

Gravity is A Pushing Force

This Gravity Subgroup – Wave Theory (GSG-WT) is a member of CNPS’s Gravity Interest Group (GIG)

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This document proposes that gravity is caused by an Electromagnetic EM wave that pushes an object as it passes through. There are other models that are based on pushing theories, but the presentation here suggests that the Electromagnetic Wave theory is the most appropriate.

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1. History

There have been many attempts to produce theories that define and explain the nature of gravity. Newton had no theory but developed a very good equation for gravity. Einstein had a theory based on space time bending which also doesn’t provide a nature for gravity. The actual assignment of a physical nature to gravity begins with Fatio and Le Sage theories based on a pushing particle. Later on Maxwell introduced the idea of a gravity wave using mathematical equations. Our paper provides a theory in which gravity exhibits the properties of electromagnetic waves.

2. Pushing Force

Fatio [1] and Le Sage [2] introduced the idea of gravity as a pushing force potentially to overcome the ‘action at a distance’ implications of a pulling force as assumed for Newton’s gravity [3]. Logically ‘the horse does not pull the wagon it pushes the harness. There are many examples of a pulling force that can actually be explained using a pushing force.

Figure 1 is a drawing made by Le Sage that shows his particles entering a spatial object and then leaving the object diminished and containing fewer particles. Therefore the pushing particle density in between two objects is less. There is less pressure between the two objects so the pressure on each is less than the pressure from outside of the shadow. Hence there is a ‘net’ force pushing the objects together. For these objects and

specifically for us on earth, the pushing particles must come at us from all directions in order to have gravity push us toward the center of the earth no matter where we stand.

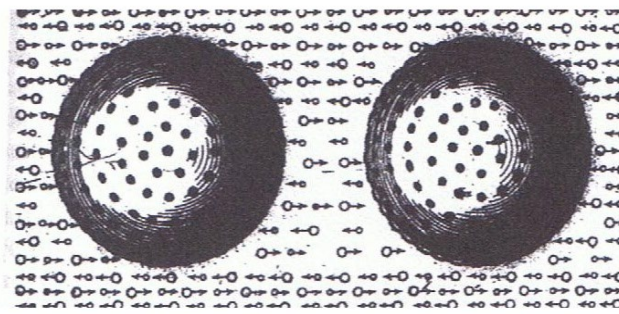


Figure 1 –Particles Pushing the Objects together

Fig. 2. Pairs of macroscopic bodies traversed by currents of ultramundane corpuscles. From Le Sage's *Essai de chymie mécanique*. Photo courtesy of the Library of the Royal Society, London.

In the model we advance here the particles in figure 1 are replaced by Electromagnetic waves. To proceed, these waves must likewise be able to push the object. So how does an electromagnetic (EM) wave push? This paper intends to answer this question.

3. Assumptions

Assumptions are used to help establish the context for explaining the theory. These assumptions may never be proved, but they must not contradict any part of the theory.

a. Space:

- 1) Space is where objects exist.
- 2) Space extends in 3 dimensions and is similar throughout.
- 3) Space is not equivalent to, nor does it contain, any void. Any void area would be immeasurable and therefore not exist.
- 4) Space therefore has structure, one possible example is plasma.

b. The Structure of Space

- 1) The structure of space is in constant motion and simulates a material nature.
- 2) Space structure is in equilibrium unless the motion of its contents is interfered with.

c. Motion

- 1) Time is man-made idea for measuring motion.
- 2) Motion is a function of both matter and waves.
- 3) A net' directional amount of motion can occur within the structure of space. That motion becomes detectible, and can apply pressure on other matter.
- 4) Motion is detected when an object's position in space changes from one instant of time to another.
- 5) Significant matter, often called a mass, interferes with the motions of the structure of space.

