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THE ISLAND EFFECT THEORY IN GRAVITATION –LE SAGE-BRUSH`S THEORY
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The island effect theory in gravitation - Le Sage-Brush's theory

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At this very moment your body is being crossed and pushed in all directions by waves and particles coming from all around. The applied forces toward the right and left sides of your body are of virtually the same magnitude, so you do not perceive them. However what occurs vertically is different. Waves moving downwards have a greater magnitude than those moving upwards, rising from the ground. The rising waves have crossed through our planet, which has absorbed some of them. Hence, you are being pushed downwards with a force of greater magnitude than upwards, with a difference of 9.8 N/kg. Connecting Le Sage-Brush's theory with M. Oldham *et al* results, we can conclude that our planet acts as a shield and absorbs (0.59 ± 0.75) % of the gravitational waves that cross it. This figure can not be used as reference. It is just a preliminary result that can be used as a starter.

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I. INTRODUCTION

To quote A. P. French[1] (from Massachusetts Institute of Technology): *"In 1747 George Louis Le Sage explained the inverse square law of gravitation by postulating that vast numbers of invisible particles were flying through space in all directions at high speeds. Objects like the sun and planets block these particles, leading to a shadowing effect that has the same quantitative result as a gravitational attraction. A theory in which*

opaque objects block the particles completely is fairly easy to refute, but a theory in which the attenuation of the particles by objects is incomplete or even very small is much harder to dismiss."

At this point we can call Le Sage's particles gravitational particles or gravitational waves. (For each particle there is an associated wave.)

II. A SOLAR ECLIPSE ARGUMENT

According to Le Sage's postulate, it is possible to say that the Sun and the Moon "attract" the Earth because they block gravitational waves (or particles) that would otherwise reach and push our planet.

During a solar eclipse, there are waves that cross the Earth after having crossed both the Sun and the Moon, in that order.

Then, before and after the eclipse the Moon blocks a larger fraction of these waves that are going to the Earth, than during it.

Thus, during the eclipse, the Earth draws a slightly wider orbit about the sun than it does before and after the eclipse, a phenomenon which can be observed experimentally by using a Foucault pendulum.

The pendulum must not be at the plane that contains the earth's center of gravity (regarding the sun's gravitational field) and is normal to the straight line that contains both the earth and the sun's centers of mass.

To quote a NASA site[2] (from Marshall Space Flight Center): *"In a marathon experiment in 1954, Allais[3] released a Foucault pendulum every 14 minutes – for 30 days*

and nights – without missing a data point. He recorded the direction of precession (in degrees) at his Paris laboratory. This energetic show of human endurance happened to overlap with the 1954 solar eclipse. It also covered slightly more than one orbit of the Earth by the Moon. During the eclipse, the pendulum took an unexpected turn, changing its angle of rotation by 13.5 degrees."

"Both before and after the eclipse, the pendulum experienced normal rotation, the Foucault effect, of 0.19 degrees/minute. This 13.5-degree excursion in the angular plane persisted throughout the length of the eclipse, a total of 2.5 hours of observations from eclipse start on Earth's west limb to end on the east limb."

"Allais got similar results when he later repeated the experiment during a solar eclipse in 1959."

"In an American J. of Physics (58, 530, 1990; G. T. Gillies) review, the summary of Allais' work reads: "A physicist (who later won a Nobel prize in economics) finds a gravitational anisotropy at the level of 5 micro-G.(5×10^{-6})." "

III. ISLAND EFFECT AT THE SEA

According to Le Sage-Brush's theory, gravitational forces are caused by what we can call: **the island effect**[4]. The sea's waves travel in all directions. **The island effect** can be summarized as follows: **on any given island beach, waves are continuously arriving.** (There are exceptions in the sea case, which do not cause problems in gravitation.) If an object floats just offshore of an island beach, it will move towards the beach as if the island were attracting it; however the waves are in fact pushing it towards the beach.

IV. ISLAND EFFECT IN SPACE

Space is filled up with waves (and particles) moving in all directions. Background radiation and neutrinos serve as examples of such omnipresent particles. Neutrinos are known to pass easily through matter[5]. They can pass through several planets similar to the Earth when placed side by side.

The island effect occurs in space (in a three dimensional way) in the same manner as it occurs at the surface of the sea (in a two dimensional way). One big difference can be noted, however. A sea island blocks the passing of all waves that hit it, while matter, in general, only partially blocks the main waves that are responsible for gravitation.

For any body waves that fill up space in an isotropic way are always coming from all sides, just as waves move towards the beaches of a sea island.

Figure 1 shows isotropic (or nearly isotropic) waves arriving at the surface of the Earth. They come from all around, however the resulting flux is radial and downwards.

This is **the island effect,** happening all around our Earth.

Your body is being pushed downwards and upwards, to the right and to the left, forwards and backwards, but the intensity of horizontal waves from the right is almost the same as the intensity of those from the left, causing the horizontal force components to be null.

The quantitative result is 9.8 N/kg downwards, which is the gravitational field or the weight per unit mass for bodies located near the Earth's surface. (9.8 N/kg = 9.8 m/s^2)

At any point near the Moon's surface, the gravitational field is less intense than here near the Earth's surface, because there is a greater intensity of waves rising from the ground there than here since the Moon absorbs fewer gravitational waves than does the Earth.

V. INERTIAL MASS, GRAVITATIONAL MASS, AND THE DARK MATTER ENIGMA

Usually we consider:

- **Inertial mass:** a measure of a body's resistance to acceleration.
- **Gravitational mass:** a measure of how much a body "attracts" others bodies.

Thus, according to LeSage-Brush's theory, it is easy to realize that gravitational mass is a measure of how much a body absorbs from waves and particles responsible for gravitation.

