Spacetime Dipole Waves Pressure and Elemental Particles.

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June ,2013

Abstract

This paper is based on John A. Macken proposal [1] that the universe is only spacetime, and in the dipole waves defined by Macken in context of Quantum Mechanics, that can be seen as a sea of energetic waves, traveling at light speed.

From this model the pressure in dipole waves is analyzed in context of kinetic theory of gases. The dipole waves pressure model are used to define a fundamental particle named Ulianov Hole (uhole). One uhole can be associated with an elastic tube that connects two regions of space (or time), generating variations in the dipole wave pressure. Two kinds of uholes are presented, the spatial uhole (uhole-S) that have a property related to the mass, and a time uhole (uhole-T) that have a property related to electric charge.

When the Uhole-S is stretched enough, so that the other uhole end (formed by antimatter) is sufficiently distant to avoid an annihilation process, a mass particle will be formed. This paper present a basic analyzes where some mass proprieties are derivate from the dipole wave pressure model proposed by de author, based in the Macken dipole wave model.

1 – Introduction

In the book "The Universe is Only Spacetime" John Macken develops a number of theories to explain how our universe works, from two assumptions [1]:

- *Basic Assumption: The universe is only spacetime.*
- *Second Assumption: Dipole Waves in spacetime are permitted by the uncertainty principle provided that the displacement of spacetime caused by the dipole wave does not exceed Planck length or Planck time.*

The Dipole Waves (DW) defined by Macken in context of Quantum Mechanics can be seen as a sea of energetic waves, traveling at light speed [1]:

> *"Spacetime: The New Ether? If the universe is only spacetime, it should not be surprising that spacetime is ultimately responsible for all of physics. The description of spacetime offered here is a combination of the energetic vacuum fluctuations described by quantum mechanics and the general relativistic description where spacetime can be curved and time is the fourth dimension. Ultimately energetic spacetime even performs the functions previously attributed to the ether. However, spacetime is much more subtle than the antiquated description of the ether. There is no detectable motion relative to spacetime*

because spacetime is a sea of energetic waves which are always forming new wavelets and all of this is propagating chaotically at the speed of light…
The quantum mechanical model of spacetime has a sea of high frequency, small amplitude vacuum fluctuations at Planck energy density ~ 10^{113} J/m^3."

Although Macken could not pinpoint exactly what are the DW, he list some of DW basic properties [1]:

"Properties of Dipole Waves in Spacetime: It is important to also understand that dipole waves in spacetime travel at the speed of light but they do not freely propagate like photons or gravitational waves. Since dipole waves affect the rate of time and the proper volume, they interact with each other. Here are some other proposed properties of dipole waves in spacetime that are presented here in summary form:
1) Every part of a dipole wave in spacetime becomes the source of a new wave (called a wavelet).
2) These wavelets propagate in all directions.
3) The addition of wavelets tends to constructively interfere predominately in the forward and backward propagation directions of the previously existing wavefronts.
4) These wavelets explore an infinite number of possible trajectories to achieve an amplitude sum at any point (intensity is amplitude squared).
5) This is proposed to be the physical explanation that is being modeled by Richard Feynman's path integral."

From the basic DW model proposed by Macken the author developed a model based on gas kinetic in which it considers that pressure variations in the DW ocean, can be identified as the mass origin of matter particles and so the origin of inertia, as discussed in this paper.

1 – Dipole Waves and kinetic theory of gases

Although Macken compare Dipole Waves in spacetime with a sea of energetic waves or a super fluid liquid, a very interesting analogy can be obtained from kinetic theory of gases [2].

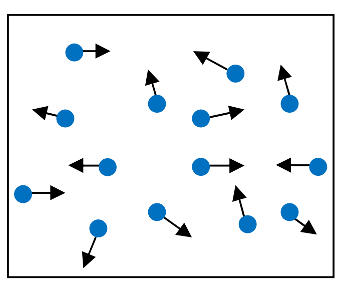

Figure 1 – Gases molecules in a closed volume.

