"Aspin Bubbles" and the force of gravity

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Abstract. Based on the "*Aspin Bubbles*" theory, we will demonstrate that the force of gravity between two neutral matters is always a residue of the electrical forces that act among their elementary particles.

Key words: Aspin Bubbles, anharmonic waves, positon, negaton, ton.

I. Introduction

The "*Aspin Bubbles*" theory (Lana-Renault 2006)[1], from now on **AB**, suggests that electrical forces among singly charged elementary particles are simply mechanical forces coming from a single mechanical interaction between anharmonic waves and particles.

In addition, **AB** considers that the ultimate components (*tons*) of the matter are two classes of spin ½ elementary particles called *positons* ***A*** and *negatons* ***B***. The *positon* ***A*** is the one having an *e* positive single charge and the *negaton* ***B*** an *e* negative single charge.

These particles are hollow spheres the membranes of which vibrate anharmonically according to the potential "Lana-Renault 2000"[2]. They can have any mass and all our known micro-universe (protons, neutrons, electrons, neutrinos, photons, nuclei, atoms, molecules, etc.) can be built mechanically with them.

The positron and the electron are the *tons* having the lowest mass, that is, they both have the mass of the electron.

II. Fundamental hypothesis

Positons and *negatons* with the same mass m_i differ infinitesimally in their size. According to **AB**'s hypothesis, the mean radius of a *ton* is:

$$R_i = \frac{2\,\hbar}{m_i\,c} Aspin_i \tag{1}$$

where the "$Aspin_i$" factor is the sole cause of the infinitesimal size asymmetry of *positons* and *negatons* with the same mass. Their value is:

$$Aspin_i = \sqrt{1 + 2H_i + \delta_i\, 2\sqrt{H_i\left(H_i + 1\right)}} = \sqrt{1 + H_i} + \delta_i \sqrt{H_i} \tag{2}$$

with

$$H_i = \frac{G\,m_i^2}{k\,e^2} \tag{3}$$

and $\delta_i = +1$ when it is a *positon*, and $\delta_i = -1$ when it is a *negaton*. G is the universal gravitational constant; k is Coulomb's constant and $\hbar$ is Planck's constant reduced.

As an example of the infinitesimal size asymmetry existing between *positons* and *negatons* with the same mass, let us calculate the mean radii of a positron (*positon **A***) and an electron (*negaton **B***). Their *Aspins* take the value:

$Aspin_A$ = 1 + **4.89897492335723406924**04886916 ..... · 10^{-22}

$Aspin_B$ = 1 - **4.89897492335723406923**80886961 ...... · 10^{-22}

and, therefore, the mean radii of the positron and the electron are, respectively:

R_A = **7.72318650935341593**40018656331167 ..... · 10^{-13} m

R_B = **7.72318650935341593**39942984937091 ..... · 10^{-13} m

As we can see, the mean radii are practically the same, their difference being:

R_A - R_B = 7.56713940754 .... 10^{-34} m

These size asymmetries, as a result of the *Aspins*, have a great importance in the calculation of the force of gravity, as we will see later on.

III. Electrical force

AB proves that the mechanical forces of attraction or repulsion between any two *tons i, j*, separated by a distance *d* is:

$$F_{ij}\left(d\right) = \delta_i\, m_i\, a_j \frac{R_i\, R_j}{d^2 - R_j^2} = \delta_i\, \delta_j \frac{Aspin_i}{Aspin_j} \frac{k\, e^2}{d^2 - R_j^2} \tag{4}$$

where a_j is the total mean acceleration of the membrane of the *ton j*.

For long distances ($d \gg R_i + R_j$) we obtain from (4) that

$$F_{ij}(d) = \delta_i \, \delta_j \, \frac{Aspin_i}{Aspin_j} \, \frac{k\,e^2}{d^2} \tag{5}$$

We can see that this mechanical force between *tons* is, precisely, Coulomb's law infinitesimally modified multiplied by the quotient of their respective *Aspins*. This entails that the absolute values of the electrical forces of attraction or repulsion are not exactly the same, they differ in an infinitesimal number. This hasn't any practical relevance, since for the moment we do not have the technical means required to test **AB**'s veracity, but it is indeed relevant to obtain the force of gravity.