For the weight we find:

$$\mathbf{F} = m\,\mathbf{g} \qquad (1)$$

where m is the body's gravitational mass and **g** is the local free-fall acceleration. Hence, according to LeSage-Brush's theory when we heat up a body, we are in fact increasing the interaction between its molecules and the waves or particles responsible for gravitation, and body's gravitational mass becomes greater[6]. We can thus state that gravitational mass increases with the temperature. However, we can not say the same about inertial mass. Let us assume that it not varies. (There are others considerations here, for example, formula (1) above becomes wrong. Sun's gravitational mass include absorption of ultra high frequencies that simply do not interact with mass in temperatures of our world, but let us simplify now.)

Possible solution for dark matter enigma

Consider a star of gravitational mass m_g and inertial mass m_i gravitating around an enormous gravitational mass M ($M >>> m_g$) at a constant distance R. Being G the Newtonian constant and v the magnitude of linear star's speed regarding a reference frame fixed in M, the centripetal force acting on the star is the gravitational one, then we can write:

$$G M m_g / R^2 = m_i v^2 / R \qquad (2)$$

Very high star's temperatures produce gravitational masses greater enough than inertial ones giving the illusion of what we are calling the dark matter.

For example: if $m_g = 10m_i$ and we consider $m_g = m_i$, then we can think that M is 10M.

VI. LE SAGE-BRUSH'S WAVES (OR PARTICLES)

The question that naturally arises at this point is:

Which waves are these, after all?

We still do not know, but out of what has been shown so far, we have been able to realize that all waves and particles which fill up space, in at least an approximately isotropic way, exert their share in the gravitational force, including neutrinos and

background radiation. However gravitational waves have to cross bodies easily, then the background radiation contribution is negligible in general.

To quote Arthur McDonald *et al*[7] (Director of Sudbury Neutrino Observatory (SNO)): (p. 60) "*If neutrinos change their flavor by oscillation, then they have mass.* ***After photons, neutrinos are the most numerous particles in the Universe.*** *Hence, even a minuscule mass could have an important cosmological meaning. Experiments that observe neutrinos' oscillation, such as SNO and Super-Kamiokande, measure only differences of mass, and not the masses themselves. Showing that differences are not null, however, they prove that at least some masses are not null.*" (It was translated from Portuguese into English.)

(p. 59):"***Five million high energy solar neutrinos are crossing each square centimeter of your body per second.***"

According to D. Halliday, R. Resnick, and J. Walker (1993): *"Billions upon billions of neutrinos pass through our bodies every second, leaving no trace."*

If one neutrino can break a deuteron nucleus, then it has the required condition to push and heat bodies. **Neutrinos can perfectly be the main gravitational waves.**

Just for information: T. van Flandern's test[8] indicates that if gravitation is something which propagates itself, its propagation speed is then at least twenty times greater than the speed of propagation of light.

VII. AN ACCELERATED EXPANSION OF THE UNIVERSE – DARK ENERGY

Red shift has showed that the universe expansion is accelerated[9].

Starting with the principle that the waves responsible for gravitation can be inside the region occupied by all the galaxies in the Universe and not outside, or even that they can be outside this region but, if so, going only from inside to outside, as they can be produced by the stars or due to another unknown cause, then we must expect an accelerated expansion of the Universe. According to this, the accelerated expansion occurs because we only have forces traveling from inside this region to outside.

As you can see, according to Le Sage-Brush's theory, we can expect an Accelerating Universe.

To quote Paul P. Sipiera[10]: "*The Sun is one of more than 200 billion stars in the Milk Way.*"

Astronomers have estimated the number of galaxies in the universe to be between 50 and 100 billion. (Hubble Deep Field Activity – NASA.)

Imagine our solar system inside this region.

VIII. NEWTON'S ACTION-REACTION LAW

In order to understand that the present theory proves itself correct, the understanding of the following statement is crucial.

If we consider two billiard balls placed vertically near the Earth's surface, and if we only take into account the gravitational forces of "attraction" between them, then the magnitude of the force acting upon the ball underneath will be greater.

Consider two identical billiard balls, (they do not need to have the same mass, but let us consider them to be identical in order to make reasoning easier), which we shall call A and B. Let these be placed vertically near the Earth's surface and also let B rest below A. Figure 2 displays such situation for bodies much bigger than billiard balls.

What is the mechanism that causes them to "attract" each other ? Ball A (the one above) blocks part of the descending waves that would otherwise hit B and push it downwards. The lack of such downward-pushing force upon ball B is what we call the uprising force due to the presence of A.

In the same manner, ball B (that stays below) blocks part of the rising waves (due to its presence) that would otherwise hit ball A and push it upwards. The lack of such upward-pushing forces upon ball A is what we call downward force due to the presence of B.

As we have seen before, we have a greater intensity of descending waves than ascending waves. Hence, ball A above (when we consider "attraction" forces between balls only) blocks a greater percentage of such waves than the ball below, and **the intensity of the force acting upon the ball located below is therefore greater.**

Notes:

1) If the balls were to have different masses, this statement would still be valid. (If, for example, we doubled the mass of the ball below and kept the other mass to its initial value, the two "attraction" forces would have their respective intensities doubled and the ball below would therefore remain under the action of a force of greater intensity);

2) We shall replace billiard balls with the following objects: **water** from the Stwlan reservoir, from the Ffestiniog hydroelectric plant, North Wales (UK) and the **sensor** of a gravimeter staying alternately above and below the water from the reservoir;

3) Because these forces possess different intensities, **such force pair is not of the action-reaction type.** To clarify, the "attraction" forces exchanged between the two balls do not constitute themselves a pair of the action-reaction kind, it suffices to remind us that such forces are not applied by the same waves;

4) There is no incompatibility whatever with Newton's law of action and reaction. We are just coming to discover that gravitational "attraction" forces do not constitute pairs of such kinds themselves. In such case of gravitational "attraction," action-reaction-type-pairs are exchanged between masses and waves that cross them, either completely or partially.

