

[Type here]

# The Future Development of Theoretical Physics and Cosmology

Ken H Seto  
kn\_seto@yahoo.com

## Introduction

In the past 100 years theoretical physics and cosmology development have been conducted almost strictly on a mathematical basis, leading to non-physical objects or processes such as fields, space-time, curvature in space-time, time dilation, length contraction, virtual particles, action at a distance, curled-up dimensions, Entanglement, Dark Energy, Dark Matter...etc. It is posited that these non-physical mathematical objects must have their origin from one physical model of our universe. As a method to find this one physical model I invented the Pyramid Technique for doing physics. The Pyramid Technique identifies the most problematic observations of current theories and formulates a physical model of the universe that can explain these problematic observations. The result is the physical model of Model Mechanics. Model Mechanics gives valid physical explanations for all the problematic observations encountered by current theories. In addition, it gives rise to a new theory of relativity called IRT and a new theory of gravity called DTG. IRT in combination with DTG can be used to replace SRT and GRT in all applications. In addition the unification of DTG with the electromagnetic and nuclear forces of nature become feasible.

## The Peril of Mathematic without Physical Constraint

Mathematics is a powerful tool that we use to describe the processes of nature. It is derived from our interpretations, observations and measurements of nature. However, without physical constraints a mathematical equation will include all the possible real solutions of the process described. It will also include all the non-existing abstract solutions. The perils of mathematics begin when we adopt a mathematical model that is based on one of these non-existing abstract solutions. For example let us examine the simple equation of  $y/x=2$ . If 'x' represents people and 'y' represents apples, this equation implies that every person gets two apples. This equation contains all the possible real initial conditions— even number of apples and whole number of persons. This equation also contains all the non-real initial conditions—odd number of apples and fractional number of persons. These are non-existing initial conditions because a fraction of a person doesn't exist in our universe. This example illustrates the importance of selecting the correct physical model for our mathematics.

The problems of using abstract mathematics become more visible as we consider the effects it had on past and future developments. Take the case of the Schrödinger's equation--the abstract provisions of this equation allowed physicists to interpret that an electron (a particle) can sometimes behave as a wave and sometimes behave like a particle. Clearly this kind of abstract behavior does not occur naturally and yet it is adopted for lack of a better model. This will cause other problems in the future development of physics. The reason is that physicists will use these abstract models to construct other theories that, in turn, give rise to further abstractions. This way of doing physics continues to this day. The results are arrays of extremely complex and abstractive equations that will need new abstract models to explain. This means that as we progress along this line of development, our mathematics will eventually reach a point complexity that only the inventor of the mathematics can understand. This is the point we have reached with the superstring theory. The most promising super string theory posits the existence of 10 dimensions of space and one dimension of time. Since we only see three dimensions of space, string theorists assert that the other seven dimensions of space are curled up and making them undetectable experimentally. It is likely that mathematical development alone will not lead to a true Theory of Everything. This led me on a search for a physical model of our universe that can provide physical interpretations of our mathematics. The Pyramid Technique is used for this search and the result is the physical model of Model Mechanics.

## The Pyramid Technique

So how do we arrive at the right physical processes for our mathematics? At the macroscopic level this is easy. It would simply be the processes that we see. However, at the microscopic level it is not so easy because the physical objects involved are too small to be seen by our most powerful microscopes. Also, there seem to be no urgent need to know the exact physical processes involved. This is because our equations are able to predict the outcome of our experiments without knowing the exact processes that give rise to the predictions. This led physicists to believe that they can use any processes to explain our equations. This interpretation led modern physics into a direction that is directly in conflict with common sense. Physicists resolve the conflict by simply saying that our common sense is wrong and that their interpretations of the unseen processes are right. It seems illogical to adopt such a point of view without exploring whether there is other alternative explanation that can satisfy both common sense and the result of our experiments. Therefore, if we want our mathematics to describe the real processes of nature, we must base it on real initial conditions. To this end I formulated the Pyramid Technique, a new method of doing theoretical physics and cosmology development. The step by step procedure for the *Pyramid Techniques* is as follows:

1. Search the literatures and identify the major problems of relativity, quantum mechanics and modern cosmology. The result of the search identified the following major problems of the current theories: The lack of a physical explanation of gravity; The observed accelerated expansion of the universe; The Horizon problem; The Flatness Problem; The Galactic rotational curve problem: Dark Energy and Dark Matter.
2. Formulate a physical model that can account for these problems. The formulator is free to assume any physical model of the current state of the universe. The assumed physical model must be capable of explaining all the forces and processes of nature. In addition, the mathematics of the current theories must be derivable from this physical model.
3. Use this physical model to develop a new theory of gravity that is compatible with the other forces of nature and derive a complete theory of relativity from this physical model that is compatible with quantum field theories.

The *Pyramid Techniques* enabled me to go through a number of possible states of the current universe quickly. The first model that was somewhat successful posits that space is filled with a substance called the E-Matrix (the prefix "E" represents elastic). The E-Matrix exerts a repulsive force on all the matter particles within it. In other words, a particle in the E-Matrix is much like a droplet of oil emulsion in water--it feels the repulsive force of the water from all sides. When the E-Matrix is distorted, it will recover itself to the original non-distorted state quickly. Light is waves in the E-Matrix and time is absolute, not flexible, as postulated by the Special Theory of Relativity (STR). This model of the universe explains the propagation of light but it was not capable of explaining the various force interactions without resorting to abstract processes; therefore, it was not a successful model.

As a means of increasing the scope of this model, I visualized that the E-Matrix is composed of E-Strings. These E-Strings are three dimensional elastic strings and they are oriented randomly in all directions. The motions of matter particles in the E-Matrix will distort the geometry of the E-Strings locally. On the other hand, matter particles will follow the local geometry of the E-Strings (due to orbital confinement) as they travel in the E-Matrix. This modified model brings General Relativity into the fold. However, it lacked the processes to describe the electromagnetic, nuclear weak and strong forces. It was evident that additional modifications were needed to explain these interactions. The next idea that I added to the above model is one of the most important ideas of Model Mechanics. This idea posits that all the forces of nature are the results of absolute motions between the interacting particles or particle systems. These modifications completed the modeling process and yield the physical model of Model Mechanics.

## The Physical Description of Model Mechanics

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 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 of Relativity Theories and the fields/virtual particles of Quantum Field Theories with the E-Matrix and the distortions or waves in the E-Matrix. This enables us to use the math of

Quantum Field Theories (QFT) in combination with the physical interpretations of Model Mechanics to explain all the processes of nature.

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. It gives rise to the following postulates:

- 1) The E-Matrix is a stationary and structured 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 different absolute motions of the S-Particles or S-Particle systems in the E-Matrix.
- 4) All the forces of nature are the results of the S-Particles 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-String(s).

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, 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.

## Improved Relativity Theory (IRT)

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 eliminates the SRT constant light speed postulate in all inertial frames. This, in turn, eliminates all the paradoxes derived from these postulates. The equations of IRT are valid in all environments, including gravity. Therefore IRT can be used to replace GRT in all applications.

### The 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 and the math of the IRT are available in the link at the end of this essay.

## The Model Mechanics Concept of Forces

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. This interpretation becomes the most important concept of Model Mechanics and it enables Model Mechanics to unite all the forces of nature naturally.