4. Definitions

a. Gravity

- 1) Gravity Source - Our pushing gravity is the source or 'cause' of the pressure that produces detectible effects. This source is currently undefined and has been since the time of Newton.
- 2) Gravity Effects - The term gravity is often used to denote the detectable 'effects', such as the falling apple. The effects of gravity upon matter bodies results in detectible motions or pressure. The 'effect' is the 'attraction' of matter toward mass bodies. The attraction effect is expanded by Newtonian dynamics to include the potential motion of two or more spatial bodies toward each other.

b. Mass/Matter

- 1) Matter is normally used as a term to distinguish visible or sensible things from apparently empty regions. The existence of regions which have only waves is often incorrectly referred to as void.

2) Mass is a property of matter which modifies gravitational pressure (causing motion).

c. Particle₂

1) A gravity particle is an object in motion that applies pressure upon contact.

2) Gravity is caused by ‘particles applying external pressure’ (PAEPs). This term is coined to avoid calling the gravity particle by the term ‘graviton’. The actual particles may be matter or radiation waves.

3) Not only electrons but all other particles, charged or uncharged, show wave-like characteristics. [4]

d. Wave

A wave is a single, but repeating, non-linear flow within a ray or a beam.

e. Electromagnetic Wave

1) Light is an example of a transverse wave. A transverse wave is a moving wave that consists of oscillations occurring perpendicular (or right angled) to the direction of energy transfer i.e. the direction of propagation of the wave. A wave on a string is easily visualized as transverse waves.

2) For motions through space, a transverse wave is an oscillation relative to the direction of the beam and occurs in three dimensions. Oscillations in three dimensions emulate a coil.

3) Waves can be longitudinal. This means that there is some variation within the beam as it travels forward. The variation is repeated compressions followed by decompression along the length of the beam. The gravity ideas we develop using transverse waves can be adapted to compression waves.

4) To picture a wave in three dimensions, consider a particle revolving within the straw. From any direction the wave will look like a sine wave if viewed in two dimensions.

5. Properties of EM Radiation

An electromagnetic wave has certain properties described below.

a. Source

The main source of EM radiation is from the stars. This means that all the stars in the universe are a source of gravity. This implies that gravity comes at us from all directions.

b. Speed

The speed of EM radiation when serving as gravity duplicates the speed of light as denoted by **c**. **c** is the constant of speed dependent upon the medium of travel. If gravity is caused by EM radiation, then the speed of gravity is about the same as the speed of light. There is evidence of this from measurements made during a solar eclipse.

c. Frequency

There are frequencies of EM radiation that can easily pass through objects and there are others that do not. It is the long wave length, low frequency EM waves that can penetrate matter the furthest, even through spatial bodies. Energy is proportional to the frequency. So, some frequency is lost during interactions.

d. Amplitude

The amplitude of the wave is the radial displacement from the wave center. When waves push on objects some of its energy is ‘used’. Energy is proportional to the square of the amplitude. and some of its amplitude is lost during an interaction. **Figure 3 and [5]**

e. Intensity

Radiant intensity is a measure of the intensity of electromagnetic radiation. We expect it is dependent on the number of beams per unit area. It is defined as power per unit solid angle. The SI unit of radiant intensity is watts per steradian ($W \cdot sr^{-1}$).

f. Applies Pressure

Upon contact with matter, EM radiation is found to apply pressure to that matter. There was uncertainty about this happening until Einstein assumed that light travels through space in concentrated bundles called photons. The photoelectric effect [6] revealed that light falling on a metal plate can

liberate photoelectrons. The resulting equation is: $h\nu = E_0 + K_{\max}$. [7] So an electron is pushed out and carries kinetic energy (K_{\max}), the amount of which is a function of the frequency. There are other cases of known pressure from light such as pressure on cones within the eye [8] providing vision and pressures upon earth's atmosphere by sunlight.

g. Phase

Waves come from all directions and from various distances. Any and all phases of EM waves may arrive at any point. The phase of the individual EM wave is not a consideration.

