Improved Relativity Theory (IRT) and the Doppler Theory of Gravity (DTG)

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A new physical model of our universe called Model Mechanics has been formulated. Model Mechanics posits that a structured and elastic medium called the E-Matrix occupies all of pure space. The S-Particles are the only mass bearing fundamental particles that exist in our universe. The different absolute motions of the S-Particles in the E-Matrix give rise to all the different basic particles such as the electron and quarks. Also the different absolute motions of the S-Particles or S-Particle systems give rise to all the processes and interactions in our universe. Specifically Model Mechanics gives rise to a new theory of gravity called DTG and a new theory of relativity called IRT. DTG in combination with IRT provides physical solutions to the following problematic observations of the current theories: 1.The accelerated expansion of the far reached regions of our universe; 2. Dark Energy; 3. Dark Matter; 4. The horizon problem; 5. The galactic rotational curve problem; 6. The Pioneer 10 does not follow the predicted path of the current theories.

1. The Current State of Our Universe

A new model of our Universe, called Model Mechanics has been formulated. Model Mechanics supposes that a stationary, structured and elastic 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 compacts 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. E-Strings will recover to a 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 mo-

tion 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 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 charged Basic 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 Basic Particles or Basic Particle systems 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 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. 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 [1], 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.

2. 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.

3. 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.

4. 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 point of view are as follows:

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

$\lambda_a =$ 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.

$$\gamma = \frac{F_{aa}}{F_{ab}} \quad\quad \frac{1}{\gamma} = \frac{F_{ab}}{F_{aa}}$$

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

$$\Delta T'_{ab} = \gamma \, \Delta T_{aa} = \frac{F_{aa}}{F_{ab}} \Delta T_{aa} \tag{1}$$

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.

$$\Delta T''_{ab} = \frac{1}{\gamma} \Delta T_{aa} = \frac{F_{ab}}{F_{aa}} \Delta T_{aa} \tag{2}$$

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

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

$$L'_{ab} = \frac{1}{\gamma} L_{aa} = \frac{F_{ab}}{F_{aa}} L_{aa} \tag{3}$$

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.

$$L''_{ab} = \gamma \, L_{aa} = \frac{F_{aa}}{F_{ab}} L_{aa} \tag{4}$$

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

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

$$\Delta t'_{ab} = \gamma \left[\Delta t_{aa} + \frac{v}{c^2} \Delta x_{aa} \right] = \frac{F_{aa}}{F_{ab}} \left[\Delta t_{aa} + \frac{f_{aa} - f_{ab}}{\lambda_a f_{aa}{}^2} \Delta x_{aa} \right] \tag{6}$$

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

$$\Delta x''_{ab} = \frac{1}{\gamma} \left[\Delta x_{aa} - v \, \Delta t_{aa} \right] = \frac{F_{ab}}{F_{aa}} \left[\Delta x_{aa} - \lambda_a \left(f_{aa} - f_{ab} \right) \Delta t_{aa} \right] \tag{7}$$

$$\Delta t''_{ab} = \frac{1}{\gamma} \left[\Delta t_{aa} - \frac{v}{c^2} \Delta x_{aa} \right] = \frac{F_{ab}}{F_{aa}} \left[\Delta t_{aa} - \frac{f_{aa} - f_{ab}}{\lambda_a f_{aa}{}^2} \Delta x_{aa} \right] \tag{8}$$

4. Momentum of an object:

$$p = M_0 v = M_0 \lambda_a \left(f_{aa} - f_{ab} \right) \tag{9}$$

5. Kinetic energy of an object:

$$K = M_0 v^2 = M_0 \lambda_a{}^2 f_{aa}{}^2 \left(\frac{f_{aa}}{f_{ab}} - 1 \right) \tag{10}$$

6. Energy of a single particle:

$$E = M_0 c^2 = M_0 \lambda_a{}^2 f_{aa}{}^2 \tag{11}$$

7. Gravitational red shift:

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

8. Gravitational time dilation:

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

9. 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.

5. Forces Based on Absolute Motions
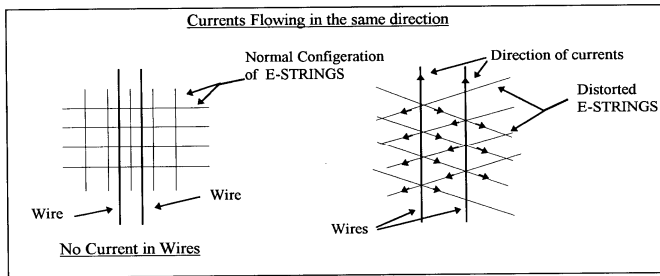
Fig. 1. Currents (electrons) in the wires are flowing in the same direction, and therefore the force between the electrons is attractive. The right diagram that shows that the tension created in the E-Strings by the absolute motions of the electrons is pulling the wires together.
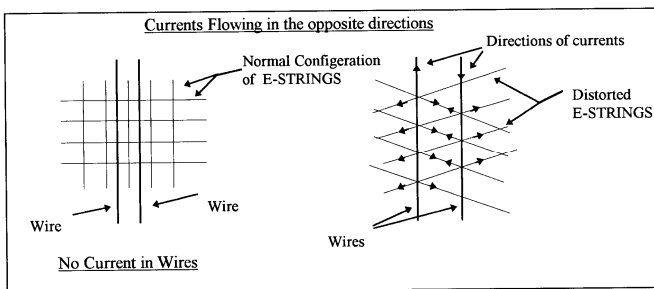
Fig. 2. Currents (electrons) in the wires are flowing in the opposite direction, and therefore the force between the electrons is repulsive. The right diagram shows that the tension created in the E-Strings by the absolute motions of the electrons is pulling the wires apart.

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.

6. Cosmological Repulsive Effect (CRE) 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 indepen-

dent 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.

7. The 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. Assum-

ing 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.

8. Model Mechanics Explains Problematic Cosmological Observations

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.

9. Conclusion

Model Mechanics leads to a new theory of gravity called Doppler Theory of Gravity (DTG). It unites gravity with the electromagnetic and nuclear forces naturally [1, 2]. It also leads to a complete theory of motion called IRT (Improved Relativity Theory). IRT includes SRT as a subset. However, unlike SRT, the equations of IRT are valid in all environments, including gravity. Both IRT and DTG give matching predictions as GRT but they avoid the following problematic predictions of GRT.

1. The accelerated expansion of the far reached regions of the universe.
2. The observed rotational curves of the galaxies disagree with the predictions of GRT.
3. The observed path of travel of the Pioneer 10 spacecraft disagrees with the prediction of GRT.
4. The observable universe appears to have a larger horizon than it is allowed by its age.
5. The observed flatness problem of the universe.

References

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