IX. LACOSTE-ROMBERG GRAVITY METER (LCR) AND THE PORTION OF WAVES ABSORBED BY OUR EARTH

The LCR gravimeter is a very precise apparatus for measuring gravitational variations of the order of one micro Gal (1uGal = 1×10^{-8} m/s^2). They can be still more precise, depending on the type of electronic output used and the mode of operation, as with fixed gravimeter models on the laboratory.

They can also measure the Earth's gravitational field at the above-mentioned precision, instead of just measuring small field variations.

The numerical values used on the present work are the ones from the article by M. Oldham *et al,*[11] in which two gravimeters were used, one above and one below the **water** from North Wales' Ffestiniog hydroelectric plant (UK), in which the water level varies up to 23 meters. The appliances remained installed on location from December 1989 to April 1990, and the evaluated data originated from eight measurement weeks, between January and March.

The LCR gravimeter contains a **sensor** (as indicated on figure 3) attached to a high sensitivity mechanism, which contains a spring and an independent system that constantly maintains it at the same (horizontal) position. It contains no magnetic components.

Replacing the snooker balls (mentioned above) respectively with the water from the reservoir and the gravimeter's sensor we find:

1) When the **water mass** from the reservoir lies **above** the **gravimeter's sensor**, as in figure 4, the sensor is "pulled" upwards with greater intensity than predicted by the current theory (Newton's inverse square law and General Relativity). The experimental **result** from the eight week's measurement obtained by M. Oldham *et al*[11] was (0.46 ±

0.53)% **greater** than the current theory forecasts. **It corresponds to an indirect measure of wave intensity reaching the Earth's surface downwards.**

2) When the **water mass** from the reservoir lies **below** the **gravimeter's sensor** (situation depicted in figure 5), this sensor (that replaces the upper ball), is "pulled" downwards by the water mass, with lesser intensity than predicted by the current theory. M. Oldham *et al*[11] obtained a **value** $(0.13 \pm 0.22)\%$ **lesser** than the current theory foresees. **It corresponds to an indirect measurement of wave intensity going upwards** and consequently, the ones that have crossed the Earth.

Note: When Newton's Constant G is measured between vertically placed bodies, in general research uses the mean value of the following two situations: 1) Gravimeter below the source mass, 2) Gravimeter above the source mass.

3) This way it is easy to determine that our Earth absorbs (0.59 ± 0.75) % of these waves when they cross it, regarding to the M. Oldham *et al* experiment, and regarding CODATA G value $(6{,}673 \pm 0.010) \times 10^{-11}\ m^3\,kg^{-1}\,s^{-2}$).

Note that the wave rays that cross the Earth, the water mass, and the gravimeter's sensor are simultaneously under consideration here. For all these directions, we are only considering the vertical components. For any other experiment the absorbed percentage may be a little different.

In order to enhance the accuracy and precision of these measurements, we have to perform experiments in laboratory[12], in which a source mass gravitational field is measured with highly precise gravimeters

For the calculation above, the absorption imposed by the Earth's atmosphere can be considered the same both for waves going upwards from the ground as well as for the ones going downwards. We are located inside a spherical layer of air that is spread around the Earth, (and which is comprised of thin homogeneous layers of air). In the inside of a homogeneous spherical layer of matter, the Newtonian gravitational field caused by such layer is null[13].

X. AN UPPER LIMIT FOR A GRAVITATIONAL FIELD MAGNITUDE

From the above-mentioned topic it becomes easy to note that there is an upper limit to the magnitude that a gravitational field can attain. If we consider the percentage that the Earth absorbs from these waves which cause the gravitational effect, it becomes easier to calculate this limit, which we shall call g_{max} , at least as a preliminary calculation.

For M. Oldham *et al* data, the deviations associated with the results are greater than the results themselves, which makes it impossible to obtain g_{max} with its correspondent deviation. But, if we may suppose that the Earth truly absorbs something around 0.6% of the gravitational waves that cross it, we can set up the following linear proportion: 0.6% is proportional to a gravitational field value of 9.8 m/s^2 (gravitational field magnitude near the Earth's surface) as 100% (that corresponds to a total absorption of these waves) is proportional to g_{max}.

This way we would obtain something near to 1600 m/s^2 for the value of g_{max}. This has to be considered as a preliminary value. The real value can be very different from it. However, let us use this as a starter.

XI. THE NEWTONIAN CONSTANT G

We obtain the following values for Newton's constant from the M. Oldham *et al*[11] experiment.

By using the gravimeter below the water from the reservoir:

$$G_{max,\ Earth} = (6{,}70 \pm 0.04) \times 10^{-11}\ m^3\ kg^{-1}\ s^{-2}\ \text{(preliminary figure)}$$

As we have already noted, we are indirectly measuring the intensity of the waves going downwards with respect to the surface of the Earth. (The value above is obtained by adding the figure for the Newtonian constant currently accepted, of $(0.46 \pm 0.53)\%$.)

By using the gravimeter above the reservoir water, we obtain the following figure:

$$G_{min.\ Earth} = (6{,}66 \pm 0.03) \times 10^{-11}\ m^3\ kg^{-1}\ s^{-2}\ \text{(preliminary figure)}$$

In this case, we are indirectly measuring the intensity of the waves that have crossed the Earth and have been partially absorbed by our planet. These waves move upwards with respect to the ground.

Of all fundamental constants in Physics, the Newtonian constant is the one measured the most in the last 200 years, but it is also the most imprecise of them all. The most precise values we have are mutually exclusive. For further information see Gillies studies[14].

The Newtonian constant seems not be constant. Even for the values introduced here, we have strong evidences that these are average values of something under constant variation.