6. Actions of EM Waves

a. Source

Solar radiation is mostly light, with its associated wave length and frequency, for which we assume the amplitude, has been reduced. From all other directions the radiation is mostly long wave, so much so that we may not easily identify the beams as EM radiation. However this radiation retains full amplitude as it travels. At any point, as the beams continue flowing, the energy is retained as other beams enter the region from all directions. Essentially the ongoing merger of beams retains the normal pressure at all remote points in space. It is when nearby lower energy beams from bodies such as the sun cause an imbalance of motions within the structure of space that we experience 'net gravity'. The centripetal force attracting earth toward the sun is an example of this 'net gravity'.

b. Fabric of Space

The farther radiation travels from its source the greater the distance between rays. That gap is filled by rays from other sources. Over many years, Scientists have made the assumption that if there is a wave moving through space there must be a medium that allows that wave to propagate. But with all these rays from every direction defining space there may not be a need for additional mediums such as aethers. Space is filled by EM radiation which possibly becomes both the action and the medium. We call this the fabric of space. Essentially the light waves are examples of the movement within the medium just as sound is the movement of air.

Science has observed that light moving in one direction does not affect light moving in other directions when they intersect. The same non-interference could then apply to all EM radiation. While the radiation moves the interaction of waves from all directions gives the impression of stasis, or no detectible motions. Space can appear void while moving internally in all directions, even at speed c .

c. Moving Through Space

We will visualize EM waves in space as transverse. Being three dimensional we must picture a wave as a coil. A sequence of coils emulates the spring in a pen. The whole spring is moving rapidly at speed c suggesting its forward flow of the waves/coils be identified as a beam. Beams/rays individualize radiation fields just as particles do for matter.

d. Penetration

The waves are coils whose frequency determines whether a wave impacts matter mostly at the surface or within the mass. A beam with low frequency waves arrives more like an arrow and penetrates the mass. High frequency impacting waves may apply greater surface pressure. However, the total of surface pressure is minor relative to the penetration pressure of long waves which continues contact throughout the mass. Penetration contact applies throughout the internal body of mass. Matter is considered as mostly empty except for the nucleus. Figure 2 depicts the concept of penetration.

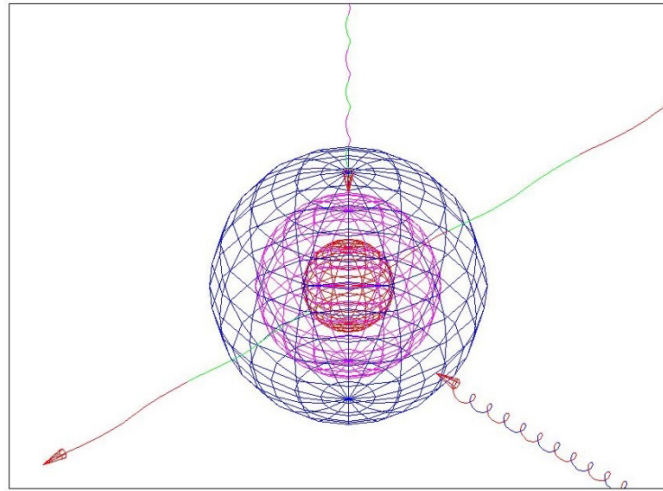
TRANSVERSE WAVE PENETRATION / INTERACTION MODEL**Figure 2 - Penetration**

Figure 2 shows three different EM waves interacting with a spherical object. It is generally understood that waves of different high frequencies may either reflect off of the object, or penetrate a short distance into the object. Longer wave rays may pass through the object. Each incoming wave is shown in three dimensions and is depicted as a coil. The wave on the lower right does not penetrate, it reflects (not shown) and loses energy. The wave from the top enters a short distance and is absorbed by the object. Finally, the wave from the upper right passes all the way through the object. Each beam incurs interactions causing the amplitude and frequency to decrease.

e. Interaction

To understand EM gravity, consider motion that occurs when two billiard balls hit. The collision is a clear example of a mechanical interaction. The motion of one ball is transferred to the other in keeping with Newton's laws. This is an inelastic interaction in which all motion is retained by the balls externally. An elastic interaction allows some of the impact to be transferred to the interior of the impacted ball so the observable motion is only part of the result. With elastic interactions, some of the kinetic energy is converted to heat and thus lost. The creation of gravity 'effects' cannot occur with strictly inelastic interactions. To anticipate elastic interactions we focus on waves rather than mass particles being gravity sources.