Figure 1 shown a basic example, where gases molecules traveling at different speeds. The molecules collide with the walls of a box, generating forces over the walls defining a pressure P, that can be calculated as:

$$P = \frac{N}{V} m \frac{1}{3} \overline{v^2} \tag{1}$$

Were N is the number of molecules, V is the box volume, m is the molecule mass, and $\overline{v^2}$ represent the average squad speed, over N molecules.

To relate one DW whit a gas molecule, we can consider that:

The DW speed is equal to light speed and so:

$$\frac{\overline{v^2}}{3} = c^2 \tag{2}$$

Note: The constant value 3 in equation (1) come from the relation: $v^2 = v_x^2 + v_y^2 + v_z^2 = 3v_x^2$. However, for $v_x^2 = v_y^2 = v_z^2 = c^2$, the value $v^2 = c^2 + c^2 + c^2$ not is 3 times the light speed, and so, from special relativity the value of v^2 is keeping equal to c^2. On this way the constant value 3 not appear on the right side of equation (2).

One DW occupies a volume equivalent to a small cube with Planck Length (l_p) edge, and so the maximum number of DW in a volume is:

$$N = \frac{V}{l_p^3} \tag{3}$$

The pressure P in this condition, where DW occupies all volume is relate to vacuum fluctuations energy density, that is connected to Planck pressure (P_p), give as:

$$P = P_p = \frac{c^7}{\hbar G^2} \tag{4}$$

Appling equations (2) (3) and (4) in equation (1):

$$P = \frac{1}{l_p^3} m_{DW} \, c^2 = \frac{c^7}{\hbar G^2}$$

$$m_{DW} = \frac{l_p^3 c^5}{\hbar G^2} \tag{5}$$

Considering that:

$$l_p = \sqrt{\frac{\hbar G}{c^3}} \tag{6}$$

Appling equations (6) in equation (5):

$$m_{DW} = \sqrt{\frac{\hbar^3 G^3}{c^9}\frac{c^{10}}{\hbar^2 G^4}}$$

$$m_{DW} = \sqrt{\frac{\hbar \mathrm{c}}{G}} = m_p \tag{7}$$

Where m_p is the Planck mass.

The result of the above equations show that the DW behavior can be linked to an ideal gas, where each DW has a Planck mass, and travels at the light speed, generating a tremendously high pressure (Planck Pressure), when hit on the neighboring DW.

On the other hand, considering that the DW mass is associated with an amount of energy, contained within a volume, defined by Planck length, the energy density of each DW (U_{DW}), can be calculated as:

$$U_{DW} = \frac{\text{DW Energy}}{\text{DW Volume}}$$

$$U_{DW} = \frac{m_{DW}c^2}{l_p^3} = \frac{c^7}{\hbar G^2} \tag{8}$$

This result points that the energy density, inside of one DW, is equal to the external pressure exerted by neighboring DWs acting as gases molecules. This may mean that there are actually two forms of pressure associated with a DW. An internal pressure generated by waves of energy contained in a Planck volume and external pressure generated by the collision of the DW moving at light speed.

Figure 2 present an artistic representation of DW in an empty space. Note that all DW is moving at light speed in random directions and so in the DW collisions can occur a DW volume change, generating momentary density increases. Besides some DW may be terminated or even split when there is space available.

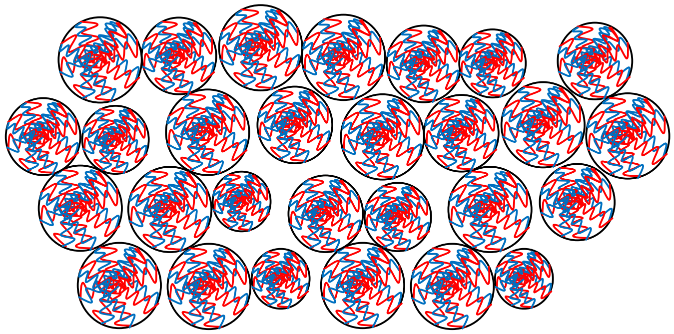

Figure 2 – Artistic representation of Dipole Waves in an empty space.

2 – Dipole waves pressure and fundamental particles

Just as we can measure a uniform pressure inside a gas composed primarily of molecules moving at high speed, in a empty space the DW external pressure becomes constant (equal to the Planck pressure), even if the one DW is moving at light speed and present punctual changes in its volume and internal pressure.