To quote J. P. Schwarz *et al*[12] (p. 2233): *"The 1997 data were processed daily, giving values of G of 6.66 x 10^{-11} to 6.71 x 10^{-11} m^3 kg^{-1} sec^{-2}."*

To quote P. Varga *et al*[12] (in the article: Laboratory calibration of Lacoste-Romberg type gravimeters by using a heavy cylindrical ring - p.752): *"Random oscillations of up to 2 μGal can be observed both at the maximum and the minimum positions. The nature of these oscillations is not clear at present..."*

If we measure Newton's constant between horizontally placed bodies near the Earth's surface we will obtain[15]:

$$G_{h,\,Earth} = (6{,}673 \pm 0.010) \times 10^{-11}\ m^3\,kg^{-1}\,s^{-2}$$

Which is the currently accepted value.

XII. NEWTON'S INVERSE SQUARE LAW

If we ignore the fact that Newton's constant seems not be constant, our theory is in perfect agreement with Newton's inverse-square law for particles. (JUST FOR PARTICLES).

Both Le Sage and Brush have written arguments similar to the following:

The presence of mass blocks the passage of a portion of the gravitational waves that reach it. The waves are blocked the same way in all directions, and so at a distance r from the particle, the effect is distributed along a spherical surface whose area is proportional to the square of its radius. By increasing such distance, the effect (that translates in wave absence) diminishes proportionally to the square of the distance.

We are considering an isotropic Newtonian constant here.

And, if we have a non-punctual body instead of a particle, how can we calculate its gravitational field?

In this case, the Newtonian inverse-square law can be used as an approximation of reality, which means: if the body is small like a snooker ball, Newton's law will be suitable because what it absorbs of the waves responsible for gravitation is very small. But if the body is large, like our Earth or even our Sun, the Newtonian law is in a difficult position because as waves cross the so-called body, they are absorbed by it. In this case, we must perform a point-by-point integration using Newton's law while considering G value variations, as caused by wave absorption.

XIII. G VARIATION AND OUR PRELIMINARY DATA ABOUT THE EARTH'S ABSORPTION OF GRAVITATIONAL WAVES IMPLY AN INCREMENT OF ABOUT 9 PER CENT ON THE SUN'S GRAVITATIONAL MASS

Let us make the simplifying assumption that we have exact values below:

1) Gravitational acceleration at the Earth's surface equals $g_E = 9.8\ m/s^2$
2) Gravitational acceleration at the Sun's surface equals $g_S = 274\ m/s^2$
3) The Earth's radius: $R_E = 6.37 \times 10^6\ m$
4) The Sun's radius: $R_S = 6.96 \times 10^8\ m$
5) The Earth's absorption of gravitational waves equals 0.59 per cent as obtained above (item VIII)
6) $G_{max,\ Earth} = (6{,}70 \pm 0.04) \times 10^{-11}\ m^3\ kg^{-1}\ s^{-2}$ (According to our item **X**)
7) $G = (6{,}673 \pm 0.010) \times 10^{-11}\ m^3\ kg^{-1}\ s^{-2}$ (CODATA value, obtained between horizontally placed bodies near the Earth's surface.)

Then we can make:

$$(\text{Sun's absorption}) / (274) = (0.59\%) / (9.8) \qquad (3)$$

$$\text{Sun's absorption} = 16.50\ \%$$

Hence, gravitational waves reach the Sun's surface with 100 per cent of their magnitude and leave the Sun with 83.50 per cent of their original magnitude. (Average value)

We can say then that Sun's atoms are reached by gravitational waves with

$$(100\% + 83.5\%) / 2 = 91.75\% \qquad (4)$$

of their original magnitude. (Average value)

Then we can calculate the Sun's gravitational field (g_S) by using Newton's law,

$$g_S = G_S \times M_S / R_S^{\,2} \qquad (5)$$

however using

$$G_S = 0.9175 \times (6.70 / 6.67)\ G \text{ (Newtonian constant)} \qquad (6)$$

As we are multiplying G by a factor we must divide sun's mass by the same factor in order to keep sun's gravitational effect. This implies for the sun's gravitational mass

$$\text{New } M_S = M_S / (0.9175 \times 6.70 / 6.67) \qquad (7)$$

New $M_S = 1.085\ M_S$

This calculation does not include ultra high frequencies absorbed by the sun, because this absorption does not interfere with planets' masses since they are cool bodies regarding stars' temperatures. If we were considering gravitational effects exchanged between the sun and other star these ultra high frequencies were considered, and the result would be very greater than 9 per cent.

As already seen, according to this theory, sun's inertial mass is lesser than its gravitational one regarding the way we measure hear on earth.

From this kind of calculation, the earth's mass does not suffer appreciable variation. (It can pass from 5.98 to 5.97×10^{24} kg, but we do not have enough precision to state this. It would be a decrement because in this case G increases.)

XIV. POSSIBLE THEOREM WAITING FOR ITS DEMONSTRATION

Now we present a possible theorem. We have calculated the horizontal component of the gravitational field created by a homogeneous sphere, on its surface g_h, which is one of its parts (due to a vertical hemisphere), as the total horizontal component is null. By using Newton's inverse-square law, a computer, and increasing the precision of the result, the quotient between the gravitational field of the sphere on its surface g and g_h approaches π.

The most precise result we have obtained so far has been:

$$g / g_h = (3.14187 \pm 0.00055) \qquad (8)$$

This result is very useful to the present theory, so it would be helpful if a mathematician would become interested in the problem; if the result would turn out to be π, as our calculation indicates, he could demonstrate it.

XV. HORIZONTAL COMPONENTS OF FORCES THAT ACT ON BODIES CLOSE TO THE EARTH'S SURFACE

If our planet absorbs only $(0.59 \pm 0.75)\%$ of the waves responsible for gravitation as they pass through it, as indicated by our preliminary calculation, the specific horizontal forces acting on bodies on the Earth's surface will be close to the ones acting on bodies far from the Earth. From g_{max} value we can write:

$$F_h \cong 1600 \text{ N/kg} \quad \text{(preliminary result)}$$

XVI. THE RELATIVISTIC EFFECT

According to Le Sage-Brush's theory, bodies fall because waves push them downwards. In order to make reasoning easier, let's suppose that a body is falling close to a giant star in such a way that there will only be waves going downwards and not upwards. Let's also suppose that on that star, there is no atmosphere, so that the resulting force acting upon the so-called falling body is just its own weight, and that it starts by accelerating vertically from rest with respect to the surface of the star.

