be considered as the dark energy posited by the astronomers.

Another problem arise from the GRT description of gravity is called the flatness problem. The flatness problem is that the observable universe appears to exist between an open and a closed universe. In an open universe, the matter density is less than the critical value and thus the gravitational braking effect is not able to halt the Big Bang expansion. This means that the universe will keep on expanding forever . In a closed universe the matter density is greater than the critical value and thus the gravitational braking effect will be able to halt the Big Bang expansion. This means that the universe will re-collapse before any galaxy would have time to form. In order for our universe to exist between an open and a closed universe the matter density must be fine tuned to be within one part in 10^{50} of the critical density value when the universe was a fraction of a second old. The inability of the Big Bang theory to explain why this degree of fine-tuning existed is what is known as the flatness problem. In Model Mechanics (DTG), gravity is the result of two gravitating objects having the same direction of absolute motions in the E-Matrix less the repulsive CRE force that exists between them. This description of gravity avoids the flatness problem completely.

The observed rotational curves of galaxies disagree with the predictions of GRT. These observed anomalous rotational curves correspond to curves for galaxies that are much more massive than the total observed visible matters for these galaxies. The observed path of travel of the Pioneer 10 spacecraft disagrees with the predicted path given by GRT. Pioneer 10 was observed to be in a state of accelerated motion toward the sun. Astronomers explain both of these anomalous observations by claiming the existence of a dark matter in space although such an existence of dark matters is not within the framework of GRT or the Standard Model. Model Mechanics explains both of these anomalous observations by positing the existence of a dark matter in the form of free non-orbiting S-Particles. The sun and all the planets contain a concentration of free non-orbiting S-Particles. When Pioneer 10 is outside the solar system the effect of these concentrations of free S-Particles contribute to an extra attractive force on the spacecraft and causes it to accelerate toward the sun.

The Origin of the Universe as Interpreted by Model Mechanics

The Model Mechanical description of the current universe leads to a new interpretation on the origin of the universe. The following is a summary of the relevant provisions of Model Mechanics as related to the origin of the universe and its subsequent evolution.

1. The E-Strings exert a repulsive force on each other and at the same time there is an unknown compacting force that compacts them together. This gives rise to a delicate equilibrium between the E-Strings and this equilibrium is self-restoring when it is disturbed. Also this equilibrium is self-restoring when the motions of S-Particles or S-Particle systems in the E-Matrix disturb it. The S-particle is the only truly fundamental particle existing in the E-Matrix. The orbiting motions of the S-particles in the E-Matrix give rise to all the observed Matter Particles and all the forces of nature.
2. There are five forces of nature and they are: the CRE force, gravity, electromagnetic force and nuclear strong and weak forces. All these forces are the

results of absolute motions of the interacting particles or particle systems in the E-Matrix. Absolute motions in the same direction give rise to an attractive force and absolute motions in the opposite directions give rise to a repulsive force.

3. An S-Particle in a counterclockwise orbiting motion around an E-String is a negatively charged particle. Similarly, an S-Particle in a clockwise orbiting motion around an E-String is a positively charged particle. The intensity of the charge of a particle is determined by the speed of the orbiting S-Particle completing an orbit.
4. An S-Particle feels a repulsive force from the E-Strings surrounding it. This enables an S-Particle to move unimpeded in the E-Matrix. Also, this enables an S-Particle to retain its original motion in the E-Matrix.
5. A photon is a packet waves in neighboring E-Strings. It will follow the geometry of these E-Strings to the target.
6. The orbiting motion of its S-Particle around a specific E-String forms a Matter Particle such as an electron or a quark. Therefore, the motion of a Matter Particle will follow the geometry of this specific E-String as it moves in the E-Matrix.
7. There are two kinds of time: clock time and absolute time. They are related as follows: A clock second will contain a different amount of absolute time in different frames (different state of absolute motion).