Figure 3 present a pressure curve in a spatial axis, which is a straight line defined by the Planck pressure. The circle in this figure is an artistic representation of pressure variation at very small distances of the order of the Planck length, for a certain time t_0.

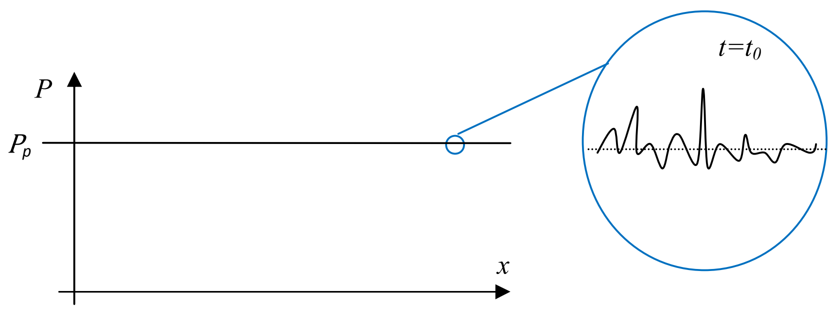

Figure 3 – External pressure of DW in a space axis direction.

Note that also is possible define the pressure behavior in a time axis, as presented in Figure 4, but on this case there is a barrier defined by the “present time”, beyond which there is no DW and therefore there is no pressure.

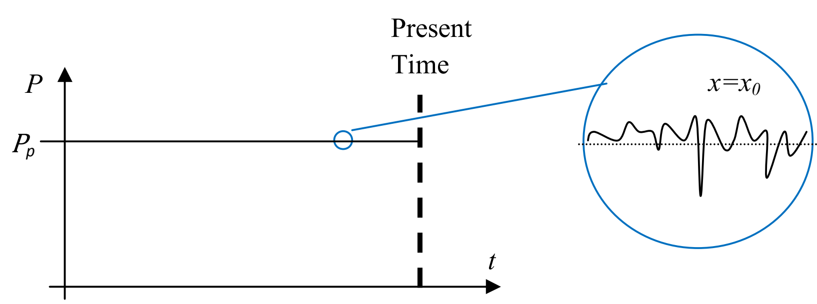

Figure 4 – External pressure of DW in a time axis direction.

The author believe that all particles observed in our universe, including the photons, can be model by a variation in DW pressure, starting from a single type of fundamental particle called by the author as Ulianov Hole or Uhole.

This model agree whit Macken fundamental particles models, as can be seen in the following text [1]:

> *"In the spacetime based model of the universe, fundamental particles are dipole waves in spacetime that possess quantized angular momentum. They are living in a sea of superfluid vacuum fluctuations that cannot possess angular momentum. Fundamental particles cannot exist without the support provided by this sea of superfluid vacuum fluctuations."*

In fact an uhole can be associated whit a dipole wave that that grew, but can also be associated with an elastic tube that connects two regions of space (or time) generating variations in DW external pressure. Uholes always presents itself symmetrically, composing a point of pressure increase and another point of pressure dropping in DW external pressure. Figure 5 present two kinds of uholes placed in a two-dimensional space, used to facilitate visualization.

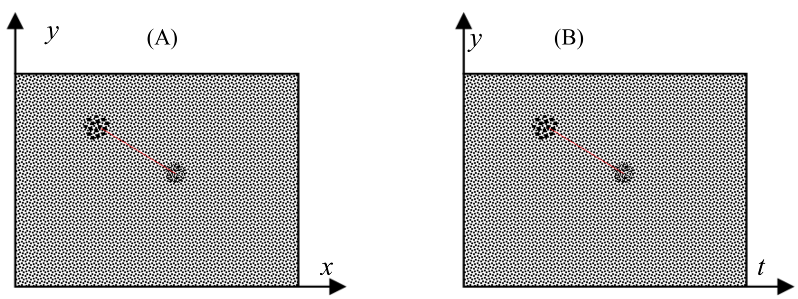

Figure 5 – Two kinds of uholes: A) uhole in space; b) uhole in time.

