

# **Absolute Motions of Objects in a Structured and Elastic Medium Give Rise to a New Theory of Gravity**

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## **Abstract**

A structured and elastic medium called the E-Matrix occupying all of space is posited. Absolute motions of the interacting objects in the same direction in the E-Matrix give rise to an attractive forces. On the other hand, interacting objects moving in the same direction in the E-Matrix will follow its divergent structure and this has a repulsive effect between them. Gravity is the combined results of these two opposing forces and that's why it is so weak compared to the electromagnetic and nuclear forces. A new theory of gravity called Doppler Theory of Gravity (DTG) is formulated. DTG and the other forces are derived from the same mechanism and thus the unification of all the forces is achieved naturally.

## **The Proposed Physical Model of Space**

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 an object 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 object. 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.

What are the processes that give rise to all the forces between interacting objects? The proposed answers to this question are as follows:

- 1) All the forces of nature are the result of interacting objects following or reacting to the geometries (*i.e.* distortions or waves) of the E-Strings to which they are confined.
- 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.

The idea that the directions of absolute motion can cause an attractive or a repulsive force between interacting objects is derived from the familiar electric current experiments in parallel wires. The following schematic diagrams illustrate these effects clearly.

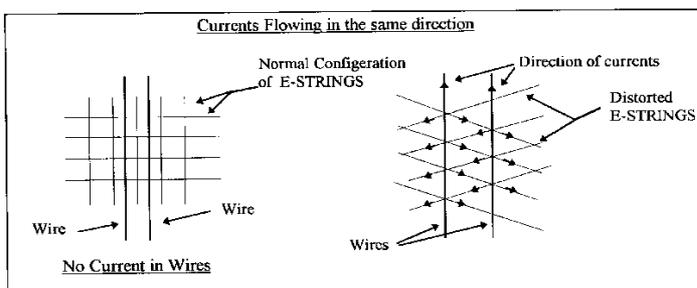


Fig.1: Currents (electrons) in the wires are flowing in the same direction, and therefore the force between the electrons is attractive. The right diagram shows that the tension created in the E-Strings by the absolute motions of the electrons is pulling the wires together.

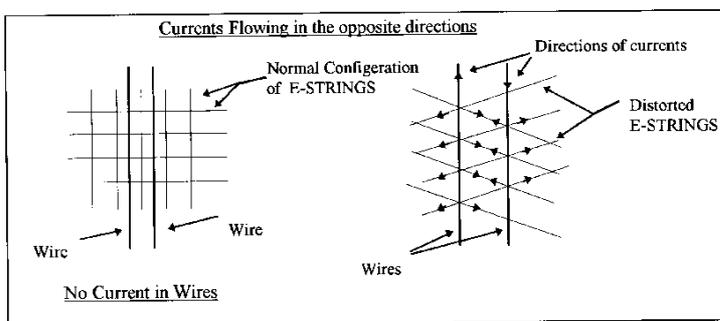


Fig. 2: Currents (electrons) in the wires are flowing in the opposite direction, and therefore the force between the electrons is repulsive. The right diagram shows that the tension created in the E-Strings by the absolute motions of the electrons is pulling the wires apart.

## **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 (Cosmological Repulsive Effect Force). The CRE force between any two neighboring objects is derived from the confinement of the interacting objects to the diverging structure of the E-Matrix.

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 is observed to be 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.

A new theory of gravity called Doppler Theory of Gravity (DTG) is formulated. DTG is based on the following provisions of Model Mechanics:

1. As the Universe expands, all neighboring objects (or neighboring galaxies) are expanding in the same directions and this causes an attractive force between them.
2. On the other hand, objects expanding in the same direction are confined to the divergent structure of the E-Matrix. This causes the repulsive CRE force between them.
3. DTG gravity is the combined result of the above opposing forces.

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 (a new physical model of the universe), the physical mechanism for gravity between two objects A and B moving in the stationary E-Matrix is as follows:

1. Due to the expansion of the Universe, both A and B are expanding 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 a repulsive CRE force between them 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:

$$F_g = \left( \frac{F_{ab}}{F_{aa}} \right) \left( G \frac{M_a M_b (j_a) \cdot (\pm j_b)}{r^2} \right) \quad 3.1$$

$F_g$  = The force of gravity between A and B.

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

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

The dot product  $(j_a) \cdot (\pm j_b)$  in Eq. (3.1) 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 – see the link at the end of this paper. This enables Model Mechanics to achieve the elusive goal of uniting gravity with the electromagnetic and nuclear forces naturally.

Reference:

<http://www.modelmechanics.org/2019unification.pdf>