IV. Force of gravity (I)

According to **AB**, the force of gravity between two neutral masses M and m is, simply, the addition of all the electrical forces existing between the elementary particles that constitute both matters, that is:

$$F_{Mm} = \sum F_{ij} = F_G \tag{6}$$

Before proving such statement, let us check the following property:

.- If a *positon* ***A*** and a *negaton* ***B*** have the same mass ($m_A = m_B$), the product of their *Aspins* is always the unit -.

$$Aspin_A \cdot Aspin_B = 1 \tag{7}$$

Let us see this; from (2) and taking into account that according to (3) $H_A = H_B$, we directly obtain that

$$Aspin_A \cdot Aspin_B = \left(\sqrt{1+H_A} + \sqrt{H_A}\right)\left(\sqrt{1+H_B} - \sqrt{H_B}\right) = 1 \tag{8}$$

In order to first check that the force of gravity between two neutral matters M and m is really a residue of the electrical forces existing among the elementary particles of such matters, let us do the following exercise:

Let us consider two neutral matters with different masses $M \neq m$ each of them made up of one *positon* and one *negaton* having the same mass, that is,

.- The neutral mass M fulfils that $M = m_A + m_B$ where $m_A = m_B$

.- The neutral mass m fulfils that $m = m_a + m_b$ where $m_a = m_b$

Note: subscripts *A, a* indicate *positons* and *B, b negatons*.

Our goal is to prove that both masses M and m, separated at a distance d, are attracted by the force of gravity

$$F_{Mm} = \sum F_{ij} = -G\,\frac{M \cdot m}{d^2} = F_G \tag{9}$$

For more clarity in the demonstration, let us indicate the *Aspin* values of the *tons* in the following way:

$$Aspin_A = A, \quad Aspin_B = B, \quad Aspin_a = a \quad \text{and} \quad Aspin_b = b$$

Using (5), and taking the common factor we obtain:

$$F_{Mm} = \sum F_{ij} = F_{Ab} + F_{Aa} + F_{Bb} + F_{Ba} = \left(-\frac{A}{b} + \frac{A}{a} + \frac{B}{b} - \frac{B}{a} \right) \frac{ke^2}{d^2}$$

$$= \left(\frac{-Aa + Ab + Ba - Bb}{ab} \right) \frac{ke^2}{d^2} = -\frac{(A-B)(a-b)}{ab} \frac{ke^2}{d^2} \qquad (10)$$

According to (3), having equal masses means that $H_A = H_B$ and $H_a = H_b$, therefore

$$A - B = \sqrt{1+H_A} + \sqrt{H_A} - \left(\sqrt{1+H_B} - \sqrt{H_B} \right) = \sqrt{H_A} + \sqrt{H_B} \qquad (11)$$

$$a - b = \sqrt{1+H_a} + \sqrt{H_a} - \left(\sqrt{1+H_b} - \sqrt{H_b} \right) = \sqrt{H_a} + \sqrt{H_b}, \qquad (12)$$

then

$$(A-B)(a-b) = \left(\sqrt{H_A} + \sqrt{H_B} \right)\left(\sqrt{H_a} + \sqrt{H_b} \right) =$$

$$= \sqrt{H_A H_a} + \sqrt{H_A H_b} + \sqrt{H_B H_a} + \sqrt{H_B H_b} =$$

$$= \sqrt{\frac{Gm_A^2}{ke^2}\frac{Gm_a^2}{ke^2}} + \sqrt{\frac{Gm_A^2}{ke^2}\frac{Gm_b^2}{ke^2}} + \sqrt{\frac{Gm_B^2}{ke^2}\frac{Gm_a^2}{ke^2}} + \sqrt{\frac{Gm_B^2}{ke^2}\frac{Gm_b^2}{ke^2}} =$$

$$= \frac{G}{ke^2}\left(m_A m_a + m_A m_b + m_B m_a + m_B m_b \right) =$$

$$= \frac{G}{ke^2}\left(m_A + m_B \right)\left(m_a + m_b \right) = \frac{GMm}{ke^2} \qquad (13)$$

Finally, taking this value to (10) and considering that $ab = 1$, we obtain the classic force of gravity F_G

$$F_{Mm} = -\frac{GMm}{ke^2}\frac{ke^2}{d^2} = -G\,\frac{M \cdot m}{d^2} = F_G \qquad (14)$$

According to **AB**, this is the mean force with which the neutral matter *M* attracts the neutral matter *m*. Equally, we can prove that *m* attracts *M* with the same force. It is fulfilled that:

$$F_{mM} = \sum F_{ji} = -G\,\frac{m \cdot M}{d^2} = F_G \qquad (15)$$

are equal and opposite forces.