Figure 6 present a space uhole (uhole-S) placed in four spacetime coordinates (x,y,z,t), that is moving in the z axis. As the curves show the pressure to a fixed position z_0, the effect of this uhole-S over the DW external pressure, appear for a time and then vanishes. Is important observe that Figure 6 display a process that occurs in five dimensions (x,y,z,t and P) using only two-dimensions graphs, which requires some simplifications, preventing the obtaining of an accurate representation.

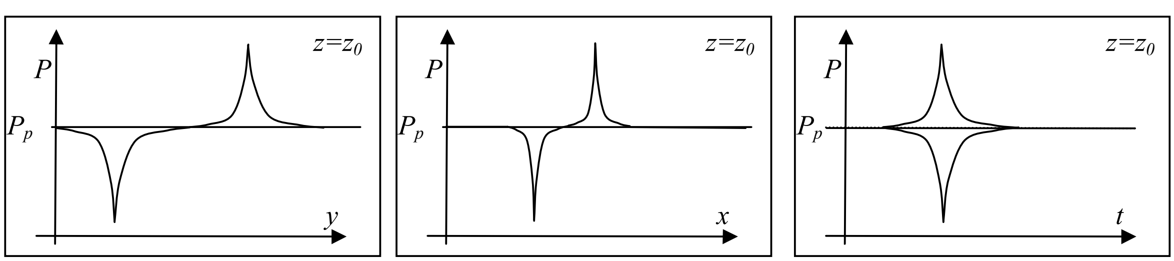

Figure 6 – Pressure in a space uhole (uhole-S).

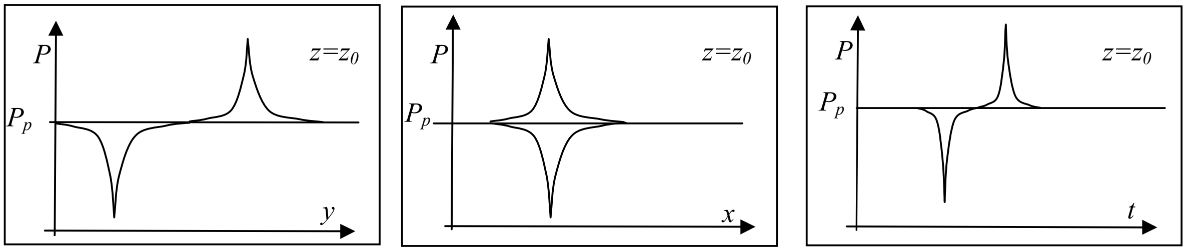

Figure 7 – Pressure in a time uhole (uhole-T).

Figure 7 present the same behavior for a time uhole (uhole-T) but now the uhole is moving in (x,z) axis, but is stopped in the time, that is a very unusual condition, but has been used to generate curves similar to those shown in Figure 6.

Like the time axis has a "time arrow" point to the "future", one uhole-T can present two "polarities" as presented in Figure 8, depends on if the positive pressure is in the "future" direction or in the "past" direction (in relation to negative pressure).

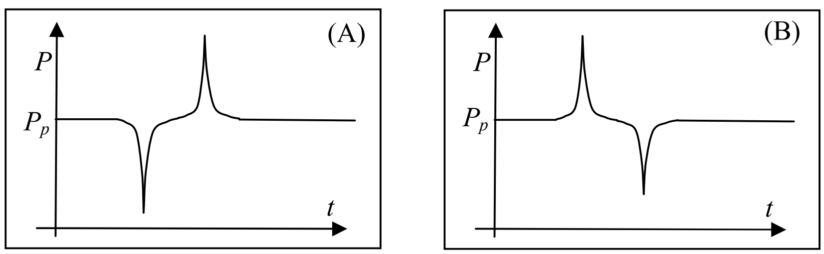

Figure 8 – Two kinds of uhole-T getting the positive pressure as reference:
A) Future direction; B) Past direction.

The author believes that an uhole-T has electrical charge propriety and so a "future direction" uhole-T has negative electrical charge and a "past direction" uhole-T has positive charge.
The space uholes not have this direct distinction, because they presented two sides at same time. Nevertheless the author believes that one side of an uhole-S has a mass property attached to matter and the other side has a mass property linked to antimatter.