The movement of a paper clip using a magnet indicates an interaction of the clip with the magnetic field which is an EM interaction.

f. Pushing

Throughout history mankind has studied motion, analyzing both the object in motion and the source of the motion. The object was matter. Being heavy it was assigned weight, was given the attribute of energy and became mass. The simplest cause of motion occurs from a push as a transfer of energy from one moving object to another object. Two of the events that cause motion - magnetism and gravity - did not follow that cause rule so the concept of force was invented. Spatial entities were originally thought to be massless objects. From Kepler forward stellar objects had mass and so Newton proposed the void where friction didn't interfere with the motion of objects. But the source remained the mythical - force.

The concept of light transmitting at speed 'c' violated rules as light did not seem to have any weight, and yet it had motion. So light moved as waves but lacked kinetic energy. Thus light had no

mass. Soon a whole spectrum of EM wave frequencies was identified. All frequencies were denied mass or energy.

Clearing up the confusion created an opportunity for Einstein. He gave light and EM radiation the attribute of matter to go along with the wave, thus the confusing duality. He took this forward into the equation $E=mc^2$ which combines the properties of matter and energy into any mass. These individual steps have confused science which should have recognized that anything that is detectible has structure, has mass and can push. More recently the push of light was recognized. There is a band of EM frequencies that corresponds to visible light. Of course the eye can detect light. It does this by having three color cones in the retina which corresponds to red, green, and blue light. The red frequency wave can activate the red cone but not the blue and green cone. In all probability the cones resonate at the given frequency and the intensity is determined by the amplitude of the wave. The frequency selects the color while the amplitude determines the amount of pressure. Likewise gravity as an EM wave should be able to apply pressure to an object and cause it to move.

Beyond just light, in analyzing the expanded spectrum, the push of X-rays was detailed by Compton in 1923 [9]. He aimed X-rays at a plate in his study of the photoelectric effect. The Compton Effect shows that X-ray beams striking a graphite block act like a billiard ball collision with free electrons. The incident wave causes electrons to oscillate. The incident photon transfers some of its energy to the electron. The 'recoil' photons emerging constitute scattered radiation.

In developing this paper the distinction of mass vs. waves led us first down trails of pushing particles and then to pushing waves for more clarity. The two push concepts become equivalent here. The source of gravitational 'attraction' is correctly the result of the push of EM wave particles. Giving gravity this structure suggests many clarifications for the study of physics.

g. Reduction

Existing 'attraction' gravity theory provides no details of how mass reveals gravity effects. There is no analysis of what features of mass provide attraction other than an overall mass in large quantities. Is the pull somehow related to atoms or to the nuclei? Likewise, how do those forces radiate out and reverse direction in order to pull back matter bodies?

The ability to have our pushing gravity cause pressure is related to the reduction of amplitude and frequency, and thus of pressure during penetration. It has been observed that less beam amplitude arrives at earth from the sun than from other directions. That leads to the LeSage shadow concept and the 'net gravity' centripetal force attracting earth toward the sun. The beams from the sun that penetrate have less amplitude than the beams from the stars. The 'net' action is more pressure downward and thus that which attracts orbitals is the same 'attraction' gravity we incur on earth.

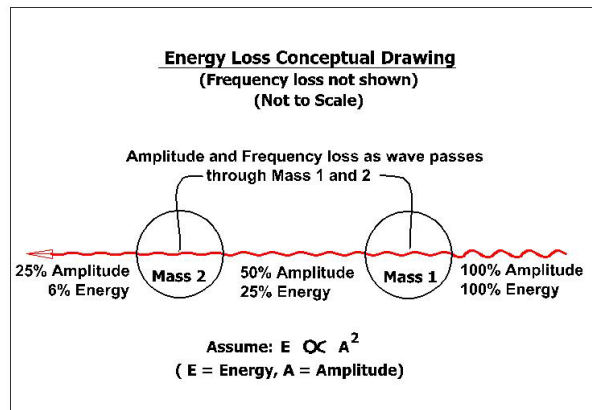


Figure 3 – Gravity Waves Penetrating Masses

Figure 3 shows the wave of amplitude “A” coming from the right and passing through Mass 1 and Mass 2. As it passes through Mass 1 it applies pressure to Mass 1 and its amplitude is reduced by 50%. The amplitude leaving Mass 1 has a value of $A/2$. Frequency reduction is not shown in the diagram.