As force is due to linear momentum transference from the waves to the body, as its speed increases the transference of linear momentum decreases, and finally if the body reaches the speed of propagation of the waves that push it downwards, the force becomes null. Consequently the speed stops increasing, and it is to be noted that speed possesses a limit because force disappears and not because mass increases, the way it is believed nowadays.

We propose the following relativistic correction:

Replacing equation (9) by equation (10) below:

$$m = m_0 / [\, 1 - (v/c)^2 \,]^{1/2} \qquad (9)$$

Where m is the inertial mass[16] when the magnitude of speed is v, m_0 is the "rest mass" and c is the speed of light. This formula is used today.

For the example above where F accelerates the body. The body's v and the speed of the waves have the same direction, we propose using:

$$F = F_0 \times [1 - (v/c)^2]^{1/2} \qquad (10)$$

Where F_0 is the magnitude of the rest force, c is the magnitude of the speed of the waves pushing the body, **that can be or not light speed**, and F is the magnitude of the force acting on the body when its speed has magnitude v.

Note that if v = c, then F = 0.

We then obtain once more the Newtonian formula from dynamics

$$\mathbf{F} = m.\mathbf{a} \qquad (11)$$

for any speed. Where **"a"** is the body acceleration (vector), and **F** is the resulting force acting on it. (**F** is a vector and F is its magnitude) And **inertial mass does not vary with speed.**

We propose equation (10) because we know that equation (9) works. The merit here belongs to Einstein or Lorentz, but we must devise a method to obtain equation (10) or its equivalent from the transference of linear momentum from waves to bodies.

Important note: this proposal is also valid for particle accelerators, for we know that the electric field propagates itself at the speed of light and also that the electric field is responsible for the force acting on particles, so that when particles reach light speed the force becomes null.

XVII. THERE IS ETHER OR NOT?

Let's check what Einstein said on June 9th, 1952[17]: *"... . Physical objects are not in space, but these objects are spatially extended. In these way the concept "**empty space**" loses its meaning."*

This quote is just to inform that Einstein agreed with the idea that there is no empty space. Maybe light does not use the ether on its propagation. Maybe neutrinos use it, we simply do not know. Michelson-Morley results are true, and were very tested.

I believe in the ether existence.

XVIII. THE MOVEMENT OF THE MOLECULES OF GASES AND LIQUIDS

These movements and also the molecular thermal agitation of a solid seem to be due to the waves that fill up space. In this way the kinetic theory of gases should be rethought.

XIX. A SOURCE OF HEAT

According to our preliminary considerations less than 0.05 per cent of the solar power comes from absorption of Le Sage-Brush's waves. See appendix B.

It is a fundamental property of waves transporting energy and linear momentum. These waves responsible for gravitation transfer linear momentum as they cross bodies by pushing them, and also transfer energy that heats up bodies.

The temperature of the Earth increases when one travels from its surface to its center[18]. For small depths (say the first kilometers) it increases at the rate of about 40 °C (72 °F) per kilometer, and then the inside temperature of the Earth increases more slowly as shown by Stacey[18].

Our Earth is almost 5 billion years old, as it is believed nowadays. It has volcanoes that erupt once in a while spending lots of energy, truly lots of energy.

It is then logical to pose the following question: where does all this energy come from?

Some theories say the Earth is still cooling down (since its formation), which could explain the fact that its internal temperature is so high. These theories have no chance of being correct, if we consider the age of the Earth is approximately of five billion years.

Other theories attribute the high internal temperatures as having originated from radioactive elements, and we should truly consider such contribution but we should also remember that almost all-radioactive emissions began with the arrival of neutrinos that could be the source of energy.

We want to propose here that the waves, which are responsible for gravitation, are the main source of heat that maintains the inside of the Earth heated, and they supply energy to volcanoes to erupt once in a while. According to this, the inside of the Earth is hotter than the external side because energy has more difficulty to escape from the inside.

The Earth must be in a stationary condition (on account of its age), i. e., equal amount of absorbed and radiated energy over a given time interval.

The high temperatures of larger planets (Jupiter, Saturn, Uranus, and Neptune) can also be explained in part by the absorption of these waves. This source of heat is not considered today.

J. Magalhães[19] from NASA states according to data sent by the Galileo spaceship probe, which arrived at Jupiter's atmosphere in December, 1995: *"Initial results include finding that upper atmospheric densities and temperatures are significantly higher than expected.* ***An additional source of heating beyond sunlight appears to be necessary to account for this result,*** *... ".*

About Atmospheric Composition Magalhães said (at the end of page 1): *"Helium was expected to be somewhat depleted in Jupiter's atmosphere due to separation of helium droplets in the metallic interior. However, the observed amount of depletion is less than predicted suggesting additional consideration of the internal evolution of Jupiter is in order. ... "*

The quantity of energy absorbed from gravitational waves, by a given heavenly body, in a given time interval, increases with its mass (almost proportionally to its mass when waves cross easily the referred body.). So, at constant densities the quantity of absorbed energy increases with the volume of a given heavenly body, and consequently with the cube of its radius.

However, for a given temperature, the quantity of radiated energy increases proportionally to the body's surface area, and consequently proportionally to the square of its radius.

So, the larger a celestial body is (at constant densities, and in quite general terms.), the more energy it concentrates from these waves. And from other internal sources too.

From this kind of reasoning, if we do not consider external sources of heat, one would say that a large planet is hotter than a small one in account of their sizes.

In the same way, going to the other extreme point, we know that an animal big as a fly can't be hotter than its environment because its surface area is enormous regarding its volume. (Or regarding its capacity to produce heat.)