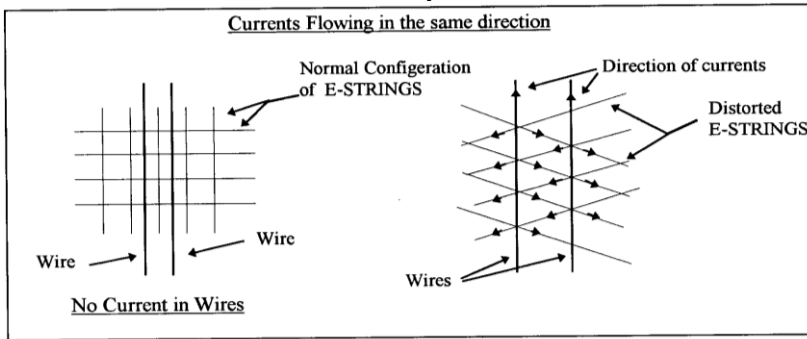


Fig.1: Currents (electrons) in the wires are flowing in the same direction, and therefore the force between the electrons is attractive. The right diagram that shows that the tension created in the E-Strings by the absolute motions of the electrons is pulling the wires together.

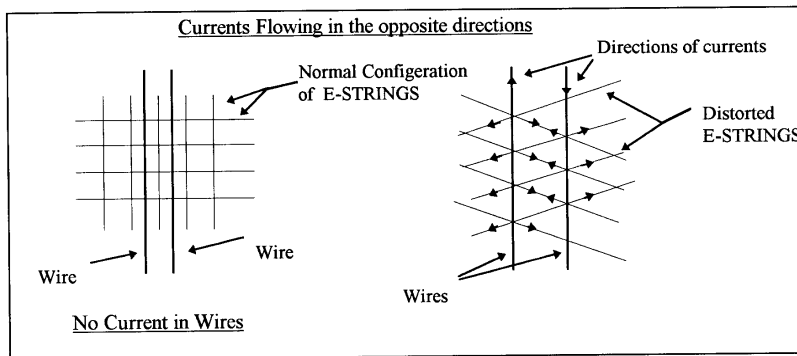


Fig. 2: Currents (electrons) in the wires are flowing in the opposite direction, and therefore the force between the electrons is repulsive. The right diagram shows that the tension created in the E-Strings by the absolute motions of the electrons is pulling the wires apart.

## 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.

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.

## The Force 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.
3. 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.
4. The above description for gravity suggests that the Newtonian equation for gravity can be modified to make it consistent with observations as follows:

$$F_g = \left( \frac{F_{ab}}{F_{aa}} \right) \left( G \frac{M_a M_b (j_a) \cdot (\pm j_b)}{r^2} \right) \quad (14)$$

The dot product  $(j_a) \cdot (\pm j_b)$  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 motions of expansion are attracted to each other, but those objects that have absolute motions of expansion in the opposite directions exert a repulsive force on each other. Assuming the Big Bang model is correct then the dot product of the unit 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. This enables Model Mechanics to achieve the elusive goal of uniting gravity with the electromagnetic and nuclear forces naturally.

## Model Mechanics Explains Problematic Observations of Current Theories

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 and thus 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 derived from the GRT model of gravity which requires that the universe exists between an open and a closed universe. That means that the matter density of the universe must be fine tune to be within one part in  $10^{50}$  of the critical density value. This degree of fine-tuning is known as the flatness problem. In Model Mechanics, gravity is the result 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 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.

## Conclusions

Theoretical physics and cosmology developments without physical constraints leads to non-physical mathematical objects that may not have physical existence in our universe. The Pyramid Technique provides a new way of doing physics and the result is Model Mechanics. The physical provisions of Model Mechanics provides physical explanations for all the non-physical mathematical objects exist in our current theories. Model Mechanics gives rise to a new theory of gravity that is compatible with the electromagnetic and the nuclear forces. In addition, Model Mechanics gives rise to a new theory of relativity called IRT. The math of IRT includes the SRT math as a subset. The equations of IRT are valid for use in all environments, including gravity and therefore they are valid for use to replace SRT and GRT in all applications. The successes of the Pyramid Technique suggest that it should be used for all future development of theoretical physics and cosmology.

Reference:

<http://www.modelmechaics.org/2011unification.pdf>