7. Inertia

Inertia is the centerpiece of Newtonian dynamics and assumes existing motion of an object is constant until an external force is applied. This inertia is not valid within the EM theory of gravity. EM waves are in equilibrium and constantly interacting with an object. EM waves push the object in all directions which results in stasis (status quo). At any instant of time, one of these waves may cause the object to move but is quickly offset. Over a longer period of time these interactions balance out providing no change in the stasis.

The issue becomes cloudy when the object is in motion relative to the local equilibrium. If the object were in motion then the stasis of spatial pressures means there would be more pressure in the forward direction than in the rear. This is called drag. The object needs help to continue moving in a straight line at a constant velocity. Per Newton’s description of inertia the motion can continue in absence of any friction or drag. But space is not void. And some drag/friction automatically occurs within the realm of pushing radiation as motion causes more push to arrive at the front of the motion vs at the rear.

8. Gravity

When two objects are near each other or touching, the reduction of gravitational pressure occurring within each body means beams exit toward each other with lower energy. This produces a low pressure between the objects providing a net push towards each other. This is the mechanism for ‘attraction’ gravity.

9. Amplitude and Frequency

AM and FM radio waves are good examples of the relation between amplitude and frequency. Both of these EM signals lose amplitude as they pass through objects (the atmosphere and walls). The loss of amplitude indicates an interaction with the atmosphere. The wave would also be putting pressure on the objects and cause them to move. This is the type of interaction by which gravity could cause pressure.

10. Where External Gravity Applies its Pressure

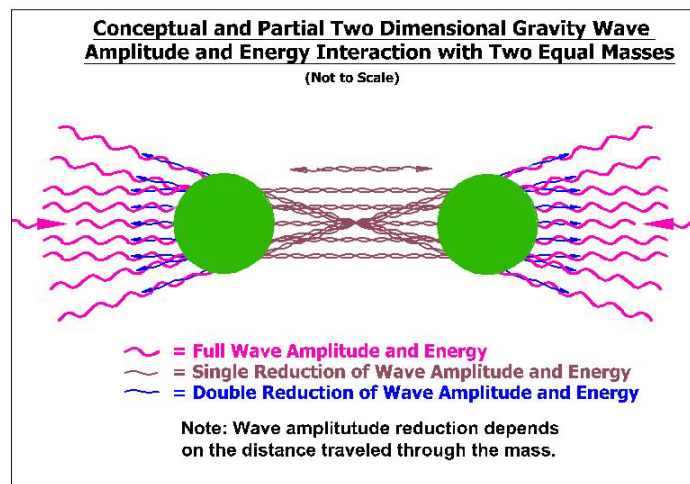


Figure 5 – Attraction Caused by Pushing Waves

All EM waves provide some gravitational type of push. The premise is that gravity beams tend to be very long waves. Shorter waves like light mainly apply pressure to the mass surface. Both long and short

waves push in some manner. Light from the sun or stars seems like the antithesis of pressure but light does carry a minimal gravity pressure. Long waves enter and continue to apply pressure throughout their passage through the mass. The longer the distance, the longer the period of penetration for long wave beams, thus the greater the sum of pressures applied to the atomic fields of the mass.

We use and distinguish rays from beams to clarify direction of travel. Rays are emitted transmissions. A beam is similar but carries waves flowing towards matter. Given a range of frequencies, the longer wave lengths penetrate and interact deeper within the matter. Penetrating beams provide pressures over time rather than instantaneously like the surface impact of short waves. The time of penetration is a factor in summing up gravity effects.

11. Predictions

One of the interesting points of reduction is that it cannot be more than 100 percent. Once it gets to 100 percent, the force of gravity is gone, even if there is more mass. In Newton's case,, the more mass there is , there is more force. This implies that there is a maximum amount of gravitational force and a maximum amount of gravitational acceleration.