3 – Dipole Waves and mass proprieties

To conclude this article we will address only the uholes-S that generate negative pressure (ie below the pressure Planck) over the sea of DW.

The author believes that the uhole-S have a property related to the mass, that appear when the Uhole-S is stretched enough so that the other uhole end (formed by antimatter) is sufficiently distant to avoid annihilation process.

It should be noted that in this model, for each particle of matter that exists in our universe an antimatter particle will continue to exist elsewhere. One answer to the "antimatter puzzle" is proposed by the author and by Adam G. Freeman [3], in a new model that present a galaxy creation processes, where the super massive black hole (that exists at the center of each galaxy) is formed by antimatter, which may also explain the origin of dark matter. In fact if this new model is true, the dark matter no exists but its effects appear in function of the super massive black hole that have gigantic angular momentum, which is equal to the total galaxy angular momentum.

The first assumption to analyze the uhole-S negative pressure is observing the lowest black hole (formed by matter) which can exist. This black hole has a mass that is equal to the Planck mass, and Schwarzschild radius (horizon event radius) equal to the Planck length.

If we plot the DW pressure in this small black hole, we can consider two pressure curves that are presented in Figure 9. In both curves the DW pressure in the spacetime volume defined by the black hole drops to zero, but in curve (A) the spacetime not yet shrunken, and so the pressure on neighboring areas was not affected (being equal to Planck pressure). In curve (B) the black hole shrink the space and decreases the DW pressure in all the space around it.

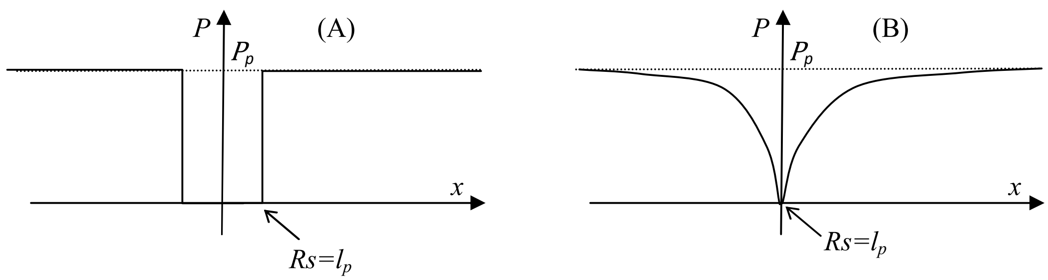

Figure 9 – Two DW pressure curves in a small black hole: A)Before the black hole shrink the spacetime; B) After the black hole shrink the spacetime

Note: The curve presented in Figure 9-A can be considered only a "trick" that makes easy certain calculations to be presented below, eliminating the need for more complex operations such as curves convolution.

The curve presented in Figure 9-B, beginning from zero and tends to the Planck pressure to a lager distance (d) from the black hole center. On this way one good approximation to this curve (without considering the relativistic effects of space shortening) is given by:

$$P(d) = \begin{cases} P_p(1 - \frac{l_p}{d}) & ; \quad d \geq l_p \\ 0 & ; \quad d < l_p \end{cases} \tag{9}$$

On this way if we get a body with mass equal to M_1, we can consider that the DW pressure outside of the body limits is equal to the same pressure generated by N_1 small black holes positioned inside the body, with N_1 defined as:

$$N_1 = \frac{M_1}{m_p} \tag{10}$$

Considering the combined effect of N_1 black holes, equation (9) can be writing as:

$$P(d) = P_p(1 - \frac{N_1 l_p}{d}) \; ; \; d > N_1 l_p \tag{11}$$

Appling equation (10) in equation (11) gives:

$$P(d) = P_p(1 - \frac{M_1 l_p}{m_p d}) \tag{12}$$

Figure (10) present an analogy based on equation (12), where the body M_1 is the Earth and DW pressure is compared to the water pressure in an aquarium.
This is an strange picture why the liquid higher pressure (in the bottom of aquarium) is linked to DW pressure in deep space far from earth, while the liquid lower pressure is connected to the DW pressure in Earth surface.