In conclusion, we can verify that for any neutral systems M_1 and M_2 formed by *p* masses *M* and *q* masses *m* respectively, the force of attraction exerted by M_1 on M_2 is the force of gravity F_G.

$$F_{M_1 M_2} = \sum F_{ij} = (p \cdot q)\left(-G\,\frac{M \cdot m}{d^2} \right) = -G\,\frac{(p \cdot M)(q \cdot m)}{d^2} = -G\,\frac{M_1 \cdot M_2}{d^2} = F_G \qquad (16)$$

V. Force of gravity (II)

In the previous section we have demonstrated algebraically that we obtained the force of gravity between neutral matters with different masses having the same mass in their components (*positon* mass = *negaton* mass). Nevertheless, this is a very particular case.

For neutral matters composed by multiple *tons* with different masses there is no an exact algebraic demonstration of the fact that the attraction existing between them is the force of gravity. However, this can indeed be proved through an approximation or through the numerical calculation with, as we will see later on, an insignificant error.

Taking into account that the value H_i has an order of magnitude that is equal or less than 10^{-37}, we will always be able to approximate the *Aspin* functions by

$$Aspin_i = \sqrt{1 + H_i} + \delta_i \sqrt{H_i} \approx 1 + \delta_i \sqrt{H_i} \qquad (17)$$

According to this, although $H_A \neq H_B$ and $H_a \neq H_b$, it will always be that

$$A - B \approx 1 + \sqrt{H_A} - \left(1 - \sqrt{H_B}\right) = \sqrt{H_A} + \sqrt{H_B} \qquad (18)$$

$$a - b \approx 1 + \sqrt{H_a} - \left(1 - \sqrt{H_b}\right) = \sqrt{H_a} + \sqrt{H_b}\ , \qquad (19)$$

and, according to demonstration (13), the product of these values will always be near to

$$(A - B)(a - b) \approx \frac{GMm}{ke^2} \qquad (20)$$

On the other hand, the product *ab* that we will call f' can be approximated to

$$f' = ab \approx \left(1 + \sqrt{H_a}\right)\left(1 - \sqrt{H_b}\right) =$$

$$= 1 + \sqrt{H_a} - \sqrt{H_b} - \sqrt{H_a H_b} \approx 1 + \sqrt{H_a} - \sqrt{H_b} \qquad (21)$$

taking into account that $\sqrt{H_a H_b} \ll \sqrt{H_i}$

Finally, taking the result numbers (20) and (21) to (10), we obtain the following approximation for the force of attraction that the neutral system M exerts on m.

$$F_{Mm} \approx -\frac{(A - B)(a - b)}{ab}\frac{ke^2}{d^2} =$$

$$= -\frac{1}{f'}\frac{GMm}{ke^2}\frac{ke^2}{d^2} = -\frac{1}{f'} \cdot G\frac{M \cdot m}{d^2} = f \cdot F_G \qquad (22)$$

where $f = \frac{1}{f'} = \frac{1}{1 + \sqrt{H_a} - \sqrt{H_b}}$ will be the correction factor for the classic force of gravity F_G.

Equally, we can make the approximation that m attracts M with the force of attraction

$$F_{mM} \approx f^{*} \cdot F_G \tag{23}$$

where the correction factor, now f^* , takes the value

$$f^{*} = \frac{1}{A \cdot B} \approx \frac{1}{1+\sqrt{H_A}-\sqrt{H_B}} \tag{24}$$

Notice that the forces of attraction F_{Mm} and F_{mM} are not exactly the same when the *tons* have different masses. They fulfil the relationship:

$$\frac{F_{Mm}}{F_{mM}} \approx \frac{f}{f^{*}} = \frac{1+\sqrt{H_A}-\sqrt{H_B}}{1+\sqrt{H_a}-\sqrt{H_b}} \tag{25}$$

VI. Gravity between 2 hydrogen atoms

As a practical exercise, let us calculate in different ways the force of attraction existing between two hydrogen atoms separated by a distance d = 1 m

1º.- As an addition of electrical forces

For this calculation it is necessary to use at least 80 significant decimal numbers in scientific notation.

We have considered that the proton (nucleus) is a *positon* ***A*** the mass of which is:

$$m_A = 1.67262310000000...............0 \times 10^{-27} \text{ kg}$$

and the electron is a *negaton* ***B*** the mass of which is:

$$m_B = 9.10938970000000...............0 \times 10^{-31} \text{ kg}$$

in such a way that the hydrogen atom mass M is:

$$M = m_A + m_B = 1.673534038970000000...............0 \times 10^{-27} \text{ kg}$$

and the force of gravity between both hydrogen atoms is:

$$F_G = -G\frac{M^2}{d^2} = -1.86880307727787219780979347310000000...............0 \times 10^{-64} \text{ N}$$