Dark Matter is proposed because the velocity of the stars at the edge of the galaxy is higher than Newtonian physics can predict. But with reduction, the force of gravity is reduced as it passes through the objects that are in the galactic plane. When it gets to the opposite edge, the force of gravity outward is less while the force of gravity inward is not. This causes a higher net force of gravity towards the center of the galaxy than Newtonian physics. This could explain the high velocity without using dark matter.

12. Conclusions

The purpose of this paper is to investigate that EM radiation has the properties needed to cause pushing gravity.

- a. The source of the EM radiation comes from the distant stars.
- b. EM radiation is the systematic movement of the EM fabric.
- c. The speed of the EM wave is similar to the speed of light.
- d. The EM wave will penetrate and pass through objects if the frequency is low.
- e. The EM waves will interact and push the object as it penetrates it.
- f. When the EM wave interacts with the object, the energy of the wave reduces.
- g. The reduced energy of the exiting EM waves cause a lower pressure on nearby objects that allows the pushing waves to move objects toward each other.

We have offered a pushing theory of gravity rather than a pulling theory. This is a 180 degree change in the direction of gravity which could have implications for other areas of physics. We first recognize that gravity exists throughout the universe along with radiation and matter and that the three interact with and penetrate each other. We conclude that gravity is a form of EM radiation and that all EM radiation traveling at speed c can act on, penetrate to some degree, and pressure matter. Meanwhile matter modifies the radiations during their penetration. The strength of radiation, and thus it's pushing potential, is a function of its amplitude while any significant degree of penetration requires long wave radiation beams which exhibit straightness. Penetrating waves lose energy causing an unbalanced push at exit point producing a 'net' downward push. The downward push diminishes and disappears at points distant from the mass as such points are pressured more equally in all 3 dimensions by undiminished beams.

Flaws in the LeSage particle model are overcome here as radiation interaction produces less heat than particles would and rotations of matter can be shown to overcome aberration and drag issues. Although the concepts used to discuss certain actions differ, the model proposed here has no underlying conflict with knowledge learned by applying Newtonian physics. In fact, the concept of pushing gravity overrides the need for several current concepts.

This proposed model does extend knowledge as it suggests that with gravity having an offsetting diminishment factor, there is an absolute limit for gravity forces which negates the unlimited measure of attraction gravity theory, that lead to black hole and expansion concepts.

A potential value of our work is to redefine forces so they become a mechanism to the orbiting and curvature to central body forces of gravity. Kepler's laws suggest that relationship. [x]

References

- [1] - I. Bernard Cohen, *Introduction to Newtons Principia*, Harvard 1978, page 177
Newton stated that "Nicolas Fatio de Duillier found the only possible mechanical cause of gravity"
- [2] - Matthew Edwards, editor, *Pushing Gravity*; Apeiron 2002, page 10, Le Sage's Theory of Gravity
http://en.wikipedia.org/wiki/Le_Sage%27s_theory_of_gravitation.
- [3] - Shortley and Williams editors, *Elements of Physics*, Prentice Hall 1955, page 95 ,
Newton's law of Gravitation
http://www.relativitycalculator.com/Newton_Universal_Gravity_Law.shtml
- [4] - Halliday & Resnick, *Physics*, Wiley & Sons. Combined Edition 1966, Section 48.1, Waves and Particles, pg 1203.
- [5] - Sound Waves – Intensity of sound is proportional to the square of the amplitude.
<http://physics.info/intensity/>
- [6] - Halliday & Resnick, *Physics*, Wiley & Sons, 3rd edition. 1978
Photoelectric effect, section 49.4
- [7] - Energy and frequency of EM waves - $h\nu = E_0 + K_{\max}$
http://en.wikipedia.org/wiki/Electromagnetic_radiation
- [8] - Radiation pressure,
http://en.wikipedia.org/wiki/Radiation_pressure,
<http://www.pa.msu.edu/~schwier/courses/2014SpringPhy184/lecture37.pdf>
- [9] - Halliday & Resnick, *Physics*, Wiley & Sons, 3rd edition. 1978
Compton Effect, section 49.6