The above provisions of Model Mechanics allowed us to formulate a model for the origin of our Universe. According to this model, the sequence of events that led to the Big Bang explosion is as follows:

The E-Matrix is infinite in all directions and thus the number of S-Particles in it is also infinite. Our universe is just one small region of the infinite E-Matrix. The S-Particles in the E-Matrix are in constant motions in all directions. As time evolved, those neighboring S-Particles that were traveling in the same general direction would have exerted an attractive force on each other. This caused these S-Particles to clump together and form a loosely packed S-Particle clump. This was the initial seed of our universe. As time evolved, more S-Particles from all directions were attracted and added to the clump. This caused the clump to have a rotation motion. The rotating motion shaped the clump into a S-Particle Ball. At this point, the S-Particle Ball had a linear motion as well as a rotating motion in the E-Matrix. This process continued until the S-Particles within the S-Particle Ball were so tightly packed together that they began to collide with each other. At this point, the E-Strings would have reached their maximum curvature. The collisions of the S-Particles increased the temperature of the S-Particle Ball exponentially. This in turn gave rise to the explosive force that initiated the Big Bang. Fig. 7.1 depicts the above processes graphically. It turned out that our universe was born from an S-Particle Ball that had a counterclockwise rotating motion.

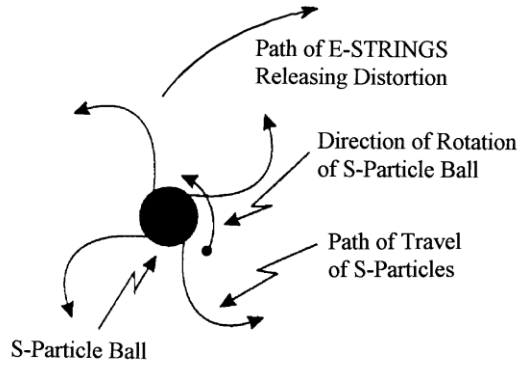

Fig. 7.1 At a critical temperature, the S-Particle Ball exploded and spewed out S-Particles in a counterclockwise direction as indicated in the diagram. This effectively released the distortion in the E-Strings (not shown) and enabled them to unwind to restore to their normal configuration in a clockwise direction.

The relative counterclockwise motions of the S-Particles and the clockwise motions of the E-Strings as they released the distortions within them lasted for a brief period--this is the inflationary period posited by current cosmology. It was during this period that all the Matter Particles (neutrinos, electrons and up quarks) of the Universe were created. When an S-Particle entered into an orbiting motion around a specific E-String from the right hand side, the resulting Matter Particle became negatively charged electron. When an S-Particle entered into an orbit around a specific E-String from the left hand side of an E-String, the resulting Matter Particle became a positively charged up quark. The intensity of the charge of a Matter Particle is related to the speed of the completion an orbit by its S-Particle. The S-Particle of an electron took the least time to complete an orbit and thus the electron has a charge of (–1). The S-Particle of an up quark took more time to complete an orbit and thus the up quark has a charge of $+2/3$.

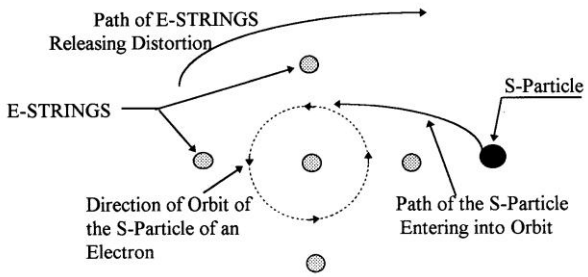

Fig. 7.2 *Schematic diagram of the processes that produced an Electron from an S-Particle at the moment of the Big Bang explosion.*

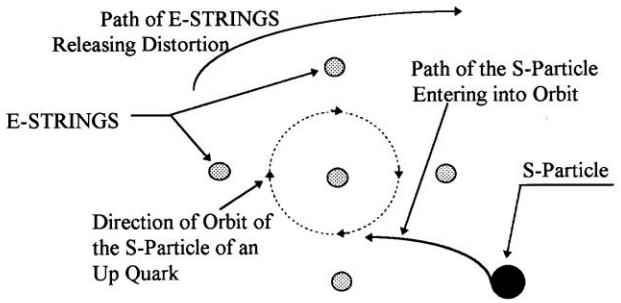

***Fig. 7.3** Schematic diagram of the processes that produced an Up Quark from an S-Particle at the moment of the Big Bang explosion.*

Fig. 7.2 and 7.3 describe the processes that took place for the production of electrons and up quarks at the moment of the Big Bang. However, the first type of Matter Particle produced was not the electron or the up quark. It was the electron neutrinos. The processes to produce an electron neutrino were exactly the same as those for an electron. The electron neutrino is the first type of Particle produced at the beginning of the Big Bang explosion.