According to (6), the force of attraction between both hydrogen atoms will be the addition of the 4 forces that exist among their components, that is

$$F_{MM} = \sum F_{ij} = F_{AB} + F_{AA} + F_{BB} + F_{BA} \tag{26}$$

according to (5) we will have:

$$F_{AB}(d) = -\frac{Aspin_A}{Aspin_B}\frac{k\,e^2}{d^2} =$$

$$= -\,2.307079555516803850897941295959265331957051783407264362998893832142849980037704 \times 10^{-28} \text{ N}$$

$$F_{AA}(d) = +\frac{Aspin_A}{Aspin_A}\frac{k\,e^2}{d^2} = 2.30707955551680384882153156450579600000..............0\times 10^{-28}\ \text{N}$$

$$F_{BB}(d) = +\frac{Aspin_B}{Aspin_B}\frac{k\,e^2}{d^2} = 2.30707955551680384882153156450579600000..............0\times 10^{-28}\ \text{N}$$

$$F_{BA}(d) = -\frac{Aspin_B}{Aspin_A}\frac{k\,e^2}{d^2} =$$

$$=-2.307079555516803846745121833052326669911751293870607834810899640957150019584673\times 10^{-28}\ \text{N}$$

and adding up, $F_{MM} = \sum F_{ij} = F_{AB} + F_{AA} + F_{BB} + F_{BA} =$ (27)

$$= -1.868803077277872197809793473\mathit{0999999999962238}....\times 10^{-64}\ \text{N}$$

we will obtain an excellent approximation of the classic force of gravity F_G.

Let us see now what our absolute error E_a is

$$E_a = F_{MM} - F_G = 3.7762....\times 10^{-101}\ \text{N} \tag{28}$$

which represents a relative error E_r of

$$E_r = \frac{E_a}{|F_G|} = 2.0207....\times 10^{-37} \tag{29}$$

that is completely negligible, as we had said in the beginning.

We can calculate the force of gravity with neutral matters having multiple *tons* coupled (*positon* and *negaton*) with different masses, and we will always obtain relative errors of 10^{-37} or less. This is the reason why **AB** insists on the fact that the force of gravity might possibly and simply be a residue of electrical forces among the elementary particles (*tons*) that constitute two neutral matters.

The fact that the calculations are correct can be verified with a mathematical program, for example MATHEMATICA, provided that for the *G, k* and *e* constants the following values with 80 significant decimal numbers are taken.

$$G = 6.672590000000...............0\times 10^{-11}\ \ \text{N·m}^2/\text{kg}^2$$

$$k = c^2\times 10^{-7} = 8.98755178736817640000000...............0\times 10^{9}\ \ \text{N·m}^2/\text{C}^2$$

$$e = 1.602177330000000...............0\times 10^{-19}\ \ \text{C}$$

with $c = 2.997924580000000...............0\times 10^{8}\ \ \text{m/s}$

2º. Using the formula (10)

For this calculation it is only necessary to use 45 significant decimal numbers in scientific notation, and as expected, the results are identical to the ones seen in the previous section.

3º.- With the approximations mentioned

For this calculation it is only necessary to use 30 significant decimal numbers. The approximation is a good one, but the errors made increase 10^{18} times. The results are the following:

.- correction factor f or f^* (the values are the same in this exercise)

$$f = f^* = \frac{1}{A \cdot B} \approx \frac{1}{1+\sqrt{H_A}-\sqrt{H_B}} = 0.99999999999999999100963...... \quad (30)$$

.- approximate force of attraction

$$F_{MM} \approx f \cdot F_G = -1.86880307727787219612967..... \times 10^{-64}\ \text{N} \quad (31)$$

.- absolute error $E_a = F_{MM} - F_G = 1.6801.... \times 10^{-82}$ N (32)

.- relative error $E_r = \frac{E_a}{|F_G|} = 8,9903.... \times 10^{-19}$ (33)

Relating the errors (32 and 33) made due to the correction factor f of the classic force of gravity F_G with those of the exact calculation (28 and 29), we clearly observe that the latter increase 10^{18} times. Nevertheless, the relative error of 10^{-19} obtained is very acceptable, thus quite facilitating the calculation of the force of attraction between neutral systems due to only having to work with 30 significant decimal numbers. In addition, we have verified that the relative error does not increase, although we have different neutral systems with very different *tons*.

VII. Conclusions

We have shown that the force of gravity between two neutral matters can be approached as a simple residue of electrical forces, considering that the electrical attraction and repulsion forces among their ultimate components are not exactly equal, but differ in one infinitesimal number, obtaining relative errors of 10^{-37} or less.

This leads us to think that the empirical formula of Newton's force of gravity is possibly nothing more than a macroscopic result of an addition of electrical forces among the ultimate components of the matter.

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