XX. GIANT DARK STARS

According to our later item, the larger a celestial body is (at constant densities, and in quite general terms.), the more energy it concentrates from gravitational waves, and from other internal sources too, and consequently the greater its temperature.

According to Wien's law the greater its temperature the greater the frequency of the main emitted radiation.

So, we can hope to find large celestial bodies irradiating with frequencies above light spectrum, and maybe above any frequency we can measure, then they do not emit light. **Giant dark stars**. Very probably they can be what physicists think are **black holes** today. They can be as well part of the **dark matter** missing.

XXI. SMALL RED STARS

At the other hand small stars must irradiate at low frequencies spectrum. So we can hope to find **small red stars**. Maybe it is influencing the red shifts that we know nowadays.

According to Stephen Hawking[20]: *"if a Quasar is so far as suggested by its red shift, then they must emit more light than whole galaxies."* (It was translated from Portuguese into English.)

Maybe a Quasar is just a small red star. Maybe not. We should study it better.

XXII. WHY DOES A STAR SHIFT THE DIRECTION OF LIGHT PASSING CLOSE TO IT

A very probably possibility is that light and consequently wave fronts propagate more slowly at spatial points closer to stars than for remote points (due to the presence of their atmospheres or because other causes too.), causing the shift. This is similar to what happens in refraction.

XXIII. A KINETIC THEORY OF GRAVITATION

Under this name Charles F. Brush from Ohio (1849-1929), had published articles from 1910 until 1929 about the present theory.

To quote C. F. Brush[21]: *"The author's original (1910) theory is briefly reviewed, viz., that gravitation is due to the intrinsic energy of the ether, which is assumed to exist in wave form or energy flux of some kind propagated with high velocity in all conceivable directions so that the ethereal energy is isotropic, and is uniformly distributed everywhere except as modified by the presence of matter. The interblending energy shadows between gravitating bodies constitute a region of less than normal energy density into which the bodies are pushed by the superior energy beyond them. It is again insisted that the energy acquired by a falling body is derived from the ether."*

In 1996 T. Jaakkola[22] has published "Action-at-a-Distance and Local Action in Gravitation: Discussion and a Possible Solution of the Dilema", with this same central idea.

XXIV. A GRAVITATIONAL REDSHIFT PROBE ARGUMENT

In 1976 Marshall Space Flight Center (NASA) launched the Gravitational Redshift Probe. The purpose of the 125-pound satellite was to test the principle of equivalence in Einstein's general theory of relativity. According to theory, but never demonstrated, a clock will appear to run faster in a weaker gravitational field, at a greater distance from Earth. A very stable atomic clock was launched through Earth's gravitational field to a peak altitude of 6,200 miles (9,980 km), and its reading during the free flight was compared with that of an identical reference clock on the ground. The experiment confirmed the theory.

According to Le Sage-Brush's theory the clock ran faster because far from Earth it was hit by a greater intensity of waves and particles such as those which fill up space, and are responsible for its functioning. Our planet acts like a shield.

As we can see the experiment confirmed Le Sage-Brush's theory too.

A lot of experiments that confirm general relativity are as well confirming Le Sage-Brush's theory.

This result includes atomic clocks in satellites as on GPS system.

XXV. CONCLUSION

Once we are proposing conceptual changes in Physics, other changes should also be expected. Today (March 21st, 2004) we can find more than three hundred thousand articles about Le Sage-Brush's theory at the Internet under the name: *pushing gravity*.

We want to state that any part of this theory can be modified with the evolution of our knowledge.

Note:

The idea of **the island effect** as the origin of gravitation came fully to my mind suddenly on the 23rd of July, Sunday, 1995 at about 11:30 A.M. (Brasilia time - Brazil) as if all my knowledge converged towards it. At that moment I was at home thinking about the photoelectric effect.

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APPENDIX A

The origin of the gravitational force

The sidereal space is just like the surface of the sea water, filled with ripples spreading in all directions.

Let's not stick to the fact that in one occasion we are dealing with waves in three dimensions and in other with waves in two dimensions.

Imagine an island in the sea, surrounded all around by beaches. So, in any beach you may be, you will see sea waves constantly coming to you; this happens because the island itself blocks the waves which travel the other way, just for the fact of being there.

Let's make an analogy in order to facilitate the understanding: The planet Earth, for instance, or any other body, is in relation to the space, as the island is in relation to the sea. However, a relevant difference must be mentioned: it is the fact that the island blocks completely the passage of the waves which reach it, while the bodies in general are partially traversed by the waves that fill the space, which we are talking about.

Therefore, in any place of the surface of the planet you are, these waves will always be coming to you, even inside your house or apartment, with several floors above you.

However, the part coming from the ground, which traversed the Earth, is reduced, exactly for the fact of having come through the Earth. So, the resulting flow is always in the downward direction.

And now the determinant factor in the gravity force is that those waves interact with the elementary particles that constitute the atoms and so they are thrust in the direction of the acceleration of gravity (vertically downwards). In each particle the intensity of the

applied force is very small, but when we make the addition for all the particles, we find, as the result, the weight of the body.

We have the impression that the body is being attracted by the Earth, but in truth it is being thrust by these waves. The same way a body that floats in the sea, near the island will be brought to the beach. One may have the impression that it is being attracted by the island.

See that, to any other two bodies, this argument justifies the apparent attraction to each other.

It's curios to observe that the more you think about this effect the clearer are your ideas.

Carlos José Borge

Appendix A is the Physical Review D unpublished article SH5601D from August 1995.

APPENDIX B

According to our preliminary considerations less than 0.05 per cent of the solar power comes from the absorption of Le Sage-Brush's waves

Without receiving sun's radiation in which temperature the Earth's surface would to stabilize?

This question is more complex than it seems, however let us assume that the rate of energy absorbed by the Earth from gravitational waves is balanced by the rate radiated outward.