The first batch of electrons and up quarks produced were very close to each other and they began to annihilate each other immediately. This process produced the down quarks and the free S-Particles. These free S-Particles become the dark matter posited by the astronomers. There were more up quarks than electrons available for annihilation because the first batch of electrons produced were electron neutrinos and they were already moved away from these later formed electrons and up quarks. Close pairs of these extra up quarks would form stacked interactions with each other. The stacked up quarks attracted a newly formed down quark to form a proton. Similarly, a close pair of the newly formed down quarks would form a stacked interaction with each other and that, in turn, attracted a newly formed up quark to produce a neutron. At this point the E-Matrix nearly completed the process of releasing the distortion within it. This ceased the up quark production process. However, the electron production process continued. The extra electrons produced became the electrons of our universe.

After the above particle production processes, the universe consisted of a mixture of the following particles: Up quarks and down-quarks that are confined in protons and neutrons, electrons, electron neutrinos and free S-Particles. Except for the free S-Particles, all the other particles have been detected in the laboratory. The free S-Particles are not in any sort of orbiting motion. Therefore, they cannot be detected directly by our instruments. However, they are involved in all nuclear processes as well as high-energy accelerator experiments. Also, they would have observable astronomical gravitational consequences on all Matter Particles as they move along with them. Indeed, astronomers have detected strange motions of galaxies in galaxy clusters that cannot be accounted for by current theories. They attributed these strange motions to an unseen dark matter.

Model Mechanics posits that the ratio of up quark to electron produced during the Big Bang is **1.5:1**. However, it is not possible to confirm this ratio by counting the number of up quarks and electrons in an atom. On the other hand, the Model Mechanical process of particle production described above is capable of confirming this ratio numerically. The reason is that a down quark is the product of annihilation of an up quark and an electron. Therefore, if we count a down quark in any atom as an up quark and an electron, the ratio of up quark to electron is **1.5:1** for all the atoms in our universe. This is a significant discovery that supports the Model Mechanical description of matter particle formation during the Big Bang.

The Big Bang explosion imparted an outward counterclockwise expanding motion to all the particles (see Fig. 7.1). Those Matter Particles that were in the same general neighborhood were traveling in the same direction in the E-Matrix. This caused an attractive force among them and this force compressed them into primordial clumps. As time evolved the CRE force broke up these primordial clumps of Matter Particles into mini-clumps and these mini-clumps becomes the galaxies that we see today. This concept of galaxy and galaxy cluster formation predicts that the galaxy clusters should be regularly spaced and indeed recent astronomical observations have confirmed these predictions. Also this concept of galaxy cluster formation avoids the conundrum of the current theories that predict that the observed huge galaxy clusters do not have sufficient time for their formation.

When the protons and neutrons were formed they were very close to each other and therefore they were able to enter into stacked interactions. This process gave rise to the deuterium nuclei, each of which consists of a proton and a neutron. The deuterium nuclei, in turn, entered into stacked interactions with each other. This process produced the helium nuclei. At the end of the helium production process, all the particles would have been driven apart sufficiently to halt almost all of the stacked interactions. However, before it was halted completely, a trace of lithium nuclei was produced. At the end of this period, the universe was 10^{-12} seconds old. It was composed of free S-Particles, electron neutrinos, electrons, protons, neutrons, helium nuclei, a small amount of deuterium nuclei and a trace of lithium nuclei. As the universe continued to expand and cooled, the electrons became less energetic and thus were able to combine with the various nuclei to form the various

atoms. These primordial atoms were the stuff that formed the first generation of stars and galaxies.