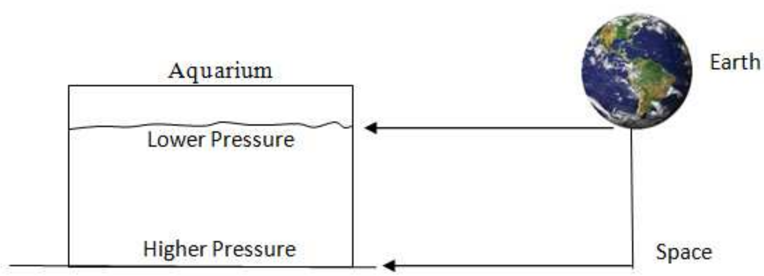

Figure 10 – Analogy of a water pressure in an aquarium with the DW pressure near to the Earth.

Extending this analogy, Figure 11 present forces acting on two bodies, with different densities, placed in the aquarium, obviously the lower density body tends to float to water surface.

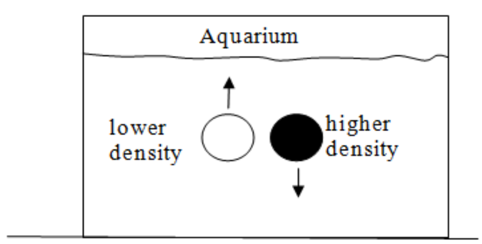

Figure 11 – Forces arising in two bodies with different densities placed in the aquarium.

Based on the above analogies we can use equation (12) to calculate the forces that arising between two bodies with mass M_1 and M_2 placed at a distance d_1, as presented in Figure 12.

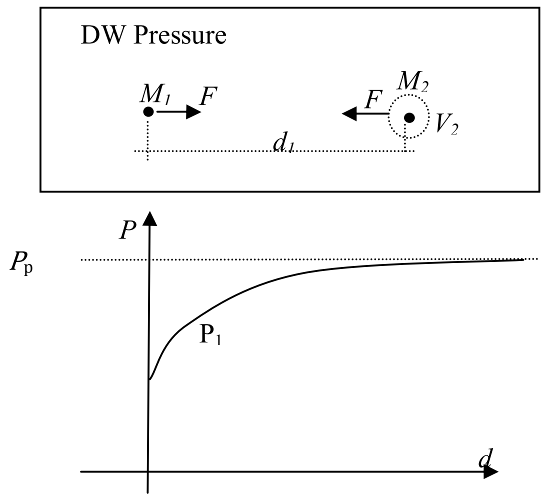

Figure 12 – Forces arising between two masses.

In this calculation we can use the Figure 9-A pressure representation for the body M_2 considering that it can be seems like an empty volume V_2, without pressure that can be calculated, with base on the small black hole volume:

$$V_2 = N_2 l_p^3$$

$$V_2 = \frac{M_2}{m_p} l_p^3 \tag{13}$$

The force that appears in V_2 can be calculated by:

$$F(d) = V_2 \frac{\partial P}{\partial d} \tag{14}$$

Applying equations (12) and (13) in equation (14) gives:

$$F(d) = (\frac{M_2}{m_p} l_p^3 \ )(P_P \frac{M_1 l_p}{m_p}) \frac{1}{d^2}$$

$$F(d) = \frac{M_2 M_1}{d^2} (\frac{m_p c^2}{l_p^3} \frac{l_p^4}{m_P^2} \ )$$

$$F(d) = \frac{M_2 M_1}{d^2} (\frac{c^2 l_p}{m_P} \ )$$

$$F(d) = \frac{M_2 M_1}{d^2} (c^2 \sqrt{\frac{\hbar G}{c^3} \frac{G}{\hbar \mathrm{c}}} \ )$$

$$F(d) = \frac{M_2 M_1}{d^2} G \tag{15}$$

Equation (15) represents the Newton law of gravitation, deduced from DW pressure mass model.

Figure 13 shows a new example of application DW pressure model, where a M body are positioned on a empty space. A force F is applied to these body, that passing to move with a speed v, which can vary in time.