Assuming yet that it is a perfect radiator ($\varepsilon = 1$) and that its surface temperature would stabilize below 210 K, by using the Stefan-Boltzmann law (for 210 K) we would have:

$$I = \varepsilon \sigma T^4 \qquad \text{(Ab1)}$$

Where I is the power (in watts) radiated from 1-m^2 area, σ is the Stefan-Boltzmann constant, and T the temperature at the Kelvin scale.

$$I = 1 \times 5.67 \times 10^{-8} \times 210^4$$

$$I = 110 \text{ W} / m^2$$

For it's all surface area, the power of the Earth would be:

$$P'_E = I \times 4\pi R^2 \qquad \text{(Ab2)}$$

$$P'_E = 5.6 \times 10^{16}\ W$$

Supposing that the absorbed rate is proportional to the heavenly body's mass[23] we can estimate the equivalent solar power (P'_S),

$$P'_S = P'_E \times (\text{Sun's mass}) / (\text{Earth's mass}) \qquad \text{(Ab2)}$$

$$P'_S = 1.9 \times 10^{22}\ W$$

Which corresponds to 0.005 per cent of the solar power ($P_S = 3.9 \times 10^{26}$ W).

We have used (Sun's mass) / (Earth's mass) = 333,000. These are gravitational masses and the very high frequencies absorbed by the Sun in account of its high temperatures were not considered. If we consider previously Sun's gravitational mass ten times greater than we usually use due to the previous considerations about dark matter[24], our result changes from 0.005% to about 0.05%.

Conclusion: Less than 0.05% of the solar power comes from the absorption of gravitational waves.

If the Earth and the Sun would have the same internal source of heat (including gravitational waves absorption) and no external sources (as sunlight for the Earth), by using

the solar power (3.9×10^{26} W), analogous calculation allows us to conclude that the Earth's surface temperature would be about 2500 K. (It is curious to observe that (within our precision) this figure is numerically equals the square root of the Earth's radius.)

Figure captions

Fig. 1. Diagram of waves arriving on the Earth's surface all the time. Spatial Island effect.

Fig. 2. Two identical bodies A and B are placed vertically with respect to the Earth's surface straight below. Considering only the gravitational "attraction" forces between them, experiments have shown that the magnitude of the force acting upon the body underneath is greater. This is one of the endorsements of Le Sage-Brush's theory.

Fig. 3. Representation (not to scale) of external side of a LaCoste Romberg gravimeter, and its sensor.

Fig. 4. Representation of a source mass A (gravitational field's source), above gravimeter's sensor B.

Fig. 5. Representation of a source mass A (gravitational field's source), below gravimeter's sensor B.