Model Mechanics provides us with a realistic beginning of our Universe. Also, it explains the origins of all Matter Particles and why there is a preponderance of matter over antimatter and what the Universe was like before the Big Bang explosion. This is a significant improvement over the Standard Big Bang model that can only describe the origin of our Universe up to a time of 10^{-12} seconds. Any time before that, the equations of General Relativity will yield meaningless results. Also Model Mechanics posits that the Big Bang explosion is a real explosive event that spewed Matter Particles into the E-Matrix and that the attractive force of gravity is due to neighboring Matter Particles expanding in the same direction from the point of the Big Bang. This explanation of the Big Bang provides an answer to the unresolved question: Is our Universe an open or closed Universe? The Model Mechanical answer to this question is: Our Universe is an open Universe.

What about God?

The self-initiating universe described above raises the question: Is there a role for a Creator? The answer for this question is a resounding *yes*. This becomes apparent when we try to go through the process of answering the fundamental questions of nature. In the case of the self-initiating universe, we would have no answer for the following fundamental questions: How did the S-Particles come into being? How did the E-Matrix come into being? What is the composition of the S-Particle? What is the E-String made of? Obviously, with this line of questioning, there would be an infinite number of questions to each fundamental assumption of the theory. What this mean is that we are not capable of arriving at the final answer to any fundamental question of nature. The only way to end the endless questioning would be to invoke the answer that 'God made it that way.'

There are overwhelming evidences that the Universe is an intelligent designed mechanism. This conclusion is based on the fact that the repulsive E-Strings that are compacted together by an unknown outside force to form the E-Matrix and the E-Matrix, in turn, allows the S-Particles to move freely within it. These unique properties of the E-Matrix and the S-Particles cannot occur naturally. They are the designed properties of a mechanical system by a Creator.

The need for a Creator is overwhelming if ours is the only Universe that exists or if there are only a finite number of Universes that exist. In these cases, the continuous self-creation scenario is no longer valid because the E-Matrix and the number of S-Particles in it would be finite. Therefore, our Universe must be '*put in place*' by a Creator. Perhaps the S-Particle Ball of our Universe was a '*seed*' of sort. The E-Matrix is the '*ground*' in which the Creator planted this '*seed*' and the current state of evolution of our Universe is the fruit of His labor. Although I have described the self-creating universe in detail, I favor the view that our universe was the creation of a God. God is infinite and all encompassing thus, His real purpose for our creation will forever be unknowable to us.

The self-initiating Universe and the Creator '*put in place*' Universe would have evolved the same. In both cases, all the Matter Particles would have been produced and interacted the same way as described above. However, there is one major difference between these two Universes. In the case of the self-initiating Universe, the E-Matrix and the E-Strings are infinite in all directions. In the '*put in place*' universe the E-Matrix is finite and there is a finite number of S-Particles in the E-Matrix. This means that the Universe is a self-contained Universe. The observed microwave background radiation is the waves in the E-Strings and these waves are the result of the continuing interactions of the Matter Particles in the E-Matrix.

Conclusion

The Model Mechanical description of the current Universe leads to a new interpretation on the origin of our Universe. This new interpretation provides valid answers to the following unanswered questions of the current cosmological theories:

1) The current theory of gravity (GRT) does not provide a valid explanation for the formation of the observed huge galactic clusters. GRT predicts that these huge galactic clusters do not have sufficient time, since the Big Bang, for their formation. The Model Mechanical theory of gravity (DTG) and the posited repulsive CRE force provide the logical physical processes for the formation of these huge galactic clusters.
2) Model Mechanics posits that our Universe is an open Universe. Current theories do not have a valid answer to this question.
3) Model Mechanics provides the processes for the origin of all Matter Particles.
4) Model Mechanics provides natural solutions to the observed horizon and flatness problems of the current theories without the ad hoc Inflationary hypothesis.
5) Model Mechanics provides a link between the origin of our Universe and a Creator.

Model Mechanics provides valid solutions to all the problematic cosmological observations of the current theories. It is recommended that the established Cosmologists take an interest to further develop Model Mechanics into a full fledge scientific theory.

References

[1] K. H. Seto, "Unification of Physics"
http://www.modelmechanics.org/2011unification.xps
http://www.modelmechanics.org/2011unification.pdf

[2] K. H. Seto, "The Physics of Absolute Motion" ISBN0-9647136-1-6, KHS Publishing, p. 57-70.
http://www.modelmechanics.org/kn_seto/index.htm