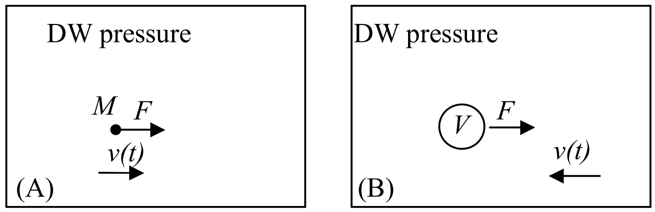

Figure 13 – Mass M being moved in an empty space:
A) M is moving by the force F; B) Mass M is replaced by the volume V and the space is moving.

In Figure 13-B, we change the reference admitting that the body are stopped an the space moves at the same speed v(t) (considered in the opposite direction). Moreover in this case mass M is replaced by the volume associated N small black holes.

The pressure in a liquid can be calculated from Bernoulli's equation:

$$P + \rho_0 \frac{v^2}{2} = 0$$
$$P = -\rho_0 \frac{v^2}{2} \tag{16}$$

Where ρ_0 is the liquid density given by the DW mass divide by DW volume:

$$\rho_0 = \frac{m_p}{l_p^3} \tag{17}$$

Under these conditions the force F, shown in Figure 13 can be calculated by:

$$F = V \frac{\partial P}{\partial d} \tag{18}$$

Since the volume V is defined by N small black holes volume:

$$V = \frac{M}{m_p} l_p^3 \tag{19}$$

The pressure change with distance can be calculated based on equation (16):

$$\frac{\partial P}{\partial d}=\frac{\partial(-\rho_0\frac{v^2}{2})}{\partial d}=\frac{-\rho_0}{2}\frac{\partial(\frac{\partial d}{\partial t})^2}{\partial d}$$
$$\frac{\partial P}{\partial d}=\frac{-\rho_0}{2}\frac{2\partial d}{(\partial t)^2}=-\rho_0\,a \tag{20}$$

Where a is the fluid acceleration that pointing in the opposite direction to the applied force. To use an acceleration reference in the same direction of the applied force, equation (20) should be modified to:

$$\frac{\partial P}{\partial d}=\rho_0\,a \tag{21}$$

Applying the equations (17), (19) and (21) into equation (18) yields:

$$F=(\frac{M}{m_p}l_p^3\ )(\frac{m_p}{l_p^3}\ a)$$
$$F=Ma \tag{22}$$

Equation (22) is the second Newton's law!

Thus, the DW pressure model allows observing why the inertial mass assumes the same value as the gravitational mass. In both conditions the mass may be associated with a volume of small black holes that will be subjected to pressure variations, which may arise due to proximity to other bodies and also arise by the movement of the volume considered in the space.

The DW model also allows explain the planetary orbits without resorting to gravitational or centrifugal forces.

In Figure 14 a body M_1 is being orbited by a smallest body M_2 that travels at a speed v in a circular orbit having a radius equal to d_1.

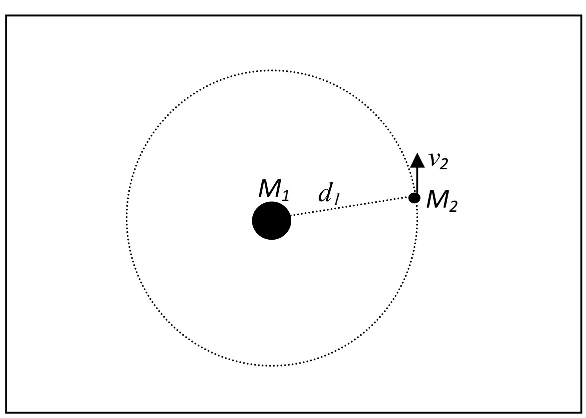

Figure 14 - Body with mass M_2 orbiting body with mass M_1.

The body M_1 generates a pressure drop which varies with the distance and generating regions of constant pressure over spherical shells centered in M_1. Thus the dotted circle in this figure represents the orbit of M_2, where the pressure will be constant, and can be calculated by equation (12):

$$P_1 = P_p\left(1 - \frac{M_1 l_p}{m_p d_1}\right) \tag{23}$$

Besides the fact M_2 body is moving at a constant speed, generating a pressure that is given by:

$$P_2 = P_p - \rho_0 \frac{v_2^2}{2} = P_p - \frac{m_p}{2l_p^3} v_2^2 \tag{24}$$

Thus M_2 body tends to move in a trajectory in which the pressure P_2 equal to pressure P_1, as shown in the graph of Figure 15.