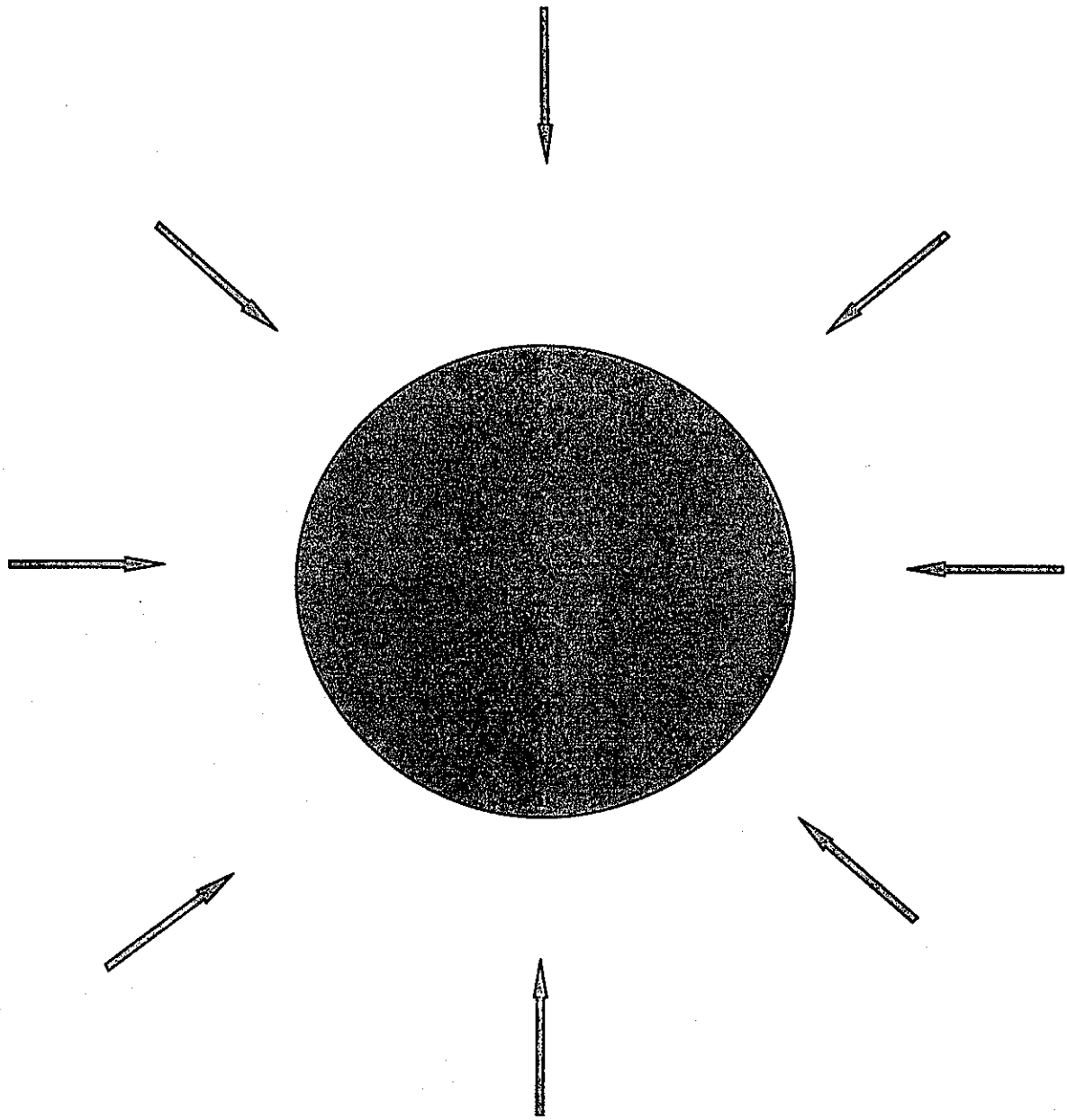


FIG. 1

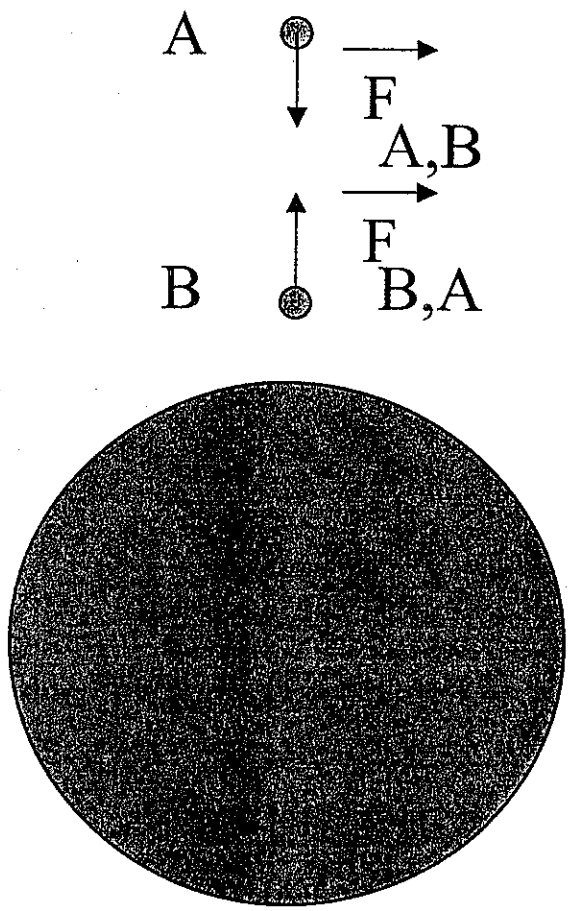


FIG. 2

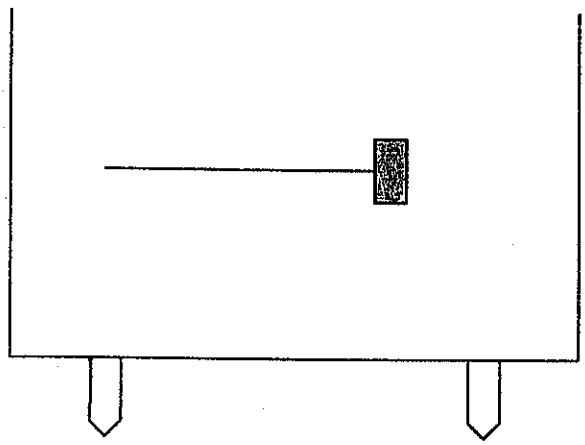


FIG. 3

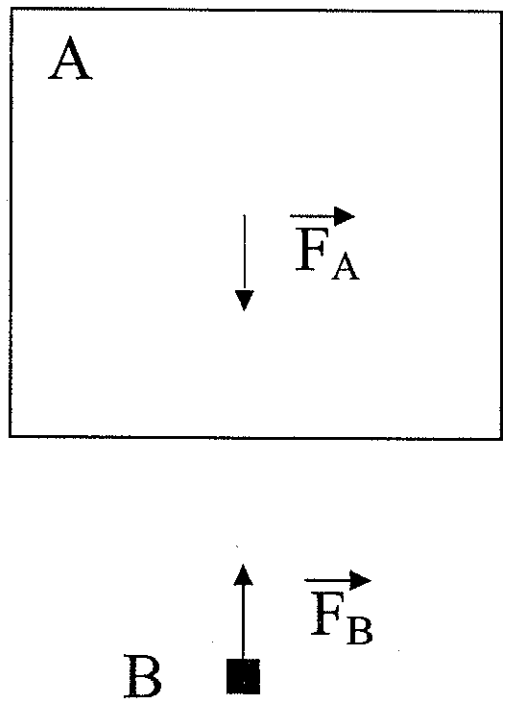
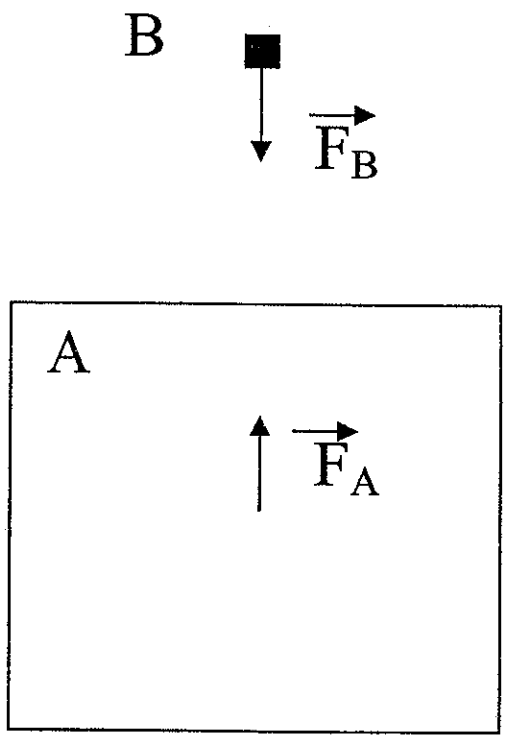


FIG. 4



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