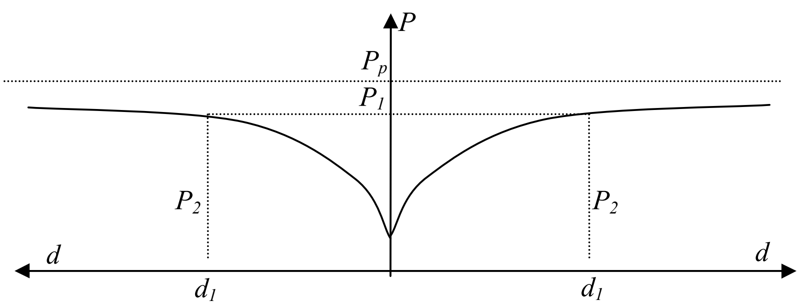

Figure 15 - Pressures along a line drawn from the body M_1.

To calculate the relationship between distance and orbital speed we can equate the equations (23) and (24):

$$\begin{aligned}
P_p - P_p \frac{M_1 l_p}{m_p d_1} &= P_p - \frac{m_p}{2l_p^3} v_2^2 \\
v_2^2 \frac{m_p}{2l_p^3} &= P_p \frac{M_1 l_p}{m_p d_1} \\
v_2^2 &= \frac{M_1}{d_1} 2 \frac{l_p^4}{m_p^2} P_p \\
v_2^2 &= \frac{M_1}{d_1} 2 \frac{l_p^4}{m_p^2} \frac{m_p c^2}{l_p^3} \\
v_2^2 &= \frac{M_1}{d_1} 2 \frac{l_p c^2}{m_p} \\
v_2 &= \sqrt{\frac{2GM_1}{d_1}}
\end{aligned} \tag{25}$$

Equation (25) is the escape velocity equation of a small object launched from a celestial body.

Note that it's this model, the body M_2 does not suffer the effect of any force, and therefore it moves following lines with the same level of pressure, forming a circular orbit around the body M_1.

4 – Conclusion

These papers are based on John Macken work that defines a new kind of Ether where dipole waves (DW) moving at light speed generate a high pressure (Planck pressure) even in an empty space.

The author use this DW pressure model to define fundamental particles (uholes) that change this pressure connecting to points in time (uhole-T) or two points in the space (uhole-S). The uhole-T has to kind of polarities and can be related to electric charge proprieties. Moreover the uhole-S can be related whit a pair of matter and antimatter particle, and so a massive body like the Earth can be associated to a low pressure liquid condition (like a top of an aquarium) whereas the deep space can be associated to a high pressure liquid condition (like a bottom of an aquarium).

From this model we can say that a massive body in fact not fallows in the Earth but floats toward to the center of the Earth where the ether pressure is lower. Furthermore we may say that one cubic meter of void space weighs more than a cubic meter of matter. On this way a black hole is the lightest thing in the universe because its weight is null.

This means that a matter body is lighter than the empty space, because inside this body the mass behaves as if full of micro black holes, like air bubbles in a liquid reduce its density. This behavior causes the mass to float in direction to space regions where the DW pressure is lower.

So no makes sense to ask where did the mass that falls into a black hole, because it mass only increases the hole, leaving it lighter, as small air bubbles in a liquid coming together to form a larger bubble.

These statements can make the proposed model very strange, but in fact the formulas obtained from DW pressure model, allow deducing the Newton laws associated with matter, using a primary mathematics.

Furthermore the model completely explains the formation of the mass and also explains the fact that the inertial mass is equal to gravitational mass, one mystery that bothers physicists hundreds of years. And no Higgs field is required…

5 – References

[1] Macken, J. A. "The Universe is Only Spacetime. Particles, Fields and Forces Derived from the Simplest Starting Assumption." Available at http://www.onlyspacetime.com/ (2010).

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